PHYSICAL EFFICIENCY

JAMES CANTLIE


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PRINCE HENRY OF WALES.

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Frontispiece.] [*See page* 87.

PHYSICAL EFFICIENCY

A REVIEW OF THE DELETERIOUS EFFECTS OF TOWN LIFE UPON THE POPULATION OF BRITAIN, WITH SUGGESTIONS FOR THEIR ARREST

BY

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WITH PREFACE BY

SIR LAUDER BRUNTON, M.D., D.SC., LL.D., F.R.S.

AND A FOREWORD BY

SIR JAMES CRICHTON-BROWNE, M.D., LL.D., F.R.S.

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DEDICATED TO MY FRIEND

WILLIAM GERARD DON, M.D. (EDIN.)

DEPUTY SURGEON-GENERAL (HON. RETIRED)
ARMY MEDICAL SERVICE

IN RECOGNITION OF HIS CONTRIBUTIONS TO A BETTER KNOWLEDGE OF THE REQUIRED STANDARDS OF PHYSICAL DEVELOPMENT AND EFFICIENCY IN YOUTH, GAINED DURING A UNIQUE EXPERIENCE OF MANY YEARS IN THE EXAMINATION OF RECRUITS FOR THE BRITISH ARMY

AUTHOR'S PREFACE

THE primary duty of every living thing is to secure the continuance of its species; and it depends upon the parent stock what the physical future of the species is to be. In the case of mankind the habits and customs appertaining to civilisation affect the individual to a degree unknown amongst the lower animals; and therefore the preservation of health in the individual becomes of great importance to the family and to the state to which he or she belongs. Our physical transgressions leave their mark on those coming after us, and the success or failure in life of our children, and through them of the nation, is largely attributable to the wisdom or folly of the parents. Our spiritual shortcomings are constantly brought before us, but the consequences of our physical transgressions are never vividly presented to us until perhaps disease has claimed its victim. Had we more sermons on hygiene there would be a better chance of preserving to the nation

a healthier and a holier people, for the one is the complement of the other. The day may come when matters appertaining to health may not always be considered of less importance than the acquirement of a dead language or the acquisition of some superfluous accomplishment.

J. C.

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By Sir Lauder Brunton, M.D., D.Sc., LL.D., F.R.S.

The health, the wealth and the strength of a nation must ultimately depend upon the strength and intelligence of the individuals which compose it. Although intelligence may occur occasionally apart from a healthy physique, yet this is only exceptionally the case, and a healthy brain must be lodged in a healthy body. But in order to obtain health it is not sufficient that States should make sanitary laws, or that municipal authorities should provide cities with ample supplies of good water, with proper drainage and with properly inspected food. It is absolutely necessary that individuals should take care of their own health and that of their families, and unless they do this they will probably end by becoming a misery to themselves and a burden to others. Sometimes people neglect their own health or that of their families through carelessness, idleness, or wilfulness, but not unfrequently their errors are due to ignorance. They do not know what clothes to wear,

how a room should be ventilated, how food should be cooked. They are ignorant of the use of baths, of the harm which alcohol does, of the advisability of exercise and many other things which bear upon their health.

Until quite lately there has not been any influence at work to guide or direct people in matters of personal health, and each person has been a law unto him or herself, or still more frequently it happens that no law of any kind, hygienic or moral, has been followed at all.

What is evidently wanting is some organisation to fill this great gap, and it is satisfactory to know that efforts are being made in this direction. The matters of hygiene appertaining to daily life must be brought home to every individual in the land, high and low, rich and poor, for all classes are in want of direction. Into our homes and schools missionaries of health must find their way, and endeavour to turn people's minds towards the urgent necessity for earnest care of the young more especially. Many agencies are at present concerned in fostering this spirit amongst the people, and it is with the intention of helping and pushing forward these several societies in their good work that the National League for Physical Education and Improvement has been formed. Within the last few years physical exercises in

some form or other have been introduced into the majority of our schools, and we hope in consequence to witness at no distant date an improvement in the health of the community.

The precise nature of these exercises is no doubt of some consequence, but the indirect effect of the introduction of exercise as a part of school training is calculated to develop a habit of thought amongst the people generally which ought to have a far-reaching effect. Children should be taught in simple language why such exercises are necessary; that a healthy body is the best preparation for their work in life, be the work what it may; that by developing healthy bodies they are in some measure repaying the State for the free education given them; and amongst the wealthier classes of the community the children are returning to their parents some equivalent, if not in brains at least in body, for the care and money which have been expended upon them. In a decade or two the children who have been thus instructed will have charge of the rising generation of the country, and it is permissible to think that the lessons bestowed upon our children to-day concerning matters of health will remain to them, and that every parent in the future will be a missionary of health and a great hygienic factor for the public good. The State through enforcing education has

undertaken a great hygienic responsibility, and has placed in the hands of schoolmasters and schoolmistresses a controlling influence in the health of the country, which, if wisely and carefully executed and managed, is a direct and potent factor for great good. The care of the young is being more and more removed from parental authority, and it behoves the State to see to it that our school teachers are equal to the task imposed upon them. Teachers, whether men or women, should be selected from the best of our kind. Real teachers are few and far between, but it is incumbent on the State at least to provide men and women as teachers who have themselves been trained to teach, and who by their character, temperament, and the grasp they show of the meaning and bearing of their responsibilities, are likely to have a good influence on the young. In the matter of physical efficiency also the teachers in our schools have a great deal in their power, and according as they use or abuse their trust so will the national health rise or fall. It is necessary that every teacher should understand aright the theory and meaning of the exercises he or she is teaching, and I hope that every teacher in the country, as a preliminary to further work in connection with physical training, will acquaint him or herself with what Mr. Cantlie has written on the subject. For

the teaching of quite young children the didactic method of instruction is the only one possible; but as children reach the higher standards of education in their schools the meaning of the exercises and movements should be explained to them, and the necessity for hygienic lives insisted upon as a duty to their country.

Mr. Cantlie's desire is to draw attention to the features of daily life which are under the control of the individual, as apart from those regulated by the public authorities. He has also left the more mechanical measures of development to be dealt with by some one of the many admirable systems of exercise now being practised in our schools. The food and rearing of infants, the clothing of children, the games and exercises required by youths and adults to maintain health are described by Mr. Cantlie in simple language, understandable by all who wish to learn. With some of the ideas expressed in the book no doubt many will differ, but if *Physical Efficiency* does no more than provoke active discussion, a lasting benefit will be conferred upon the community.

FOREWORD

By Sir James Crichton-Browne, M.D., LL.D., F.R.S.

Efficiency, in these days, is in all men's mouths, but in comparatively few men's performances; it is the manifest failure of it in various directions that is at length arresting attention, and leading to the investigation of its conditions. Long lulled in *laisser faire*, the British Public is now awakening to the consciousness that its constitution is not just what it ought to be, and that something must be done. The physicians it has consulted have spoken, as in the case of deep-seated maladies with obscure and remittent symptoms physicians are wont to do, in enigmatic terms, and assured it that there is no conclusive evidence that it is actually dying on its feet; but the patient, as under such circumstances a prudent patient will invariably do, has put aside all soothing ambiguities, and realised that the time has come for a radical change in its habits of life. An uneasy misgiving has grown into a painful conviction amongst us that all classes of the community are

in need of bracing up, and that some classes are in a state of deplorable debility. There is a widespread desire for sound advice in the selection of social tonics and restoratives. Pick-me-ups will no longer avail; a systematic course of treatment is required.

The appearance of Mr. Cantlie's book on *Physical Efficiency* is therefore opportune. He is no upstart expositor improving a passing occasion. Twenty years ago he was a voice crying in the wilderness on this subject, and was then but little heeded. It is fitting that now that the warnings he uttered so long ago are being justified by events, and that the market-place is agog for guidance, he should set forth his well-matured views.

Mr. Cantlie's book has a message for everybody. It touches on topics that deeply concern the statesman, the politician, the social reformer, the practical sanitarian, the family man, and the valetudinarian. So extensive is its survey, so unexplored some of the territory it skirts, that unanimity as to the correctness of its observations, or the particular utility of its projections, is not to be expected. There is room for wide difference of opinion on many points with which it deals, but the most critical and contumacious reader will find in it more with which he is compelled to

agree than from which he is able to dissent. It is broadbased on physiological science, and is eminently sane and wholesome in its teaching throughout.

It may be thought that Mr. Cantlie is inclined to look on the dark side of things, and to take too gloomy a view of our national situation. But it is to expose our flaws and blemishes, our faults and foibles, that he has taken up his parable and pen. Had all been bright and shining he need not have spoken; and if he does represent the times as being much out of joint, he is ready with ingenious apparatus for reducing the dislocations. He is full of resource, ready with remedies for the evils he deplores, and highly original in many of his suggestions for the bettering of the people. If he is laudatory of the past and denunciatory of the present, he is perhaps too sanguine as to the possibilities of the future, and allows his zeal to outrun popular discretion, which in the region of hygiene never runs at all but crawls slowly. His proposal that the use of baby comforters should be prohibited by Act of Parliament will perhaps secure to him again the attentions of the comic papers. And his recommendations that only healthy persons should be allowed to marry, that female candidates for matrimony should have to pass an examination

in cookery, and that the profession of the "no family creed" should be a ground for divorce, will startle the most advanced advocates of Eugenics. But with occasional hyperbolic flashes—illuminative in their way—Mr. Cantlie's book is on the whole singularly practical and moderate in tone. It is philosophical in its breadth of view and philanthropic in sentiment, while its lucidity and freshness of style and freedom from the neo-pedanticism of language that muffles up so many modern works in science make it pleasant and attractive reading.

In his address to the British Association at Johannesburg, Professor Darwin said that while amazed at what man has been enabled to find out, we stand humbled by the contemplation of the immeasurable magnitude of his ignorance, and the force of that remark will, I think, be brought home to anyone perusing the first part of Dr. Cantlie's book. He will there be humbled by the contemplation of ignorance, due not to limitation of faculty, but to indolence and ineptitude in gathering in the knowledge that lies ready at hand. "The proper study of mankind is man." That is an old adage, but so little have we laid it to heart that we have as yet scarcely mastered the alphabet of the subject. For centuries past man has been measured for his

clothes all over the civilised world, and yet we do not know to-day the dimensions of his body. In estimating the physical development of our own people, in trying to discover its trend, and in comparing it with that of other races and of our colonial offshoots, Mr. Cantlie has to depend largely upon general impressions, because statistics are not available. We distinguish between Pygmies and Patagonians, and have a few incomplete returns relating to the stature and weight and chest-girth of the inhabitants of our own islands; but are sadly lacking in the precise anthropometric information that ought to form the basis of sound generalisation in connection with physical efficiency. Mr. Cantlie is an acute and cautious observer, and I have no doubt his general impressions are for the most part correct, but it would be satisfactory to have the evidence of the tape-measure for beliefs such as these, that the girls of the affluent classes in this country are growing taller and narrower in the pelvis, that the Germans are broader shouldered than we Britishers because of their addiction to the gymnasium rather than to sports, that Australians of the third generation manifest a change in type in being more "finely drawn" in their lower limbs, and that telegraph and messenger boys are bigger and healthier than

other boys of the same age in London. We should like to have for statements of this kind the same firm numerical basis that makes unassailable the second part of Mr. Cantlie's work when he is treating of the expenditure of energy and food values. It is one of the merits of his work that it calls attention to the need there is of a measuring as well as a numbering of the people. It will, I have no doubt, stimulate anthropometric inquiry and encourage the keeping of family registers, recording the growth and notable vital events in the history of each member of a household, the want of which often leaves the physician puzzled as to lapses in physical efficiency and as to the best measures to adopt for their relief. Size is not everything, but it is a primary consideration, and taken in connection with a few other simple observations affords invaluable insight in all comparative studies of mankind. The investigations into the physical and social condition of the inhabitants which have been recently voluntarily carried out in several large cities—Edinburgh, Glasgow, Manchester, and Dundee—have yielded results painful and disquieting no doubt, but highly instructive and suggestive, and it is to be hoped that we shall before long be put in possession of trustworthy facts as to the physical development, efficiency,

and defects of our school children, at any rate throughout the country. Mr. Cantlie is right in maintaining that the regular medical inspection of schools is one of the urgent questions of the hour, and it is not for me to quarrel with the somewhat arbitrary powers he would like to put into the school medical officer's hands. There is no danger that too much power will be given to doctors, so it may be diplomatic to begin by claiming for them absolute rule.

Our medical officers of health throughout the land are gradually amassing information of incalculable value in connection with the investigation of physical efficiency, information which will help us to form some notion of its geographical distribution—a point on which Mr. Cantlie does not touch, except in the contrast between town and country. But there are different kinds of towns, and the country varies greatly in different parts, in weather and in many other respects, and it would be interesting to know to what extent different kinds of industrial occupations and habits of life are affecting the physique of the people. Dr. Tatham has clearly brought out that there has been marked prevalence of various diseases in certain areas or localities, and that such prevalence must generally have depended on defects of local sanitary administration. They would probably in

many instances go far towards explaining any physical deterioration or any general reduction in the level of health which may be discoverable in the population immediately concerned.

I feel strongly that the reports of our medical officers of health are not being utilised for the public benefit as they ought to be. They are of far more than local interest and significance, and, if all brought together, would constitute a mine of wealth from which much precious metal might be extracted. There should, I think, be a central bureau, in which they should be summed up and analysed, and from which a vidimus of the whole of them should be issued annually. Such a vidimus would cover entirely different ground from the report of the Local Government Board, and would make generally known observations and hints that do not now gain currency beyond a borough or county, and even in that limited circle are often but scantily appreciated. Had a bureau such as I indicate existed we should not have had the Physical Deterioration Commission entirely overlooking a potent factor in the deterioration they were appointed to investigate, namely, those great waves of influenza which have swept over the country during the last five-and-twenty years, and lowered, Dr. Clouston tells us, the nerve energy of the country by 30 per cent.

The imperial importance of the questions Mr. Cantlie discusses is strikingly illustrated in what he says about our soldiers and sailors, and as to the adaptability of our people to various climates and meteorological conditions. As regards the latter point, it is possible that we shall have to review our received beliefs, and enlarge our notions as to the regions of the earth in which people of British parentage can thrive, that is to say, live without impairment of efficiency, and rear vigorous progeny capable of taking root in their adopted country. The evil reputation which some tropical and subtropical districts have acquired in the past, has been due not perhaps so much to climate directly as to the diseases incidental to it, which, when not fatal, often shatter health and leave constitutional enfeeblement behind them. Now that many of these diseases are better understood, and that in respect of some of them effective measures of prevention can be taken, it may be anticipated that areas hitherto regarded as unsuitable for European settlement will be found to be safe and salubrious. The knowledge of the fact that these diseases have been brought under control will allay the nervous trepidation which has been one of the causes of health-failure in Europeans sojourning in the tropics, and a stricter observance than has been hitherto practised of

appropriate dietetic rules will also conduce to the maintenance of efficiency under such circumstances. Of all races the Anglo-Saxon has best adjusted itself to a wide range of climate, and its adaptability is not yet exhausted.

Strongly imbued with patriotism, or "the self-respect of race," as Lord Rosebery has defined it, Mr. Cantlie is partial to Scottish customs and pastimes, which, although excellent as regards efficiency, are sometimes wanting in polish, but he supplies a general and judicial compendium of athletics which cannot fail to be useful.

But I am here to herald Mr. Cantlie, not to analyse him, and I should be glad if any proclamation of mine helped in drawing to his book the attention it deserves. Like ozone, that intense form of oxygen, on the virtues of which Mr. Cantlie so justly insists, it is calculated to prove a vivifying ingredient in our social atmosphere, cleansing it of impurities and promoting efficiency.

PHYSICAL EFFICIENCY

CHAPTER I

MEANING AND IMPORTANCE OF PHYSICAL EFFICIENCY

By physical efficiency is meant the fitness of men and women for their life's work.

It matters not what the work may be, the maintenance of the physical powers of the individual is the all-important element in the national asset.

In its widest sense physical efficiency implies both bodily and mental efficiency; for although physically unfit persons do occasionally exhibit mental powers of a high, it may be of the highest, order, the continuance of the species will not be of them nor of such as they.

The physical and moral health of the people is the all-important factor in a nation's welfare; all other considerations are merely details of policy. Governments come and go, monarchies fall and

republics rise, even religions and religious beliefs alter, but the soundness of the people physically and morally is the essence of national being. It is therefore no ephemeral question which at present concerns us, for it is none other than our continued existence as a virile race.

Public Anxiety Regarding National Physique.

That the possibility of physical degeneration has taken hold, justifiably or otherwise, upon the minds of British folk, there is abundant evidence; the subject is well-nigh in every one's thoughts, and many have written convincingly upon it. Not only in Britain, but in several other countries, the health standard of the people is causing anxiety; and, for the first time in the history of the British people, the subject has lately been seriously considered by two Royal Commissions. Both of these inquiries practically resolved themselves into a question of the physical degeneration of the people; and although the findings of these commissions and of other investigating bodies incline rather to the belief that the people of these islands are not really deteriorating, the very fact that such inquiries were, and are being, held, points in the direction that all is not well with us physically.

There are few amongst us, who have observed at all, who do not regard with something akin to alarm the physical condition of the poorer classes of the population. It may be contended we have no justification for this pessimistic belief, because there is no scientific basis to start from upon which to found an inquiry into the relative physique of the people of to-day, and of those of, say, even a couple of generations ago. Our ancestors handed down to us no accurate figures or measurements on which to base comparative arguments, so it seems impossible for a strictly scientific judgment to be formed. Even the army statistics do not help us, as might be supposed, for previous to 1879 standard measurements were part of the military, and not of the medical, examination; they were then in the hands of "recruiters," and carried out in a very loose and unscientific manner, so that army statistics of measurements before 1879 are extremely unreliable.

Before the question can be placed on a scientific basis, it would be necessary to record the physical state of each individual in the nation at a given date, and, by keeping the record for future references, the generations coming after us could ascertain by comparison whether they had fallen off from, maintained, or improved upon the physical state of their predecessors. Such a

physical census would be, no doubt, of material importance, but it is a Herculean task which is not likely to be fulfilled in our day. No doubt there are many records that assist us to come to fairly sound conclusions. We have for a generation or two kept careful records of the number of births and deaths, of the ages at which death occurs, and of the increase of population. From these we can arrive at general conclusions as to the fertility and longevity of the people, but they do not, except in a general way, give us a standard by which to gauge the physical development of the present generation. It is mainly, therefore, a general suspicion and belief on the part of the people of Britain, that we are not as a nation maintaining the standard of physical development which naturally or racially belongs to us, that has raised the question so acutely at the present time. The subject would seem to have laid hold upon us, and whether the inferred degeneracy be true or not, it is one evidently that has not been raised by a few faddists, and it has gone surely beyond the stage of mere speculation. The people as a whole are now alive to the question, and even if all inquirers are to be regarded as faddists, it is necessary for us as a people with national and imperial responsibilities of an exceptional character to seriously consider the question.

No Reason for Despair—A Hopeful Forecast—British Youths in Sport.

The outlook for the physical well-being of the people of Britain is not without hopefulness. That we have held, and still hold, high place amongst the nations as a robust people is abundantly evident. In almost every branch of sport, and in trials of physical strength and endurance, the British youth maintains a proud record. Championships have in almost every instance to be finally competed for in Britain, or to be wrested from British-bred folk. In feats of strength, in running, jumping, rowing, boxing, cricket, football, swimming, shooting, and many other out-of-door sports, the best men in the world have to match their powers against British athletes before assuming supremacy, and although the prize is occasionally lost, the ultimate test remains here. The "pace" for almost all nations as regards physical feats has been set in Britain, and, in spite of assumed physical decline, the youths of this country have still to be reckoned with as the toughest of competitors. Although it is the fact that Australian cricketers are able to hold their own against British teams, that a Canadian in 1904 took the King's Prize in shooting, that a citizen of the United States holds the record for the high jump, that the rowing championship was

wrested from us by an Australian and then by a Canadian, that the British universities lost the "rubber" in their last contest with American university students, yet the championship or prize had in each instance to be competed for against British youths, and the temporary loss of individual supremacy serves but as a stimulus to greater endeavour.

Physique of Middle Classes—Police—Volunteers—Workmen.

Amongst what may be termed the upper middle class in Britain the average physique is of a high standard. The class is a very large one, much larger relatively than in any other country, owing to the accumulated and widely distributed wealth of the nation. In the public schools and universities the physique of the youths of the better classes is well cared for, as a rule, at an age at which growth under favourable circumstances tells. Amongst the workmen class also men of good physique exist in great numbers. The police force throughout the country is composed of men of powerful build, and there is no scarcity of recruits. In London, although the police force requirements demand that a man must be five feet nine inches in height, and of proportionate chest

measurements and weight, there would be no difficulty in obtaining many times the number of men necessary to supply the 17,000 men of which the Metropolitan Police Force in London is composed. The height, namely, five feet nine inches, is somewhat above the average height of men of the working class in Britain, yet are such men forthcoming in thousands; and were the standard lowered to admit men of five feet eight inches, the numbers available could be multiplied tenfold.

Surgeon-General Don, in his examination of men proceeding to the South African War, states in his evidence before a Royal Commission, that he was struck with the splendid physique of the Reservists, and especially of the last batch of the Imperial Yeomen, and adds, "none who have seen them could believe that these men had in any way declined from the standard of their forefathers."

The physique of our volunteer regiments should apparently prove a good test of the state of the physical development of the young men of the country. We have many regiments of magnificent physique amongst country corps, and in corps in towns composed of men belonging to the middle class of the community; but in volunteer corps recruited in towns from the working classes, the physique, partly owing to the youth of the recruits, is unsatisfactory. Town-bred lads, moreover, remain

as a rule undersized, until about fifteen years of age, owing, no doubt, to faulty environment in childhood and to insufficient food; but after that age, when they can earn additional food and clothing for themselves, and are better housed, their growth is rapid, though late, and consequently apt to be suddenly checked owing to the approach of the age when growth naturally ceases. When the war in South Africa broke out, and there was a chance of members of volunteer corps going on active service, not only did the number of recruits for these corps increase amazingly, but the excellence of the physical standard of the young men who came forward was most marked, showing that there is a reserve force of men of good physique available in the country in case of need.

In physical endurance and power of work the British workman is ahead of all rivals, he can and does accomplish (if he chooses) more thorough work in a given time than the workmen of any other race or nationality; even with curtailed hours of labour he can show more result from a "day's work" than foreign competitors in the labour market.

The British Soldier.

In military prowess—one of the three requirements of national strength—it is the fashion of our

enemies to decry or affect to decry the British army. The perfect organisation of our army, owing to its multiple and peculiar duties in a world-wide Empire, may be difficult or well-nigh impossible; but the individual prowess of our soldiers remains as of old. The following testimony of a Canadian comrade in arms is perhaps the most eloquent. This gallant soldier, in acknowledging a toast to the way Canadians and other Colonial troops fought during the South African War, said, "He accepted the eulogiums passed upon Canadian and other Colonial soldiers with sincere thanks, and whilst willing to believe that, as scouts, as irregular cavalry, and when chances offered as infantry, they did their duty, there was one member of the force in South Africa who had received but slender notice. When, however, a hard day's fighting had to be done, when a strongly held place *had* to be taken, when it was a question of a bayonet charge and a fight to a finish, there are none of us but recognise 'Tommy Atkins' as our superior." This tribute to the British soldier we know is well deserved, for blind jealousy is apt at times to lead unfriendly critics astray.

We hear also of the efficient fighting machines produced by Continental military conscription and training, while our army is described as that of a mere fourth-rate power. The last time the British

soldier met trained Continental soldiers was in the Boer War, when the German corps attacked a handful of British soldiers. The affray is graphically described by Mr. Winston Churchill in his book, *Ian Hamilton's March*, as follows:—

"At last about two o'clock, some one hundred and fifty of the German corps of the Boer force advanced, from the northern point of Thoba, in four lines across the table top to drive the British off the hill. So regular was their order that it was not until their levelled rifles were seen pointing south that they were recognised as foes, and artillery opened on them. In spite of an accurate shell-fire they continued to advance boldly against the highest part of the hill, and meanwhile, cloaked by a swell of the ground, Captain Towse, of the Gordon Highlanders, with twelve men of his own regiment and ten of Kitchener's Horse, was steadily moving towards them. The scene on the broad stage of the Thoba plateau was intensely dramatic. The whole army were the witnesses.

"The two forces, strangely disproportioned, drew near to each other. Neither was visible to the other. The unexpected collision impended. From every point field-glasses were turned on the spectacle, and even hardened soldiers held their breath. At last with suddenness, both parties came face to face at fifty yards' distance. The Germans, who had already made six prisoners, called loudly on Captain Towse and his little band

to surrender. What verbal answer was returned is not recorded; but a furious splutter of musketry broke out at once, and in less than a minute the long line of the enemy recoiled in confusion, and the top of the hill was secured to the British."

The above references to British prowess in sport, in work, and on battlefields are not made in a spirit of boastfulness—boasting is to the weak,—but to show that our physique is not yet impaired beyond regeneration. The reason for our alarm is that during the last quarter of a century, a larger body of the poorer classes of the community than formerly have become subjected, owing to the exigencies of modern life, to an unhealthy environment in cities. Our innate stamina, however, is not yet irretrievably impaired; even admitting that a large section of the community has temporarily deteriorated, the tendency of a race is to revert to its normal type, and the progeny of even a temporarily degenerate people will under fair conditions throw back to the ancestral type; and, in our case, than that type the world's history shows no superior. It is therefore with a spirit of hopefulness that we may set to work to attempt to improve and maintain the physique of our countrymen, for the parent stock has hitherto been, and is, of excellent quality.

The Less Hopeful Aspect.

What may be termed the reverse or dark side of the physical picture is composed of many elements which contribute to cause anxiety. The foremost place must be assigned to the insanitary environment of the poorer class of the community who dwell in towns. The high rents curtail sufficiency of food, confine families in overcrowded rooms, and engender surroundings in which immorality prevails, and degeneracy in mind and body necessarily ensues. The desertion of the rural districts, owing to the impossibility of employment consequent upon the land going out of cultivation from foreign agricultural competition, strikes at and threatens the very root of our national well-being.

The falling marriage and birth rates are due to ambitious parents demanding that their marriageable daughters are to be kept in the position which they themselves attained after a lifetime of work, thereby deterring men from marrying until late in life, combined with, it is sad to think, the "no family" or "limited family" teaching of selfish and degraded minds. The high death-rate amongst children under one year of age—136 out of every 1000 born, according to the latest returns for England and Wales—

largely points to the neglect of parents to perform their natural and primary duties to their tender offspring. Acquired disease also amongst men, condemned by the exigencies of modern life to remain unmarried until late in years, is a common cause of deplorable ailments in their progeny. Too severe and unnatural physical work for young girls, entailing in their mature years loss of maternal powers; alcohol and all that proceeds from its influence, irreligion and consequent want of discipline, are potent agents for evils which of themselves are calculated to sap the vigour and destroy the self-respect of men and women.

Are We Played Out?

It is often told us, especially by Americans, that Europeans, and the British in particular, are played out; that we have had our day, and that the world is now for the "hustler from the other side." Every maritime nation of Western Europe has had its period of supremacy, and the downfall of the prestige of Britain is being daily dinned into our ears by our neighbours and rivals. Because a nation has held a high place for a century or two, the argument would seem to be that the people of that nation

necessarily become, through the enervating effects of luxury, or from other causes, racially effete, and that the pride of place must pass from them to others. There is no real justification for any such conclusion.

The Chinese and the Japanese are examples of a civilisation much older than that of any European people, but the inherent virility of these nations remains unimpaired, and is perhaps even improved and improving at the present time; so much so that even the cry of a yellow peril has lately been raised in Europe. The Chinese have remained a distinct and inbred people for several thousands of years; some five or six centuries ago their power and influence were so extensive and so great that even ambition seemed satisfied, and they refrained from further conquest from lack of appetite rather than from inability to acquire more. For the past century or two younger nations have regarded China as an easy prey, and tried to bend China and the Chinese to their will. This, however, was and is not to be; the virility of the Chinese remains unimpaired; the intellectual capabilities of the people continue superlative, their commercial integrity and diplomatic powers are of the first order, and it only requires the organisation of their military resources and the adoption of modern education

to place them in the first rank of nations. As with the Chinese, so with the Japanese; the latter have set their house in order, and astonished the universe; the Chinese are also about it now, and will at an early period show that a people may retain their virility intact even when their civilised history dates from dim antiquity. With the example of these Mongol peoples before us, it is merely begging the question to state that because Britain has held a foremost rank for some hundred years or so, her prestige must necessarily cease and her people be content to take a lower place in the scale of nations. As the Chinese and Japanese have preserved their physical and mental powers through the ages, so may we, if we act wisely, as they have done, continue to thrive, and even improve upon our past. The argument that because we have reached a high, it may be the highest, pinnacle of national greatness, we must therefore now succumb, is one not in accordance with historic fact; and it but behoves us to study what is wanted to ensure our maintaining our condition of physical efficiency, to render us not only equal to any present emergency, but to amply provide for the future requirements of our people.

CHAPTER II

DOES EFFICIENCY DEPEND ON PHYSIQUE?

THE term "efficiency" is used in this instance to signify intellectual ability, power to govern, to invent, to investigate scientifically, to promote useful enterprises, be they commercial, scientific, or exploratory; in short, to continue on the lines our forefathers have done during the past three hundred years of our history. It frequently occurs that our greatest thinkers and our foremost men in many branches of life are far from robust. Pale, sunken-cheeked men, with a poor frame and a troublesome digestion, they are often endowed with mental capacity of a high, it may be of the highest, order. With such men in view, it is often argued that it is brains that are wanted, not muscle, nowadays; and we are apt to console ourselves that what the town-reared child loses in physique, he or she gains in the rapid development of his or her mental power.

This is a dangerous doctrine, although one which unfortunately prevails. Can people of an inferior

physique, or who systematically ignore hygienic teaching, beget children likely to inherit the mental ability which was perhaps their portion? The physically weak man or woman may possess mental ability of a high order, but it is unlikely their children will be so endowed. The man with strumous or scrofulous tendency—tubercular, it is called nowadays—may himself have been a genius in his business or profession; but his children, if he begets any, will, as a rule, be weakly, and their brain power of an inferior quality. But leaving actual disease or tendency to disease out of the question, parents who are physically below the normal standard, are calculated to produce children still lower in the physical scale, especially if the children are brought up in the unnatural environment and polluted air of a city.

In refutation of this statement it is not unusual to bring forward the citizen of the United States of America as an example of high mental capacity. Let us consider the matter. The typical citizen of the United States of America is usually pictured as a tall, gaunt, dyspeptic-visaged man with hollow cheeks and lined features, and we are told to look upon him as the concentration of progressive ability. This is a physical type evidently produced by the environment in which he finds himself.

Many American writers deplore the alteration in physique which is taking place amongst the people of the United States, and fear that the national physique could not be long maintained without steady immigration of people of European stock. It would seem, therefore, that an individual endowed with a discredited physique may still be mentally efficient, or may even excel; but, leaving the individual out of the question, and considering the problem from the higher platform of the future of the race, the children of such a parent will tend to become physically and mentally inefficient unless reared in the best of hygienic environment away from cities.

The Need for a Healthy and Increasing Population—The Demands of Transmaritime Britain.

At no time in history has it behoved a people to obey the command, "be fruitful and multiply and replenish the earth," more pronouncedly than in the present case of the inhabitants of these islands.

The contention of the sociologist, that there should be an intelligent restriction of the birth-rate, so that children should only be born in due proportion to the immediate requirements of the

community in which they are to live, is a maxim which may suit a Little Englander's notion of our destiny, but is not compatible with a people imbued with imperial ideas and colonising duties.

We require all our sons to carry on the work of the Empire. We have not only to make good the wastage of life going on in the cities of our own country, but to provide for the peopling of our colonies, and for the loss of health and life attaching to the governing and commercial development of our Crown colonies, of the great Empire of India and of many countries lying within the tropics.

The stocking of "Transmaritime Britain" is a great drain upon the population of the British Isles, yet the destiny, development and welfare of many lands and peoples of other races and climes depend upon the number, the quality and the health of home-bred British folk. Our colonies, our possessions and our dependencies are for ever calling, "Come to us, but send us only of your best." Here it is the sturdy labourer and his healthy family that is wanted; there it is those educated and trained in ways of government and governing that are required. The untilled soil of the Canadian prairies, of the Australian bush, of the South African veldt, and of the pasture lands of New Zealand requires the men

and women bred to agricultural work; whilst the Crown colonies and the colossal Empire of India take all the most competent we can send to carry on the work of governing their teeming millions. It is not, therefore, the health and condition of one class of our people only that have to be considered; the demands on the people of this country are so manifold that every class of the population, from royalty to the most humbly born, is called upon to play a part—an important part—in the maintenance of the welfare of the Empire. The cruise of the *Ophir* brought home to us the fact that even our royal family have their part to play in the sense here enunciated; and wars in India, China, Egypt, and South Africa, within quite recent times, prove how essential to our existence is the stamina of the soldier who is called upon to fight under conditions and in climates and surroundings foreign to those in which he was reared. But important as these sections of the community are to the maintenance of our national existence, the parts they play are largely ephemeral so far as actual colonisation is concerned. Royalty merely visits, the soldier ultimately returns to his native land; but the colonisation of our Empire and its government are carried on by men and women who go forth to remain, or, at all events, to spend the

best part of their lives, abroad. These latter are the really important sections to consider; and the question, "Are our islands overpopulated?" that is, populated beyond what is required of us, assumes a wide meaning when such considerations are taken into account. In any estimate of the numbers of British people this wider view of our national responsibilities must play an important, nay the leading, part. Stated a little differently the proposition amounts to this: Can we produce a sufficiency of people to carry on the needs of the Empire in all its several and various branches—for home work, for colonisation, and for governing India and the Crown colonies and dependencies? No race or nation has ever had to undertake so huge a task heretofore; it is one without parallel in either ancient or modern times.

Are We Overpopulated?

The cry is often raised that our islands are overpopulated, that the unemployed increase with each succeeding year, and were there fewer people in Britain there would be more food and more work available, and, therefore, a smaller population is desirable. This is a pernicious economic doctrine for a people with world-wide responsibilities. Canada can take another 50,000,000 of

people at least, Australia could support double that number, South Africa has room for many millions of our race, and several other fertile lands under our flag are calling for British immigrants. Moreover, even our home industries are not all fully supplied by British labour. The ships of the Mercantile Marine, the service which proclaims the predominance of Britain on every sea, and for which our huge and costly navy largely exists, are manned by thousands of foreigners. Other industries, even within these shores, are in other than British hands, but none so prominently as that of our vaunted British marine, which is largely not British after all, but a mixture of German, Scandinavian, or Dutch sailors; so that our great navy is engaged in guarding the ships which are manned by many subjects of other crowns than our own.

There is indeed room in the Empire for another 100,000,000 of home-bred British folk, and when that debt to the Empire is discharged, the subject of overcrowding may be then seriously considered, and the proposals of the sociologist, concerning a restriction of the birth-rate, entertained. The presence of an apparent surplus population, which the numbers of the unemployed would seem to indicate, is but a local congestion; these islands are small, but the Empire is wide, and it is merely a matter of distribution requiring an imperial

teacher to bring home to British folk that the men and women of Australasia, Canada, or South Africa are as assuredly children of the Empire, bone of our bone, and flesh of our flesh, as are "the men of Kent," or "the Lancashire lasses."

Infant Mortality.

How are we fulfilling our duties to the State as regards rearing a sufficient population? Badly, it is to be feared. The mortality statistics show that in Great Britain, of 1000 children born, 136 die before the age of twelve months. When large families were the rule, the loss of many infants did not affect the population statistics to the same extent as to-day; but with a steadily diminishing birth-rate, owing to late marriages, contagious disease, and "no-family" creeds, this continued severe sacrifice of infant life threatens failure in the fulfilment of our destiny.

The modern employment of single women at arduous indoor work in shops, factories, offices, etc., may not immediately affect the public health or well-being seeing there are 2,000,000 more women in the country than men, but it is quite a different matter when such women get married and become mothers.

Legislation upon women's work is urgently

required. We have been prodigal of human life in this country heretofore, but with a diminished and diminishing birth-rate we can no longer afford to be so. A woman who is married, or who intends to marry, should find her life's work in the household, not in the shop or factory; her duty is at home, not behind a bar. Were women who take up laborious work, necessitating long hours of standing, forbidden to marry, the national health would not suffer; but the useful daughter at home is not always the ornamental one of the flock; the girl who affects work away from home, who goes to work with unbrushed boots and a novel in her hand, is unfortunately more sought after than her stay-at-home sister, who can cook a good dinner or "tidy" a room. The parents know the value of the latter, and keep her in the background in case some sensible man should deprive them of a useful daughter. A people guided by hygienic laws will legislate that healthy men and women only be allowed to marry; that before taking up the business of married life a woman shall give proof that she has had an education fitting her for taking the duties of a household; and that a man and woman may respectively be entitled to a divorce should the "no-family creed" be proved against either.

To check child mortality should therefore be

our earnest endeavour, and to attain this end the causes conducing to such mortality should be inquired into. The causes are unfortunately many, but parental ignorance and selfishness hold the first place as ætiological factors:—Ignorance, from the quashing of the normal parental instincts implanted by nature within us in the process of cultivating so-called civilisation; selfishness, in the desire of the potential parent in the higher ranks to follow a life of so-called social pleasure; and amongst the poorer classes, in the misnamed "necessity" for mothers to go to undomestic work and leave their infants to be cared for by others. The habit, for it is not by any means always a necessity, amongst married women engaged in mills, factories, etc., to return to such work soon after a baby is born is pernicious in the extreme. Necessity, in the majority of instances, cannot be pleaded as a reason for this desertion of maternal duties by women workers. The desire for company and the gossip at the workroom, mill or factory, not necessity, is frequently the true reason of the women hands casting aside their daily task at home and leaving their infants to the care of others. It is selfishness in the case of the working woman, more so even than in the case of the well-to-do, that accounts for this evasion of motherly duties

and the consequent shocking mortality amongst the infants.

The well-to-do are able to entrust their children to the care of more or less competent nurses, but the caretaker of the infant in the case of the poorer people is as often as not an elder child of tender years, the manager of a crèche, or an incompetent or careless neighbour.

The Requisite Size of Families.

To carry on the work of the Empire in all the phases already mentioned, a certain number of children must be born and brought up if we are to advance in our mission and to take up the white man's burden; for to the people of these islands, more than to any other, does this burden belong. The families of a generation or two ago were much larger than they are nowadays. It was the numerous and virile population, not politics and bayonets, that gave us our over-sea possessions. These countries still call upon us for more men and women, but it is doubtful if in the future we are to be in a position to grant their requests. For a man and woman to limit their family to two does not fulfil the conditions required; they do not increase the actual numbers of the population, for they have left the number of the population as

they found it. We require, at least, that four children in every family shall reach adult years, and this will only suffice if every man marries. Considering, however, the infant mortality, the number of unmarried men leading unnatural lives —especially amongst those who go to our colonies and to India, and the numbers of childless parents, four in a family is less really than we require. A minimum of five children in British families would appear to be absolutely necessary if we are to advance in our imperial mission.

Change in Racial Customs.

In dealing with these problems of physical degeneration, let a beginning be made by first looking backward at the history of the inhabitants of these islands. When the Saxons came to British shores they encountered a people differing in customs, religion and in civilisation from themselves. Contact with the Romans had made the early Celtic inhabitants of Britain largely town-dwellers, and introduced a higher civilisation amongst them. The Saxon inroad once more introduced paganism, destroyed the advanced civilisation of the Roman teaching, and, most marked change of all, favoured the rural or hamlet system of life in contradistinction to the more

centralising influence of the city. The Saxon preference for country life survived the Norman Conquest, and it is but yesterday that the Anglo-Saxon attempted city life to any marked extent. This phase of modern life strikes at the root of all racial hygiene, and determines the lines on which the problem has to be studied. It is the vital question which concerns not only the British, but the peoples of Western Europe generally; for although the recent massing of the people in huge manufacturing cities began amongst British folk, owing to their being the first to discover and utilise the machinery dependent upon the power of steam, the same influx into the cities is taking place in every country of Western Europe and Northern America.

The cause of this sudden change in the grouping of the population is not far to seek. Towns of moderate size existed before the latter half of the nineteenth century, but when steam and machinery brought great factories into existence, there followed a necessary congregating of the "hands" required to work them, and hence our modern cities. Work which was formerly done in the villages, hamlets, and rural cottages scattered throughout the kingdom could no longer compete with steam-driven machinery, and the isolated producers were then drawn together by the exigencies of trade.

In yet another way did modern invention act detrimentally on the rural dwellers. Steam and machinery applied to sea traffic, combined with Free Trade in foodstuffs, lowered the value of land by allowing other countries to compete freely in the open market, ruined farming and reduced the wages of the farm labourer to starvation point, causing him to emigrate or to leave the country and seek employment in towns. Our public health authorities have, therefore, to deal with this great problem—how to render town life healthy; how to maintain a healthy race of town-bred people to carry on the work of the Empire. Is it possible to do so? Or are we setting nature at defiance in attempting it under existing conditions?

The Diminution of the Influence of the Church in Public Life.

In yet another way has the rush to the cities deprived the people of a "guide, philosopher and friend." The clergyman used in bygone days to be really the parish priest; he knew his people, and in trouble, in difficulties, and when advice was needed the people turned towards him. The sudden overcrowding of the cities has rendered it impossible for the clergy in towns to grapple with

the influx, and to know their parishioners. Whilst many of our country churches are almost empty from the fact that the majority of the people of the parish have departed, the city parishes are being crowded by families who remain unknown to the clergy of any sect. In the country the church is the church of the people; in towns it is too often but the church of the well-to-do. The poorer parishioners in towns are neglected because their numbers are such that the clergymen can find no time to visit them. Mere preaching is not what the poor in towns require; they must know their clergyman before they go to him; but so long as it is impossible for him to interest himself in, and to direct, their daily and family life, so less and less does he exercise any influence upon them. Noble attempts are being made: lay readers, city missionaries, salvation armies, strive and work with commendable purpose, but these organisations are insufficient, unstable and too ephemeral, it is to be feared, to cope with the multitudes. Such being so, the discipline of the city masses is mere police work; detection and punishment of crime constitute the only restraining influences; but the exercise of the moral power which belonged to the clergy of previous generations has unfortunately, in our cities at all events, almost disappeared.

If the Church is again to acquire a beneficent influence, and to suit itself to the altered conditions of our people, it must acknowledge the change and move with the times. Country parish charges must be amalgamated, and the clergyman, with his emoluments, his tithes, and his privileges, be made to transfer the place of his calling to the city whence the people of his parish have gone. Such a *régime* would, no doubt, dislocate the finance and trusts of the parish; but looked at broadly, and in the spirit of what is required and what is best for the people, it is a measure that, unless undertaken soon, will end by the clergy losing their hold upon the very class of people which most requires their guidance and help.

CHAPTER III

WHERE DO THE PEOPLE OF BRITISH PARENTAGE BEST THRIVE?

It would be of supreme interest from many racial and ethnological points of view were it possible to compare the physique of the men and women born and bred in Britain, with those of other lands to which our countrymen have heretofore emigrated. Is the physique of the American citizen, the Canadian, the Australian, the New Zealander, or the South African colonist equal to, an improvement upon, or a retrogression from, the parent stock in this country? The issue is obscured by the frequent intermixture of race due to the emigration which is constantly taking place from Northern Europe to over-sea British communities.

It is difficult to find a wholly inbred third generation in any of these countries, with the exception, perhaps, of the older settlers in the United States of America. The present time is therefore unfavourable for instituting accurate

racial development comparisons, and even a review of the wider social questions is scarcely possible. It may, however, be stated that in no new country are the British folk showing superior physical development to that which formerly obtained in the old home of their parents, and it is even doubtful if the average standard natural to the middle classes is being maintained.

The British over-sea dominions are world-wide, and present a diversity of climates. From this country a constant stream of men and women is uniformly proceeding to take part in the government, in the commerce and in the productive development of the colonies. It will be observed, however, that in countries whither Europeans emigrate it is only in those regions farthest removed from the tropics—in other words, in those parts which most nearly approximate the climatic conditions of the mother country — that it is possible to rear a vigorous progeny capable of taking root in, and of becoming indigenous to, the soil of their adopted country. The British Isles lie between latitude 50° and 60° N., and although all our colonies, except the very northern part of Canada, in which British emigrants have settled lie nearer the equator, it is always in the portions of the respective countries which approximate most nearly to the climatic conditions of the

mother country that the greatest amount of racial activity prevails. In Canada the great towns are as far south, and in the United States as far north, as possible. In South Africa and Australia the centres of civic activity are in the coolest or the less tropical and upland districts. A race reared in a moist, temperate, variable and insular climate has sought to continue its kind in countries under vastly different meteorological conditions. Climatic environment has undoubtedly directly to do with racial physical development, and it is interesting to watch and note its effect in bringing about a variation in type of the original stock.

In dealing with this question there are many difficulties. In the first place, it is difficult to set up a physical standard typical of all classes in the British Isles. The upper middle class in England is of one type, the poorer classes in towns of quite another; or if we take men of the same class, say, railway porters, and compare the physique of the men engaged in the railway station at, say, Manchester with those of a town so adjacent as York, the defective physique of the former is in marked contrast to the healthy appearance of the latter.

Again, the physical standard of a regiment raised in one of our large cities, when compared with one

recruited from, say, the rural parts of Aberdeenshire, shows so extreme a variation that it is impossible even to set up a standard for men fulfilling the same calling in life and derived from approximately similar grades of society. In this country the middle classes represent a proportion of the population larger than that met with in any other European country; and it is the middle-class Briton that we must take as the standard of manhood which both we and our over-sea cousins should aim at producing. The more we can elevate the masses of the people in the social scale, the more surely may we expect to see men and women of the type we hope for, and the less we shall have to dread national degeneration.

The American Citizen.

No one can say what the type of people in the United States will become when the influx of emigrants from Europe becomes markedly lessened or is wholly stopped. In the opinion of several American writers who have dealt seriously with this subject the outlook is far from promising. Amongst the people of the States who have had little or no new strain of European blood for three or four generations, the tendency is towards an altered type, with which there is much dissatisfac-

tion from a physical point of view. It is not that some of the finest types of manly or womanly physique are not met with in the United States; it is not that in athletic exercises the young men do not excel; nor can it be said that the general mental capacity of the American citizen is anything but of a high order.

Amongst the "cow-boy" class in the United States are to be found some of the finest specimens of manhood known amongst the white races; but the cow-boy class diminishes with advancing years. Large ranches are not for all time, nor even for a long time. As the population increases and untilled areas shrink, his services are less and less required; the land in the near future will be divided into smaller farms, where the rough-rider will be unknown, because unnecessary, and the cow-boy will become a memory merely.

Proofs of American virility there are in plenty. The question is, will the race, when unrefreshed by new blood from outside, and becoming more and more urban, be equal to the "strenuous" life at present led? The tendency is towards the cities, no New Englander is content with agricultural or rural life; others must till the soil for him, and he will buy and sell or speculate with the profits. This trend may develop the brain after a fashion, but not the physique. The environment of city life,

the unwholesome meals, the ice-watered drinks, the "quick" lunch, the pungent sauces, the pickles and cocktails necessary to create and foster a spurious appetite, can only end in one way, and has already necessitated the manufacturing of dyspeptic "cures" to an extent unheard of in other sections of the human race, ancient or modern.

It may be that a new type of being will come to inherit the North American Continent—one different from his progenitors, yet enabled to meet the requirements of life in a changed environment. No one who travels through the United States can be but struck by the highly intellectual type of face which prevails in town and country. At the present moment, as a nation, they are of all white people, perhaps, the most regular featured, and possess beyond other peoples all the facial characteristics we usually associate with a high and an alert intelligence.

It is interesting to note that the latitudes in which the Anglo-Saxon in the United States is evidently thriving are considerably farther south than are those from which his British or Teutonic ancestry sprang. The southern limit of the States is in latitude 30°; in other words, twenty degrees nearer the equator than the most southerly point of Britain. When we come to look into it, however, we note two points: first, that all the

centres of commercial and intellectual activity—Boston, New York, Philadelphia, Washington, and Chicago—are as far north as possible; and secondly, that the negro is gradually causing the white man to recede from the more southerly States. There is a climatic limit not only in America, but also in Australia and South Africa, beyond which the white man cannot propagate a healthy race; it would be well were politicians in America and elsewhere to recognise this scientific fact. Nature determines these questions in her own way, and the question of the coloured *versus* the white race occupancy of warm countries is beyond the power of politicians to settle.

The people of the United States may, however, well ask themselves: How is it that we are the chief producers of artificial foods? Why is it that dentistry has become so flourishing a profession amongst us? How is it that our stores are flooded with patent cures for dyspepsia? and that our street hoardings at every turn blazon forth quack remedies for "nervous" complaints? How is it that so many crack-brained religious absurdities emanate from amongst us? Are these evidences of national well-being? Are human beings compounded of all the artificialities likely to beget a healthy race? The effect of all these products of a new civilisation in a new environment is not yet

apparent, for the tide of emigration is still flowing westward, and the sturdy immigrants continue to leaven the lump. The American citizen is at present a type of physical and mental efficiency. Will this continue when emigration ceases to supply fresh blood?

The Canadian.

The Dominion of Canada is being so constantly vivified by immigration that it is at present well-nigh impossible to find a third or fourth generation of pure-bred Canadians. The admixture of French and British blood tends still further to obscure what the Canadians may ultimately develop into when immigration slackens or ceases. In the meantime, however, they have reason to be satisfied so far as physical evidence goes. In many branches of prowess they hold their own. They have carried off the rowing world-championship; and in 1904 a Canadian held the King's Prize as the best marksman in the Empire; also in war, in Canada and in South Africa, they have shown high military courage and endurance. Than the soldiers of Strathcona's Horse during the South African War no finer body of men ever joined in battle, and the physique of the Canadian soldiery generally is excellent. That there is a

difference in type, however, from the parent stock developing in Canada there is no doubt. People reared on a continent with arctic winters and fierce heat in summer are bound in time to alter, in frame and in facial type, from those born and bred in the moist, temperate, insular climate of Britain. What that alteration in type may become, whether an improvement upon, or a retrogression from, the ancestral type, it is well-nigh impossible to prophesy.

The population difficulty in Canada would seem to be the rearing of children. Summer diarrhœa is the one great infantile scourge, and some time ago it was stated that two out of every five children born succumb to this complaint. This is a serious hindrance to the increase of population, but it does not imply impaired physique of those who survive. Canada suffers from extremes of climate, a factor which renders the rearing of children difficult. The winters are so severe that young children must be kept indoors in hot rooms to an extent which is apt to be detrimental to their healthy growth, while the summer heat is at times fierce and trying and unfavourable to the development of the young.

Every climate, however, has its drawbacks, and, taken as a whole, that of Canada has perhaps fewer shortcomings than almost any other, so far

as the possibility of healthy growth amongst the people is concerned; and there is good reason to believe that the fine physique of the present Canadian will continue even when emigration from Europe fades into insignificant proportions.

The Australian.

The southern coast-line of Australia reaches only to about thirty-nine degrees south, whilst the northern shores extend right up to within eleven degrees of the equator. Here we have a British people colonising a continent, more than half of which is within the tropics and subtropics. Did Australia lie in the same latitude north of the equator, the attempt to develop a "white Australia" there would be an impossibility, for the climates of countries lying in corresponding latitudes north and south of the equator are wholly different. The Asiatic and the northern portion of the African continents afford no example of a white race in tropical and subtropical climates being able to colonise permanently, so that they can continue a virile progeny unto the third generation.

The meteorological and climatic conditions, however, of countries north and south of the line must be taken into account. The contrast is no

doubt due to the fact that the distribution of land and sea is wholly different. To the north of the line huge continents intervene between the equatorial belt and the Pole, whilst to the south the continents of America and Africa taper off towards the South Pole. South of the line, therefore, oceanic influences tend to modify the climate, and the fact that the Antarctic ice extends farther north than the Arctic ice does south, serves, perhaps, to explain the dissimilarity of climatic conditions in the parts of the world lying in corresponding latitudes north and south of the equator. It is therefore a great experiment that is being tried, and one quite new in the annals of mankind. In Australia we find men and women of fine physique, but the majority are of the first generation of British parentage, and many are actually British born. We are familiar with the appearance of our Australian cousins in the cricket field, and we have learned to admire them for their skill, endurance, and courage. We know also of their prowess in other athletic exercises, as in rowing; and it is not so long ago that the mother country had to stand aside and witness a contest for the world's championship in rowing between an Australian and a Canadian. Their markmanship is also known to be excellent, and their military capabilities have been testified on many occasions.

They have actually taken part in several campaigns, in the Sudan, China, and South Africa. The remark passed upon the physique of the colonial troops during the South African War was, that they were more "finely drawn" than the regular British soldier, but certainly the difference in no way lessened their powers of endurance. The quality of the children, however, of these "finely drawn" men is the problem; is the alteration in type likely to lead to permanent improvement of the people?

The Australian is eminently a city man. With a population of some four millions in a continent capable of supporting at least 100,000,000, one-third of the whole is concentrated in the large cities. The birth-rate is lessening, the evils of city life as regards the propagation of children are beginning to tell, and immigration for the moment is more or less at a standstill. The exclusion of fresh blood from other countries, be they European or Asiatic, is regulated and checked by legislation. Politics, it is said, determine the policy of exclusion, but the true reason may be, and probably is, deeper. Is it a confession or feeling of physical unfitness to compete in energy with immigrants freshly arrived from the more temperate climates of Northern Europe? Australia is not advancing as it should and could, and if the policy of

exclusion of Europeans is persisted in, not only will there be fewer invincible cricket teams from amongst the inbred population, but in more important ways will the effect of the present suicidal policy become apparent. Is it already showing? Is the exclusion of immigrants, attributed to astuteness, but the legislation of an enfeebled people? A "white Australia" in the northern tropical portion of the continent is an impossibility; and it has yet to be proved whether a healthy population without a regular influx of fresh blood can continue in a country so different in environment from that from which their ancestry sprang. It is to be hoped that better, wiser and more liberal counsels will prevail amongst this important section of British folk, and that their motto "Advance" may be no mere legend, but an actual reality.

It is true the population in Australia is chiefly collected as far south as possible. This is the coolest region of the country, and approaches nearer than any other part to the more temperate climates from which their ancestry emigrated.

Melbourne, Sydney, and Adelaide are on the southern coast in a latitude corresponding to that of Greece in Europe, the farthest south point where Europeans can thrive. Northwards from these towns Australia is subtropical and tropical,

and it has yet to be proved that a virile white people can continue there.

Emigration to Australia, although commenced over one hundred years ago, advanced to large dimensions with the gold rush in the middle of the last century. There has therefore scarcely been time for an indigenous "white" population to have reached a third generation, consequently it is too early to judge of the actual and prospective physique of the Australian. The influx of Europeans also has been continuous up to quite lately, so that recent immigration further obscures conclusions as regards the physique of children of pure Australian ancestry.

The food of the Australian must also play a part in his development. Beef and mutton are so cheap and plentiful that they enter into the dietary to an extent unknown in any other land. Tea is taken with almost every meal, and of all diets one of tea and meat is perhaps the most unwholesome. The tannin in the tea combines with the albumen in the meat, and forms a tannate of albumen which is indigestible and unabsorbable, and leads to digestive troubles of an aggravating description. Digestive troubles are the bane of the Australian, and are scarcely to be wondered at. The meat diet accounts for the "fine drawn" appearance of the men, in con-

trast to the cereal-fed people in other countries. Man is what his environment makes him, and the kind of food, more than even the direct effects of climate, is perhaps largely responsible for the alteration in type arising in Australia.

Australia, until British emigrants settled there, has not proved attractive to mankind: the Malay, the Negrito, and the Papuan peoples avoided it evidently in the past. Nor does the soil and climate seem to beget a vigorous race, for the aborigines of Australia are amongst the most effete of the human species. From an unkindly environment, however, have sprung some of the finest races in the world, and from his conflict with nature the Australian may emerge altered in physical type perhaps, but retaining the vigour and grit which we know especially belongs to him at the present day.

The New Zealander.

In no country in which British folk have settled is the prospect of the race better than in New Zealand. The climate is insular, the people are not collected in large cities, agricultural pursuits are of the first importance, so that the deteriorating influences of indoor occupation are largely discounted. Moreover, the native race indigenous to

New Zealand—the Maori—is one of magnificent physique, so that it is evident coloured people can thrive in New Zealand in a way they have not hitherto done in Australia, and if with coloured, so possibly with white people may a similar racial characteristic obtain.

The New Zealanders who volunteered for service in South Africa were, as regards physique and prowess, accounted to be as good as any serving in the British army during the war; and the general physical development of the people is known to be good.

There is also a quiet reserve about the New Zealander which augurs well for his future, and is in marked contrast with the high-strung tone of those of our race born and bred in sister countries.

We may, therefore, confidently look forward to the New Zealander maintaining the physical and mental characteristics of the British race in an environment which, although altered to some extent, resembles in many respects that to which his ancestors belonged.

The South African.

In Cape Colony and Natal, British settlers have until quite recently been comparatively few, and

there is but a small proportion of children of purely British parentage of the third or fourth generation. Intermarriage with Boers, of more or less pure European blood, has also served to obscure the issue. The Boer, however, affords material for study of a white race, emanating from a northern latitude parallel with our own and nearly allied to us in type and character, successfully colonising a country between thirty-five degrees south and as far north as the tropic of Capricorn. Of the virility of this people we have lately had ample evidence, and we may assume that in regions where the Boer has succeeded, British folk will also manage to develop successfully. It is impossible to say to what extent a native or Kaffir strain in the modern Boer prevails, but it is not evident to any considerable degree. Be the explanation what it may, the finest children seem to be born to parents, one of which is British, the other Boer. This should prove a happy augury for the future of the white people in South Africa, for the process of natural selection is the predominant factor in determining the future of any species, and natural laws will be able in course of time to settle the future of South Africa better than big armies or intricate legislation.

What has already been said about countries

lying to the north and south of the equator must be taken into account when considering South Africa as a possible home for British folk, and it is possible that the general elevation of the Transvaal, combined with the fact that it is south of the equator, may allow of white people settling there and continuing a vigorous and healthy race. In Cape Colony and Natal the climatic conditions along the littoral are not of the best for colonising purposes, but there seems little doubt that many parts of South Africa will prove a possible "white man's" country in a sense favourable to the physique of the race.

Conclusions.

To what conclusion does a review of the future of our race at home and in Britain beyond the seas bring us? Are the people now thriving or likely to thrive better in the mother country or in their adopted over-sea homes? It may be answered that the time is not ripe for a definite statement to be made on the subject. That the masses are not thriving physically in British cities is, at the moment, only too apparent. We have become an urban in place of mainly a rural people within a short period of time. Sixty years ago the rural stood to the urban population at about four to one.

We are in a transition period in our physical history; the agricultural interest has been neglected, and it is to be hoped that the people will be induced to stay on the land before the degeneration, inevitable to dwellers in large cities, develops beyond the possibility of remedy. The land must, under new economic conditions, be made to pay; in 1801 there were but 900,000 of our population fed on foreign grain, in 1895 the number had grown to 28,000,000, whilst the actual production of wheat in Britain fell during the latter year lower than at any recorded period.

If the fiscal policy that is at present being advocated does not improve farming in this country it will serve no hygienic purpose, and from a public health point of view will be worthless. If any form of protection merely means more money in the pocket of the town-dwellers so as to enable them to buy more foreign food, then the physical condition of the city masses in this country is bound to go from bad to worse; for without a healthy, numerous, and prolific rural population we cannot replace the wastage going on in our towns—a wastage which demands a constant renewal to about one-third of its numbers.

The upper and middle classes in Britain, those who can afford frequent holidays, suburban houses,

and who can send their children to be educated out of towns, present a type of our race which has no superior. Fortunately this class is a large one, more numerous, in fact, than in any other country, and supplies us with the stock of men requisite for many of our imperial needs.

It is doubtful if any foreign country could produce an army equal in physique to our own were conscription to become law, for there would be drawn into the ranks the middle-class Briton, who by his up-bringing, by his natural affinity for manly sports and out-of-door exercises and games, would bring to the army a physically fit frame and a mind at once disciplined to command or obey.[1]

[1] The 1905 Australian Cricket Team.

The parentage of the men composing the Australian Cricket Team that visited Britain in 1905 may form an interesting note here. All the members of the team were born in Australia.

Of the Members of the Team	Father born in	Mother born in
4 had	Australia.	Australia.
3 ,,	Australia.	England.
3 ,,	Australia.	Scotland.
1 ,,	Australia.	Ireland.
2 ,,	England.	Australia.
1 ,,	England.	Scotland.
1 ,,	Denmark.	Scotland.

From information obtained from Mr. Frank Laver and placed at my disposal by Dr. Drummond Morier.—J. C.

CHAPTER IV

LIFE IN LARGE CITIES AND IN THE COUNTRY COMPARED

IN attempting to answer the question, "Why is town life detrimental to health?" there are several considerations that have to be taken into account. In the first place, we have to inquire in what ways do town life and country life differ.

DWELLINGS in towns are as a rule more sanitary, so far as the mere buildings are concerned, than is the country labourer's cottage. The mud, or badly boarded, floored rooms, the small windows which frequently are made *not* to open, and the all too common leaky thatch in the roof, cannot be said to present an ideal picture of construction from a hygienic point of view, however artistically the dwelling may be set in flower or ivy bedecked surroundings. The construction of a dwelling in town in however wretched a quarter may present many drawbacks, but as a rule the walls are dry, the windows *can* be opened, and the inhabited rooms may be off the ground high up in the house.

The WATER supply of the city is laid on from a more or less pure source—the water is filtered, carefully stored and distributed through pipes, so that pollution is well-nigh impossible. In the country the water supply may be the village pump, but more frequently it is derived from a shallow well in the back garden, adjacent to the stables, cow-sheds, or cesspool, and therefore liable to contamination. In still more primitive states the water may be drawn from an unprotected and frequently contaminated stream.

SEWERAGE.—In towns connection with the main system of sewerage is insisted upon; sinks must have traps, water-closets have to be constructed according to plan, and bath water is disposed of on sanitary principles. Country dwellings are all too often a law unto themselves; sanitary faults are the rule, and the disposal of sewage, except in the houses of the well-to-do, is a constant sanitary danger.

FOOD in town and country nowadays differs but little in quality, and in many ways the town has the better supply. The railways focus upon the town, and bring thither fresh meat, fish, fruit, vegetables, eggs and milk, where higher prices are expected than in the country. The cottagers see but little of the produce of their environment. Fresh fish is a luxury reserved for large cities, and

denied to most country villages. We find tinned foods, Danish or Australian butter, foreign rolled oats, in country homes in the heart of England, and the legend of British beef, of home-made bread and cakes, of freshly made butter or preserves, and home-grown, properly ground oatmeal, even in Scotland, is rapidly becoming a thing of the past.

In what do the Town and Country differ Hygienically?—The Quality of the Air the Differential Characteristic —Ozone.

If the town life is superior in the matter of dwellings, water supply, sewerage, and even as regards food, wherein lies the advantage of country life? There is but one thing left to consider, namely, Air, and on the quality of the air supply does the whole matter hinge.

The air, both of town and country, consists of oxygen and nitrogen and of various other gases in minute proportion. In towns, and manufacturing cities more especially, we have soot and several deleterious elements present, which detract from the quality of the air we breathe, but none of these constitutes the important difference. Country air possesses something that the air of towns has not, namely, ozone. The presence of ozone supplies the

vivifying ingredient of the atmosphere. It is a modification of oxygen to which unsearchable vital powers are ascribed; ozone is present in the air of the open country, at sea, in fact everywhere, where there is not too great an aggregation of human beings to abstract or decompose it. This gas gives the peculiar odour present in the neighbourhood of an electric machine; it is present in the air even in the centre of large cities during a thunderstorm and a fall of snow; it is present in greater quantity in the south-west wind than in any other, probably because that comes, in this country, from over the wide stretch of the Atlantic, for the sea seems to be its birthplace. The selection of West End sites for the dwellings of the well-to-do in almost all our cities is attributable to this fact. If ozone is the health-giving spark it is not present in the air of the central part of large cities. The writer tested the air for ozone in different parts of London simultaneously on 18th January 1885. The wind was from the north-east, and travelling at the rate of only one and a half miles an hour. The various places whence information was gathered on that day were Brownswood Park in the N.E. of London, Maida Vale in the N.W., Wandsworth, Barnes, Chiswick, and Bushy Park in the S. and S.W. districts, and in Hyde Park. No evidence of ozone was anywhere apparent

except at Brownswood Park, in the N.E. It was from the N.E. quarter the wind was blowing, and the air had lost all trace of ozone before it had reached Hyde Park; at Bushy Park, although practically a country district, no ozone was present in the air. London had not only abstracted the "goodness" out of the air that swept over it, but had added to it the exhalations from the breath and bodies of millions of human beings, and of tens of thousands of animals. The drains and ventilating shafts served to further vitiate the atmosphere; smoke with its deleterious gases, and the street refuse and dust-bins had each and all contributed their quota to the pollution. The dwellers in the south-western districts, the wind being in the N.E., had only the pre-breathed and refuse air of London entering their dwellings. With the wind in the S.W., which, fortunately for those living in the south-west of London, is the prevailing wind, the reverse takes place, and the districts lying to the north and east have to be content with the air-sweepings of the south. It is plain, therefore, that the people dwelling in the centre of the city never get fresh air around their dwellings. Persons living within a one or two mile radius of Charing Cross cannot have fresh air entering their dwellings at any time, for between them and the country, whichever direction the wind blows, there are a

million human beings, with all the attendant emanations consequent upon large collections of dwellings, polluting the air.

As in London, so to a less degree in all large cities, the dwellers to leeward of the wind for the time being must breathe foul air, and according to the extent of the town, so there may be parts of the centre of the city which can never be said to know what fresh air—that is, ozonised air—is. The absence of fresh air, therefore, is the deleterious influence at work in the large cities, and if we could get rid of this detrimental factor, the problem of "how to be healthy though living in towns" would be solved.

There is no doubt that various habits of town folk tend to aggravate the deleterious influences ascribable to city or stale air, and were more time spent out of doors even in city air the health need not deteriorate so markedly.

The healthiest section of our youths in London are, no doubt, the telegraph and messenger boys, who have a great deal of outdoor exercise. They grow taller, their complexions are more healthy, than those whose work keeps them indoors all day, and their duty compels them to walk.

Few dwellers in large cities have any inclination to "take a walk" in the streets, or in the parks

for that matter. There can be no doubt the disinclination to take exercise in cities is an important factor in rendering city life unhealthy. This disinclination bears several interpretations. In the first place, there is but little temptation "to go for a walk" in our cities. Smart walking is well-nigh out of the question, owing to the crowded thoroughfares; the monotony of "going for a walk" along the well-known streets around one's dwelling is not exhilarating; even walking in town parks, with their formally cut paths, their trim flower-beds, and their police restrictions, relieves the walk of but little of its sameness. In the second place, the absence of pure air deprives the walk of much of the good that ought to accompany muscular exercise; and yet a further question for our physiologists to settle is whether a considerable amount of exercise in large towns is beneficial or not? By exercise we inhale more air, but if the air we inhale is foul, will not exercise cause the blood to be loaded with an increased amount of what will but add to our difficulties? To put it concisely, will a man taking violent exercise in such an atmosphere as that of the underground railway live longer than one who keeps still and therefore inhales less of the foul gases? The answer would appear obvious, and an extension of the principle to the difference between

much and little exercise in the street air of a large city would bear a like interpretation. One must not push such an argument to its apparently natural conclusion, and say, "Never take exercise in towns"; for this would lead to an erring conclusion, and the statement is merely advanced as one of the reasons to explain why people do not care to take exercise in towns.

Some Reasons why Exercise in Towns is not taken.

The writer ventured in 1885, in a lecture at Exeter Hall entitled "Life in London Hygienically considered," to further explain why walking exercise in towns was not attractive. The pavements on which we walk in towns all incline towards the gutter, and consequently one always walks on a slope. Taking the slope of the pavement to be about one inch per foot, and because there is about one foot distance between the centre of the feet during walking, there is practically an inch difference in the length of our lower limbs, for the foot on the up side of the pavement is an inch higher than the foot on the lower side. The consequence is that we make an extra call on the muscles to maintain the equilibrium of our bodies, and thereby get

tired more quickly. The slope also in our streets for carriage traffic is quite marked on vehicles travelling not on the top of the causeway but on either side, the wheels nearer the gutter being the lower. This is quite noticeable in an omnibus, where there is a "high" side and a "low" side, the latter being the one nearer the pavement. Men by preference occupy the seat on the lower side, women the upper side; the cause of selection being due no doubt to the difference in clothing, the low seat not recommending itself to persons with the more rigid garments. In driving in cabs and carriages the slope of the street towards the gutter causes people sitting in the cab to sit crookedly and to have to continually balance themselves by muscular effort. These remarks were ridiculed in the papers at the time, and the comic papers found congenial matter for making most amusing sketches. *Punch* revelled in the opportunity, and in the issue of 1st November 1885 drew attention to the slope of our pavements by a clever sketch. It was said in the papers that I had asserted that the sloping pavements caused curvature of the spine, a statement which on the face of it is nonsense; but leader writers have to produce articles, and fiction is more attractive than hum-drum fact. It is not that lateral curvature results from the temporary crookedness

of the body, it is the muscular energy expended in maintaining the balance that causes tiredness sooner in streets than on country roads, and this combined with the absence of fresh air renders walking exercise in towns unattractive and calculated to speedily cause fatigue.

Is City Life Detrimental to Health?

In 1885 the writer delivered a lecture at the Parkes Museum of Hygiene entitled "Degeneration amongst Londoners," and made the definite statement that a third generation of city bred and reared Londoners did not exist. Within two days almost all the daily papers in the country devoted leading articles to the subject of the lecture. The general opinion was adverse to the conclusion come to by the writer, and the comic papers devoted a considerable amount of good-humoured banter on the subject, and in the form of comic sketches sought to deride the very idea of the existence of degeneration. The lecture and the warnings it contained faded from men's minds for a time, but recently the doctrines then initiated have come to the front as a great general question, and in a form which cannot be allayed by flippant articles or comic sketches. The nation is in a serious mood over the health of the people

—over the young more especially, and it is well that it should be so.

Absence of Fresh Air in Towns—Introduction of Air by Pipes.

Absence of fresh air is the one great cause of physical deterioration consequent upon living in towns, and the problem resolves itself into this:—Either take the people to the fresh air, or bring the fresh air to the people. To take all town-dwellers to the country is an impossible task, although the richer members of the community do send their children to school in the country, and themselves take long holidays or week-ends in the country or at the seaside; but this is within the power of few. The "masses" cannot go out of town, and the well-meant efforts of those concerned in promoting fresh-air funds, whereby children can have an outing for a day or a few days in the country, do not cope with the difficulty. A day in the country once a year affords pleasure to the children, but it can have no permanent effect upon the physical welfare of the community. The writer proposed in 1885, at one of the lectures mentioned above, to bring fresh air into the towns by pipes laid down for the purpose. This proposition was received by

the press, the comic papers, and the public with a shout of derision, for the idea appeared ridiculous to the country-loving and sport-enthusiast dweller in these islands, which we still regard as typified in the country-squire-like form of John Bull. Unfortunately that robust figure no longer indicates the modern Briton; he is to-day a clerk, a merchant, a shopman, an engineer, a town-dweller; above all, anything but a farmer or a tiller of the soil, and the comforting and comfortable appearance presented by John Bull has given place to something less satisfactory from a physical —and is it also a mental?—standpoint. As an example of how the proposition to bring fresh air into towns was received in 1885, a quotation from *Punch* of that period is interesting. *Punch* writes:

"OUR LONDON LAZAR-HOUSE,

AFTER DR. CANTLIE.

"1. Eliza, have you turned on the 'Bottled Bournemouth' or the 'Fine old crusted Madeira' air this morning?

"2. The trail of the Gas Companies seems still to be painfully present in the atmosphere which comes to us through our old family gas-pipes.

"3. How many people did you say were suffocated yesterday on attempting to turn on

their 'Margate Mixture' atmosphere, owing to a residuum of gas being left in the meter?

"4. This plan of being able to take one's seaside holiday by simply going into a room in one's London house has certainly the advantage of economy." Etc.

Some few years later Sir Benjamin Ward Richardson, in the revised edition of his *City of Hygeia*, adopted the suggestion so severely scouted in 1885, and into the houses in the streets of "Hygeia" he introduced air by pipes laid on from air reservoirs placed outside the city. The public had ceased to laugh at the idea, and Richardson's plan was commended by the press. As usual the originator of the new creed had to suffer.

In this connection also the following paragraph from the *Globe* of 1st December 1904 is not without interest:—

"It is rumoured that a scheme is on foot for erecting a palatial building in Piccadilly, to the various rooms of which air from the principal health resorts will be conveyed through the country by underground pipes. A patient ordered to Margate, Braemar, or Brighton will simply have to spend a few hours a day in the rooms labelled with these names to obtain the requisite result. Ultimately, it is hoped to lay subsidiary pipes to private houses. The effect of this on London rents would be most beneficent."

Water, gas, and electricity we have laid on to our houses, and yet the most vital fluid of all—Air—is allowed to take care of itself. Pipes for conveying air into our houses would at first sight seem a ridiculous idea, yet, when once laid down, they would require no further attention, and involve no further expense; the air itself would cost nothing, and by the same methods as gas is now stored near gas-works, the air could be forced into the pipes and distributed. The cost would be small and the benefits incalculable. The idea no doubt seems far-fetched, and outside the sphere of practical hygiene; so did the distribution of water from afar in pipes to people who were accustomed to pump up water in their own gardens, or draw water from a well or stream. The idea of bringing gas in pipes to be distributed to houses whereby light could be obtained, seemed also far-fetched to our grandfathers who were accustomed to candles or rush lamps. Gas lighting is being rapidly replaced by electricity, and instead of tearing up the plant whereby gas is conveyed, it would be a simple matter, after cleansing them, to utilise the pipes for the conveyance of really fresh air. Still, with the doubtful air we have in large cities, were the citizens to admit more of it into their houses, or go out in it more often and for a

longer time, a great improvement to the general health would result.[1]

Ventilation of Rooms—The Dread of "Night Air."

The ventilation of our rooms is an important factor in the matter of health. It may be stated as an axiom that air from the outside ought to be systematically admitted into all dwelling-rooms at all times and at all seasons. Fresh air can only be obtained by way of the window, unless some special form of ventilation has been provided for when the house was being built. It may be safely said that the ventilation of our rooms is not as a rule considered when houses are being built. The architect is full of theories of what should have been done *after* the house is built; but, whether it is the builder or the architect that is at fault, practical ventilation is seldom taken seriously into consideration during the building of our houses. One naturally asks, how did our ancestors thrive in their dwellings? it would seem that the old-fashioned wide chimneys, which prevailed in most rooms up to about the

[1] Since the above was written the subject of introduction of air by air-shafts and pipes has been discussed in the daily papers—see *Daily Mail*, 1st August 1905, in which issue of the paper a practical method is illustrated.

last fifty years, were sufficient channels for the exit of foul air by day whilst the fire was burning, and they allowed of the interchange of air down the chimney at night; but the old-fashioned wide chimney has disappeared, and provision is seldom made by the modern architect to allow for the ventilation it afforded. The fireplaces are now of minute dimensions, the narrow throat of the chimney is provided with a "register," which in most bedrooms will be found closed, so that no "night air" can enter. The dread of "night air" has haunted us from time immemorial; there was some justification for these fears when malaria prevailed in England, for the mosquito came in through the open window with the "night air," carrying the germ of malaria in its body, and capable of transmitting malaria (ague) by its bite. Our grandmothers, therefore, had some reason for closing the windows at night; but nowadays, since malaria has disappeared from England, the night air, which in former times really meant the admittance of the malaria mosquito, has lost its harmfulness. In towns it is the fact that the air entering the windows by night is purer than that which is admitted during the day, for there are fewer chimneys smoking than in the daytime. We hear it said that "I have delicate lungs and cannot have the windows

open at night"; but we now know that the only chance for persons with delicate lungs living at all is to be in the open air as much as possible. The more tender the lung the wider is the window opened; and when the lungs are far advanced in disease the side of the room is removed altogether, and the patient sleeps in the open air. The older generation, however, it is impossible to persuade; but it is satisfactory to know that amongst the rising generation the admission of air into the bedroom is being followed to a hopeful extent.

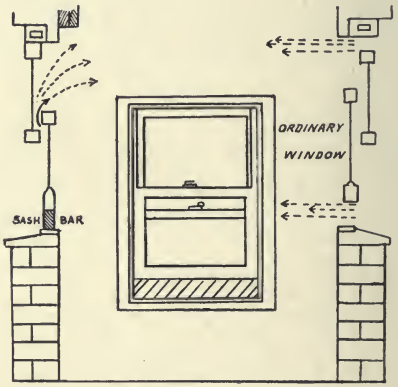
To bring the matter to a practical issue it may not be amiss to give a concrete example. Suppose a person sleeping in a room 10 feet high, by 10 feet wide, by 10 feet long, that is, a room of 1000 cubic feet—the full dimension being obtained by multiplying these three measurements 10 × 10 × 10 together. The air in such a room, supposing no ventilation is possible, would serve for twenty minutes only; after that time the person in the room would be breathing his own breath over again, for 1000 feet of air lasts him only twenty minutes; in another twenty minutes the air would be doubly polluted; and the state of the air after a period of, say, eight hours, a normal period of sleep, would be poisonous in the extreme. Yet is this practically the state of the air that pervades the bedrooms of nine-tenths of the people of Britain

to-day. Morning laziness under such circumstances cannot be wondered at; the remark that "I feel more tired when I get up in the morning than when I went to bed at night," is actually true; the morning headaches, backaches, and want of appetite for breakfast are readily understood, and the statement that "I feel better as the day advances," is easily explained, for it takes hours to get rid of the carbonic acid gas that deluged the blood during the hours of sleep.

How is this to be overcome? First, by teaching the people that it is necessary to have a current of air from the outside entering occupied rooms during night and day, in sickness and in health, in all seasons and in all climates. Secondly, by refusing to pay the architect his fees or the builder his wages until they can prove that, just as the drains are according to plan, the entrance and exit of air is in accordance with hygienic laws. Legislation is the only means by which to ensure this being carried out, and the public health suffers seriously by want of it.

Luckily we have at hand a means of admitting air from the window which is at once available and inexpensive. The drawback to it is, that it is left to the persons occupying the rooms whether it be followed or not, and in the present state of ignorance, even amongst the educated classes, the

prejudice against the admission of air is the rule. Mr. Hinckés Bird devised a simple method of admitting air into rooms which in every way complies with the rules which ought to regulate the entrance of air. These are: (1) the air entering a room ought to be given an upward direction; (2) the current of air should be broken against the



Bird's plan of ventilation. Central figure shows board or bar beneath lower sash; the left-hand figure shows the same in section; the right-hand figure indicates how not to ventilate by the window.

ceiling, so that it does not pour down directly on the inmates; (3) the air ought to be warmed.

Mr. Bird's simple device is to throw up the lower sash of the window and insert a board lengthwise along the gap, which, when the sash is shut down

upon it, allows no air to enter below. The air now gets in between the upper and lower sashes, it is directed upwards, it is broken against the ceiling, and, by passing through the upper stratum of air in the room, is warmed before it finds its way to the lower parts of the room for the inmates to breathe. Whilst recommending a free allowance of fresh air to our rooms and dwellings, we would warn those who are inclined to follow it against imagining that the admission of air means a draught. How often do we hear the "advanced" person of to-day say, "Oh, don't close the window, I enjoy a draught!" A person making a statement of this nature, and acting upon it, is unhealthy in body and mind. Take the temperature of one who says this; I have done so many times, and found that it is always above the normal. It is only a person slightly feverish who says so; no healthy person will sit long in a draught. It is the weakly person, that is the slightly feverish person, who affects to go about in wintry weather without a greatcoat, who mounts on the top of a 'bus be the temperature what it may, and who insists upon sitting with the window of the railway carriage wide open, and the air playing directly upon him, whilst travelling at the rate of anything between thirty and sixty miles an hour. A draught kills; but the free and judicious admission of fresh air is essential to good health.

It is useless at the present time to raise one's voice against allowing men and women to work in rooms where the ventilation is imperfect, where the work during the day has to be conducted by artificial light, where the daily task is conducted in rooms below the level of the ground, where servants and other *employés* are compelled to sleep in the basement. There is no law against these transgressions of hygienic principles, and commercial necessities are stated to demand their continuance. The health of the people is not an asset in business transactions; "business" concerns itself only with the making of profits and satisfying shareholders. Human life is cheap, and philanthropy is a thing apart from business. The sharp and frequently impertinent answer returned by shop assistants can hardly be wondered at when one considers the atmosphere in which they are compelled to work; the impudence and the languid attention to duty of post-office female clerks, so often complained of, would be readily explained and pardoned did the annoyed purchaser of stamps change places for a week with one of these girls. In an office somewhere at the back of a stuffy shop, with no exit or entrance for air except through the shop, with an oil-lamp stove to supply heat and the waste products of combustion poisoning the air they breathe, the

uncongenial behaviour of post-office assistants is pardonable and easily understood. These, moreover, are Government premises, and to say the least of it the Government sets a bad example to other employers of labour. No one can be polite, can be ready to serve, or to do the work entrusted to his charge efficiently, if he is breathing a polluted and carbonic-acid-laden atmosphere. "Too old at forty" is a legend which obtains at present, and for the most part it is true. The youth of twenty, who has to work in close rooms, frequently below the level of the street, and by artificial light, will be too old by forty to do any work efficiently. The day will come when this sacrifice of health and life must be seriously considered. We could perhaps afford it once upon a time, when there was a sufficiency of country-bred folk of good physique to meet the wastage; but with the diminution in numbers of country-bred folk, and with the lowered physique which we find amongst country-reared children of to-day, the supply which we have up to now been able to command is drawing to a close.

The Effect of Large Cities on Country Dwellers—Tied Farms.

The demands of the cities have dealt a severe blow to the country dwellers and to the national

health in yet another way. The calls of the cities for milk are so imperative that the children in the country obtain their supply with difficulty or are altogether denied it. In many districts, for many miles, forty or more round London, and in a lesser degree in the neighbourhood of other large cities, the farmers are bound to hand over all the milk they produce on their farms to the city agent. This may be a profitable thing for the farmer, but how about the people in the district? Milk for the local families may be impossible to obtain, and the children have to do without and be content with tea. We hear a good deal about "tied public-houses," but the "tied farms" are a greater evil. Beer is a luxury, milk a necessity. It matters not to whom the beer-shop is leased or how it is "tied," beer is always obtainable; but the tied farms strike at the vitals of the nation, for upon the children from the country the towns rely for supplying the deficiency due to wastage of human life going on within them.

The towns, however, will soon call in vain; for in place of being robust and healthy, the children of the rural districts will often be found to be stunted and rickety and in a worse plight physically than the city children. Rickets is as common in the rural villages around London as in London itself. Milk is not to be had, the "tied farmer" is not

allowed to sell the villagers milk, and, moreover, the ruin of farming has cut down the labourer's wages to starvation point, so that he can ill afford to buy milk even were it available.

On fourteen shillings a week the labourer is expected to keep house and home together, to feed and clothe his wife, himself, and, it may be, half a dozen children. The cottage garden or an allotment patch will give some cabbages and potatoes for the maintenance of the household, and tea and bread complete the usual fare. An occasional bit of bacon may be obtainable, but there are no butchers' shops at which scraps and odd bits of meat can be obtained for a few pence as in towns. Yet this labourer is expected to supply the empire with healthy children, to stock our colonies and to fill the gaps in cities due to the waste of human life going on there. It is evident that we are burning the candle at both ends. We are sacrificing the stock in hand and cutting off the source from which alone it is possible to replenish. Farming was ruined by the introduction of foreign produce in the 'seventies, and from that date the serious falling away of physique amongst the labouring classes began.

The town-dwellers, unfortunately for the national welfare, now form the majority of the inhabitants of Britain, and the town-dwellers say they will

have cheap food, perish the countryman. The town folks return to Parliament men who support their desire, and being in the majority they have their way. The town agent will buy the farm produce at a price which barely pays the producer, and if the produce is not forthcoming there are foreign sources of supply. Rolled oats from America and frozen mutton from anywhere seem good enough for the people of Britain. In these days finely ground oatmeal and prime beef are out of date.

The rights and wrongs of the various fiscal contentions, who can pronounce upon? From the point of view of the national well-being, however, the fiscal policy which can restore to this country a population that can live on and by the soil, is the one which the public health demands.

CHAPTER V

THE PHYSIQUE OF OUR BOYS AND GIRLS

I. Girls.

A COMMON observation at the present time is that our girls are growing taller, that they are of larger frame than their mothers, and that their physique in every way has improved of late years. This is ascribed to modern methods of up-bringing, and the assumption is probably correct. But the subject, when looked into, will not bear a general statement of this nature. The fact is that the girls of the middle and upper classes are improving in physique, whilst those of the poorer classes—the masses—are declining. The young women who belong to the class of domestic servants are not improving, but deteriorating. The complaint that servant girls *will not* do the work of servants of some forty years ago is universal; but were we to change the words "will not" into "cannot" we should be nearer the truth, for it is largely a question of physical inability.

Many ascribe the change to socialistic notions, to the effects of an imperfect education, to cheap literature, etc., but it is more probably assignable to physical incompetency to do the same amount of work their mothers did in their time. The white-faced, anæmic female servants in our large towns proclaim the effect of service in unhealthy surroundings. Too often their day is spent in rooms below the street level, in basements in which sunlight is a rarity and sun-penetrated air is unknown. Their nights are spent in small or overcrowded bedrooms in which, owing to their ignorance and dread of "night air," ventilation is almost *nil*; for even a chimney is uncommon in many servants' bedrooms. The morning laziness of our domestic servants is proverbial; but it is largely attributable to the want of fresh air in their apartments; for poisoning by carbonic acid gas from the rebreathing of their own breath is sufficient to explain the morning laziness, the puffy, pasty, pale face, the morning headaches, the want of appetite for breakfast, and the demand for "beer money" as a normal part of the daily wage. The employer who requires his servants to be up betimes will gain his end more harmoniously by providing better hygienic conditions in his servants' bedrooms than by alarm clocks and threats of dismissal. Not only, however, is it the

case in towns that the women are evidently falling off in frame and appearance, but a still more serious matter is the fact that in the country also, whence many of our domestic servants are obtained, is this anæmic and pasty-faced girl found nowadays. In our country villages and districts the young women of the working class, the very backbone of our physical hopes, are deteriorating. Their school board education has had the effect of causing them to look askance at farm work. The few, the very few, who are still induced or compelled to do so, are flouted by their stay-in-door neighbours. Women used to be employed in England in the harvest-field, in the turnip-field, in the barns, at the milking of cows, and in much of the ordinary work of a farm. Nowadays this is all changed; women can hardly be induced, even by good pay, to assist in the fields during either hay-making or harvest, or even to gather fruit; in many places they scout the idea of earning money at picking strawberries, or even gathering blackberries, free to their hands on the hedgerows, so that they may make preserves for their own family, stating that they can buy these at the shops. The out-of-door employment of women in the country districts of England is largely a thing of the past, and the consequence is that we find their children are of inferior physique. Their

daughters, moreover, have not the opportunity of the physical recreations which girls of the middle classes enjoy, and in consequence the robust, red-cheeked, full-limbed country girl belongs to a past generation. The spirit of village life has changed; the pride of being a good housewife finds few exponents; home-made things, be they food or clothing, are at a discount. The modern notion is that "they can buy these things at the shops," and household work is but household drudgery. With the prevalence of such a pernicious doctrine in our midst it would seem as though the freedom granted to women by the chivalry of men has been, to say the least of it, premature. Women have used their freedom to acquire accomplishments which tend to render the home a mere unattractive lodging-house.

The statement, therefore, that our women as a whole are improving in physique requires qualification; for although this may be true of the classes, it is unfortunately the reverse amongst the women of the masses. The effect of this upon the national health must tell and is telling. The work of the country will be badly done if the physique of the labouring class is bad; the town-dweller will and must degenerate unless fresh blood is supplied from the country; but if we bring into our towns a class of people already deteriorating,

A family group of to-day. The average-sized mother, the taller and larger-framed daughter, and the insufficiently clad boy of poor physique.

the degeneracy will proceed amain, and be accelerated at a rate which it will only take a generation or two to render appalling.

The essence of the nation's physique consists of the physical fitness of the masses, for from them in course of time the classes emerge. We believe that with the girls in the better-off classes all is fairly well physically, but in the case of the poorer classes, in both town and country, the condition of the physique is not so. It is to these we must turn in future attempts to build up a healthy race; and as we have succeeded of late years with the girls and young women of the better-off class, it should be our endeavour and our hope to improve those of the masses also.

II. Boys.

There are more boys born into the world than girls, yet when adult years are reached the women outnumber the men. Boys are always considered more "difficult to rear" than girls, and the cause of this fact is difficult to ascertain.

That our women of the upper and middle classes are improving in physique generally would appear to be a fact; yet any one who observes at all cannot but be struck by the fact that the boys of even the well-to-do are not apparently improving

in similar fashion. Many assert that it is even the other way, and declare that our boys are not only not improving, but that they are not developing as they ought. How often do we observe a family group consisting of an average-sized mother, of tall, well-set-up girls, and of rather ill-developed, often weakly-looking boys.

The cause of the increased development of our girls we have discussed, but why are the boys not correspondingly improving? It is, of course, a physiological fact that girls develop earlier than boys; that a girl at twelve to fifteen is frequently taller and stronger than boys of her age, and that it may not be until sixteen or seventeen that the boy begins to indicate what the physique of his manhood is to be. That is no reason, however, for the boy appearing weakly compared with his sisters, as is so often the case. There must be something in the environment or *personnel* of the boy that causes this curious, but too frequently patent, phenomenon.

Boys' Clothing.

The difference of the physique of boys and girls cannot be due to food or lodging, for the members of a family are usually fed and lodged alike. Nor is it owing to out-of-door exercises, for boys have still

more of open-air life than have girls. Can it be in clothing? Quite young boys and girls are not clothed alike as heretofore. At an earlier age than used to be the case boys are taken out of frocks and put into "suits." A "sailor suit," made of thin serge for winter and cotton for summer wear, is affected by the majority, and the under-clothing consists of close-fitting "combinations," reaching but a short way down the thighs. This is an insufficient covering for a growing boy. The young girl is usually much more suitably clad: her loins and abdomen are kept warm by virtue of the petticoats, frock, etc., she wears, and there is nothing to complain of as to the amount of *her* clothing. Not so with the boy of to-day; when two and a half or three he is put into a "suit" which gives little warmth, especially around the waist, where warmth is essential. Forty years ago it was not so; boys were not put into "suits" until a much later period; their dress until the age of six or eight was practically the same as girls. All this is, however, changed, and our boys when mere infants are now clad in garments which, when actually weighed, show that girls are given much heavier and therefore more ample clothing than are boys. Boys insufficiently clad look pinched in feature; they appear starved, and by comparison with girls' clothing they actu-

ally are so. The modern mother is anxious to see her infant boy look a "little man"; she is anxious to "harden" her child. A most unfortunate thing is this "hardening" fashion of to-day. Infancy is not the period for hardening children, nor is it to be accomplished by an insufficiency of clothing. Give the boy a well-grown frame, and he will stand "hardening" later. The carefully forced plant will develop out of doors and harden off when it has attained a certain stage of growth, but it will only shrivel and wane if it is transferred from the forcing pit and exposed to the spring frosts at too early a period. Keep the child warm is the one great secret of rendering children healthy, but with skimpy "sailor suits" or such-like insufficient clothing this cannot be done. Without, however, dealing further in theories, let us come to actual facts and figures.

Weigh the clothing of a girl between the ages of four and ten years and that of a boy of corresponding age, and note the result. The girl's clothing, will be found to weigh nearly double that of a boy of the same age. Either the girl has too much clothing, or the boy too little; or there must be a difference in the "constitution" of boys and girls if both are satisfactory. The girls, however, are, we know, growing well, but

the boys are not thriving. The "sailor suit" at two and a half or three years is a recent innovation, and the rather puny young boy of to-day came in with the change. After numerous observations, and actually weighing the clothing of many children of both sexes, the writer has arrived at the definite opinion, that, except in very hot weather, in this country the weight of clothing for children ought to be 1 lb. weight to every stone weight of the body. The clothing of most of our young boys will be found far short of this and quite inadequate. Take the case of a girl weighing 3 stones; her clothing is usually about 3 lbs.; a boy of the same weight and "sailor suited" has usually but $1\frac{3}{4}$ lb. weight of clothing —a markedly inadequate amount. An insufficiently clad child cannot thrive, cannot be "hardened" without danger to his growth or his life. In a recent book, *Erchie*, by Hugh Foulis, many of the follies of the day are cleverly hit off, amongst others the "hardening" process. Describing "Duffy's" family and the way they were brought up, Mr. Foulis makes Erchie say: "Duffy's notion was to rear a race o' a kind o' gladiators. . . . His son was washed every morning, winter and summer, in cauld watter in the jaw box, and rubbed wi' a towel as coorse as a carrot grater till the skin was peelin' aff his

back. . . . The son was fair on the road for bein' an A1 gladiator, but he went and dee'd on Duffy." A good many of the children of to-day do "dee" (die) of the "hardening process," or are permanently stunted in their growth. Not only is the boy's dress insufficient, but it is especially so in that part of the body which requires above all others to be kept warm, namely, the loins and the abdomen generally. The girl's dress affords her ample covering and warmth round the loins; not so the boy's. The sailor blouse (the coat?) reaches but to the top of the knickerbockers; there is no warmth by lining or kilting to the top of the trousers or knickerbockers, and the boy's loins and abdomen are insufficiently wrapped. In former days the boy wore a frock and petticoats, whereby his loins were kept warm, but the introduction of "manly" dresses for boys, when but little more than babies, has unfortunately pushed out this healthy dress and injured the physique of young boys.

Any of my readers who will turn to the *Graphic* of 6th December 1902 will see at page 760 a picture of a properly dressed child.[1] He has the best and most sensible of mothers in the land, for she is none other than H.R.H. the Princess of Wales. The young Prince is dressed in a kilted skirt, the perfection of dress for a boy of his age. The

[1] See frontispiece.

pleats in a kilted skirt run right up to the waist and encircle the body as a wide band an inch or more in thickness, just where warmth is imperative. The kilted skirt, or its fellow the kilt, is the best dress for young boys; it serves to bring the weight of the boys' clothing up to the standard of the girls', and to keep the body warm round the loins. Were the mothers of the country, in all grades of society, to follow the example set by our royal family in this as in other features of family life, it would be well for the nation.

The Eton Jacket.

The "uniform" schoolboy jacket "served out" at our public schools has influenced the fashion amongst those outside the jurisdiction of these institutions. It is an unfortunate fashion, for the Eton jacket is a wholly unhygienic garment. It ceases just where warmth is wanted; and were one of the masters to wear this form of jacket for twenty-four hours, his pupils would have a holiday on the following day, for he would be laid up with rheumatism, lumbago, congested kidneys, or some other form of illness due to catching cold. Discipline for the young is no doubt imperative, and even the wearing of clothing of a particular pattern may be defended as a phase of discipline; but

A BOY SUFFICIENTLY CLAD.

when the uniform insisted upon is detrimental to health, the sooner it is done away with the better. Traditional use does not justify retaining the unhygienic Eton jacket, and perhaps a man of sufficient strength of purpose will arise from among the heads of our public schools, at an early date, and set his face sternly against this apology for a jacket. The Norfolk jacket should be introduced to supplant the Eton, so that our boys may have ample clothing and be kept warm around their loins. The public school that will introduce, as a "uniform," the Norfolk, in place of the Eton, jacket will thrive at the expense of its neighbours; for no one who has thought at all about the subject will allow his or her children to be submitted to the present ordeal.

Braces.

The physical evils of the "joined" brace.

The brace worn by our fathers consisted of separate straps; nowadays the straps are united behind by a variety of mechanisms as far as the back of the neck, and from this purchase point the brace is brought forward over the shoulder and down the front of the chest. With tall lads or men the effect upon the chest is not so

pronounced, but with average-sized boys or youths, and more especially those of short stature, the braces, to perform their function as suspenders, have to be pulled so tightly that to straighten the back or to expand the chest fully is an impossibility.

The unhygienic or joined brace.

The hygienic or separate brace.

Here is a back view of a boy wearing the "joined" brace, and the evils consequent upon its use are patent at a glance. The braces are so tightly pulled up that there is even a kink on the right side brace, and the parting of the braces

presses on the neck, causing the boy to stoop and to poke his head forward.

The relief experienced by the youth, whose back is here photographed, when the separate brace was substituted for the "joined" brace, was sufficient to cause him to forswear the latter for the future.

It is impossible for any one wearing a brace of the kind to stand erect with the shoulders "squared." Youths bending over desks all day at lessons, or in commercial houses, are notoriously apt to be round-shouldered; and when across their shoulders are straps, completely preventing them straightening their backs, the result causes them to permanently stoop, renders chest expansion impossible, and acts as a check to breathing. The braces joined behind is a modern invention, it is said to be necessary owing to the old-fashioned separate brace slipping off the shoulders, and one can readily believe it; the "fine-drawn" citizen of to-day has not sufficient breadth of shoulder to keep the brace in its place, and what is worse, he continues to wear a form of brace calculated to prevent his shoulders ever growing wider. That modern atrocity, the high stiff collar, came in shortly after the united brace, and was probably due to the latter, for the poking forwards of the head and chin, and the stoop caused by the brace,

had to be counteracted in some way, and the high stiff collar was devised in an attempt to keep the head up—a natural sequence on evolutionary lines.

The separate brace is difficult to obtain; the shopkeeper does not "stock it," as it is out of fashion, and we are at his mercy, as we are in regard to a number of other articles of bodily wear. Were we to think a little more, and take a little more interest in our immediate surroundings, we would be less at the mercy of the persons who take upon themselves to dictate what garments we are to wear, what boots and shoes are best for us, or what form of hat is least likely to cut off the blood supply to our scalps and so prevent baldness. We have yet to learn that neither the haberdasher, the shoemaker, nor the hatter are the ultimate hygienic authorities in the land.

It is to be hoped that this condemnation of the joined brace, and the difficulty of obtaining the separate brace in the shops, will not drive our young men to adopt the elastic belt to supply its place. The brace may be bad, but an elastic band round the loins is infinitely worse. During athletic exercises there is a proper place to wear the belt, namely, round the body *below* the level of the top of the haunch bones; but, as in ordinary

attire this would bring the belt to show below the waistcoat in front, it is impossible to wear it in everyday attire. A belt worn between the last rib and the top of the haunch bone—that is, round the loins—presses upon the abdomen in a hurtful fashion, and in a short time causes an alarming and serious train of evils.

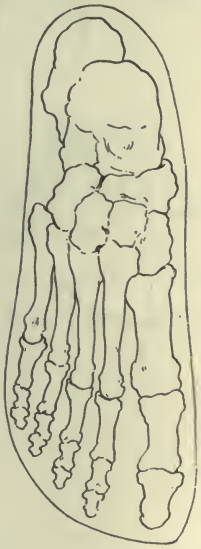
Boots and Shoes.

Boots and shoes have perhaps more to do with efficiency than any other part of our dress. The high heel is bad enough, but when we place the centre or point of the boot opposite the middle of the foot, seeing that the most lengthy toe is the big toe on the inner side of the foot, it is an outrage against nature for which we must suffer. Shoemakers must have originally learned to make boots and shoes for a being differently constructed from historic man, for we have no evidence of any race of men capable of wearing modern foot-gear with impunity. The big toe is the all-important factor in walking, and its displacement and partial dislocation, owing to its being pushed towards the centre of the foot, impairs its action, and reduces the powers of taking walking exercise. For soldiers to march well is the very essence of their existence, and to civilians to be able to walk well

is essential to good health. It is surely time, therefore, to cease deforming our feet at the bidding of ignorant men and perverse fashion, and to insist that every shoemaker should be properly taught the anatomy of the organ he provides covering for.

Some few of the more intelligent master boot-makers have insisted on their *employés* studying the human foot, with the result that they are extensively patronised by the more thoughtful. Unfortunately, customers who have thought for themselves are few, and those shoemakers who have taken pains to study the shape of the foot are driven to supply the people with boots and shoes of a shape which they know to be unhygienic, in order to live by their trade. Ready-made boots and shoes are accountable for much of the deformity of the feet we see; in our fathers' time boots and shoes were always made to measure, but now we have "sizes," and we have to model our feet to fit the shoe, and not the shoe the foot. Most families have traditions that the overlapping of a certain toe across or beneath another is due to a family peculiarity and is unavoidable. This is, of course, an attempt to exonerate themselves from any suspicion of their boots not fitting them — an aspersion which every one resents, from the lady who wears the tiniest of shoes on a foot of, it

may be, more than ordinary size, to the long-drawn point of the modern American shoe in its attempt to fit the feet of that section of men who are weak-minded enough to wear it. At



By permission, Messrs. John Bale, Sons, & Danielsson.

Bones of a normal foot outlined in properly shaped boot.

Bones of a distorted foot outlined in a boot with point in centre.

the present moment the young mothers of the well-to-do class are in an anomalous position; they wear the smallest sized shoes they can get their feet into, and, at the same time, a few of

those who affect "advanced teaching" compel their children to go about without shoes and

Distorted foot from badly fitting boot.

Distorted foot in narrow pointed boot.

Naturally shaped foot in relation to narrow boot.

stockings, or with sandals merely. When we look at the small shoe of the mother, and then at the

Foot of Chinese lady, 2½ inches long, produced by bandaging in infancy.

bare, natural-sized foot of the child she parades beside her in the street as a show figure to her neighbours, one wonders if a small foot or a small shoe is a necessity for admission to "society"; or how her daughter with her naturally developed foot is ultimately to get it into a shoe of the small size her mother affects, and

Naturally shaped foot in boot with surplus room.

Naturally shaped foot in properly shaped boot.

which "society" dictates. Will the girl thank her mother for her natural-sized foot when she grows up? Perhaps by then fashion will have changed and a properly fitting covering to the foot become the order of the day. It is curious that whilst at one extremity of the Eurasian continents, the Chinese mothers devote their attention to reducing

their daughters' feet to the most minute proportion —some two and a half to three inches long,—some fashionable British mothers at the other extremity are allowing their children to go barefooted. Nature intended the foot in colder climates to be protected, and it is quite possible to have the foot covered without causing distortion. We are quite aware that in Scotland in summer-time children (used to) go barefooted by preference, but we have never seen even the hardiest among them condemned by frivolous mothers to brave wintry weather without shoes and stockings. The sacrifice of a few children's lives may not be in vain, if it but induces parents to see that children's boots fit them, and perhaps we ought to be thankful to those English mothers who willingly sacrifice their infants at the shrine of theory for the nation's ultimate good.

There are several other articles of apparel which might be mentioned as being wholly detrimental to our frames. The writer has purposely omitted dealing with women's dress; the reason is obvious.

CHAPTER VI

PHYSICAL ENERGY AND ITS EXPENDITURE

Measurement of Energy.

The method of estimating the amount of work done by the body is by ascertaining the force required to raise a given weight for a given height. Thus the force required to raise one pound to the height of one foot is called a "work unit," and the force expended is called a "foot-pound." On the same basis of calculation the force required to raise a ton one foot from off the ground is termed a "foot-ton." Now the total amount of force daily expended by a man weighing 11 stones (154 lbs.) is estimated at 3400 foot-tons, and the expenditure of this enormous force is relegated to three channels of output, namely, (1) internal work; (2) the production of heat; and (3) muscular work.

(1) Internal Work.

By internal work is meant the energy expended

by the organs (viscera) of the body concerned in digestion, circulation, respiration, nervous energy, absorption, and excretion generally. These perform an enormous amount of work, sometimes termed Internal or Visceral work, but more technically "metabolism." For the most part this force is passively expended, but the enormity of the work performed can be gauged when one thinks of the ceaseless activity of the heart and blood-vessels, of the uninterrupted act of breathing, of the movements of the stomach and intestines, and of the expenditure of nerve force. In all, the total amount of energy expended on internal work by a man weighing 154 lbs. is estimated at 260 foot-tons every twenty-four hours. This leaves 3140 foot-tons to be expended in the production of heat and in muscular work.

(2) The Production of Heat.

Heat is produced by every muscular act, by the chemical changes taking place in every organ and tissue of our bodies in the process of their functional activity. Heat is lost or given off by our bodies, by way of the skin, the lungs, the kidneys, and the bowel. The two first mentioned are by far the most important eliminators of heat, the skin being the most active of all. In providing for the

production, the maintenance, and for supplying the loss of bodily heat, it is calculated that no less than 2840 foot-tons of energy are spent daily. The conversion of "units of heat" into units of foot-pounds is based upon elaborate calculations, whereby it has been proved that to raise the temperature of water 1° Fahrenheit, a force equal to that expended in raising one-third of a ton one foot off the ground is required. Were we to apply this law to explain the temperature of our body, which is about 98½° (actually 98.4°) Fahrenheit, we should find that about 30 foot-tons of initial expenditure would be all that is required; but this makes no provision for the maintenance and expenditure of body heat. When, therefore, the amount of heat lost to the body is taken into account, it will be found that no less than 2840 foot-tons of energy are expended daily. In the colder climates more heat is required to be produced and to be conserved, hence the necessity for foods that supply the greatest amount of heat to the body, and the reason for wearing warmer apparel to prevent the too ready escape of the body heat from the skin by radiation. It is thus seen that of the 3400 foot-tons of energy daily expended, Internal work and the Production of Heat, or what may be termed the passive energies, have together absorbed 3100 foot-tons of the

whole, leaving but 300 foot-tons of energy to be accounted for.

(3) Muscular Work.

External or mechanical movements, usually termed muscular work, amount in a man of average weight, performing a moderate day's work, to an expenditure of about 300 foot-tons. This, of all the means of expenditure of force, is the most variable, for it is directly under the control of the will, and is therefore distinct from the more passive forms of expenditure hitherto dealt with. On the management of this expenditure greatly depends our bodily health and our physical efficiency. When the energy is not expended, the whole of the body gear is thrown out of order: the muscles become soft and fatty; the heart impaired in action; exercise becomes more and more a difficulty and a labour; and the unexpended energy, like a restless prisoner, determines to escape by bypaths and by channels not consistent with health. The expenditure of muscular force in marked excess of the 300 foot-tons, on the other hand, must be injurious; so that, whether the amount of energy put forth falls short of or exceeds a just and due proportion, each is prejudicial to health and long life.

The amount of energy expended in walking a

mile, on a level road, by a man weighing 11 stone, and without such impedimenta as are carried by a soldier on the march, is calculated to be equivalent to raising 17 tons one foot from the ground, that is, 17 foot-tons. Were the man's daily expenditure of energy merely walking, it would be necessary to walk some 18 miles daily, or, in other words, he would have to walk about five hours daily, to be kept in health. But from the hour of getting up in the morning until going to bed at night the available muscular energy is being expended in a great number of ways. The act of dressing, getting up and down stairs, going to and fro to work, the muscular force expended at even so-called sedentary occupations and in the ordinary avocations of life, consume a considerable amount of the available 300 foot-tons, so that the amount of force and the time to be spent in bringing the average up to nearly 300 foot-tons is markedly lessened; by how much will depend very largely on the nature of one's occupation. Before dealing with the various methods of expending energy, or gaining exercise by games and sports, etc., it is necessary to consider food and the energy it gives.

Food and the Energy it Produces.

The next important question is: How is the

balance between the amount of food required to generate and maintain the necessary bodily energies, and the energies themselves to be ascertained? in other words, how much food does the body require? Most people settle, or attempt to settle, this question for themselves, and consume the stereotyped foods which custom and experience have shown to be most conveniently available. Some eat too much, a few too little, and it is well to point out that scientific investigations are able to guide experience on this point as on many others. Details of the investigations as to how food is developed into energy in the body are beyond the scope of this short monograph, and a mere outline will be attempted on lines as free from technicalities as possible. The relationship between motion, heat, and energy has been already discussed, and it is perhaps sufficient to state that the energy afforded by a given amount of food has been carefully calculated. The process of investigation has been conducted after the following fashion:—A given quantity of dry albumen (albumen deprived of its water—the most typical albumen (moist) known is the white of egg), when burned in an atmosphere of pure oxygen, engenders a given amount of degrees of heat; these have been carefully observed and calculated, and constitute what is technically termed the "units

of heat." We have already seen how "units of heat" are converted into "units of motion," and we are therefore in a position to state how much of a given quantity of oxygen is necessary to produce a given amount of "units of motion." It has been found that—

1 gr.	dry albumen	yields about	923	foot-pounds	energy.
1 gr.	,, fat	,,	1847	,,	,,
1 gr.	,, starch	,,	781	,,	,,

Three grs. dry albumen, fat, and starch therefore yield about 3551 foot-pounds energy. But 7,616,000 foot-pounds (=3400 foot-tons) is the total amount expended; we have therefore to multiply the above numbers by 2144 (approximately) to get the total quantity of grains of dried food to satisfy the bodily energy.

2144 grs.	dry albumen	yield about	1,978,912	foot-pounds.
2144 grs.	,, fat	,,	3,959,968	,,
2144 grs.	,, starch	,,	1,674,464	,,

Therefore 6432 grs. albumen, fat, and starch yield about 7,613,344 foot-pounds, or 3388 foot-tons, of energy, *i.e.* within 12 foot-tons of the total 3400 expended.

But food is not taken in the "dry" state, but as the flesh of animals, as vegetables, etc., so it is necessary to give a table showing the amount of energy derived from the food we eat, which con-

tains the albumen, starches, and fats in the form nature presents them. We find—

Food.	Amount.	Energy Produced.
	lbs. oz.	foot-tons.
1. Flesh	1 0	880
2. Bread	1 8	1340
3. Butter	0 1½	420
4. Potatoes or other vegetables	0 12	456
5. Milk	0 9½	79
6. Sugar	0 1	275
Total . . .	4 0	3450

that is, 4 lbs. mixed diet give 3450 foot-tons of energy.

Another method of calculating the amount of food required is to estimate the Waste that takes place in the body. The two most important elements in our food are nitrogen and carbon. Nitrogen and carbon are supplied by albuminous or nitrogenous foods, that is, by all the tissues and products of animal and vegetable life. Albuminous substances such as flesh do not contain carbon and nitrogen in the proportions suited to our wants; thus, were we to attempt to live on flesh alone, we should have an excess of nitrogen in our diet. So, on the other hand, were we to try to live on products of the vegetable kingdom

alone, we should have too much carbon in our diet. A mixed food is therefore necessary, and instinct has led us to choose our food and to regulate our diet in accordance with our bodily wants.

It is found that of the 4500 grs. of solid matter excreted by an adult, 4000 grs. consist of carbon and 300 grs. of nitrogen. The question therefore resolves itself into providing a diet yielding these quantities in due proportion. Analysis of a full diet shows that 4 lbs. of food such as we are accustomed to eat, give the following results :—

Food.	Amount.	Nitrogen.	Carbon.
	lbs. oz.	grs.	grs.
1. Flesh . . .	1 0	160	1024
2. Bread . . .	1 8	120	1676
3. Butter . . .	0 1½	.3	450
4. Potatoes, etc. . .	0 12	12	588
5. Milk . . .	0 9½	10	100
6. Sugar . . .	0 1	0	187
Total . . .	4 0	302.3	4025

This diet yields practically the 300 grs. of nitrogen and the 4000 grs. of carbon necessary to supply the bodily waste in the form of excreta.

By combining the table showing the quantity

of food necessary to make good the waste and that necessary to supply the energy required, we find the following diet appropriate in almost every particular:—

Food.	Amount.	Nitrogen.	Carbon.	Energy Produced.
	lbs. oz.	grs.	grs.	foot-tons.
1. Flesh .	1 0	160	1024	880
2. Bread .	1 8	120	1676	1340
3. Butter .	0 1½	.3	450	420
4. Potatoes, etc.	0 12	12	588	456
5. Milk .	0 9½	10	100	79
6. Sugar .	0 1	0	187	275
Total .	4 0	302.3	4025	3450

It will be seen therefore, from the above table, that the amount of food required and the expenditure of energy are not fanciful or popular notions, but can be stated with almost mathematical exactitude. To attain health, therefore, it is necessary to take food in such a form that the waste is appropriately repaired, and that the expenditure of the body energy is provided for.

The one point which above all others concerns us, is the expenditure of that energy which is under the control of our own will, namely, the muscular work, estimated at 300 foot-tons; as

all other forms of expenditure are more or less independent of our will-power. According as these 300 foot-tons of what may be termed working energy are expended, so will the body be healthy or unhealthy, and the individual be physically efficient or not. The proper expenditure of this energy constitutes the basis for all systems and forms of exercise. The labourer, be he bricklayer or farm hand, disposes of this force in his daily employment; the soldier on the march, the sportsman at a day's shooting, expend the full amount, or may exceed the limit; but the merchant, the clerk, the tailor, the student, and professional men from their enforced sedentary lives, from the nature of their employment, are not called upon to expend this stored energy, and consequently if health is to be maintained, exercise, by which is meant artificial muscular work, must be taken. In Great Britain we encourage our youths to take their exercise in the form of field sports of various kinds, for "going a walk" is an unattractive form of exercise for young people. "Walks," however, become the habit of the older members of the community, partly because the active exercise required in most sports becomes impossible owing to "loss of wind," and partly because experience teaches them exercise is a duty requisite for the maintenance of

health. It is necessary, therefore, to discuss these exercises in some detail.

The Effect of Foreign-grown Foods upon our Physique.

Another aspect of the kind and quality of the food we eat, which may, however, be considered of a fanciful nature, may or may not have to do with physique or with national character. It may be taken as an axiom that man in his physique and national characteristics is an expression of his environment.

The country-bred man fed upon the produce of the land around him is truly a product of the soil on which he lives and has his being; the vegetables are from his own garden, the beef and mutton he consumes are obtained from the animals native to his district, and all his food and drink are, or may be, local products. How different is the case with the town-bred, and more particularly with the London-reared, dweller. His food and drink are derived from far-afield sources. The flour for his bread is probably American, his eggs are possibly French, the bacon he eats is likely imported from Chicago, butter from Denmark, beef from Argentine pasturage or from some "foreign" source, tea from

China, coffee from Brazil, sugar manufactured from beetroot grown in France or Germany or from Jamaica cane, imported fruits from the utmost ends of the earth, and wines from the vineyards of Southern Europe, Australia, California or the Cape afford him sustenance. There is little British in his composition in a physical sense. Mentally his efforts are mainly directed to the newspapers, and the pabulum for his consumption is mostly concerned with foreign politics and the doings and opinions of every country under the sun. The same town-dweller, who interests himself acutely in world-wide questions, is frequently at a loss if he is suddenly asked to state in what parish he lives, or the name of his representative in Parliament. Which is his parish church, and what is the name of his parish clergyman, may not be known to him. Environment has little to do with his existence; his body is mostly composed of materials derived from any source except British. Appeals to his patriotism have another basis than in times gone by when the Briton was the product of British pastures. Henry the Fifth's words, "And you, good yeomen, whose limbs were made in England, show us here the mettle of your pastures," bear no meaning to the "frame" of the modern Briton.

This may be all for the best, it may fit our

minds to be non-parochial; but that rolled oats, beef from an animal in Germany, or elsewhere on the Continent, which has pulled the plough for many years, and only been condemned to death and the British market when beyond its work, canned foods, tinned milk, and frozen mutton are conducive to the highest physical development is not in accordance with physiological teaching or common sense. Nor is this the case in towns only, for in the country houses and cottages in the heart of England the table is spread with imported, and therefore inferior, foods. All this may seem fanciful at first sight, but British-fed animals have no superior; the products of these islands, whether animal or vegetable, from the nature of the climate and soil, are unexcelled, unequalled, and, although with imported foods we may appease our hunger, the "mettle of British pastures" is wanting, and inferior articles of food will produce inferior tissues and frames. Physical deterioration and consumption of foreign-grown foods came in together, about thirty years ago, and it is possible the inferior quality of the food we now consume may have directly to do with our falling off in physique. British prowess cannot be maintained on the dumped refuse of the Chicago slaughter-houses canned for British consumption.

Alcohol.

From earliest times alcohol in some form has been known to and consumed by man; and there are few, if any, of the most primitive races of later times amongst whom a native alcoholic beverage is unknown. Although alcohol and alcoholism were in evidence before the days of Moses, abstention from it is not one of the ten commandments. It would perhaps have benefited the world if such had been the case, for to alcohol are ascribable many social and physical evils. The form in which alcohol is taken varies according to latitude and with custom. In the countries lying to the north of Europe — Scotland, Scandinavia, and Russia—spirit is the principal form in which alcohol is taken; in countries immediately south of these —England, Holland, Germany, and Hungary— beer is the chief drink; whilst in the more southerly countries of Europe wine is consumed. As a rule, in all parts of the world, the potency of the alcoholic beverage weakens as we approach the tropics. Spirit-drinking, however, has in recent years gained ground, and has, in our tropical colonies especially, supplanted most other forms in which alcohol is consumed. The effect of alcohol upon the health of a people is a large question and impossible to be dealt with fully

here. It may be stated, however, that the more strenuous peoples of the world drink alcohol in some form, including the northern Chinese and the Japanese, and it so happens that the strenuous nations are at present the more northerly. This does not prove that alcohol-drinking and physical and mental energy are in any way allied, for the energy would in all probability have been with these people had alcohol never been known. The cause of their present position is ascribable to other factors, and there were great nations at one time farther south, amongst whom alcohol played no part. One effect ascribed to alcohol is the prevalence of gout amongst us. It is usually assigned to the fact that, in the time of our immediate ancestors, port-wine drinking prevailed to an inordinate degree amongst the well-to-do. One curious result has been that, because the drinking of port was possible only for the better-off classes of the community on account of its expense, at the present day the prevalence of "gout in the family" is regarded by many with something akin to pride, inasmuch as the "family taint" betokens well-to-do ancestors. This is certainly all the benefit the "taint" can claim, for gout and its complications cause many ailments, and are prolific in the production of racial infirmities. Gout is responsible for the birth of

many children of a weakly and degenerate type; it is the cause of much of the sterility so common at the present day amongst the wealthier classes, and explains in many cases how families high in the social scale so frequently have no direct heir to their titles or estates.

The effects of alcohol upon the individual are of some consequence to the State, but the condition of the children of a drunkard has a direct bearing upon the public health. A child begot by a father in a state of chronic intoxication, or a child born of a mother who is a chronic alcoholic, is as a rule both mentally and physically deficient, and children so begotten fill our lunatic asylums and our prisons. It is in this sense that alcohol becomes a tax upon, and proves detrimental to, the public health of the country generally, and it is the duty of the State on behalf of the national welfare to interfere. How, when, and with whom to interfere is a difficult question. A drunken man reeling homeward in the street is the vision the abuse of alcohol presents to most minds when the evils of drink are spoken or thought of. Unfortunately this easily recognised evidence of the effect of drink is not the most serious from the public health point of view. The man who occasionally gets drunk is seldom a chronic drunkard; the Scottish farm servant who gets

drunk once or twice a year at the feeing (hiring) market, does not as a rule touch alcohol, except on the one or two days mentioned, during the whole course of the year. As a class they are the most temperate in this country, and the physique of their children proves them to be so. It is the chronic alcoholic, not he who occasionally drinks to excess, that constitutes the danger to the public health. His tissues are bathed in alcohol, yet is he not seen to be drunk in the generally accepted notion of that state. He is not "had up" for being drunk, because he does not reel about in the street, yet is he the evil factor in the country's stock in trade, so far as drink is concerned. Individually he is a useless member of the community, but unfortunately his evil habits do not end with him. He leaves a legacy of worthless children to the nation, who prove a drain upon the public purse, or upon private charity. It is impossible to positively state what constitutes a drunkard. Every one, however, will allow that the man who drinks before breakfast—and many do so—is a chronic drunkard. The man who drinks a bottle of whisky during the day—a not uncommon quantity —is a chronic drunkard. Yet is whisky a slow poison, for it takes about twenty years for a healthy man of, say, thirty to kill himself with

whisky, at the rate of a bottle a day; it is unfortunate it should be so, for such a man begets degenerate children.

These instances, although common enough, mark the extreme in regard to the consumption of alcohol. The next rung in the alcoholic ladder is the man who requires alcohol about 11 a.m., and who once started continues to take indefinite quantities during the rest of the day. This class of man constitutes the most common type of tippler; he maintains himself in a state of slight exhilaration during the day, and is therefore a chronic alcoholic, and his progeny will be degenerate. The so-called "night-cap" is a dangerous form of drinking. To go to bed slightly exhilarated, that is in the first stage of drunkenness, is a pernicious custom. The "night-cap" is taken to obtain sleep, which may come immediately on going to bed, but it is the sleep of partial intoxication, and therefore generally short-lived and unrefreshing. No one should go to bed until about one hour at least after taking the "last drink"; if he does, he is laying the seeds of kidney trouble. To lay down "rules" concerning the quantity of alcohol to be consumed with impunity is not likely to do any public good. Alcohol in any shape is not a necessity for a healthy person. The man who requires alcohol

to "keep him up to his work" or "up to the mark" is a physiological bankrupt, and his days of healthy life are few in number. He had better seek a less trying employment, if it is really the case, which it generally is not, that he requires alcohol to enable him to finish his day's work. The man who is not absolutely a total abstainer will live longer, will enjoy health in advancing years, and will beget healthier children if he confines his alcohol to a glass of whisky, or a couple of glasses of beer, or a glass or two of light wine with his evening meal. These quantities may do no harm, but they are not necessary to good health. The present legislation in force in regard to the drinking habit is useless from the public health point of view. Locking up a few men found drunk in the streets has merely the effect of preventing disturbance of the peace; it does not strike at the root of the evil, for, as we have seen, the chronic alcoholic, the persistent tippler, is the real danger to the health of the community, but for him there is neither punishment nor restraint provided by law.

CHAPTER VII

INFANT FOOD AND FEEDING

THE natural food of an infant is its mother's milk, all other foods are artificial and unnatural: cow's milk is *not* the natural food of babies, although we seem to have drifted towards accepting it as such. Cow's milk prepared in various ways, "humanised," "sterilised," "from one cow," etc., has, unfortunately for us, come to be looked upon as the normal food of infants; and when to the prepared milk is added some one of the many advertised infants' foods, it can only be viewed with sadness and regret that nature is being set at defiance. We are, however, told that it is impossible for most of our women to feed their infants, that they have tried and failed, and that artificial feeding is a necessity. In a generation or two it will perhaps be really impossible, if women continue to neglect their duties. Want of use of any organ or any part of our bodies will no doubt in time breed a race in which that organ will lose its functions, and, in the case of the

modern mother, the function of the organ upon which the natural rearing of children depends, stands a good chance of becoming effete. Physical efficiency of the mothers of the country to rear their children as nature intended them to do, is imperative if the physical standard of the people is to be maintained; without it all else is but vain endeavour; no amount of wonderfully prepared artificial foods can take nature's place; no amount of gymnastic exercises in after life can compensate for the loss of natural food for the infant. We may attempt to improve the wrecked physique by artificial means, but we can never make up to the child what the mother through selfishness has denied it.

No class of women have betrayed their trust more emphatically than has the modern trained monthly nurse. Many—not all, fortunately—of them urge the mothers to give up nursing their children. It may be that these nurses, being wise in their generation, say what they think their employer for the time being would wish them to say, and so between them the child is condemned to "the bottle," from which milk of a kind, "thickened" with some advertised infant food, is imbibed. The medical man is not responsible for this culpable teaching; the trained —and I put emphasis on the trained—monthly

nurse is the author in most instances of this recommendation to give up feeding the child. The mother is told it is not considered "good form" to feed her baby; that no ladies in "society" do so, and that she is "not strong enough" to attempt it. A viperous doctrine taught by women who are not themselves mothers, and it is hoped never will be. It is time we had a State registration for nurses, so that we could deal with persons of this type, who are hurling our nation to destruction by encouraging inefficiency in the mothers of our land. The basis of this teaching is again selfishness on the nurse's part; she cannot get complete control of the child if the mother plays her part; but once freed of the mother's "interference," she can feed the child when she likes and how she pleases; the present moment concerns her, not the child's future.

Artificial Foods for Infants.

On every street hoarding we are met face to face with an advertisement announcing the benefits of this or that infants' food, and with a picture of a baby whom the proprietors seem to imagine represents a thriving child. The child is pictured as plump and fat as a prize

over-fed animal. The over-fed animal, however, is not the specimen one would select as representing the healthy type of its class, no more is the baby depicted on these pictures. The subsequent history of such children is not recorded; but, to say the least of it, the extensive use of artificial foods has not perceptibly reduced the mortality amongst very young children.

The writer had occasion to gather information from manufacturers or their agents concerning prepared infants' foods. The point at issue was, at what age should these foods commence to be given, and what was the practice of the manufacturers in regard to advising purchasers on this point? Circulars with specimens of many foods were sent and pictures of fat children. One firm, and one only, of those applied to did not write, but the representative of the firm called and explained matters. This firm was quite well aware that mothers and nurses gave these foods at too early an age, but they did not care to put this in their advertisements. The representative of the firm agreed that no infant should be given any form of artificially prepared food until it had attained the age of five or six months, and said, when selling the food, they told their customers so. One step only was wanted to complete the honesty of this endeavour, and

that was to state the age the food should be taken in their advertisement and on their labels. Of course, had this firm done so, their custom would have passed into the hands of other traders whose purpose was to sell their food, not to preach hygiene to the people. Why should these foods be withheld until the fifth or sixth month of infant life? Because the child has not yet developed the necessary secretions whereby their ingredients can be digested. A child is not born with all its physiological functions a-going. Tears are not secreted until over a week after the child is born. The secretions of the pancreas, by which starchy and other materials are largely digested, are not in evidence until some five months after birth, and consequently these artificial foods cannot be assimilated. Before the fifth month artificial infant foods are a useless waste of money on the part of the parent, and a standing danger to the child. Some live through the ordeal, and they are puffed and pictured, but those that are below the sod tell no tales. The food for an infant is its mother's milk, and the only reason for any other being used is the physical inefficiency of the mother to feed it.

When artificial food has to be supplied it should consist of—During the first month, one-third cow's milk and two-thirds water; during the second

month, one-half cow's milk and one-half water; during the third month, two-thirds cow's milk and one-third water; after the third and until the end of the sixth month, milk only. Subsequently other foods may be given, gradually increased, even "prepared infants' food," if preferred, or bread or rusks, the yolk of an egg or gravy of beef occasionally.

In regard to the quantity of food to be given, the baby's stomach and the wants of its system are the best judges; the infant should leave off of its own accord. The baby also best knows when it is hungry, and no precise rules, laid down by "trained" monthly nurses, should be permitted to cause children to suffer the pangs of hunger because the nurse's "system" as to times for feeding is being interfered with. A baby cries for one of two reasons, either because it is hungry, or because it is in pain; if supplying it with food does not allay its crying, the cause of its pain must be sought for and dealt with.

The Infants' Comforter.

Of late years a chief part of the equipment of a baby seems to be a solid india-rubber teat or "comforter." It is a recent introduction, and one of the most deleterious and destructive to health

perhaps ever invented. Out of doors and indoors, whether at rest or at play, when crying to quieten it, and when quiet to keep it "good," the comforter is for ever in evidence. Every man and woman who has thought at all, knows that sucking a solid teat is deleterious to health, but most parents and nurses only smile when remonstrated with upon their children using it.

The evil effects of the prolonged use of the "comforter" are not temporary merely; they continue throughout life, causing a permanent deformity of the mouth, of the nasal passage, and of the air passages generally, frequently inducing many collateral deformities and disfigurements, resulting in conditions difficult to remedy and incompatible with robust health.

It may seem the mere froth of a faddist to deal with this subject seriously, but, at the risk of being classed with such, the writer ventures to draw the earnest attention of parents and nurses, and even the legislature, to the evil wrought by this apparently innocent contrivance to "quieten" children.

Adenoids.

To begin with, the marked prevalence of "adenoids" and the introduction of the "comforter" came in together; and it is possible, nay

probable, and to the writer's mind convincing, that they stand to each other as cause and effect.

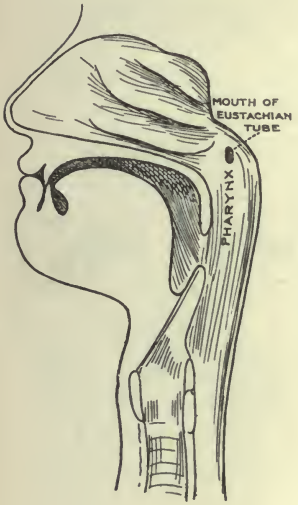
It is needless to tell any parent at the present day what is meant by "adenoids." Well-nigh in every family one or more of the children suffer from the disease, and "the removal of adenoids" is a common feature of modern family life.

The disease was known before the "comforter" was in evidence. Every child allowed to suck its thumb, or to have the teat of the feeding-bottle in its mouth at other times than whilst feeding, is liable to get adenoids; but with the common use of the "comforter" the ailment increased to such an extent that but few children of to-day, other than breast fed, are quite free from the complaint.

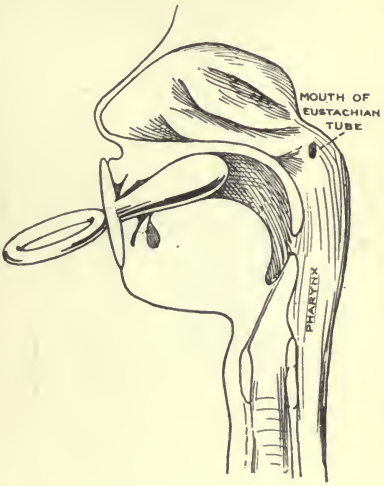
To fully explain the effects of the prolonged use of the "comforter" takes some patience, but even at the expense of being prolix a short explanation is here attempted.

To understand what the "comforter" does, let any adult try the experiment of keeping one in the mouth and sucking at it for, say, half an hour. After even a few minutes it is found that the roof of the mouth becomes painful and the mucous membrane covering the hard palate becomes swollen and irritable. The roof of the child's

mouth, however, does not consist of bone as in the adult, but of cartilage (gristle), which yields to the continued pressure of the teat and is pushed upwards, causing a high arch (Gothic



The natural relations of the roof of the mouth to the nose, with the teeth and gums in their natural position.



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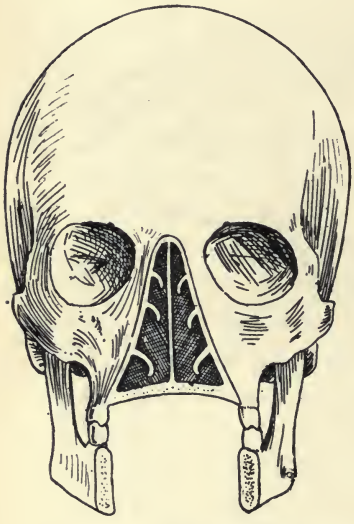
Distortion caused by the "comforter." The roof of the mouth encroaches on the nose, the teeth of the upper jaw are pressed forward, and the lower jaw, teeth and gums are pressed backward.

arch) to the palate. When the roof of the mouth is pushed upwards, the floor of the nasal cavity is encroached upon, and the passage of the air through the nose impeded. The child finds

breathing by way of the nose difficult, and mouth-breathing with all its attendant evil effects is set up. The natural channel by which the air enters the lungs is through the nose, where the air is



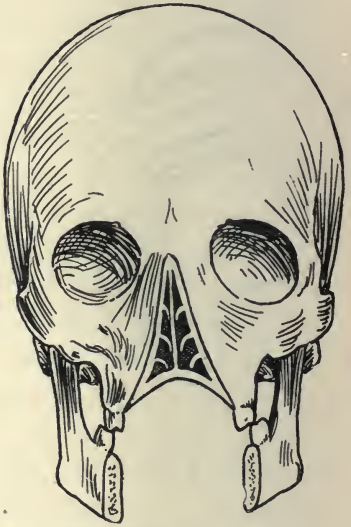


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Diagram showing natural relation of roof of mouth to floor of nose, and of the bony outline of the nose.

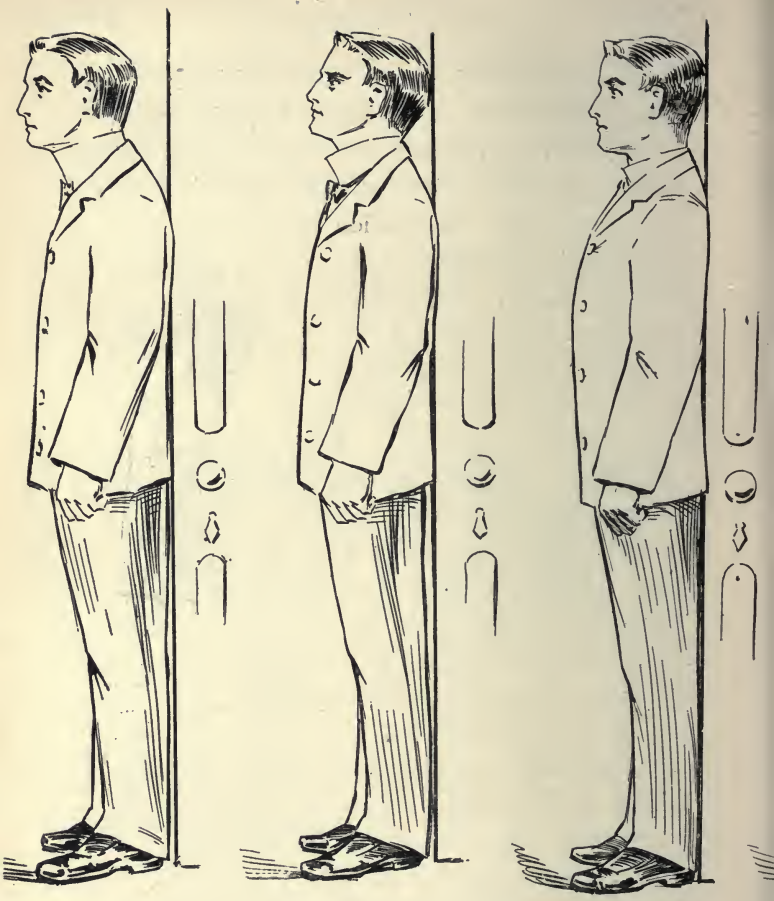
Diagram showing the encroachment of the roof of the mouth on the floor of the nose due to the use of the "comforter," and the arrest in development in the nose owing to mouth-breathing.

moistened and warmed before it reaches the windpipe and lungs. When the air enters directly by the mouth the throat and tonsils are

subjected to direct irritation, and resulting enlargement of the tonsils still further impedes respiration. Breathing becomes laboured and noisy, the exertions of the respiratory muscles are increased, but after a time exhaustion ensues, and the air is inhaled in lessened and insufficient quantity, leading to diminished expansion of the lungs, narrowing or flattening of the chest, and imperfect oxidation of the blood.

By permission, Messrs. John Bale, Sons, & Danielsson.
Mouth-breathing has caused the angle of the jaw to become permanently rounded; the chin is protruded; the chest is undeveloped, and the high collar serves to perpetuate the deformity.

The effect upon the *upper jaw* consequent upon a high arch to the palate, is that the sides of the jaw are drawn inwards towards the mouth cavity; the whole upper jaw, which is normally horse-shoe shaped, becomes pointed in front, causing the jaw to assume a V-shape. The front teeth of the upper jaw protrude and project beyond the front teeth of the lower jaw, and the back teeth of the upper jaw fall within the back teeth of the lower jaw, so that biting and grinding are interfered with, and perfect mastication of the food is impossible. The effect of



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The round-shouldered youth of to-day. The head is carried at an angle with the body and is NOT balanced on the top of the spine.

Incorrect attempt at removing the deformity. The high collar prevents the shoulders being "squared," as the high collar would then catch the chin.

The proper carriage:— shoulders "squared" and the collar lowered.

mouth-breathing upon the *lower jaw* is that the bone itself is altered in shape. Instead of the sharp angle natural to the lower jaw just below and in front of the ear, the angle is rounded, and the chin consequently becomes pointed, giving rise to the stupid and listless aspect common to all persons who breathe through their mouths.

The effect of preventing the natural current of air passing through the nasal passage and the upper part of the pharynx is to induce an abnormal condition of the lining mucous membrane. The tissues of the membrane become sodden and swollen, and the glands (lymphatic) in the upper part of the pharynx enlarge and protrude from the surface as out-growths or adenoids.

The argument that the use of the "comforter" induces the child to breathe through the nose and thereby prevents mouth-breathing, is one which would apply to most of the deleterious customs which afflict mankind. The chronic tippler may temporarily "feel better" for his whisky, but his liver in time tells a different tale. The child may be compelled temporarily to breathe through its nose by stopping up its mouth, but constant sucking at a "comforter" causes deficient respiration, a deformed mouth, a miserable chest, a ruined disgestion, adenoids and ear troubles.

Effect on Hearing.

At either side of the upper part of the pharynx are the openings of tubes (Eustachian) which lead to the ears; the adenoids frequently block these openings, and the balance of air in the ear being disturbed impaired hearing results. In time further ear troubles may ensue with discharge of matter and destruction of the drum, when more or less permanent deafness ensues. The above-mentioned alterations in the mouth, throat, nose, pharynx and ears are the direct consequence of mouth-breathing, but the indirect effects are still more deleterious to the natural development of the body. Imperfect chest development and insufficient aeration of the blood tend to impair the frame, to weaken the digestion, and to render the young man and woman physically deficient. The listless or backward child at school frequently becomes so in consequence of defective hearing due to adenoids; the nasal twang of the voice and the wizened "old-fashioned" aspect of many children will be found to be due to mouth-breathing consequent upon nasal obstruction and adenoids. If there is truth, therefore, in the assertion that the wide prevalence of adenoids and the use of the "comforter" are contemporaneous, it is surely not too

strong a measure to request that the sale of the infants' "comforter" should be forbidden, or at all events regulated, by law, for to the prevalence of adenoids many of the present-day evils amongst children are due.

Effect on Digestion.

No mention has been made of the harassing and deleterious effect upon the digestion due to the presence in the mouth of a foreign body, and more especially when that body is calculated to induce the action of sucking. The salivary glands are kept continually active, instead of being allowed due periods of rest. The ferment natural to the saliva (ptyalin) is wasted, and the glands from prolonged action become exhausted and secrete a thin watery fluid devoid of the power of digesting food.

Not only has the "comforter" a pernicious effect upon the salivary secretion, but the secretion of every organ and fluid concerned in digestion is equally disarranged. Any substance placed in the mouth excites the glands of the stomach, and gastric juice is poured out in harmony with the salivary flow. The "comforter" in the mouth, therefore, causes a continuous secretion from the stomach glands, which in turn become exhausted,

and the ferment (pepsin) and the acid (hydrochloric acid), which are naturally present during digestion, are wasted and of feeble strength.

As with the stomachic, so with the liver and pancreatic secretions. The whole of the precious ferments of these organs are rendered feeble and inefficient by reason of the constant irritation caused by the presence of any substance digestible or indigestible in the mouth. In the adult, chewing gum—an American habit—corresponds in some slight degree with the evil effects of sucking a "comforter," and in both adult and child the deleterious effect upon the digestion is very grave. The adult, however, elects destruction of his own digestion, but it is the ignorant parent that condemns the child to ill-health and an ill-developed frame; the child, could it reason, would refrain from working its own destruction; it has, however, no choice in the matter. Surely it is time the law intervened to prevent parents thus wrecking the national physique.

Teeth, their Development and Decay.

The early decay of the teeth is exciting interest in almost every civilised country. In Britain and in the United States of America more especially is the subject causing concern. The state of the

teeth was first brought home to us by the number of recruits for the army who were rejected on account of the teeth they had lost by decay, and when inquiry was carried further, it was found that as a nation we were threatened by serious impairment to our physique on account of defective teeth. Decayed teeth and good health are incompatible; it is impossible to raise a healthy race of people possessed of caries (diseased) teeth. In the first place, with a mouthful of decaying or tender teeth, it is impossible to chew the food sufficiently, and in addition the rotten stumps festering in the gums are continually discharging the foulest of inflammatory matters. The discharge —pus—is carried into the stomach with the food, and sets up abnormal fermentation, resulting in poisonous products—toxins, which become absorbed into the blood and affect the whole system. Were a person condemned to suck the matter from an abscess in, say, his own forearm, he would be doing what every one who has decayed teeth in his or her jaw is constantly doing—a foul picture indeed.

The early decay of the teeth is attributed to a variety of causes, and many ideas have been brought forward upon the subject. The writer has added his theory, and it is this—the early decay of the teeth is mainly due to the high temperature of our food. It is well known that

breast-fed infants keep their milk teeth longer than bottle-fed infants. The breast-fed infant gets its milk throughout the *entire* meal at about 98.4° Fahrenheit—the normal temperature of the human body. The bottle-fed infant's milk is never at the same temperature for a minute together; now too hot, now comfortably warm, now too cold. How is the temperature of the milk in the feeding-bottle usually tested? By the mother sucking a little from the teat, and if the temperature is agreeable to the mother or nurse the child is allowed to have it. Not only is this test unreliable, but it is fraught with danger, for milk at a temperature which the child appreciates as warm, namely, 98.4°, seems cold to the mother; and milk at a temperature which seems warm and pleasant to the mother, almost 115° F., will scald the child's mouth. To understand this, it is only necessary to test the temperature of some of the food and drink we ordinarily consume. Tea at 140° F. can be sipped from a spoon, at 130° can be sipped from the cup, and tea below 120° is pronounced by the adult to be cold; that is, we drink tea usually at over 20° above the temperature of our bodies. We eat our eggs at 115°, that is, some 17° above the normal temperature; a potato is consumed at about the same heat; and a beefsteak or chop is pronounced cold if the temperature

is below 120°. It is thus with all warm foods and drinks. We have accustomed the mucous membrane of our mouths to stand a temperature from 15° to 30° above that of our bodies, and the bottle-fed infant is given milk about 20° above the normal, *i.e.* 98.4°—the temperature of the milk it would naturally imbibe from its mother. The effect must be trying, not to say disastrous. It is relatively as if an adult took food and drink at, say, 140° or 150° of heat—that is, 10° to 20° above what the mucous membrane of the *adult* mouth is accustomed to; the effect upon the adult would be to scald the mouth. Relatively, the child is similarly affected by milk, which, though at a comfortable temperature to the palate of the mother or nurse who tests the temperature by her own sensation, is calculated to scald the child's mouth. The mucous membrane of the bottle-fed infant's mouth is kept in a partially scalded, sodden, and swollen condition. But in the child's gums are the milk and permanent, that is, the first and second sets of, teeth; for both these are present, even before birth. The permanent irritation of the mucous membrane attracts the blood-vessels to the surface of the gums and mouth generally, thereby depriving the teeth in the gums gaining their normal supply of blood. Deprived of blood, they grow imperfectly; and the teeth, whilst biting or grinding

food, are apt to have their enamel broken, the dentine exposed and a pathway for infective germs opened, and the tooth becomes carious (ulcerates and decays). It is here the dentist is called in; but his work is taken up at present with merely remedying a diseased organ. The evil should be anticipated, and dentistry will become a science worthy of public esteem only when it teaches us how to *produce* good teeth. It is to be hoped dentistry will concern itself seriously with this problem, viz. studying the causes of decay, and endeavour to lay down hygienic rules on prophylactic lines whereby disease may be anticipated and the liability to decay prevented.

CHAPTER VIII

THE THEORY OF EXERCISE

In the selection of any form of exercise one or two axioms must never be lost sight of:—

1. Following the chase and tilling the soil were the original callings vouchsafed to man, and the forms of artificial exercises which come nearest to the muscular acts required by these callings, are to be commended.

2. Any exercise which tends to develop the upper limbs to the neglect of the lower is wrong in principle.

Accepting these premises, the evolution of a satisfactory form of exercise would not appear to be difficult. The tendency of almost all indoor artificial exercises, however, is to devote attention to the development of the arms, and the man who can show the biggest biceps is considered the most perfectly trained and the most physically fit. Systems of physical culture in advertisements are frequently adorned by a picture of a young man placing his arm in such a position as to show a

huge "lump" on the front of the arm, as if that were the be-all and the end-all of physical culture. It is implied, no doubt, that with the muscles of the shoulders and arms in this magnificent state of development, all the other muscles of the body are in a similar state of perfection. The assumption, however, is not well founded, for the other muscles of the body are not as a rule correspondingly developed.

Is it, however, desirable that the upper limbs should be developed to such an extent? It is an altogether abnormal development; the muscles of the arm of even the labourer or blacksmith continuously engaged in manual work do not show such bulk or rigidity. The muscles of the arm in the process of artificial exercise would appear to be trained beyond the needs of man, and perhaps beyond what is hygienic. If the labourer does not require such development, how can it be necessary for the clerk, the student, the professional man, the tradesman, or any person engaged at indoor employment, to cultivate his muscles to the extent so frequently seen in our gymnasia?

Our hands and arms were given us as the means by which to earn our livelihood, and most of the human race have to use them for that purpose. Will those who earn their livelihood by a minimum of muscular expenditure do so

better by possessing arms of elephantine proportions, when those whose calling is manual labour in the fields or in the smithy and elsewhere can do their day's work with limbs of less ample proportions? After all, is the arm, to which we devote so much attention in our gymnasia, the part of the body that should be so specially trained? We are well aware it is contended that by exercising the upper extremities the chest is developed and the breathing capacity is increased. This is no doubt true; the exercise of the arms is meant to develop the chest and increase the breathing power, and both are intended to give us increased "staying" power when our lower limbs are exercised. But if our lower extremities are not correspondingly called into play, what then? Our efforts have been in vain if the muscles of the loins and the thighs are not developed.

The gymnast trained to perform on the cross-bar, rings, trapeze, or in rope-climbing, etc., is usually a bad walker; his lower extremities are, as a rule, not in proportion to his shoulders and arms. Few stage athletes have well-proportioned lower limbs. The Germans, who depend upon gymnasia for their physical culture instead of field sports, are broad-shouldered, but their lower limbs are not in proportion, and their "staying" and marching powers suffer accordingly.

In what part of the body does man's strength naturally lie? In his loins and thighs. Naturally strong men are strong because of the possession of well-developed loins and thighs. Two of the naturally strongest men this country has ever produced in recent times were Donald Dinnie and Captain Webb. Dinnie had no artificial training in athletics. He tossed the caber, threw the hammer, "putt" the stone, and carried his 15-stone weight over a six feet high bar because of his natural strength; and those who examined his arms or chest failed to find wherein lay his strength. When, however, he stripped for athletic work, the secret was seen to lie in the huge proportions of his loins and thighs. Webb swam the channel by reason of the strength which naturally belonged to him; his powers were not produced in a gymnasium. In his loins and thighs lay his strength, and his chest being ample, gave him the breathing capacity which the muscles of the lower part of his body demanded. No Greek or Roman athlete is ever figured in the position of "showing off" his biceps; the muscles of the thigh, hips, and loins are always figured in vigorous action, and the limbs are represented as tapering off from the thick-set trunk, without undue bulgings of locally developed muscles.

What then does all this teach us? not to despise

gymnastic work, but to see that it is directed aright. To see that we encourage the development of strength in that part of our bodies where nature meant us to be strong, and in our artificial exercises to follow nature's plan.

Why is it necessary for the citizen engaged at indoor employment to develop his muscles at all? If he has not to lift weights at his work, to exert himself further than walking to his train or omnibus, and to go up and down stairs, why is it necessary for him to further exercise his muscles? He is set the example to do it, or he does it of his own accord, because "it is good for him." What does all this mean? It is impossible to enter into a complete explanation of this physiological problem in the present chapter; but it is necessary to deal with it briefly. Physiologists tell us that, as far as is known, there is no reason for the gradual decadence of our bodies, during and after middle age, except for the fact that the blood-vessels fail us. As we get older the blood-vessels lose their elasticity, their walls become impregnated with lime salts, and thereby are rendered less expansile and more brittle. The heart also is involved in the change going on in the other parts of the blood circulatory system, and together they produce the inability to do, when one is older, what was possible in more youthful days. In

young and middle-aged people, however, circulatory troubles arise of a different character. From want of exercise the action of the heart is weakened. The heart walls are composed of muscles, and when muscles in any part of the body are allowed to fall into abeyance by not being used they waste and shrivel to small proportions. The heart muscle in like manner deteriorates, and in time may shrink beyond the possibility of being again developed to normal proportions. Any sudden muscular effort undertaken by a person following a sedentary life means that upon the weak-walled heart a great strain is suddenly thrown, causing giddiness, faintness, pain, or fluttering in the region of the heart, shortness of breath, or yet more serious consequences. For a man to leave his desk, at which he has been hard at work from early morning until late at night, and suddenly undertake, say, mountain climbing, a run with the harriers, a long march in uniform, a cycling tour, etc., is an unwise and dangerous step. The Alps claim such men as victims; the slip that caused the calamity was probably due to giddiness caused by defective circulation and irregular action of the heart; the cycle accident was caused not by skidding, but possibly by temporary giddiness due to the balance of the circulation being upset; missing birds when walking up grouse or

partridges, is not to be ascribed to the "eye" or to the "hand" not being in training, but to blood circulatory troubles; the bad shooting of soldiers, when after a desperate effort they have gained the crest of the hill, has often lost them the victory when it seemed within their grasp. All these and similar misfortunes are ascribable to functional defects of the "system," as they are called, which being interpreted mean that the heart was muscularly incompetent to deal with the effort.

Yet it may be argued, if such calls are not likely to be made on the system, why insist upon exercise beyond the limited amount requisite to carry one to and from one's work? I will endeavour to put it shortly:—

To be in a good physical state it is necessary that a man shall possess a reserve of strength or functional activity to be called upon in case of need. The heart, for instance, should be maintained in a state of efficiency somewhat in excess of the daily needs of conventional life; the stomach should be able to secrete gastric juice to some degree over and above the actual needs of the economy; and similarly with all our organs and muscles, they must be maintained and preserved, so that they possess a reserve power, in order that they can respond, without detriment to the system, when calls are made upon them. This condition

lies at the root of physical and even mental efficiency, and must be sought after for our every function, it matters not in what line of life one's calling may be cast. The labourer in the field must be muscularly endowed so that when the strenuous work of seed-time and harvest is upon him he can rise to the occasion. The literary man, the student, the financier, the politician, must possess a reserve of brain power to meet the occasions when the mental strain arises, otherwise the work is badly done or exhaustion ends in ill-health. To be "fit" and to feel "fit" means the possession of reserve power for work, be the work what it may. The necessity, therefore, for physical exercise to accomplish this end is evident, and on the recognition of this principle the necessity for possessing means of maintaining physical efficiency is evident.

The Theory of Training.

By a course of what is termed "training" the heart and circulation, the respiratory organs and the muscles of the body are brought into a state of fitness necessary to accomplish the physical effort contemplated. It is a gradual process, and the more gradual the training, the more fit will the individual be; and the less the danger to the "constitution" likely to ensue. The muscle of a

healthy heart can be developed as markedly as the muscles of the arm or of any part of the body. The development of the muscles of a limb without a corresponding increase in the heart's power is of no advantage to the health of the individual, and is frequently attended by danger to life or at least failure in the physical effort contemplated. The man with, say, huge arms will fail as an oarsman if he relies upon the strength of his arms alone; the bicyclist will suffer in health if he relies upon the "hardness" of his leg muscles to provide him with power to win races. It is therefore not one part of the body only, but all parts—the circulatory, the respiratory and the muscular—that must be developed in consistent and proportionate harmony, if the training is to be effective.

Training Off.

After the amateur "sports" are over, after the professional athlete gives up his vocation, is the period of greatest danger to the "constitution." The heart, which was strengthened in its muscular walls by gradually increasing or maintained exercise, is allowed, when the sports or season is over, to suddenly relax and become soft. The heart walls decrease in bulk by the degeneration of the muscular fibres of which they are composed, and

the circulation becomes upset, causing irregular heart beat, palpitations, occasional giddiness, black specks in the field of vision, dyspepsia, and, it may be, lung and kidney troubles to a marked and frequently to a serious extent. These consequences of training are, with care, avoidable; the heart may return to its normal state if ordinary care is taken to allow it so to do. The relaxation in training should be gradual, the exercise necessary to bring it to perfection should be continued in a gradually lessening amount for a long time. How long? At least for a period corresponding equally in length of time to the training. If the course of training extended over a month, six weeks, or two months, so should the training *off* exercises be continued for a month, six weeks, or two months in a gradually declining scale. Neglect of this precaution is the cause of many of the sad accounts we hear of as the result of training; it is not the training, however, but the *sudden* cessation from training that is the deleterious factor. In a lesser but in no less marked degree are we made aware of this when after a month's holiday we return to everyday life. Active out-of-door exercise is suddenly left off, and lessening of the amount of muscular exertion brings with it a train of symptoms of a varied and depressing nature, which causes many people to say that

"they do not believe in holidays, as they always feel worse after them." The cause of this feeling is readily understandable—the cessation from an increased amount of exercise has been too sudden; and to prevent "one's holiday doing one harm," the rule should be to keep up a gradually diminishing amount of the extra exercise previously indulged in until the heart and circulation come back to that which is required in the ordinary routine of life.

Infants' Outings.

Babies must be taken into the open air as frequently as possible; it is the form of "exercise" fitted for the very young, but in our damp climate this is often a great difficulty. Spells of very cold or uncongenial weather are a great detriment to the health of infants, owing to the fact that they may be confined to the house for days together. In days gone by, women used to carry their infants in their arms when out of doors. With a shawl wrapped around the mother and child, the little infant was held in contact with the mother's body, and thereby kept warm, at a proper temperature, namely, the normal heat of the human body. This custom is followed in some parts of the British Isles still, one is glad to know, although it is to be feared to a lessening extent. In several countries

in Europe and by most Asiatic peoples the mother carries the baby about, sometimes in her arms, sometimes on her back, at times on her hip. The child, to whom warmth is so essential, is thereby ensured an equable and normal temperature, to the inestimable advantage of its growth and well-being. How different is the custom in most parts of Britain, in America, and many parts of the European continent! The child is condemned to a perambulator; the heat of the child's body is conducted away to warm the perambulator, or is dissipated in the surrounding air. It is useless, however, to hope that the old custom will revive in England; nurses and the women of the poorer class have not now the physique, even if they had the desire, to carry their children in their arms. Superiority is claimed for the perambulator method of carriage, and the precocious brain so often associated with physical inferiority is in this instance, as in many other instances, ready to defend the artificial, instead of the natural, method by quips and quibbles of argument. It is useless to point out to these degenerates the defects of the perambulator, and how the child suffers from its use. They argue that "the things" were warmed before the child was put into the perambulator. But that does not provide an *equable* temperature for the child; the water-bottle is now too hot and

The natural and proper manner of carrying children in Britain.
A north-country mother and child.

now cold, and the warmed covering soon parts with its warmth to the surrounding atmosphere. The perambulator does not provide an equable temperature, nor one at the body heat; it does not give to the child what the mother's or nurse's body does, and never can be made to do so.

Children's Exercise.

A set walk of two or three miles for children under twelve or thereabouts is a trying ordeal. They profess tiredness, discontent, and inability; and in all probability they *are* tired. Children seldom walk. They run or skip by preference, anything rather than walk steadily. All young animals are alike, and the enforced daily *walk* of children in towns is wrong in principle and dubious in its benefits. Covered playgrounds for children are a necessity for our town life. In proportioned and allotted districts it is necessary to provide covered recreation grounds for children, not only for the poor, but also for the children of the better class. The poor should be provided with free playgrounds, but the better-off citizens would be willing to pay for the maintenance of a place where their children could play during wet, cold, and unseasonable weather. Our parks for some five months of the year, November to March, are

useless as recreation areas. That is to say, that for well-nigh half the year, except as "lungs" to the city, the parks are not utilised. If the health of our town population is valued,—and as the majority of our people are town-dwellers, we must attend to it or wither away,—means of recreation must be provided, and especially for those at the growing age. Large covered play-grounds, warmed and rendered attractive, should be made in the centre of our cities, not near the outskirts necessitating a journey to reach them, but plentiful enough to be within a reasonable distance, say half a mile, of every household. The scheme is not impossible, and might even be made to pay, and the city of the future will no doubt reckon this as one of its essential public works.

The gardens of our squares are but seldom used. The householders in the squares are provided with a key for the gate of the garden, but how seldom is advantage taken of the privilege. For some five or six months, moreover, extending from October to May, the garden is deserted, the ground is wet, the trees are bare, and it is not attractive. Were, however, a portion of the garden covered in, the children could be sent thither to play games and to romp as they list. This will no doubt be done in the course of years, but in the meantime the trim-kept walk and the show

flower-beds are of more importance than human life, and the child is condemned to play in the gutter until such time as it is "moved on" by the policeman. To play games under these circumstances is an offence, and unless desisted from the child is liable to be punished by the authorities. Town life has much to answer for, and the child may well put the pitiable question, "Where am I to play?" Could the child frame its thoughts it may well ask, "How can I become a healthy or useful member of society, when by following the instinct nature has planted within me I am considered guilty of an offence?"

School Life.

From the moment children enter the portals of the board school, the nation assumes responsibility to a considerable extent for their health and physical development. The assumption of this responsibility is a great advance in public health measures, and is potent for good and for indefinite improvement. The neglected child comes under the ken of a teacher, and the parents can be remonstrated with if the child is apparently neglected, is dirty, under-fed, or too scantily clothed. A great power is placed in the hands not only of the board school teachers but of all

teachers, and except quite occasionally the trust imposed upon them is loyally fulfilled. It is to be hoped their influence for betterment of the young will increase, and that greater power as "missionaries of hygiene" will be given them. To every school a medical officer of health should be attached, endowed with executive powers, to whom the teacher can report whenever he or she sees anything amiss with the children under his or her charge. The dirty child, the diseased, the under-fed children, should be reported to the medical officer, to whom power to deal promptly with the matter should be given. In addition, children's teeth ought to be inspected regularly by a qualified dentist, to whom full power should be given to do what is necessary, and at once.

On these lines alone is it expedient that the health of the young should be entrusted to the State. The authorities have assumed a grave responsibility, but the school board authorities, who compel the children to attend their schools without providing medical inspection for their "compulsory service" scholars, are not fulfilling their trust. Practically, the parents in the nation have agreed on the following terms to school board *régime*:—"We are willing to hand over our children to you for mental and physical training;

see that you deal with them to the satisfaction of the parents, and for the national good." The Church schools and the parish schools are practically things of the past; they, however, trained and educated the men and women who have made the Empire; all we ask of the board schools and our public school authorities is to produce the men and women to hold it together.

The Duty of Teachers in our Schools.

One might write lectures of interminable length to the instructors of our children. The ideal schoolmaster or schoolmistress is a rare being; just as in other phases of employment geniuses at their art or first-class workers are the exception. We entrust so much of our children's training nowadays to school authorities, however, that it may be truly said the efficiency of the country is in their hands. The parent has, unfortunately or fortunately, less and less to do with the upbringing of the children. The responsibility of the school teacher has been enormously increased of late years, and the result is not yet known. In the old parish schools of the country men possessing a university training frequently took a share. In Scotland especially has this been the case, and in the north-east corner of Scotland—Aberdeen-

shire, Banffshire, Morayshire, and Kincardineshire —it has continued for two or three centuries. In these four counties over eighty per cent. of the parish schoolmasters were graduates in arts of their universities, and were capable of giving the boys in the most remote glen an education fitting them for the university. In no part of the world have the opportunities of a higher education for the people been known for so long a period, and the result is felt in every corner of the Empire to-day. The type of teacher, however, has changed in all parts of the country; in the majority of instances the village children are no longer taught by young graduates of our universities. In some ways this may be an advance; instruction may be even better given, and the children may pass examinations more readily. We do not, however, find that the MANNERS of the children are improving, that respect for their parents is increasing, or that discipline, social or moral, is being maintained. The effect of the change in the class from which school teachers is recruited is not in this sense encouraging. In China, when a young man misbehaves himself, even after he has left school, his schoolmaster is held responsible for his acts, and is punished by fines, by banishment, by imprisonment, even by death when the offence is murder.

In this country when a young girl at home, in service, in the post office, or behind a counter, is rebellious and impudent, the schoolmistress who had the training of the girl is to a certain degree responsible for the offence; or when a young man develops "hooliganism," or grave misdemeanour, his schoolmaster is largely to blame. This is the logical outcome of entrusting the upbringing of our children so largely to school teachers, and the fact should be brought home to all those who in any way assume responsibility for their training. To-day the Church is debarred from assuming the control it once exercised in our schools; let those who have usurped its authority see to it that they fall not behind in their newly acquired powers.

Physical Exercise in Schools.

To provide physical exercises for our school children is one of the great questions of the day; it is a laudable attempt, and one to be encouraged in every way. As with all new fashions, it must be, however, carefully and judiciously practised and controlled. In country districts, if the child has some distance to walk to and from school, in all probability it has had a sufficiency of physical exercise. In some parts of the country, in many parts of Scotland and Ireland, children have to

walk to school a distance of three or four or more miles in the morning, and the same distance home again at night. Wet or fine, summer and winter, after usually a hurried breakfast, the child of, say, six or seven has to find its way on foot, carrying books, a bottle of milk, bread or oatmeal cakes for the midday meal. In wet weather the children arrive in school with wet clothes and feet, and have to sit through the school hours with the clothes drying upon them. That these children should have to undergo physical exercises at school with the prospect of a three or four mile walk home after school hours can only be stamped as cruelty.

It was said at the Royal Commission (Scotland) appointed to consider this matter that no child nowadays had more than a mile to walk to school; the evidence supplied on this point was evidently defective. In the more thickly populated districts this is no doubt the case, but in sparsely populated parts it is untrue. The parent may not be compelled to send his children to the board school when it lies beyond a mile from their home, but the children must be educated, and the school may lie many miles beyond the legal limit.

It therefore behoves school authorities to discriminate between pupils in regard to the imposition of physical exercises on young children, for it may be they are overtaxing the strength of

those committed to their charge. In this, as in all aspects of school life appertaining to physique, medical surveillance is imperative. It is not fair to expect the master or mistress to judge what is expedient, although many masters and mistresses, unfortunately for the community, must do so. We are not yet quite far enough advanced in civilisation to allow the doctor full control. In the military, naval, civil and colonial services he is as yet merely a servant; and in school and municipal matters he is similarly kept in check. Laymen cannot get rid of the notion that the medical officer is merely a saw-bones, a prescriber of pills and potions, and cannot understand that he should have a voice in the direction of affairs of the State. The day of the medical officer of health is, however, at hand, and the health of the community will be, when that day does arrive, regulated by those who have no axes to grind except the good of the people.

Until medical men are placed in complete charge of physical exercises in all our schools, both public and private, it is unwise to bring in a law compelling parents to allow their children to be subjected to the physical tax imposed on them at the will of authorities unqualified to legislate in the matter.

CHAPTER IX

SPECIAL EXERCISES

Walking.

No form of exercise is complete in which the lower limbs do not play the chief part. The development of the chest by artificial means in gymnasia, and by such forms of exercise as extension movements, are all imperfect exercises in themselves, although constituting valuable adjuncts to the attainment of good physique when the lower limbs are not neglected. We have seen that each muscular act is the expenditure of so much force, and the amount is expressed in foot-pounds and foot-tons. The methods by which expenditure of energy is calculated have been also stated; and it is accepted as an axiom, that 300 foot-tons of muscular energy is an average day's work for a healthy man, weighing about 154 lbs. (11 stones), between the ages of, say, twenty and sixty.

It is calculated that walking one mile is equivalent to the raising of 17.67 tons one foot off the ground, thus—

Distance.	Number of tons raised 1 foot.	
1 mile . . .	17.67	foot-tons.
5 miles . . .	88.35	„
10 miles . . .	176.70	„
20 miles . . .	353.40	„

Were, therefore, no other form of exercise taken, it would be necessary, before expending the 300 foot-tons available, to walk about 17 miles daily. This would require four or five hours to perform; but it is evident there is not sufficient time in ordinary day life to accomplish this.

We have, however, many calls upon our available strength which reduce this amount to within possible limits. In the ordinary avocations of life we expend a large amount of energy. Going upstairs alone consumes a considerable amount of our spare energy in everyday life. Assuming the steps of a stair to be 6 inches in height, and allowing the weight of the body to be 154 lbs. (*i.e.* 11 stones), the force expended lifting 154 lbs. through 6 inches would be as follows:—

Number of steps 6 inches high.	Foot-lbs.
1 step	77
12 steps	924
24 steps	1848
48 steps	3696
70 steps	5390

In many town houses the stairs from the kitchen to the top floor number 70 or more, necessitating an expenditure of nearly 2½ foot-tons in the performance. A maid may have to run up 12 steps twenty times a day, merely answering the door, etc., expending thereby about 16 foot-tons of energy on the act. In many other ways, in every movement in fact, muscular energy is freely expended, so that the amount of actual superadded exercise required is reduced to an amount which it is possible for every one to take.

The Minimum Amount of Walking Required to Maintain Health.

The actual amount of time required to be spent in walking exercise by persons leading more or less sedentary lives may be stated at one hour. By this is meant one hour wholly given up to walking at a stretch, not half an hour in the morning, and, say, half an hour in the evening. There is a great difference between walking for an hour at a stretch and for two half-hours at different periods. It appears absurd at first sight that this should be so, for one may say, "I have expended the necessary amount during the twenty-four hours, therefore I ought to be considered to have done my duty." It is not so,

however; many quite feeble persons or invalids can walk a short distance, and with intervals of rest, resume exercise; but to walk straight off for one hour at a fair pace may be impossible. The heart and circulation of a person with a flabby or fatty heart may be equal to half an hour's walk, but be wholly unable to accomplish one hour at a stretch. It is necessary to walk so as to stimulate the heart and circulation if any real good is to be obtained from walking, and this cannot be done by short spurts, but by keeping up the exercise for at least one hour at a time. The *rate* of walking is also an important item, if the heart and circulation are to be kept fit. A stroll for an hour does not strengthen the heart, as there are no calls upon its muscular walls, but a brisk walk increases the rate of the circulation and gives the heart more work to do. The rate should be gradually increased by those taking to walking as a regular exercise, otherwise breathlessness, palpitation, fluttering, and, it may be, actual pain in the region of the heart may ensue if a quick pace is suddenly assumed. In time the pace can be increased, and it is well always to bring the will into play, so that one walks at a little quicker pace than one would naturally fall into. In this way the heart and circulation are kept "trained," so that there is

always a reserve of available strength to fall back upon in case the need of extra exertion arises at any time. The calculations given, illustrating the amount of energy expended in walking, are based upon observations made whilst walking on level ground and without extra clothing. If a greatcoat of, say, 5 lbs. weight is worn, and a handbag of, say, 7 lbs. weight is carried, it will be found that the amount of energy expended will be 19.07 foot-tons per mile, or 2.60 foot-tons extra per mile; and it is evident the greater the weight carried the more the force expended. It is often astonishing to civilians that military marches are so short; from 10 to 12 miles a day being a good march for an army. The cause of this will be understood by referring to the subjoined table. The weight of the soldier's kit varies in different armies, but take it at 60 lbs.

Distance.	Foot-tons.
1 mile, carrying 60 lbs. kit . .	24.75
5 miles „ „ . .	123.75
10 miles „ „ . .	247.50
20 miles „ „ . .	495.00

It will be remembered that 300 foot-tons is the normal maximum expenditure; a 20-mile march under the conditions given is therefore a Herculean effort, and when it is remembered that the soldier

in the field has to "break camp" before he starts, and after he reaches his destination has to pitch camp, draw water, collect fuel, take sentry go, clean rifles, etc. etc., the slow rate of progression of an army is readily understood. Examples of what the human frame can endure and perform we learned from the long-distance walking competitions with which some few years ago we were made familiar. By one competitor (Weston) 120 miles were covered in twenty-four hours, implying an expenditure of 1800 foot-tons of energy; and during six days, 520 miles were covered, necessitating an expenditure of 7800 foot-tons of energy, perhaps the greatest amount of energy ever expended, not only by any man, but by any animal, in a given time.

The Effects of Walking on the Frame and on the General Health.

Walking being the chief means whereby exercise is obtainable by the bulk of the community, and seeing that it is the necessary adjunct of many athletic sports and games, its claim to ensure physical efficiency has to be considered seriously. We have already seen how the available muscular energy of the body is disposed of in walking, but did walking do nothing more than this,

it would have no more claim than, say, cycling as a factor in promoting public health.

All the muscles of the body are called into play by walking, except the muscles of the upper limbs. Now a muscle when in motion, *i.e.* contracting and relaxing, attracts blood to its substance. The oxygen brought by the blood is utilised or consumed, and heat, carbonic acid and other excretory materials are produced. Continued action of the muscles demands more oxygen from the blood, and produces more waste products, and the quicker and more violent the action, the more blood is demanded; in other words, the circulation of the blood is quickened. But an increased rate of blood in the blood-vessels demands quicker and more powerful heart contractions, and an increased rate of breathing. By the stimulus thus conveyed to the heart and circulation, not only is more blood sent to the muscles, but every organ and tissue of the body is flushed with an increased quantity, so that the whole system benefits. Digestion is thereby aided, the brain is supplied with blood in increased quantity and every sense and organ stimulated. It is not, however, merely in this indirect fashion that digestion is aided by exercise; a more direct and immediate part is played by the fact that exercise increases the rate of, and deepens, the

breathing. A reference to the accompanying diagrams will show that several of the important

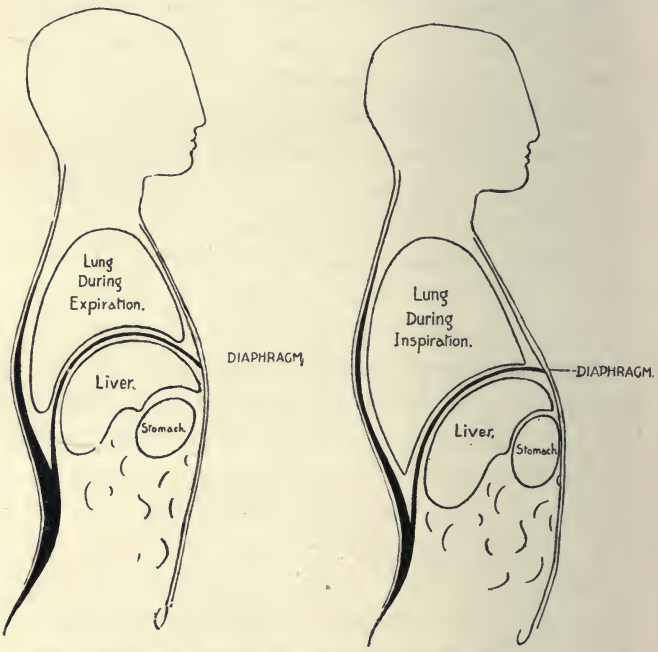

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Diagram showing the ascent of the diaphragm (midriff) during expiration, the diminished area of the lung, and the liver and stomach relieved of pressure.

Diagram showing the descent and advance of the diaphragm (midriff) during inspiration, the expansion of the lung, and the liver and stomach pushed forward and compressed against the wall of the abdomen.

organs of the body are assembled under cover of the ribs. We are accustomed to think only of

the lungs and heart in connection with the ribs and their movements, but the stomach, the liver and the spleen are not only in close proximity to the ribs, but are actually directly affected by their movements. The muscle mostly concerned in breathing is the midriff or diaphragm; when a deep breath is taken the diaphragm moves down, thereby increasing the capacity of the chest and pressing down towards the cavity of the abdomen; when the breath is expelled the diaphragm moves upwards, the chest is diminished in size and the abdomen is freed from pressure. But the movements of the diaphragm in breathing do more than merely alternately increase and diminish the size of the cavities of the chest and abdomen. The diaphragm is not a transverse partition in the body, it is placed obliquely, so that when it descends it advances forwards as well, and will therefore compress the organs on its under aspect.

When, therefore, the diaphragm contracts during respiration, it not only descends, but advances forwards and compresses the liver, stomach and spleen, and plays a distinct physiological part in the functions of these organs. The movement is necessary to aid the stomach in its work. The human stomach has not the power of triturating food as does the gizzard of the bird; but the bird

has neither diaphragm nor teeth, hence the necessity for a grinding organ — the gizzard. The stomach of all gizzardless animals is always placed so that it can receive the impulse of the diaphragm. The movements of the diaphragm are therefore necessary to digestion, and the more the muscle is exercised within reason the better will be the digestion. "Laugh and grow fat" is an old adage, and it is evident that he who laughs will not only fill the lungs deeply with air, but will also help digestion in the stomach, aid the circulation of bile in the liver, and cause a brisk flow of blood in both the liver and spleen.

Walking, therefore, not only affords exercise to the muscles of the trunk and lower extremities, but plays a distinct and direct part in digestion.

The effect of walking on the breathing is marked, not only with regard to the rapidity of the respiratory acts, but also as regards the quantity of oxygen inhaled, and the quantity of waste material got rid of. The ordinary rate of breathing when the body is at rest is about 15 respirations in the minute; at each breath 32 cubic inches of air are inhaled, amounting to $32 \times 15 = 480$ cubic inches every minute. Whenever walking is begun, however, the amount of

air inhaled is augmented, and in the following proportions:—

Walking at the rate of		The air inspired amounts to		
1 mile an hour	.	912 cubic inches	per	minute.
2 miles „	.	1320 „	„	
4 miles „	.	2400 „	„	
6 miles „	.	3260 „	„	

This enormous increase of the movements of the chest and of the quantity of air consumed during exertion will at once bring home a number of lessons.

1. Exercise is best taken in the open air and not in a gymnasium. If we have to consume more air, it is well to see that the air breathed is of as good quality as possible, otherwise the inhalation of increased quantities of impure air may do more harm than good. As stated previously, this fact is most forcibly put by asking the question, "Would a man in such an atmosphere as the air of our underground railways, live longer were he to sit still, or to take violent exercise in the polluted and smoke-laden air?" The more one inhales of such air the worse for the man. It therefore seems plain that exercise taken indoors, in the polluted air we meet with in most of our city gymnasia, may be not only not beneficial, but may be actually harmful.

2. Free play must be allowed the chest and abdomen during the increased breathing occasioned by walking, etc. A soldier's or policeman's jacket, buttoned up nearly to the chin, is almost as bad a form of uniform as it is possible to conceive, and the civilian's waistcoat is but one degree less hygienic. The most perfect dress as far as chest expansion is concerned is that of the sailor of the Royal Navy, as the chest is not encumbered either by tightly buttoned garments or by braces.

3. Bands or belts round the abdomen, especially during exercises, are to be condemned. It has been pointed out that the abdominal wall moves during breathing, and any compression or restriction of movement is almost as bad for the abdominal organs as for the organs in the chest; yet how frequently is the law broken. How common is it to see athletes putting a band or belt round the soft-walled abdomen; how common is it to find a labourer with a band like a horse-girth round his body, to allow, as he says, of his lifting weights that he could not otherwise do. A man who requires such artificial support to enable him to lift weights is exerting himself beyond his strength, and will induce in no long time "asthma" from dilatation of the air vessels of the lung and dilatation of the heart. Below the

belt rupture (hernia), so frequently met with in labourers, is almost certain to follow, and the compression of the veins in the abdominal cavity will induce piles and other troubles. A belt round the centre of the body is what a tight garter applied below the knee is to the veins of the leg — varicose veins being prone to follow the use of the garter. If a belt is worn to keep the trousers up, on no account should it be worn round the soft-walled part of the abdomen, but *below* the top of the haunch bone, where the bones can

A. Where the belt should not be worn.
B. Where the belt may be worn with safety during athletic exercises.

resist the pressure. In this situation, however, the belt is apt to appear beneath the waistcoat in our everyday apparel, hence the wearer is apt to push the belt up above the bones on to a part of the body which cannot be encircled by a tight belt without causing material damage to the economy. A sailor's trousers are made tight around the hips, *i.e.* below the top of the haunch bone, where no damage ensues from the tightness. Braces are a blot on our apparel, and it lies with the tailor to devise a means of suspending the trousers, by making them fit tightly round the hips, so that braces are unnecessary.

A "walk" for children under 12, in company with an adult, is a trying ordeal. The exercise for young children is "play," not set walks for an hour. When a child of, say, from 3 to 8 years of age goes out, the natural inclination is to run, not to walk. In the streets of towns, however, they have to be restrained for several reasons, but chiefly owing to the danger of being run over by getting in the way of vehicles. A child aged 3 to 6 or 8 years trying to keep pace with an adult is often a pitiful sight. The step of 30 inches usually taken by an adult is three times the length possible for a child of 4. The child has as often as not to be held by the hand and dragged along at a most uncomfortable semi-

trot; it is not allowed to run, nor to walk at its own pace, but at an intermediate pace very difficult to maintain. Parents seem to forget that the length of the child's limbs is not theirs; and the inability of the child to keep up with them is usually termed naughtiness and as often as not brings punishment as its reward.

Every individual, moreover, has his or her own pace as regards length and number of steps per minute. Any infringement of the natural pace lessens the power of walking. A person fitted by length of limb to take a 30-inch pace loses power if he or she has to reduce the length of stride to suit a person taking a shorter stride, and *vice versâ*. This is an argument against the "keeping step" regulation amongst soldiers, and during a long journey marching-at-ease or as-you-please must be the rule if a long distance is to be covered, owing to the loss of power in the case of tall men in reducing their natural stride, and by the short men to increase their stride to suit men of greater height. The number of steps taken by British soldiers is 116 per minute when marching quick time, and 75 per minute when marching slow time. It will be found, however, that a step of 130 per minute is an average rate for individuals of average height walking smartly by themselves. Women, owing to their

width of pelvis (haunch bones), are debarred from success in such sports as running, jumping, and long walking competitions. Women who are adepts at these sports have not a properly developed pelvis, and are physically malformed.

From these remarks on walking the following conclusions may be drawn:—

1. Walking is the best form of exercise for adults.

2. A walk for one hour at a stretch daily, at the rate of between 116 and 130 steps per minute, will give the necessary amount of exercise for persons who dwell in towns and engage in sedentary occupations.

3. Whatever other form of exercise is taken, walking is a necessary adjunct.

4. Children should never be taken for "set walks," but allowed to run or "play" as they please.

5. Breathe through the nose, not through the mouth, whilst walking.

The time of day most suitable for walking is a difficult point to settle. For persons with leisure, 11 to 12 o'clock for the "constitutional," or 3 to 4 in the afternoon, is best. For persons engaged in business from, say, 9.30 to 5.30, the "constitutional" may be taken before or after office hours. No one should go for a walk before having some food, and quite early morning walking, from about

6.30 to 7.30, is of doubtful benefit. In the case of a person who has to be at work at 9 or 9.30, it is best to breakfast at 7.30 or 8 o'clock, and start to walk half an hour after breakfast is finished. The evening walk after office hours has the advantage that on reaching home the clothing can be changed, but for several months in the year the walk has to be taken in the dark—a great drawback.

Domestic servants ought to be compelled to be out of doors one hour every day.

Running.

In walking one foot is always in contact with the ground, in running both feet are off the ground for a time. The chief cause of the rapid rate in running is the increased number of steps taken in a given time, and not so much the increased length of step. The length of step of soldiers at "quick march" is 30 inches, and when at the "double" it is increased to only 33 inches at each step. The number of steps is increased, however, from 116 to 166 per minute. But this is slow progression to what one finds in running competitions, owing to the soldier having to run with all his kit and accoutrements. The record time in which 100 yards have been run is a fraction over nine seconds, and the length of step varies with the

individual. Allowing, for the sake of easier comprehension, that a runner takes a step of 36 inches, *i.e.* 1 yard at each step, and assuming that the 100 yards is run in ten seconds, that would mean 100 steps in ten seconds, or at the rate of 600 steps per minute. This necessitates the expenditure of an energy five times as great as that required for walking the same distance; and when it is remembered that the body is lifted completely off the ground at each step, the body weight has to be added. To understand this better, suppose a mile (1760 yards) is run in five minutes (it has been run in 4 minutes $16\frac{3}{4}$ seconds) 1760 steps are taken (assuming the step to be 1 yard in length), or at the rate of 352 steps in one minute. The amount of energy expended is apparently about double that expended during walking, or about 35 foot-tons; but when it is remembered that the weight of the body is lifted off the ground 1760 times during the distance covered, and taking the weight of the body as 11 stones (154 lbs.), it comes about that 154 lbs. are raised 1760 times, *i.e.* $1760 \times 154 = 271{,}040$ lbs., or 121 tons; adding this to the 35 foot-tons expended, we find that in running a mile in five minutes a man expends about 159 foot-tons of energy. The exhaustion entailed by rapid running can thus be easily understood, considering that a man expends as

much energy in five minutes as he would under ordinary circumstances, and with a moderate amount of walking, expend in a whole day. The strain upon the system, chiefly the heart and lungs, is not here reckoned with, but it is evident that it is only when the blood-vessels are young and elastic, and the heart can adjust itself to the strenuous calls upon its muscular walls, that running at great speed can be undertaken with anything like impunity. The rule to be insisted upon in our schools (and, in fact, in the case of adults) in running, as in most sports, is that boys or men who compete in running races should be of approximately similar ages. Boys of 7 ought to compete with boys of 7 years of age, not with those of 10; and similarly, youths of 17 should not be allowed to compete with men of 21 years of age and over. Running races should be absolutely forbidden to men of over 27 years of age. Between 30 and 40, a man may indulge in running at a moderate pace for exercise, but not in races. Men over 60 years of age should never run at all for anything, not even to catch a train. The "veterans' race," so often a feature of public games, should be forbidden by the medical men in the neighbourhood. It is needless to say that after 15 or 16 years of age no one can start to run races without careful training, begin-

ning at a slow pace and working up to racing pitch. Further, if a man takes one month to train, he should train off also for one month, gradually lessening the pace, so that the heart and circulation are not thrown out of gear by suddenly stopping the muscular effort immediately after the race has been run.

Jumping.

The concentrated and enormous energy expended in jumping, and the suddenness of the act, is a great strain on the muscles and tendons, and on the heart and blood-vessels. Taking the average weight of a man at 11 stones (154 lbs.), the force expended in jumping the height of one foot is equivalent to a force capable of suddenly raising 154 lbs. one foot off the ground. Supposing a jump of—

2	feet	high	is	made,	force	expended = 308	foot-lbs.
3	„	„	„	„	„	= 462	„
4	„	„	„	„	„	= 616	„
5	„	„	„	„	„	= 770	„
6	„	„	„	„	„	= 924	„

The force expended in a jump of 6 feet $5\frac{5}{8}$ inches (the highest on record) is equivalent to the sudden raising of nearly half a ton and hurling it in the air to the height jumped.

Dancing.

In all times and amongst all peoples, civilised and savage, dancing to music has taken a prominent part in the history of their sports and pastimes. Like many other ancient customs which civilisation has modified, the alteration is all for the worse. In earlier times dancing was performed for the most part out of doors and in the sunshine, but in modern days dancing is conducted in badly ventilated and crowded rooms and indulged in at an hour when people ought to be in their beds. Dancing, one of the most beneficial and useful of exercises, is to-day unfortunately set in a flagrantly unhygienic environment, and regarded as an exercise in such surroundings it is bad.

Amongst many peoples, especially in Asia, the dance is often arranged to convey the description of some heroic deed, some historical fact, or some love tragedy, and the idea survives, but at a great distance, in our modern stage ballets. It were well when modern dances are being taught that they should be associated with some such idea. The dance would be raised from mere stage pirouetting or purposeless twirling round a ballroom to be even of some significance, not altogether devoid of an educational value. When we look into it, even modern dancing in its "saner" forms has

retained some of its original idea and purpose. Take the much-neglected and despised quadrille; of all our modern ballroom dances it alone shows a meaning in its various figures. In the first figure the couples act as if ill-acquainted with the other couples; but as the dance proceeds they become better acquainted with their neighbours, and finally end off by being "intimate." The quadrille, in fact, represents a gradual "growth of intimacy" of the couples engaged in it, and this idea must have been present in the mind of the person or persons who devised the dance. Analyse the various "figures," as they are called: In the *first figure* couples cross over and return to their places—quite a stiff proceeding; the ladies (they are always the first to call or make advances) then engage in what is called "ladies' chain," and setting to partners ends the figure. The ladies have made the advance, the men have held back.

In the *second figure* the man is led forward when he takes the lady's hand, and, as it were, introduced to the opposite couple, who perform the same movement.

In the *third figure* acquaintance has so far improved that all the four join hands and form a line or chain.

In the *fourth figure* the man has come to know

and trust the man opposite to such an extent that he leads his partner forwards and leaves her with him; the man opposite returns the compliment, and all now join hands in a circle and dance round together.

In the *fifth figure* all the couples in the set have improved upon acquaintance to such an extent that they show their friendliness by all joining hands and advancing together.

In the *sixth figure*, often called the "flirtation" figure, every man in the set so "trusts" his neighbour that he allows his lady partner to dance, or, as the name implies, to "flirt," with every man in the quadrille before she returns to him.

It is evident that a quadrille was devised with a meaning, and it would be much more interesting were the teacher to bring this before his pupils; the dance would cease to be a purposeless puzzle, and be raised to an old-time platform when dancing had meaning. The "lancers" bears a like explanation, and so do most of our graceful English country dances, now shamefully set aside for senseless and sensual cake-walks and other vulgarities.

Step-Dancing.

As a form of exercise step-dancing has no superior. I would place it first in the rôle of

indoor exercises. It was the original pastime of mankind and as a mode of muscular development has no superior. In step-dancing the weight of the body is sustained on the toes, of first one foot and then the other. The muscles of the back are strengthened as well as those of the lower limbs, and the poise of the body is thereby improved. A generation ago dancing was part of the education of every boy and girl. Now it is rare to find a young man that can dance, or if he does so, it is the waltz he is taught, and although exercise is gained thereby, it is not of a kind to improve the carriage or give that "deportment" which was the old-time dancing-master's endeavour when he undertook to teach "dancing and deportment."

Were we to teach dancing, and especially step-dancing, in our schools, instead of the staid "drill" which is so much in fashion, we would give our children more pleasure in their task—for the drill hour is a set task; and we would be exercising those parts of the body which nature meant us to develop thoroughly — the loins and lower extremities.

Skipping is highly commended as a physical drill, but it is purposeless in its aim compared with dancing, and gives breathlessness, perhaps, but it is not a real exercise. It leads to no

accomplishment, and comes to be dreary work when daily insisted upon.

Step and clog dancing, the hornpipe, the Highland fling, and the Irish jig were a means by which the generation now passing away obtained their physical exercises at school and in their homes, and they were a more pleasant and more efficient exercise than the muscle-grinding tricks taught in our gymnasia or the monotonous physical drill of to-day.

Singing.

As a hygienic agent singing is of national importance. It is, if taught properly, a means of inducing deep inspiration and expiration, that is chest expansion, not as a mere drill, but in a fashion at once attractive in its practice and pleasant in its acquirement. Mere singing, whether in a class at school or at home, unless conducted by a teacher who appreciates singing as a hygienic factor, can, however, have little real beneficial action. Unless in singing lessons deep breathing is taught systematically, singing as a means of improving the physique is well-nigh useless. In our schools class singing conducted by the school teacher may serve as a recreation, but otherwise little good comes of it; a trained teacher of singing is imperative if physical benefit

is to result. By singing chest development is encouraged in a more pleasant way than by any set form of chest expansion movements; as a "constitutional walk" is to a game of golf; as drill for children is to their games; so are mere chest expansion movements to the more pleasant associations attaching to the practice of singing. Singing is, or should be, exercise with an object, namely chest expansion, in addition to the accomplishment acquired, which at once dispels the monotony of any form of exercise taken merely for exercise' sake. Singing should therefore be taught by competent teachers to all young people, not merely for the accomplishment attainable and for the pleasure proficiency gives, but as a means of promoting national physical efficiency. Fifty years ago the majority of children in Britain were taught singing and step-dancing; and, were these reverted to by the present generation, physical development would be attained in a more pleasant manner and quite as efficiently as by the more monotonous "drill" and breathing exercises which have become the fashion in recent years.

Riding.

The privilege of exercise on horseback belongs, in towns at least, to persons of the richer classes

only. It is considered a tenet of citizenship by many that every man ought to be able to ride and to shoot; a theoretical creed as society is constituted at present, seeing that our army system, by which alone the people of the nation could be taught to ride and shoot, is diametrically opposed to it. Whilst our Prætorian army remains to us—the only army of the kind tolerated in the universe at present—the people will not be taught to ride and shoot. These privileges of citizenship are abrogated by the class "Regular Army" as far as the bulk of people are concerned, and it is only by nationalising the army that they can ever be regained. But nationalising the army means the destruction of a "caste,"—the "Army class,"—and, as we know, a fetish of the kind dies hard. "Army reforms" do not probe the difficulty; reform as we may, we are dealing with the same men, the same "class"; the pawns on the board are the same pawns; there are a certain number of cards in the pack, but they are the same cards shuffle or deal them how we may.

Riding as an exercise is especially beneficial to those who lead sedentary lives, and particularly to those in middle life and even old age. In towns it is more attractive than walking, as the rider can be carried more quickly to the outskirts where better and fresher air is obtainable. The actual or

physiological good is most pronounced by the effects it has upon the abdominal organs, the liver perhaps more particularly. Upon the lungs and heart riding bestows but little excitation, and except for the muscles of the back and some of the thigh muscles, the muscular system is not furnished with a complete form of exercise. The good done by riding may be ascribed as attributable to the infinite succussions which riding produces. These rapidly following succussions tell chiefly upon the abdominal contents, increasing the circulation within these organs and aiding their digestive and excretory powers. Riding to hounds bears a similar relation to riding for mere exercise, as does golf to "taking a walk." The hunter and the golfer take their exercise with an object, rendering the mere muscular exercise taken secondary to the excitement of the "sport" involved in the procedure. The sameness and monotony of the "constitutional" ride or walk are overcome, and what is a dreary duty to many becomes an anticipated and realistic pleasure.

Riding for boys is chiefly to be recommended inasmuch as it early accustoms them to sit a horse, an accomplishment which acquired in early life stands them in good stead, it may be, in after years. That it is a complete form of exercise for boys is far from being the case, and the boy, or man for that

matter, but especially the boy, who rides to the neglect of other forms of exercise, will not attain the physically efficient state which should be his.

Riding as an exercise for women below forty-five years of age is to be condemned. Of the young married women who ride to hounds about sixty per cent. are childless; and of the remainder few have more than one child. No girl over thirteen years of age should be allowed to ride much if at all, and then only at an amble. The reasons are obvious, but cannot be given in detail here.

Skating.

Opportunity for skating upon natural ice is so rare an occurrence in England that it cannot be elevated to a place in the category of health-giving exercises. In countries where it can be obtained it is an almost faultless form of physical gain. The benefits derived from indoor skating on artificial ice are greatly annulled by the fact that the exercise is obtainable only under cover, and in a warm and crowded area in which fresh air is at a discount. All indoor rinks should have movable roofs.

Rowing.

As in most forms of exercise, fortunately it may be but from many aspects unfortunately, rowing

reaches all too often beyond a mere physical exercise, and is elevated into the sphere of sport. It is necessary to distinguish between haphazard or occasional rowing, and rowing whilst in training. Being as a rule indulged in only at certain seasons of the year, rowing is not an exercise that, even were it a complete exercise in itself, affords a sufficiency of exercise all the year round.

In the act of rowing the muscles brought chiefly into play are those of the upper limbs and the back; but the muscles of the hips and lower limbs are utilised after a fashion, especially with the sliding seat. The main work, however, is thrown upon the shoulder and loin muscles, so that the lower limbs are neglected to a great extent—a serious omission. For this reason, therefore, walking exercise must be practised by rowing men if they are to get the full benefit of their pastime and not go "stale."

Those who engage in *occasional* rowing exercises form the majority of the community. A day on the river now and again, or it may be even once a week for some months, is a common pastime for many; and for the yet more numerous folks who occasionally have an hour or two in a boat at irregular intervals during their summer holidays. To all of these a special word of warning is due.

When one unaccustomed to pulling an oar begins to row, one holds the breath at each stroke, pulls with the arms only, and gets up so rapid a stroke that in a few minutes breathlessness results, and rest becomes imperative. Not only is this uncomfortable, but it is dangerous. In the case of both young and old it may give rise to a rupture (hernia), dilatation of the heart, rupture of a heart valve, varicose veins in certain regions, lung distension (asthma), etc. In persons in advanced middle age, it may set up, in addition, aneurism—that is, damage and dilatation of the wall of a blood-vessel, or apoplexy—a rupture of a blood-vessel on the brain. To guard against these evils in the case of untrained persons starting to row :—

1. Never be induced to race a passing boat whether by "chaff" or by the spirit of emulation inherent in us all.

2. Maintain a slow stroke of not more than twenty-two to the minute.

3. Allow the breath to escape whilst the oar is in the water.

4. Never row until some time, say an hour, after a meal.

Training for rowing races differs in no way from training for other sports in which the heart and circulation have to be educated up to the necessary state of efficiency. There is no more dangerous

sport, from the point of possible injury to the constitution, than rowing. No one should handle an oar who is not sure of the state of his heart and blood-vessels, and no one should enter for training unless he has been first medically examined. Further, every one, however strong, should whilst training be examined medically every third day. One of the first of the serious conditions induced is kidney trouble, manifested by albumen in the urine. Not a few of the young men at our universities lose their lives or permanently injure their health by rowing whilst physically unfit. To many it is the one way to distinction and to the notice of their fellows; emulation sets the pace, and the strengthened arm is contemplated with pleasure. Meanwhile the heart is increasing in size, it thumps against the chest wall and at times attracts attention by causing some sharp pain, lightly termed "a stitch," or by fluttering uncomfortably. These sensations mostly occur when rowing is left off for a day or two, and the feelings are ascribed to want of exercise. By and by sleeplessness supervenes, and owing to a feeling of unfitness a doctor is consulted, who may, and in all probability will, find kidney trouble present, to be followed all too frequently by alarming and occasionally fatal results. Several sad cases of the kind have come to the writer's knowledge lately. Had these young men been

medically examined when they began to pull an oar with intent to excel, and at *frequent intervals during their training*, several homes would have been happier to-day. It is some one's duty surely to see that our young men are not sacrificed to fashion at our schools and universities; and if the parents continue to allow the schoolmaster to usurp their authority and the supervision of their children, the schoolmaster must accept the responsibility for the ruined health and sad homes his "system" has caused.

The amount of muscular energy expended in rowing a mile under racing conditions is calculated at 18.56 foot-tons. This is but very slightly in excess of the expenditure of force incurred in walking a mile on a level road. A six-mile row at racing speed gives an expenditure value of only 111.36 foot-tons, or about one-third of the amount of the available force expendable during the day. In occasional rowing many things contribute to modify the figures given above. The size and weight of the boat, the number of occupants, the number rowing, the current, and several other items complicate the calculations, so that it is impossible to give definite statements how far one may row, or for how long a time one may continue to pull a fairly heavily laden boat through the water.

After the race is over the oarsman must "train

off" with extreme care. The strain in rowing is on the heart; the walls have been increased in thickness and strength; and sudden cessation from work is dangerous. Rowing ought to be continued after the race, as it is the best method of training off from rowing: the pace should be gradually lessened from day to day; the distance may also be lessened, and there must be no spurts with passing boats, no pulling against time. Other forms of exercise may be taken in addition to rowing as a means of training off, but to suddenly stop rowing and hope that lawn-tennis, golf, or such form of exercise will suffice "to let one down" is calculated to provoke loss of health. The evils here enumerated are not intended to prevent men rowing or even to cease to row in races; the intention is rather to encourage rowing as an exercise by placing it on a hygienic basis, a position which it is far from occupying at the present moment.

Swimming.

It is the duty of every one to learn swimming. It is peculiar that amongst a people so essentially maritime as the British, learning to swim should be neglected to the extent it is. Many thousands even of our fishermen and sailors cannot swim,

a state of affairs which should be corrected at once; no one ought to be permitted to take up any duty on boats or ships who cannot swim; the acquirement of the art should be made compulsory, and be an integral part of the training necessary before a man is allowed to be engaged as a fisherman or sailor.

Swimming is not, however, an exercise in the true sense of the word; in Britain the "bathing season" on our coasts is too short—some two or three months at most, and it is liable to be interrupted by bad weather.

Swimming-baths have served to remove this shortcoming, but only to an infinitesimal extent.

Swimming as a systematic exercise is of doubtful good, and is attended by many dangers. It is a severe muscular strain, the loss of bodily heat is great, especially when the water is markedly cold; for young women indulgence in swimming beyond a very moderate amount is likely to cause permanent injury to important organs, and both boys and girls become anæmic if swimming is practised frequently. River bathing is particularly productive of anæmia. By girls especially, beyond acquiring the art of swimming and occasional practice, it should be avoided, and young men would do well to observe the same rule.

Ball Games—Cricket.

Of all our national sports cricket is the chief. Cricket is an English game, essentially English as distinct from a British game, and it follows the children of England to the Australian continent, to the Indian Empire, to the South African colonies; it is at once the companion, the health-giver and the "manly" maker of almost a nation and a people. The spirit of honour, fair-play, self-reliance, and sound emulation cricket almost creates in boys is productive of much good, both in regard to the physical health it bestows and the pleasant manner it ingrains into the character at an early age all that is best in us. The days spent in the cricket field are the boy's delight and the man's most pleasant reminiscence.

For youths at school, cricket is the perfection of games, as it requires no such special preparation or training as do rowing, running, etc. As an occasional exercise for men also, cricket is likely to produce fewer physical catastrophes owing to lack of training, than any other game in which some aptitude is essential for enjoyment. When the heart and circulation are being tried too severely the batsman's wicket is readily reached; or when the bowler's reserve of strength fails, his balls become loose and are severely

punished, with the result that he is "taken off." A long day in the field is tiring, but it does not subject the fielder to physical strain of a nature likely to be injurious. From this point of view, cricket, whether for youths or occasional adult players, is a commendable form of exercise.

The rights and wrongs of professional cricket do not concern the question of the beneficial physical qualities of the game. The adult "flannelled fools" of our cricket fields may not be an edifying spectacle; for to find men making any game their life's work does not recommend itself perhaps to earnest folks who view life seriously. As a pastime and a means of procuring healthful exercise, cricket has no superior; but that men, between the ages of twenty-one and forty-five, can be found day after day, month after month and summer after summer, occupied at nothing but cricket or any other game, is an attribute of our civilisation of dubious commendability. It may be that cricket would not maintain its prestige and importance had we not men amongst us who either have the time to play, or who are willing to earn their livelihood by proficiency in the game. If this is the case, the devotion to cricket of the energies of almost a lifetime of some hundreds of men is perhaps justifiable; for to youths of the upper and middle

classes the game is a distinct health-giver and a gain to the physique of the nation generally.

Cricket is, however, merely a summer and fine weather game; it cannot be seriously considered by itself as a sufficient or complete physical exercise. Even during the cricket season other exercises must be taken, especially walking, if the cricketer is to remain fit and to succeed, and when it is remembered that for at least seven months of the year the game has to be abandoned, it is evident that, as a physical exercise, cricket by itself is incomplete. The bulk of the youths of this country have not, however, the opportunity of playing cricket. The poorer class of boys in towns are denied the privileges of the game, except the few that may live near the parks, as no grounds are available. Like some other of our so-called "national" sports, cricket is not, and cannot be, a national game in the sense that the bulk of the people join in it. It has, unfortunately, become a game for the better-off classes only, at least in towns. When the majority of the people lived in the country or in the smaller towns and villages, the poorer class of boys did have opportunities of playing, for every country village had its cricket pitch; but now that the majority of our population are town bred, out-of-door sports are to them a legend merely. To the country boy cricket

may not be essential although of great benefit, but for the town-bred boy such a game is essential for the maintenance of his health, and yet he cannot get it. It is plain, therefore, that we must search in other directions for exercise for our town folk.

The fact that cricket has to be left off during the winter months may be the reason for the fatality which seems to attend professional cricketers; they seldom live long, and the enforced intermittency of the game would seem by the physical, or the induced mental, conditions entailed to determine this misfortune.

Football.

During the last twenty years football has passed from being a little noted game to a position of importance in the national health laboratory. Twenty years ago the players were many; the lookers-on, or those who took interest in the game, were few. Now the position is reversed, and the lookers-on are in hundreds of thousands weekly. Football is, or ought to be, the winter complement of cricket in summer. As a winter out-of-door game football stands almost alone. Skating is so uncertain in the British Isles that it may be considered a blank in the list of exercises, and, in this country, hunting and golf are obtainable only by the few; we have, therefore, to rely on football

for out-of-door exercise for the majority of our youths during the winter months.

The advantages of the game are many. In the first place, it takes our young men out of doors at a season of the year when other exercises in the open present few attractions. In the second place, the game does not occupy much time, so that it affords opportunity to thousands to engage in it at least once a week; and it ought not to be expensive. Thirdly, football calls upon the pluck and courage of each individual engaged in play more than does any other game. It encourages a rapidity of decision, it teaches a boy confidence in his physical powers, and insensibly contributes to mould his character to the manly quietude of unconscious self-reliance. These are qualities of the game which induce us to encourage the "muddied oafs" in their continuance of this pastime. The question of professionalism in football does not concern us; the remarks applied to men devoting their lives to any game (see Cricket) apply also to football, but football holds this advantage—if advantage it be—that after twenty-seven, as a rule, the game must be dropped, for physical reasons. The rule in football should be, that the boys engaged in play should be as nearly as possible of the same age. Boys should never be allowed to compete with men; there is danger

to life and limb when boys or growing lads meet men in a football match, and this splendid game is brought thereby into disrepute. The storm of abuse showered upon mere onlookers at football matches is scarcely justifiable. To take the town-dweller even for an hour to an open field and into the fresh air on Saturday afternoons is a wholesome proceeding, and if thereby more of our youths are encouraged to keep themselves physically fit, so as to render them good football players, the more onlookers the better for the national health. Football as a game is in itself not a complete exercise, but as those who wish to play well must keep themselves efficient by other exercises, the Saturday afternoon football match should be considered a valuable asset in our national health stock-taking.

Other Ball Games.

Many of the older form of "ball games" have been supplanted during the last quarter of a century by Lawn-tennis. The introduction of this game was notable inasmuch as it brought women for the first time into the arena of engaging in sports with men on something like an equal footing. The advantages of the game are many. In the first place, it actively exercises the muscles of almost all

the body; it can be left off when the exertion threatens to be excessive; it is played usually near home, so that the clothing can be changed immediately after the game is over; it is more free from accidents than any other of the active exercise sports. The "tennis elbow," due to the compression of a nerve as it passes through a muscle which is much called into play just below the elbow, is the only common accident attendant upon the game.

Tennis, Rackets, Fives, Badminton, la Crosse, and Push-ball are ball games which call forth exertion in varied degree and possess marked advantages as means of exercise. Croquet, after its introduction some forty years ago, fell away in its popularity, to be lately revived in a modified and improved form. Croquet possesses the advantage of bringing persons into the open air, but as an exercise it is apt to produce tiredness rather than to afford true muscular exercise or development. No croquet lawn should be without sitting accommodation when women join in the game.

Unfortunately the last-mentioned ball games are, as most other games, not open to the masses, and whilst affording physical good to the upper and middle classes, they are not for the bulk of the people.

Hockey.

The most interesting development in connection with the ancient game of hockey is the fact that it has within recent years become a popular recreation for young women. It is to be hoped that the extension of the game to women is for the benefit of the national health; but we must reserve judgment until the "hockey-girl" is a little older, and watch the effect. To develop big-boned, broad-shouldered women would seem at first sight the correct thing to do, and there can be little doubt amongst the better-off classes this is being done; but it is premature to pronounce upon the wisdom of the procedure, for with the altered physique there has developed a frame of mind at variance with womanly duties. From the schoolmistress' point of view hockey for girls seems a perfect exercise; her pupils appear in robust health, they are growing taller than their brothers, and in every way seem flourishing. The ultimate "benefit" to the nation, however, will be gauged by the Registrar-General when he makes up his statistics of the population: one dreads the perusal of these.

So far the evidence is against the sudden change in feminine type to which we have become accustomed during the last decade. The entrance

of women into the arena of the games of boys and men is, however, so recent, and at present amounts to a "fashion," that a little time must be allowed to pass to permit of experience coming to our assistance, when no doubt the common sense of the nation will cope with it.

As in all games demanding sudden and continued effort, boys and girls should play with those of their own age. Girls should play hockey by themselves, never with boys or men; they are physically unfitted to compete with them in "running games," unless at a sacrifice of the proper development of their frames.

Golf.

The game of golf fulfils the axioms laid down for a perfect exercise—a walk with an object. When it is considered that the limbs and the trunk are exercised, golf may be classified as one of the few games, if not the only game, which affords a complete exercise in itself.

Golf is a health-giving factor of national importance, for old and young, men and women, can engage in it, and to persons of advanced middle age especially is it beneficial. Unfortunately the golf links are not within the reach of the poorer classes of the community in towns.

Bicycling and Tricycling.

It is now over forty years since bicycling was introduced into the country, but it is only within the past fifteen or twenty years that the use of the bicycle has been general. The "craze" which lasted until quite recently has gone, and the bicycle is falling into its proper place amongst our modes of progression. At first procurable only by the well-to-do, the bicycle has more recently, by the modern method of adjusting payments and by its cheapness, come within the reach of a larger number of the community.

As a means of locomotion the bicycle has revolutionised individual travel; our country roads, which, since the days of mail-coaches, had fallen almost into desuetude, became, when bicycles came in, once more alive with travellers. The roadside hostelries multiplied, and "cyclists' rests" appeared everywhere. Cycle racing and record breaking became part and parcel of our national sports, and professionalism grew apace. It is well to consider the position of bicycle riding as a recreation and exercise. During the period when the rider is inexpert, the amount of physical force expended is testified by the state of breathlessness and perspiration into which he is thrown; as proficiency, however, is attained,

this becomes less, and the expert rider is able to travel a great distance at, it may be, a great pace without any signs of the work being hard. The opposite in fact obtains, and, in place of the breathlessness and the flushed complexion of the beginner, there is frequently marked pallor and drawn features. The movement of the lower limbs necessary to propulsion becomes almost mechanical, so that there is no indication that the heart is being overtaxed by the exertion. That the heart is strained there is unfortunately ample proof. The whole of the young bicyclists in the French army in 1903 were pronounced unfit for service in the ranks when they were tested as to their physical fitness. From the German army comes a similar report; and we have only to examine the boys we see struggling through our streets on tricycles, emanating from our business houses, to understand the evils wrought by cycling. Long cycle rides by boys are very dangerous, inasmuch as the heart and blood-vessels can accommodate themselves for the time being to the extra work thrown upon them, and the damage may escape recognition for a season. In the case of adults the damage is generally more quickly declared, as they recognise the upset to their system and take advice more readily.

Boys and girls under fifteen should never be allowed to take long journeys by themselves; some one of more mature years—not an expert cyclist—should accompany them, so as to check them going up long and steep hills at a great pace, and to prevent them overdoing their strength. It will be found, as a rule, that a person who has ridden one hundred miles at a good pace in one day is "never the same person again." Yet how many young men state with pride the accomplishment of this feat, and wish to convey how sound they are by having done the distance! The writer has had unfortunately to reject most men as physically unfit for public services who have made this statement. The cause of the heart trouble may be thus explained:—Cycling is not a complete exercise inasmuch as the expert rider, by using the lower limbs whilst the weight of his body is supported on the saddle, causes increased circulation of the blood without a corresponding increase in breathing. The respirations are not increased sufficiently to cope with the blood being poured into the heart, and the right side of the heart dilates; the continuance of this disproportion leads to permanent injury. The breathing is further hampered by the position most men affect, namely, bending low over the handle-bar.

Women by maintaining the erect position in the saddle obviate this evil.

Occasional rides of ten to twenty miles on a cycle taken at an easy pace on level roads is a useful and agreeable form of exercise for both young and old, men and women; and when a healthy man is in fair training, forty to fifty miles a day at a moderate pace and with frequent rests should be the maximum. The amount of energy necessary to travel a mile on a bicycle is about one-fifth of that expended in walking a mile.

Motor cycling cannot be called a physical exercise; one is merely carried through the air at a rapid rate without any necessary exertions on the part of the rider. The limit of time a motor cyclist who rides frequently can continue riding before he seriously damages certain important organs is about eighteen months. It is a form of conveyance and "sport" that is to be condemned.

Gymnastics and Gymnasium Drill.

By the Greeks the building in which systematic physical exercises or gymnastics were taught and practised was termed the Gymnasium. The habit of stripping the outer garments, or practically the whole of the clothing, before engaging in physical exercises or games gave rise to the

word "gymnasium," from the Greek word *gymnos* signifying "naked." In these gymnasia games and exercises of many kinds, running, jumping, throwing weights, fencing, wrestling, swimming, etc., were followed for the purpose of cultivating and improving the physique of the young men. Teachers of different systems trained their pupils by their special methods. Physicians superintended the physical state of the pupils and apportioned them exercises suitable to their age and strength. In course of time these exercises were utilised as a means of correcting bodily deformities and infirmities; lectures on the laws of health were superadded; and, finally, philosophers took the opportunity of the gatherings, consequent upon the attractions of the gymnasia to both competitors and onlookers, to teach the people. The gymnasium became therefore an educational institution in both a physical and mental sense, and we find the term in use in Scotland and in Germany to denote a higher school or a preparatory school for the university.

Amongst the Romans military drill and especially the short sword exercises took the place of gymnasium training. In Britain out-of-door and military exercises, tournaments and quarter-staff bouts, archery, hunting, and many other forms of physical culture were also practised in olden times

with the purpose of training for fitness in the field of battle, or in hunting. With the introduction of gunpowder, however, the necessity for such training largely disappeared. The prowess of the individual became of less direct importance, and in this belief gymnastic exercises fell into desuetude. In Britain, however, out-of-door games and contests began to develop in their stead, and during the nineteenth century became part and parcel of the national life. To such an extent did these "national games" afford exercise to the young men in Britain that they were kept fit thereby for military duty, and they attained a pre-eminent place in the world for physical strength. Gymnasia were not necessary, therefore, for the British schoolboy, for his national games were and are superior to any form of purely gymnastic exercises possible to devise.

Gymnasia and compulsory drill on the continent of Europe correspond in their means of affording physical exercise to those obtained in Britain by "national games."

All this would seem satisfactory were the national games really national. That they were once practised really by the people throughout the country, we know, but with the introduction of machinery into manufactures, the towns began to grow; the cloth which used to be made in the hand-looms in village houses is now made by machinery; the

hand-looms disappeared, and the people had to leave their villages and crowd into the towns to gain a livelihood at the mills. For this town population out-of-door games are no longer available, so that although in Britain we still have our national sports and pastimes, they are possible only for the children of the well-to-do, whose parents can afford to send them out of town to school, or for the children resident in the country. The poorer townsfolk's children therefore, deprived of the opportunity of field sports, have no means of obtaining exercise; military service is not compulsory in Britain as in other countries, and the physique of the people in towns has suffered, and is suffering. It requires no commissions or statisticians to work out the proof. Given a people who are condemned to city life, to live in crowded rooms, to work in an atmosphere where fresh air is not obtainable, and to whom an occasional day's holiday in the country once a year is alone possible, how long under such circumstances will it be before such a people deteriorate? The question is how to prevent this deterioration, and the answer would seem to be recurrence to the old system of gymnasia. When gunpowder came in, and physical strength was supposed to be less necessary than formerly, we saved ourselves from deterioration by our national games. Gymnasia in other countries

developed during the nineteenth century *pari passu* with sports in this country, but the bulk of our people are denied these physical privileges, and must go down before the people of countries where physical and military training is compulsory. The formation of gymnasia, therefore, is a new feature in Britain, and whilst we welcome this means of improving the physique of the many, it is to be hoped that those who can engage in out-of-door national sports will continue to do so, and not leave the better for an inferior system of gaining improved physique.

One of the great faults of gymnasia in towns is that the exercises must be undertaken for the most part indoors and in the heart of the city; for this there is no remedy, but it behoves gymnastic instructors to see that their buildings are ventilated as thoroughly as possible. Could sliding roofs for our gymnasia be afforded, they would prove a distinct benefit. At our schools of to-day physical exercises are almost universally taught; the children in fine weather are, or ought to be, drilled in the open air. The system to be followed should be that which primarily tends to strengthen the loins and lower extremities, and any system or sets of exercises devoted to the development of the upper extremities to the neglect of the lower limbs condemned. There is too much "arm work"

in our gymnasia at present; the ambition seems to be to develop lumps on the arms and to point to that as the pith and substance of physical development. Drill for some children comes, moreover, to be a monotonous procedure; their natural means of obtaining exercise is by "playing"; and games ought to be devised at which a sufficiency of suitable exercises is obtainable.

Yet has drill many advantages; the discipline inculcated is beneficial, highly beneficial, especially in these days of "licence" granted to children. The Fifth Commandment is not insisted upon at home; it is not taught by the school teacher, who regards the parents as beings who are apt to interfere with his authority and system; the respect of children for their parents, and the insistence of parents and elders upon receiving that respect, which is the keynote of all true discipline, has been allowed to lapse in recent years. Men and women earning good wages in many instances think it no shame in our days to allow their parents to be supported by the parish; a state of affairs which shows degeneracy more pronouncedly than even physical deterioration; for not only the body but the spirit is weakening.

Drill at a school tends to benefit all the children; whereas when they are left to play voluntarily, many are prevented joining in the game either

from weakness or awkwardness, and thus the very children who most require attention are neglected. Drill also tends to draw the child's attention to the necessity for exercise, and if the instructor is really a teacher the reason why physical exercises are necessary should be frequently explained, and the rudiments of hygiene thus inculcated.

Many parents consider that military drill is inadvisable because it tends to develop militarism, but surely it is the duty of every male born into a nation to be capable of defending the "flag" under which he enjoys the privileges of citizenship. He cannot efficiently do this without being trained "how to obey," and how to co-operate with his neighbours when collected in large numbers. Without organisation, an army is a mere rabble, and becomes only food for powder and shot. No man has a right to claim the privileges of living under a flag he is not prepared to defend, and the earlier the age he is taught his duty as a citizen the better.

Flesh and blood used to be cheap in Britain, but its value is increasing. There was a wealth of physical strength in this country up to some thirty or forty years ago; we have, however, nearly reached the end of our reserves. The town-bred youngster is a sorry substitute for the yeoman of England. We have now to call upon our men to

show us the "mettle of your slums" instead of the "mettle of your pastures." Before it is too late it behoves the military authorities to encourage, not to thwart, the volunteer soldiers in their endeavours; the constant call for better men for the army it will be impossible to satisfy if the military spirit of the people, who voluntarily submit themselves to drill, is constantly slighted. The volunteers are the only attempt we have at a national army, as distinct from a Prætorian or "class" army; and being in direct touch with the people they can do much to foster or thwart the military spirit of the nation. At the present moment the tendency is to reduce the number of the volunteers, a hygienic misfortune to the country which can only tend to hasten the degeneracy with which we are threatened.

POSTSCRIPT.

Physical Efficiency of the Volunteers.

Since the above was written, we have witnessed the excellent material to hand in the volunteer force as shown at the recent (1905) review of Scottish Volunteers at Edinburgh; but more important still, we have an authoritative statement as to the result of the recent (1905) physical examination of volunteers. Out of 187,000 volunteers

examined no less than 159,000 were pronounced physically fit for foreign service. The result is eminently satisfactory; and shows that a larger proportion of the men in the volunteer force are up to the standard required for foreign service than could be found, not only in the regular army in Britain, but in that of any other body of armed men in the world. From a national health point of view, the volunteers, instead of being cut down in numbers, ought to be increased tenfold; for short of conscription the development of this force presents the chief means by which the physique of the masses can be saved from irremediable deterioration.

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