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MINISTRY OF HEALTH.

AN OUTLINE OF THE PRACTICE OF PREVENTIVE MEDICINE.

A Memorandum addressed to the Minister of Health

by

SIR GEORGE NEWMAN, K.C.B., M.D., D.C.L., F.R.C.P.,

Chief Medical Officer of the Ministry of Health.

Presented to Parliament by Command of His Majesty.



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ERRATUM to Cmd. 363.

Page 29, line 16, read "admitted" for "admittel."

*Page 73, para. 83, line 17, read "be provided"
instead of "is provided."*

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THE RIGHT HON. CHRISTOPHER ADDISON, M.D.,
F.R.C.S., M.P., MINISTER OF HEALTH.

SIR,

I HAVE the honour to submit, in accordance with your instructions, a memorandum on some of the principal medical matters having relation to the practice of Preventive Medicine. I recognise that its contents must, of necessity, be fragmentary and provisional, and that primarily they concern my colleagues and fellow-workers in Medicine, to whom has been given the task of fulfilment. Only as the principles and methods of prevention enter into the daily practice of all branches of Medicine can it become effectual. I trust, however, the memorandum may be useful to Local Authorities and their officers in reminding them of some of the subjects which call both for their consideration and their action in continuing or initiating schemes under the Ministry of Health, and to voluntary workers of all classes and kinds who are devoting themselves with public spirit to manifold services on behalf of the health of the nation.

I have the honour to be,

Sir,

Your obedient Servant,

GEORGE NEWMAN.

Whitehall,

August, 1919.

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AN OUTLINE OF THE PRACTICE OF PREVENTIVE MEDICINE.

SECTION I.

THE PURPOSE OF PREVENTIVE MEDICINE.

1. The first duty of medicine is not to cure disease, but to prevent it. In its simplest terms, therefore, the purpose of the science and art of Preventive Medicine is to apply human knowledge to the prevention of disease. It is the common and universal experience that life is crippled or curtailed by the occurrence of disease, which leads to a greater or less degree of disablement, incapacity and premature death. To prevent or avoid such disease is to lengthen the period of life and make it happier and more effective. Hence we may express the objects of Preventive Medicine as follows:—

- (i) To develop and fortify the physique of the individual and thus to increase the capacity and powers of resistance of the individual and the community.
- (ii) To prevent or remove the causes and conditions of disease or of its propagation.
- (iii) To postpone the event of death and thus prolong the span of man's life.

Much has already been achieved in these three directions. No one can read the records of social and physical life in Britain in the days of Alfred, in the Middle Ages or in the last four centuries without recognising that a vast improvement has taken place, and that to-day human life is potentially a better thing than in the past. Leprosy, sweating sickness and the plague have disappeared in England; cholera has not been epidemic since 1866; the small-pox, though liable to outbreak, appears to be vanishing under our eyes, and compared with only a century ago is relatively a rare and mild disease; typhus, or gaol fever, is rarer still; typhoid and diphtheria are yielding to improved sanitation, isolation and the use of antitoxin; hospital gangrene and sepsis in their gross forms have largely disappeared in response to the application of antiseptic treatment; and some of the great scourges of the world, such as malaria and yellow fever, are coming steadily under control.

2. Great and far-reaching medical problems, as we shall see, lie before us, but the advance in the public health has been remarkable in degree, wide in scope and steady in occurrence, in spite of the fact that since the spacious days of Queen Elizabeth the population of England and Wales has risen from 3½ millions to 33½ millions, and the stress and strain of life have increased beyond measurement. We have, therefore, substantial grounds

of hope for the future. Yet this must not blind our eyes to the issues remaining. Though the death rate of England and Wales has fallen from 20·6 per 1,000 living in 1868 to 13·5 in 1917, and the infant mortality rates from 155 to 96 per 1,000 births, we still lose in England every year upwards of 235,000* lives by the death of persons under the age of 50, we still lose upwards of 64,000† infants and many still births; and though the public health is steadily improving, there is still a vast burden of sickness and disease involving much suffering and the loss of millions of pounds of wages and production every year, and of millions more on expenditure for treatment and insurance, and this in spite of the fact that the exigencies of the times demand increasing output and production. We cannot forget, too, that in this relatively enlightened age it is estimated that six million lives were sacrificed to the plague in India in 1901-1910, that four millions died from cholera in India, 1902-1911, that upwards of six millions died from influenza in India in 1918,‡ that 100,000 persons died of influenza in England and Wales alone in 1918, that a million children of school age are unable to derive reasonable benefit from the education the State provides, and that a million recruits were found to be unfit for effective enlistment. The problem before us is thus partly a problem of the defeat of "the captains of the men of death" and partly a problem of husbanding and strengthening the normal physique of the people as a whole in order that life may be happier, more satisfying and more productive.

3. The science and art of Medicine is not restricted to the diagnosis and cure of disease in its gross forms; it includes also a knowledge of how disease comes to be, of its earliest beginnings, and of its prevention. It is, in fact, the science and art of Health, of how man may learn to live a healthy life at the top of his capacity of body and mind, avoiding or removing external or internal conditions unfavourable to such a standard, able to work to the highest power, able to resist to the fullest, growing in strength and efficiency. Preventive Medicine must not be understood to consist only of external sanitation. It is something wider than "Public Health"—one of a dozen subjects in the medical curriculum. In regard to disease, it is something more than the closing of its channels of communication, something more than an avoidance of the ways and means of its infection and invasion, certainly much more than a registration of its effects, a record of the morbidity and mortality which follow in its train. The turning point of the battle is elsewhere. The first line of defence is a healthy, well-nourished and resistant human body. And to this end the whole man must be dealt with, for he is something more than animal. His body is, in greater or less degree, the instrument and expression of emotion, intellect and will. There is thus a psychological

* 236,581 in 1917.

† 64,483 in 1917.

‡ The general insanitary conditions and the relatively low standard of living in India were largely responsible in all probability for this amazing scourge, which is said to have affected over 50 per cent. of the population of India. See *Moral and Material Progress and Condition of India*. 1917-18. (1919. No. 143, p. 184)

aspect of clinical and preventive medicine hitherto greatly neglected. Nor is the individual, taken at any one moment, the whole of the issue. His life history, his heredity, his family, his domestic life, his personal habits and customs, his rest and his occupation, his home as well as his workshop have also to be considered. In short, Preventive Medicine to be effective must deal with the man, the whole man, as an individual as well as a member of the community. It must deal with the *causes* of his health, for then it may discover the causes of his disease. "Happy the man" wrote Virgil in his villa at Naples, "who has attained to the knowledge of the causes of things," and four hundred and fifty years afterwards Augustine added, "there are none which it concerns us more to know than those which affect our own health."

4. The human body is a finely-adjusted physiological instrument, which must not be wasted, much less destroyed, by ignorant or wilful misuse. For, apart from moral considerations, it must not be forgotten that a working man's capital is, as a rule, his health and capacity to perform a full day's work. Once that is impaired or damaged beyond recuperation, two things happen; first, if the bodily defence be undermined by stress and strain the man falls a ready prey to disease; secondly, his whole industrial outlook is jeopardised and instead of being an asset he becomes by rapid stages a liability, and even a charge on the community. Therefore, as the problems to which reference is made in these pages concern the future as well as the present, so also they have regard to that interpretation of Preventive Medicine the aim and purpose of which is the *removal of the occasion of disease and physical inefficiency, combined with the husbanding of the physical resources of the individual*, in such a way and to such a degree that he can exert his full powers unhampered, at home or in the workshop, over a reasonably long life, and with benefit and satisfaction to himself and all concerned. Its ideal is to restrict, subdue and, in the far distant future it may be, annihilate the tendencies to marked variation in the healthy body of man. Its object is to prevent not only the spread of disease but its *occurrence*, to remove its occasion. Its spirit must not be confined to sanitation or the "public health" alone, but must pervade and inspire all branches of Medicine. For it is concerned with the causes and conditions of disease, which must be sought and known, then brought under control; in achieving this, or attempting to achieve it, Preventive Medicine must define and secure the maximum of those conditions of life for the individual and the community which are the frontier defence against disease, and establish the foundations of sound living. For the health and physique of the people is the principal asset of a nation.

SECTION II.

THE RISE OF PREVENTIVE MEDICINE.

(i) *The Growth of Medicine as Knowledge.*

5. The practice of Preventive Medicine had its origin in the ancient world. Long before the days of Hippocrates (460-377 B.C.) men had sought to stem the tides of disease which threatened to overwhelm them. Even in Britain it was the ravages of pestilence in the Middle Ages—of leprosy from the twelfth century, of the “black death” from the fourteenth, of sweating sickness in the sixteenth, of cholera and of the small pox—which compelled attention to the conditions which seemed responsible for such epidemics. But over all the centuries which record these pestilences in this and other countries there broods the darkness of ignorance, veiling the truth and seeming to mock at man’s helplessness. It has slowly dawned on his mind that without knowledge of the nature of disease and of infection he is without hope of discovering the rational means of prevention. The history of Preventive Medicine is the history of the seeking and finding of these essential things.

6. At the end of the golden age of Greece Hippocrates was at his zenith. He first systematized the existing knowledge of medicine and classified the causes of disease into those concerned with seasons and climates and external conditions, and those more personal causes such as the food, exercise and habits of the individual. He wrote also on the “humours” of the body and the “elements” of therapeutics and laid down the principle that the process of disease consists of its invasion of and disposition in the body combined with the reaction of the body in its own defence, the two-fold struggle in which Nature attempts to overcome disease. Hence Hippocrates taught the sufficiency and healing power of Nature, and that the true physician observed her method and copied rather than modified it. Five and a half centuries after him came Galen, the famous Greek physician who lived in Rome in the days of Marcus Aurelius, Commodus and Severus. He gathered up all the medical knowledge of his time and his books fixed it so firmly that the Galenic tradition lasted through East and West for fourteen hundred years. As a great medical historian, Haeser, has said, “to every question it (the Galenic system) had an answer, for every problem a solution; and this spurious air of infallibility led the spirit of man in fetters for centuries and shattered any hope of progress.” Through the Middle Ages medicine slept, and the scourges of leprosy and plague taught it little. In the fourteenth century there were the plague tractates and various ecclesiastical provisions against disease. Then with the Renaissance came the new learning, which threw a flood of light on the nature both of health and disease. It revolutionized the whole content of Medicine, and gave it a fresh centre of gravity and a revised orientation. At first the revival of learning in the West consisted of the diffusion—by the Fall of Constantinople and the invention of printing—of Greek knowledge, and the result might well have been merely

a widening sphere for Galenic doctrine. But happily, in fact, new knowledge and new understanding arose, for there was escape from the trammels and domination of authority, of tradition and of abstract theory, and an acceptance of the return to what Vesalius called "that true bible of the human body and of the nature of man." The fifteenth century gave us Leonardo da Vinci—whose genius foreshadowed some of the greatest advances in science which we owe to the Renaissance—the sixteenth, Vesalius himself, the seventeenth, Galileo and Descartes, the philosophers, Harvey, Willis, Malpighi and Helmont, the experimentalists, Mayerne and Sydenham, the practitioners—who with their contemporaries taught that "epidemic constitutions" seasons, contagion and telluric conditions had relation to epidemics—and these men revolutionized the philosophy of science, anatomy, physiology, and the clinical study of disease. It is not too much to say that they relaid the foundations of Medicine. The eighteenth century gave us Morgagni, Bichat, John Hunter and Edward Jenner, who opened the book of pathology. Thus was provided not only a more accurate and living knowledge of the structure and functions of the human body but the fundamental facts of morbid anatomy, abnormal structure, perverted function, and the resultant signs and symptoms, in short the nature of disease. More than that was provided, for these epoch makers subdued to practice the scientific method as basis both of knowledge and its application. They handed down to us a body of information and also a way of working. Their method was to drink at the source. "I profess both to learn and to teach anatomy," wrote Harvey, "not from books but from dissections; not from the positions of philosophers but from the fabric of nature." This was the beginning of the modern science of Preventive Medicine.

7. Perhaps the way of learning had in the long run a greater effect than the learning itself. For close upon the heels of the cellular pathology of Morgagni and Virchow came the new knowledge of Infection, the acquisition of which forms one of the most fascinating chapters in the whole range of Medicine, a chapter which has made bright our own times. For long centuries men had believed that certain diseases were caused by external living agents and conveyed by contagion. Aristotle himself had taught this, but in the sixteenth century the doctrine began to be defined more clearly. Jerome Fracastor in *De Contagione* (1546) and Cardan in *De rerum varietate* (1557) conceived that infection was due to seeds of disease capable of reproduction in the human body; and this view, which had been foreshadowed by Paracelsus, gained increasing acceptance as men came to believe, like Fallopius in 1564 (in phthisis) and Kircher a century later (in plague), that the "seeds" of disease bore some relation to the corpuscles of the blood, as they came to think in terms of the atomic theory enunciated by Descartes, as they familiarized themselves with the idea of parasitism, as they conceived fermentation and putrefaction to have a vital cause, and as eventually they saw for the first time with their own eyes some of the forms of micro-parasites. At the end of the first half of

the nineteenth century a beginning had been made in the discovery of specific organisms in diseased tissues. (Pollender's bacillus of anthrax.) Then came the immortal work of Louis Pasteur on the causes of fermentation in 1857, on the diseases of wine in 1863, on viruses in 1877 and on vaccines in 1880-82. His vision and technique and that of Robert Koch—with his solid culture media and precise methods of identification—opened the gates of a new kingdom. They had great reward, for in trooped the long line of their successors. From 1870 to 1905 there followed that wonderful succession of discoveries which have distinguished for all time the age in which we live, and which gave us the bacillus of leprosy (Hansen), the gonococcus (Neisser), the typhoid bacillus (Eberth-Gaffky), the micrococci of suppuration (Ogston), the bacilli of tuberculosis (Koch), of cholera (Koch), of diphtheria (Klebs-Löffler), of tetanus (Nicolaiier) and of plague (Kitasato and Yersin), all between 1871 and 1894. In 1880 Laveran announced the discovery of the *plasmodium malarix*, and eighteen years later Ross demonstrated its relation to the mosquito. In 1878 came the trypanosoma of Lewis, to be followed by various members of its genus; in 1883 Friedländer described the pneumococcus, and four years later Weichselbaum the meningococcus and Bruce the micrococcus of Malta Fever. The last to be named in this brief review is Schaudinn's Spirochæta of Syphilis discovered in 1905. These then were the principal authentic representatives of that unseen world the existence of which had been long foretold.

8. But the discovery of the disease-producing bacillus was only the first step in establishing a trinity of knowledge. What did the bacillus do? and what could restrain, prevent, or control its activity? In 1888 came the brilliant work of Roux and Yersin, in which they demonstrated by filtration the existence of the toxins of the bacillus of diphtheria and thus opened a new chapter in pathology. Only the year before Metchnikoff had shown the bactericidal powers of the leucocytic cells of the healthy body and had introduced his famous theory of phagocytosis, and two years later (1890) Behring and Kitasato completed the case by producing the antitoxin of diphtheria—the final step in the establishment of the far-reaching conception that though the healthy body of man may be subject to the bacillus and suffer its toxic effect, it is able of its own cells and fluids to provide defence, in the form of the destruction and assimilation of the invading bacillus. Thus was built our modern conception of the *Bacillus* as agent, of the *Toxin* as product of the bacillus, of the *Antitoxin* as the body's defence against the effects of the *Toxin*. Further research by many living workers has added knowledge in regard to the antitoxins of tetanus, of cholera, of typhoid; it has given us the beginning of an understanding of the place of opsonins, agglutinins, and precipitins in the body defences. Lastly, in 1910, Paul Ehrlich announced his discovery of 606, the arsenical compound salvarsan, which is able to destroy in the living body the parasite of syphilis. Thus was the illuminating chapter in the new learning respecting the agents of infection and the body's natural de-

fences begun in 1857 by one chemist and so far completed in 1910 by another—a significant illustration of the interdependence of the Sciences in the pursuit of truth. “All sciences gain” said Pasteur in 1878, “by mutual support.”

The discovery of particular micro-organisms in association with particular diseases, and possibly even causally associated, is not, however, the whole story. Men soon learned that bacteria are unstable and variable, and that their functioning, action and reaction, is dependent upon many circumstances, both within and outside the living body of their host.

(ii) *The Growth of Application of Medicine.*

9. Alongside the growth of medical knowledge there slowly came into being an extension of its application. Like the rise of medical learning this also sprang, in its origin, from the prevalence of disease. During the ten dark centuries which separated the end of the Western Roman Empire from the discovery of America and the opening of the New World, there had been a steady increase in man's apprehension of the scourges of disease. Leprosy, scurvy, the epidemics of the Middle Ages, the black death, the Levantine plague, famine sickness and ague spread misery and death among the great mass of the people all through the West. The great monastic orders, and some of the historic cities, like Rome, Venice, London, provided comfort, refuge and sustenance for the afflicted, and in 1388 was passed the first Sanitary Act in England directed to the removal of nuisances. Following this famous precedent, the application of Preventive Medicine came shortly into being, nearly always in the track of the plague. In 1518 was made the first rough attempt at notification and isolation of the patient; in 1543 came the first plague order recommending separation and cleansing; under Elizabeth scavenging became more stringent; in 1568 the Aldermen of the City of London received instructions as to dealing with infected houses and persons; before the end of the century “searchers” and death registration were in vogue; and by the time of the Great Plague quarantine was a well-recognised institution.* Two factors were involved in the progress of the application of Preventive Medicine in England in the seventeenth and eighteenth centuries. First, there was the new medicine itself, and secondly there was the new humanity. The former had for its exponents such practitioners as Thomas Sydenham, Morton and Richard Mead, the latter had for its prophets the practical philanthropists, Oglethorpe, John Howard and the religious revivalists. There was new light in science as there was a dawning altruism in politics. It was in 1720 that Dr. Richard Mead published his famous *Short Discourse* concerning the necessity of quarantine against foreign countries and the proper management of infected places in England. “There is no evil,” he wrote “in which the great rule of resisting the beginning more properly takes

* The profession of medicine was now an organised body. The Medical Registration Act of 1511, the foundation of the College of Physicians in 1518 and the Incorporation of the Company of Barber Surgeons in 1540 provided its machinery which was subsequently strengthened by the Medical Act of 1858.

place than in the present case." Hence, instead of penalizing infected families and houses or marking them with a cross, he advocated (a) notification to the magistrates, (b) early visitation by official medical advisers, (c) isolation of the infected families, "the sick to different places from the sound, the sound to be stripped of all their clothes and washed and shaved before they go into their new lodgings," and (d) cleansing of the house. Mead also recommended that "all expenses should be paid by the public, and no charges ought to be thought great, which are counterbalanced by the saving a nation from the greatest of calamities." Indeed, he suggested that a reward should be paid to the person who makes the first discovery of infection. In all this we see the foundations of the administrative practice of modern Preventive Medicine, of which Mead was one of the great inventors.

10. Yet Mead was the forerunner of others. Richard Bradley studied plague at Marseilles; Sir John Pringle began hygienic reform in the British Army; Lind laid down the principles for the abolition of scurvy among seamen and the prevention of typhus fever; Rogers, of Cork, suggested methods of preventing epidemics; Sir George Baker wrote on the cause of Devonshire colic and palsy; Sir Gilbert Blane served with the Fleet and studied the diseases of the Navy; Percival denounced the lack of hygiene in crowded factory towns; and at the close of the eighteenth century Edward Jenner introduced vaccination for small-pox in place of the inoculation method practised seventy years before. Moreover, the eighteenth century was the period of the foundation of the great London hospitals, Westminster, Guy's, St. George's, the London and the Middlesex—St. Bartholomew's and St. Thomas's already existed—and near its end came the Industrial Revolution, which brought with it public health problems of its own.

11. The applications of State medicine in the nineteenth century found their inspiration in England in two sources, and their expression in legislation. The twofold inspiration came from the recurrent outbreaks of cholera and consequential commissions of inquiry, and from popular demand for reform. The legislature placed on the Statute Book a wonderful series of enactments. The alarm caused by the ravages of cholera in 1831 led to the first steps in administrative sanitary reform; in 1849 there was a second visitation of cholera, and in 1854 a third.* Concurrently with and following upon these epidemics there were various commissions of investigation. In 1838-9 the Poor Law Commissioners drew attention to the prevalence of epidemic diseases and its relation to poverty;† in 1843 Sir Robert Peel, at the instigation of Edwin Chadwick, advised the

* These cholera epidemics led to a new appreciation of the insanitary condition of the country as a whole, to an understanding of the nature of the disease and its epidemicity, to the establishment of "cholera dispensary stations," and to the passing of the Infectious Diseases Prevention Act, 1855.

† These Reports by Neil Arnott, Kay, Southwood Smith and Chadwick were the predecessors of another famous series of investigations in 1859-65 by Greenhow and his colleagues under the Privy Council into epidemic diarrhoea, pulmonary disease, infant mortality and ague; and also into the four "elementary requisites

issue of a Royal Commission to inquire into the outbreaks of disease in large towns, and the best means of improving the public health, the Report of which led to the passing of the comprehensive sanitary measure of 1848, the establishment of the General Board of Health and the appointment of Medical Officers of Health. In 1869 was appointed the Royal Sanitary Commission, on which sat Thomas Watson, James Paget, Henry Acland, Robert Christison and William Stokes, and before which Simon, Budd and Farr gave evidence. Speaking broadly, the 1843 Commission found the existence of a serious national evil of insanitation and ill-health, and recommended a legislative remedy, whereas the 1869 Commission found that the remedy had proved ineffective and recommended that "the present fragmentary and confused sanitary legislation should be consolidated." They proposed, in fact, for the first time, a Ministry of Health; but the case miscarried and the Local Government Board was created in 1871.* The Commission's summary of the national sanitary minimum of "what is necessary for civilised social life" is the grand inventory of that period. Here it is:—

- (i) The supply of wholesome and sufficient water for drinking and washing.
- (ii) The prevention of the pollution of water.
- (iii) The provision of sewerage and utilisation of sewage.
- (iv) The regulation of streets, highways, and new buildings.
- (v) The healthiness of dwellings;
- (vi) The removal of nuisances and refuse, and consumption of smoke;
- (vii) The inspection of food.
- (viii) The suppression of causes of diseases and regulations in case of epidemics;
- (ix) The provision for the burial of the dead without injury to the living.
- (x) The regulation of markets, &c., public lighting of towns.
- (xi) The registration of death and sickness.†

12. Half a century ago that programme represented the most enlightened thought of the time regarding the sphere and scope of Preventive Medicine. Even now it is almost a complete summary of the elements of a sanitary environment. But this prescription was not all the advice the Commissioners felt called upon to furnish. First, they showed how it could be worked out in practice, by laying down the general principles to be followed and by drafting a new Statute. Secondly, they diagnosed with unflinching accuracy the causes of imperfect sanitary administration: (a) the variety and confusion of authorities concerned in the public health, (b) the want of sufficient motive power in the Central Authority, (c) the non-coincidence of areas

of popular healthiness," viz.: food supply, house accommodation, physical surroundings and industrial circumstances. They led the way to the new applications of medicine for the removal of nuisances, the prevention of contagion and infection, and industrial hygiene and welfare.

* Two illuminating chapters on the history of this period will be found in Sir John Simon's *English Sanitary Institutions*, pp. 322-432.

† Report of the Royal Sanitary Commission, 1871. Vol. I, p. 20.

of various kinds of local sanitary government, (d) the number and complications of enactments, (e) the needless separation of subjects, (f) the leaving some general Acts to voluntary adoption and the permissive character of other Acts, and (g) the incompleteness of the law. This, which might have been written yesterday, was 48 years ago.* Finally, the Commissioners lent all the power and prestige of their position and experience in unreserved support of the great principle of local self-government.

13. The Public Health Act of 1875, which emerged from the labours of the Royal Sanitary Commission, may be regarded as marking a great advance in the development of sanitary administration. Before that time sanitation was interpreted in large measure as a negative policy, in a word the removal of nuisances; after that time sanitation received a new connotation, positive, constructive, remedial. That is the reason why this Act forms the great line of division, the watershed in the progress of modern Preventive Medicine on its environmental side. The report of Sir Robert Peel's Commission, in 1845, contains a significant suggestion in its recommendation that each local governing body should have a medical officer whose duty it should be "*to ascertain the true causes of disease and death, more especially of epidemics increasing the rates of mortality, and the circumstances which originate and maintain such diseases, and injuriously affect the public health.*" No one can read the preamble of the Report of the Commission of 1869 on the History of the Sanitary Laws enacted up to that date without being impressed with their character. They deal, almost monotonously, with nuisances and their removal, sewerage and drains, sewage utilisation, the paving, lighting and cleansing of streets, common lodging houses, the supervision of artisans' dwellings, smoke, nuisances, local government, and the burial of the dead. The only group of laws directly concerned with disease was the Vaccination Acts. Then came the Public Health Act of 1875, which in conception and working led for twenty years, to enactments on the prevention of river pollution, the protection of water supplies, the provision of housing accommodation and isolation hospitals, and the notification and prevention of infectious disease. The Elementary Education Act of 1870, and the Public Health Act of 1875 were forms of germi native legislation bearing fruit in a single generation.

14. While sanitation was thus developing under the impetus given by Chadwick and Simon other influences had been at work. The labours of the great philanthropists of the nineteenth century, and especially of Lord Shaftesbury, had roused the public conscience to a sense of responsibility for the evil conditions under which masses of people lived and worked and of the need of protecting those who were least able to protect themselves. This movement found part of its expression in the Factory Acts. The result was a new outlook, "a developed apprehension of the meaning of social justice," as it was truly described. For, in fact, this new outlook was a result not only

* Report of the Royal Sanitary Commission, 1871. Vol. I. p. 22°

of the movements already named but of the spirit of social reform and altruism which sprang out of the despair and the aspirations of the Industrial Revolution. The growth of the towns and the over-employment of women and children (1780-1820)—as apprentice children, as piecers in the cotton mills, as trappers and drawers in the mines, and as chimney-sweepers and climbers—were predominant factors in demonstrating the need for a reform guided by medical science. Thus it was that Preventive Medicine became more personal, social and apposite than formerly, more nearly related both to the new knowledge of medicine and to the problems to be solved, based more upon the child, concerned more with the individual than the environment, dealing more with the true causes of disease, and finding its scope in the ever-increasing affinity between Preventive and Curative Medicine. In the last decade of the nineteenth century came the London Public Health Act, legislation on housing and on industrial betterment, on the cleansing of persons as distinct from properties, and on the education of blind, deaf and defective children. Then with the new century came a significant series of Acts dealing with midwives, the employment of children, the provision of school meals, the protection of food, the notification of births, the medical inspection and treatment of children, the Children Act itself, old age pensions, the health insurance of the adolescent and adult, and a group of Acts concerned directly with some of the prevalent diseases, tuberculosis, mental deficiency, ophthalmia neonatorum, and the venereal diseases. No individual planned this significant sequence, no single factor explains its emergence. It represents a new social spirit, a new application of science to the life and labour of man.

SECTION III.

THE NATURE OF DISEASE.

15. A consideration of these steps makes it clear that the foundations of Preventive Medicine are built upon a body of knowledge concerning the *nature of disease*. As we have seen there have been attempts since the time of Hippocrates, and long before his day, to define the nature of disease. Before the germ theory emphasis was laid upon the individual who was the subject of disease, his bodily form and habit, his heredity, customs and environment; in the heyday of the germ theory the tendency was to attribute the origin of disease to the germ, its prevalence, invasion and virulence. Subsequently it has become clear that disease is a complex expression of the sum total of the inter-action of parasite and host, a matter of relationship and relativity of many factors. The human body is seen to be a complicated organism, grown and fashioned through the ages from a variety of organic and inorganic elements, designed to withstand the pressures and strains of the surrounding universe, and developed in response to the necessity of functioning. Man's healthy life depends upon the orderly sequence of a series of processes and functions. If they cease or become impaired or irregular, there is disease, imperfect correspondence, absence of rhythm. The essentials of disease are thus the soil, habit and powers of resistance of man's body; the seeds or germs or cause of abnormal action, their point of entrance, means of access or site of operation; lastly, the whole process is profoundly modified by a vast concatenation of variable social, personal, external and even economic factors.

16. First of all then the body is the dominant factor: its heredity, its nurture, its degree of nutrition, its habit. For on these conditions depends its form of resistance to poisoning, accident or infection. A person of sound heredity may become susceptible to disease by poor social circumstance, lack of food or unsuitable food, unwholesome surroundings, excess of alcohol, fatigue, cold, diminished vitality, previous disease or condition of body tissues; conversely, the effects of an unfavourable ancestry may be modified by favourable surroundings or by improved nutrition in its broadest sense. Man's survival in Nature is evidence of the predominance of the body and mind in the struggle, and this cardinal fact is after all the foundation of Preventive Medicine. Many subsequent and collateral issues must be considered in the fight against disease, but first and last stand the nurture and harnessing, the strengthening and husbanding, of the natural resources of the individual; in this task the racial character of the individual, the age and sex, the idiosyncrasies and susceptibilities, the predispositions, the laws of Nature by which he lives and dies must be considered. Above all must be taken into account the powers and properties of the human body which furnish its defence against infection, for it is essentially these resources which make the

body predominant. They are of two kinds. First, there is the cellular mechanism, and, secondly, the chemical process. The former consists of the epithelial cells of the skin or mucous membrane, the leucocytes which have phagocytic powers, and the cellular changes of the inflammatory or necrotic process; the latter consists of the chemical metabolism of the cells and fluids of the body which furnishes "anti-bodies" able to oppose and destroy the products of infection. "The living human body is, surely, the most complex mass of matter in the known world," said Sir James Paget, forty years ago.

"In composition it surpasses the highest powers of chemical analysis; in mechanism it is as far beyond the calculations of the physicist; its structures are but dimly seen with even the most perfect microscope; all the known forces of nature are constantly and coincidentally at work within it; through circulating blood and a nervous system every part is in swift communication with all the rest, and it includes the apparatus of a mind from whose influence no portion of its matter is distantly removed. And in this body the pathologist has to study not that which is fixed, orderly and natural, but that which is in disorder and unsettled."

17. Secondly there is the infecting germ or agent, the operating habit or trauma, which disturbs the structure or function of the body. In regard to the bacterial or parasitical agents of infection, it must be borne in mind that they also are governed by laws of evolution and degeneration, of development and decay. Disease following their activity is dependent not alone upon the body they attack but upon their own character, virulence and pathogenicity, quantity or quality, the path of admittance to the body, the locus of their operations, their mode of action. It is not enough merely to know that disease is present in the human body and is due to invasion by a bacillus. We must know also what is the character of the invading bacillus, whether it is human or animal in origin, whether its virulence be high or low, and in what way or degree variable, whether it is present in great numbers or few, where it entered the body, where it operates in the body, and what is its plan of campaign. Some bacilli remain local, others become generalised; the material presence and multiplication of some bacteria in the body produces effects on the tissues (*infection*), others act only or chiefly by the secretion of ferments or toxins (*intoxication*) affecting the body generally. These facts must be known before the methods of Preventive Medicine can be effectually applied. Again, there is the question of point of entry and site of action. The tubercle bacillus, for example, may enter through the respiratory tract, the alimentary canal, a decayed tooth, an open wound or an abrasion of the skin. It may remain local or become general. Finding itself in a suitable nidus in different tissues or organs of the body it may, proceeding by the same pathological process (reactive and necrotic tissue changes and disturbances of metabolism), set up the same disease, but manifesting itself in quite different form. In the lung and respiratory tract it will produce various forms of *phthisis*; in the alimentary canal *tabes mesenterica*, tuberculous ulcers, &c., in the glands of the neck, the scrofulous condition; in the brain coverings, *tubercular meningitis*; in the skin or naso-pharynx, *lupus*; in the bones or limbs, skull or spine, *tuberculosis of the bone* (e.g. Pott's disease of the

spine); and in the joints *tubercular synovitis* or *arthritis*, e.g., hip-disease. Thus the tubercle bacillus may originate disease in skin, muscle, bone, or in the nervous and glandular tissue or in all or any of the systems of the body, always a similar pathological process, but profoundly modified by the point of entry, the site of action and the cellular defences of the body. The body is the soil, the bacillus is the seed; they interact upon each other. The seed affects the soil and may make it ultimately immune; the soil modifies the action of the seed and may excite or depress its pathogenicity. Further, our conceptions of pathological process are continually expanding, in relation both to new knowledge of pathology and to the variations in the "clinical" character and type of disease. For *disease is a process*, as Morgagni showed in the Eighteenth Century; it is not a fixed entity. It has, as Virchow taught a hundred years later, a local focus and a local origin. It may affect the whole body or only a special organ or tissue; but it begins in the *cell*. In modern understanding all pathology is cellular pathology, which may or may not issue in recognisable disease from a clinical standpoint. Indeed, we are beginning to get further back still to the physico-chemical changes taking place within the cell; and in this way our study of the disease process in man, and *our means of checking or controlling it*, are inter-related not only with anatomy and physiology, not only with pathology, with clinical observation and with *post mortem* examination, but with new applications to Medicine of the sciences of physics, of chemistry and of biology.

18. If then our object be, as I submit it is, (a) to determine the causes and conditions of disease, (b) to define and explain the morbid state, above all (c) to interpret its meaning to the living patient, and (d) to control it, then we must learn that Preventive Medicine concerns not only the external environment of man, not only the clinical and morbid phenomena of disease, but implies an understanding of those unseen processes of attack and defence which find their sphere in the cells and fluids of the body, and their influence upon the infecting or disturbing agent. There is opened to us a vast new field, not only of biology, of the part played by the cell in Nature, but of practical medicine, of anti-septic surgery, of the natural defences of the body, of vaccine and anti-toxin, and of serum therapy. How far indeed is all this from Galenic doctrine, from the pathological conception of the Middle Ages, from "humours" and "spirits," from "visitations" and penalties! And how far removed may the new Preventive Medicine be in aim, practice and achievement from the days of witchcraft, of papal bulls, of charms, and of the "dooms" of the Early English Kings! Little wonder that the Regius Professor of Physic at Cambridge calls us to see in all this profound revolution of scientific thought a new birth of Medicine.

19. In the third place there is a group of conditions outside both the subject and the infecting or disturbing agent, namely the general environment and the effect of treatment. The incidence of disease is affected by climate and by a series of factors of a communal nature. The physical world and its atmosphere, the

climatic conditions in which people live, play their part in the creation of disease. Tropical, temperate and cold climates, marine or mountain climates, wind, rainfall, altitude, dryness or moisture of atmosphere, all exert their influence and must be included within our comprehension. They affect both the individual and the causal agent. Then there are communal conditions contributory to environment, the density and movements of population—especially the aggregations of non-infected population—its age and sex distribution, its character and occupation, the marriage rate, the birth rate, peace or war, food supply or famine, the price of wheat, urban life or rural, and the means of intercommunication. Then once more there are the near environmental conditions, the housing and still more the home life of the people, the family, the school, domesticity, the workshop—all these outward circumstances govern the issue of the incidence, manifestation and prevalence of disease.

20. Lastly, the treatment of disease and the relation of a people's attitude to it modifies its nature and affects its prevalence. The immunity of England from ergotism, the ancient liability of the Normans to leprosy, and of the Italians to pellagra, had relation to food; variolation modified smallpox in the eighteenth century, as did vaccination in the nineteenth; the introduction of disease into a virgin soil seems to result in acute virulence (as in typhus, measles and smallpox), even as that virulence is reduced in a population subject to, or immune from, the disease; the use of quinine modifies malaria, inoculation against typhoid modifies enteric, isolation modifies measles and influenza, and anti-toxin modifies diphtheria. In this way, as in others, every healed person in every town and village of the land is a recruit secured for the great army of Preventive Medicine. He not only proclaims its principles, *he embodies them*.

21. These remarks apply generally both to epidemic and sporadic disease, but it should be added that in epidemiology we must recognise that we are faced with a condition of things which compels not only the broad view but the long view also. Here, more even than elsewhere, it is necessary to take into account the whole history of each disease over years, and even for centuries. For there is a *secular trend*, "a long-period modification, in virtue of which a specific type becomes dominant in a particular epoch and then gradually or suddenly gives place to a rival"*; there is also, to use Sydenham's term, an *epidemic constitution cycle*, in which "certain types of epidemic or certain features of morbidity tend to prevail at a given time to the exclusion of other types"†; and lastly, there are *seasonal cycles*, "short-period oscillations in epidemicity" due to seasonal prevalence. The historic scourges of plague and small-pox illustrate this cyclic phenomenon, and we have examples now with us in the characteristic wave incidence of such maladies as measles and influenza. But whilst there is thus a certain constancy of

* International Congress of Medicine, London, 1913, Section 18, Part 1, p. 52 (Greenwood).

† Loc. cit.

behaviour in epidemics, there are wide variations, inter-epidemic periods, endemic, epidemic, and pandemic characters, only partially understood. It is known that pathogenic bacteria may have a saprophytic cycle of life, that they may be "carried" in the body of man or animal without producing disease, and that they vary greatly in degree of pathogenicity. It is known, too, that man himself varies greatly in degree of susceptibility, due to health or disease, and that the accumulated susceptibility or insusceptibility of a community is a factor in the rise or fall of epidemics. "What hopes seized upon me," wrote Pasteur, "when I realized that there must be laws behind so many obscure phenomena." Disease is not capricious. It follows laws of cause and effect, and it is our business to study and observe those laws, to investigate and understand their action and meaning—in brief, (i) to collect with patience vast bodies of natural facts; (ii) to check these natural facts by observation and the experimental method and note the atypical and variant conditions; (iii) to differentiate and classify these natural facts; (iv) to draw valid deductions and standardize them by the plumb-line of experience; and (v) to integrate the facts, building a synthesis, as far as may be, and seeking ways and means of application. This is the rational method, but to find truth it must be applied in the scientific way. The scientific way is the way of Nature rather than artifice. If we examine bacteria in a laboratory under conditions wholly unnatural to them, we must expect false returns—a chemical stain, precipitation of albumin by heat, the organism itself modified in structure and function by artificial cultivation, may, indeed must, profoundly affect the issue. Similarly the clinical study of disease hidebound by tradition can but reproduce the errors of those who went before. We must, as far as we can, study the germ and the patient under natural conditions, allowing for stages of modification and evolution to be taking place immediately before us, allowing the germ and the disease to speak for themselves. We are students of the book of Nature—"that universal and publick Manuscript, that lies expans'd unto the Eyes of all," as Sir Thomas Browne called it—of her signs and symptoms, objective and subjective, unmodified and unaffected by mechanical design or artificial contrivance. Those signs and symptoms and their cause and meaning are the "facts" we seek. Here is a vast unknown world, only partially explored, immediately at our doors; to observe and investigate, relentlessly and with patience, over a long period of time and in many fields, is to make our knowledge of the true nature of disease wider and deeper.

SECTION IV.

THE PRESENT PROBLEM.

22. The present position may be stated in few words. We have an immense body of knowledge and experience, new and old, on the one hand, and vast effort and desire to apply it on the other, but there is lack of correlation of the knowledge and there is lack of understanding of the precise problems to be solved, and of the ways and means by which they may be faced. The result is a certain degree of wastefulness and confusion, individual and public effort tending to become arbitrary, sporadic, and perhaps a little capricious. This is entirely natural, and possibly inherent in the situation, which is itself transitional and progressive.

In the first place, in medicine itself the new knowledge and methods are insufficiently shared by the whole profession, they are separated from each other in water-tight compartments, and are not brought into practice. Its energy is potential and not yet kinetic. The new chemistry is not yet sufficiently penetrating the new physiology; the new physiology is not yet made generally available for the uses of hygiene or pathology; the physiology and pathology are not yet fully brought into clinical practice; clinical practice itself must be aided, though not dominated, by the new knowledge in bacteriology, epidemiology and therapeutics. The physiological interpretation of medicine, in its broadest meaning, must be brought to bear upon the patient, in the clinical laboratory, the hospital ward and the sick room. There must be fuller recognition of the part played by the organic regulation of the body, its composition and functions, for it is this *vis medicatrix naturæ*, no longer an abstraction but an ordered sequence of actions and reactions, which the wise physician and surgeon will seek not to destroy or pervert but to release and supplement at the bedside. The present situation reveals then this lack of inter-relation, of inter-dependence, of co-operative systematic handling; it is characterized too much by spasmodic action, too little by unified and sustained effort.

23. Secondly, the administration of the public health service, both central and local, is insufficiently co-ordinated and unified. The service has grown up as we have seen, almost haphazard; it is casual and anomalous in formation; often overlapping and sometimes redundant. Thus it is less effective than it might be. There are a dozen departments concerned in Whitehall; there are half a dozen in every local area. Complete unification is impracticable, and indeed, with so great a variety of duties, undesirable, but there is urgent need for simplification, economy of administration and effective co-ordination. There are several thousand medical men engaged in one capacity or another, and in greater or less degree, in the public medical services (excluding the practitioners working under the National Insurance Act), but full value is not being obtained from their service because of lack of appropriate association, differentiation of duty and co-operation.

24. Lastly, there is all over the country inadequate treatment of the sick and incapacitated, in quantity and quality. The beginnings of disease are still almost entirely ignored. The treatment provided for the majority of the sick is insufficient and inadequate; it does not represent the best of present medical knowledge. Whole groups of disease are neglected as far as prevention is concerned, for prevention has been too exclusively concerned with certain infectious diseases, and much disease is allowed to 'go by default,' untended and untreated. The provision of facilities for residential hospital treatment of patients requiring it (with the exception of the insane and the infectious) falls far short of what is necessary if they are to be healed and returned to the ranks of efficiency.

25. Thus, the outstanding defects in our practice of Medicine in England to-day are, first, the absence of correlation of medical knowledge and its application to the real focal point of the problem; secondly, the anomalous and overlapping administration, which is too spasmodic, uncertain, unequal and discontinuous to yield its proper national effect; and thirdly, the inadequacy of the treatment of disease.

Results of Present Conditions.

26. The steady advance of Medicine in conjunction with social betterment, particularly in the eighteenth and nineteenth centuries, has won astonishing victories. Vast sections of the population live healthy and fully occupied lives. The expectation of life has extended* and many gross forms of disease have almost disappeared. There have also been conquests in the realm of prevention. Leprosy, typhus, gaol fever, scurvy and the plague have vanished from Britain, and whole groups of tropical diseases are rapidly coming under control. Yet we are often defeated and unready, and Influenza sweeps through the world finding us almost helpless. The imperfections in the national health have lately been unveiled or confirmed in a variety of ways and spheres in the domestic and industrial life of the people, the facts of which furnish a body of accumulated evidence which cannot be doubted or gainsaid, and which has not been available before. This evidence comes at a time when our potential capacity to prevent and treat disease has been overwhelmingly demonstrated in the war zone, and when our national and Imperial need of a virile race is afresh borne in upon us. Let us consider briefly to what this evidence amounts.

(1) *The Public Health Service.*

27. The external sanitary circumstances of the country have shown in recent years enormous improvement. Water supplies and sewerage have been brought, on the whole, to a high standard.

* There has been, at all ages, a reduction in the death-rate (1911-15 compared with 1871-80), varying from 7 per cent. (ages 75-85) to 51 per cent. (20-25); the expectation of life at birth (males) which was 41.35 years in 1871-80, 43.66 in 1881-90, 44.13 in 1891-1900, reached 48.53 in 1901-10 and in 1910-12 became 51.50, an improvement of more than 10 years.

of efficiency; food, meat and milk are steadily coming under supervision; factories are controlled; nuisances are abated; provision is made for the removal of refuse and street cleansing; widespread action is taken against the ordinary infectious diseases. No student of the official local sanitary reports can doubt the steady improvement which has taken place in the external sanitation of town and country. The housing problem, however, remains and is more acute and difficult than ever before; there is insufficiency of house accommodation and consequent serious overcrowding, there are innumerable insanitary dwelling houses, and consequently a large measure of domestic discomfort and insanitation. If, even on our old standards, we are half a million houses short, it requires no expert knowledge to foresee the results. Gross overcrowding and domestic insanitation spell, inevitably, disease and degeneration of race, as no one who appreciates the effect of slum life, as seen in all our great cities and in many country villages, can doubt. As regards the prevalence of infectious disease, we find that in 1918 there were notified 92,000 fresh cases of tuberculosis and 92,000 cases of diphtheria and scarlet fever, representing 2.7 per 1,000 of the population in each of the two groups. During the last five years (1914-1918) there have been notified 486,000 cases of tuberculosis, and whilst some are duplicates many cases are missed. There were, in 1918, 414,000 "first" cases of measles notified (the notification of only the first case in a family being required), which means probably upwards of a million cases of this disease, a disease which, slight in itself, may lead to serious after-results. There was a severe outbreak of influenza in two separate waves. In the same year there were 6,500 cases of ophthalmia in the newly-born infant—a preventable condition, which if not dealt with leads to blindness. It must be remembered that though infectious disease is a relatively small direct contributor to the death rate, it is relatively a large contributor to disablement and incapacity. But there are some bright spots in the infectious diseases record of the year: there were only 4,300 cases of typhoid, only 63 of small-pox, 8 of typhus, 7 of plague, and none of cholera. Certainly such figures would have greatly astonished our forefathers, who in such a return would have seen at last the defeat of the Captains of the men of Death.

Most encouraging is the maternity and infant welfare work now undertaken by local authorities and voluntary societies in association with them. The infant mortality has shown a steady decline, and tens of thousands of mothers are attending the 1,600 maternity and infant welfare centres. Increased attention is also being given to particular diseases, including tuberculosis, venereal disease, dysentery, malaria, and cerebro-spinal fever.

(2) *The School Medical Service.*

28. The national system of supervision of the health of the child of school age began in 1908 under the Education (Administrative Provisions) Act, 1907, s. 13. Speaking generally, there is here also much to encourage us. The majority of the children

at school are, in most respects, healthy. That is the fundamental fact. Nevertheless, the actual findings and experience of a decennium and the medical examination of fifteen million children show that physical impairment of these children is somewhat wide in distribution and serious in effect upon adolescence and adult life. Malnutrition, anæmia, defective vision or hearing, dental caries, and disease of special organs are either too prevalent or insufficiently remedied, with the result that a foundation is being laid for enfeeblement or subsequent disease.

In estimating its extent we must include (1) the disabilities of the great group of children in attendance at school; then (2) the disabilities of the group of defective children, blind and deaf, halt and lame, feeble-minded and epileptic, for many of whom the special schools (containing, in 1918, 30,000 children) have been provided; and (3) the large number of children not in attendance at any school on account of sickness or invalidism.* Children in all three groups are "children of school age," and of all the children in the last two groups, numbering tens of thousands, it must be said that their physical condition debars them from obtaining reasonable advantage from the system of education provided by the State. Of the children in attendance at school in England and Wales (6 millions) we know by medical inspection that many, though not specifically "feeble-minded," are so dull and backward mentally as to be unable to derive full benefit from schooling,† that upwards of 10 per cent. of the whole are at a like disadvantage on account of uncleanness, and that 10 per cent. also are malnourished. Then we come to disease. Perhaps the largest contributor is dental disease, which handicaps children almost as seriously as it does adolescents and adults. Not less than half the children are in need of dental treatment, and a substantial number (not less than half a million) are urgently so. Again, upwards of half a million children are so defective in eyesight as to be unable to take reasonable advantage of their lessons. Many of them need spectacles, some ophthalmic treatment, others special "myope classes," and all of them careful supervision and attention. Next we must add diseases of the ear, throat and lymphatic glands, another quarter of a million in a relatively serious condition. Then there come skin diseases, disorders of the heart, infectious disease, and tuberculosis. Many of these children suffer from more than one disability, but a moderate computation yields not less than a

* The child population in England and Wales for 1916 between the ages of 5 and 14 years has been estimated by the Census authorities to be 6,807,260. The number of these children on the registers of Public Elementary Schools in 1916 was approximately 5,800,000. The number of children of school age not on the registers was, therefore, about 1,000,000. Many of these had left the elementary school, many others were at public, secondary, proprietary, reformatory, or poor law schools, and an unknown number were absent from the registers on account of chronic invalidism of one sort or another.

† In London in 1917 it was estimated that there are from 30,000-50,000 such mentally retarded children (Burt); in Blackpool an investigation revealed 35 per cent. (Ikin); and Dr. Thomas, in a "surprise" inspection, found one-third of the children examined at least two or more years behind their normal standard. (Report of the Chief Medical Officer of the Board of Education, 1917, Cd. 9206, pp. 30, 100 and 101.)

million children of school age (not, be it observed, children in school attendance) as being so physically or mentally defective or diseased as to be unable to derive reasonable benefit from the ordinary form of education which the State provides.*

(3) *The National Health Insurance System.*

29. The National Insurance Act, which was passed in 1911, provides a system of insurance against ill-health for all employed persons between certain ages and within certain financial limitations. The advantages include "medical benefit" (medical attendance and treatment), "sanatorium benefit" (treatment, institutional and otherwise, of tuberculosis), "sickness benefit" (weekly cash payments during the first 26 weeks—commencing usually from the fourth day—of incapacity for work), "disablement benefit" (reduced cash payments in incapacity extending beyond 26 weeks), and "maternity benefit."

Upwards of 10 million persons in England are eligible for medical benefit. There are approximately 11,000 doctors engaged in examining such patients as submit themselves and in providing treatment for them. Here, therefore, we have a new means of gauging the health of the State. Whilst it is too early to obtain well considered and properly corrected returns, there are certain broad findings which can be stated, namely, (a) the number of persons who actually seek medical advice, (b) the amount of time lost from employment in the aggregate on account of sickness, and (c) some general view of the character of the sickness.

(a) *Number of Insured Persons seeking medical advice.*

The estimated number of insured persons in England entitled to medical benefit (*i.e.*, treatment and attendance in sickness) for 1914, was approximately 10,300,000. Of this number it appears that approximately 5,800,000 applied for and received medical attention under the Act in that period, being 56 per cent. of the whole number entitled to treatment. In other words over half the total insured population in that last normal year before the war came under review by the Insurance practitioners within the twelve months. In certain industrial practices the proportion claiming and receiving treatment was as high as 70, 75 or even 80 per cent. of those eligible.

(b) *Amount of time lost from employment owing to sickness.*

For the year 1916 (the latest year for which figures are available) the amount paid in sickness benefit in England only for men was £3,409,914, and for disablement benefit £587,671. Taking the maximum rate of sickness benefit (10s. per week) and of disablement benefit (5s. per week), these figures represent 6,819,828 weeks' sickness, and under disablement benefit 2,350,684, a total of 9,170,512 weeks. For women the corresponding figures for England only for the same year (ascertained

* See *Some Results of the School Medical Service.* (Report for 1917 of the Chief Medical Officer of the Board of Education, 1917. Cd. 9206, a decennial review, pp. 160-174.)

in the same way) were 2,295,304 weeks' sickness benefit, and 1,178,120 weeks' disablement benefit, making a total of 3,473,424 weeks. Thus at least 12,643,936 weeks' work were lost through sickness during the year 1916, or a period equal to 243,000 years.

In a more comprehensive way the case may be stated in tabular form for England and Wales as a whole as follows:—

*Summary of the Expenditure of Approved Societies (England and Wales) on Sickness and Disablement Benefits in the Years 1914, 1915 and 1916.**

Year.	Sickness Benefit.		Disablement Benefit.	
	Men.	Women.	Men.	Women.
	£	£	£	£
1914	4,322,694	1,795,651	125,608	37,810
1915	3,949,503	1,389,653	498,332	206,807
1916	3,701,427	1,193,944	640,395	306,530
Total for three years ...	11,973,624	4,379,248	1,264,335	551,147
Average amount per annum	3,991,208	1,459,749	421,445	183,716

Again, taking the maximum rate of sickness benefit for men (10s. a week) and for women (7s. 6d. a week), and of disablement benefit for men and women (5s. a week), the amounts per annum given in the above Table represent a minimum average of 14,295,724 weeks† of sickness per annum, or a period of upwards of 270,000 years. This is equivalent to a loss to the nation every year of the work of upwards of 270,000 persons. Moreover, no account is taken of the labour and expense involved in the care, nourishment and treatment of these sick persons during the 14 million weeks of their incapacitation.. The above returns do not include the absence from work due to maternity benefit, sanatorium treatment or absence for less than four days per patient.

(c) *The Character of the Sickness.*

A moment's reflection will make it clear that this vast body of insured population—which is practically synonymous with the mass of the workers of the country—suffers from sickness and disease in the following degrees:—

- (1) there is sickness which does not come under medical notice, wide in extent, relatively light in burden;

* See Report on the Administration of National Health Insurance during the years 1914–17. Appendix (Joint Committee) IV., p. 238. Cd. 8890.

† These figures represent not the actual amount of sickness but a minimum, because the rate of benefit in certain cases is lower than the amount thus stated, and therefore a given sum represents a greater period of sickness: moreover, on account of the waiting period in the case of the first illness in any twelve months' period, a certain amount of sickness does not show in the figures of cash benefits.

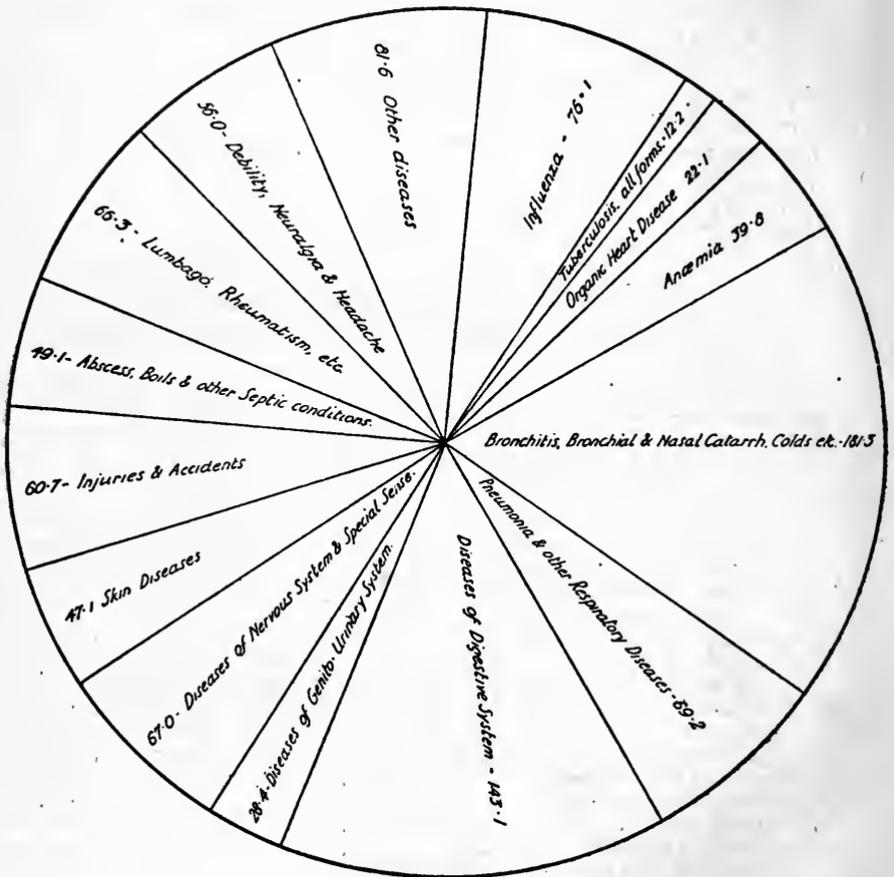
- (2) there is sickness which is included in medical benefit, the patient being ill enough to come to the doctor and receive advice and treatment (including if necessary three days' absence from work);
- (3) there is sickness which, in addition to requiring medical treatment, incapacitates for work, thus entitling the sufferer (according to its duration) to "sickness" or "disablement" benefit;
- (4) there is sickness requiring treatment in hospitals and other residential institutions, to which the insured have access on the same conditions as the rest of the population;
- (5) there is sickness resulting in death, the records of which are included in the returns of the Registrar-General.

We may go a step further. The following Table affords some indication of the principal conditions of sickness and disease for which patients have sought medical advice. It has been drawn up from the data of five representative insurance practices in five of the large towns of England in 1916, and records the provisional diagnosis made of each patient. An accompanying chart expresses the return graphically.

Insured Persons in Representative Cities—Proportion of Certain Diseases to Total Cases—1916.

Disease.	Number of Cases.	Proportion per 1,000 cases.
1. Influenza	386	76·1
2. Tuberculosis, all forms	62	12·2
3. Organic heart disease	112	22·1
4. Anæmia	202	39·8
5. Bronchitis, bronchial and nasal catarrh, cold, &c.	920	181·3
6. Pneumonia and other diseases of the respiratory system.	351	69·2
7. Diseases of digestive system	726	143·1
8. Diseases of genito-urinary system	144	28·4
9. Diseases of nervous system and special sense...	340	67·0
10. Skin diseases	239	47·1
11. Injuries and accidents	308	60·7
12. Abscess, boils and other septic conditions ...	249	49·1
13. Lumbago, rheumatism, &c.	336	66·3
14. Debility, neuralgia and headache	285	56·0
15. Other diseases	414	81·6
Total	5,074	1,000·0

INSURED PERSONS IN REPRESENTATIVE CITIES.—PROPORTION OF CERTAIN DISEASES TO TOTAL CASES—1916.



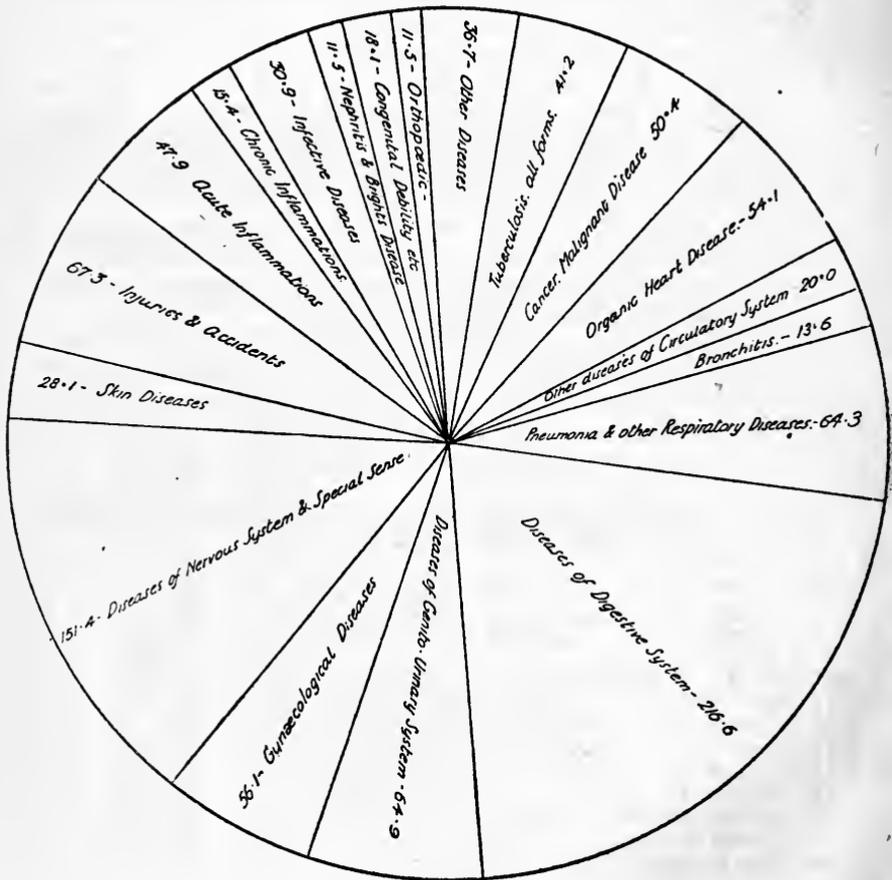
Whilst it is not permissible to draw far-reaching deductions from these figures they are full of interest and suggestion. It will be observed, first, that certain conditions such as heart disease and tuberculosis furnish few patients, though respiratory disease, indigestion and general minor conditions (Nos. 10-14) furnish many. Indeed, more than a quarter of all the patients suffer from general minor conditions, and a quarter from bronchial catarrh or pneumonia, indigestion coming third in such a classification. Secondly, the chief burden of sickness here recorded, and which led to a greater or less degree of sickness benefit and lost time, falls within the category of preventable disease.

Such being the diseases which take patients to their insurance doctor, we may well ask what diseases take them to the hospitals? The following Table sets out the principal conditions of sickness for which patients were admitted to the wards of a large London hospital in 1913.

A large London Hospital—Proportion of Certain Diseases to Total Cases—In-patients, 1913.

Disease.	Number of Cases.	Proportion per 1,000 cases.
1. Tuberculosis, all forms	796	41·2
2. Cancer, malignant disease	975	50·4
3. Organic heart disease	1,046	54·1
4. Other diseases of circulatory and lymphatic system.	386	20·0
5. Bronchitis	262	13·6
6. Pneumonia and other respiratory diseases ...	1,244	64·3
7. Diseases of digestive system	4,188	216·6
8. Diseases of genito-urinary system	1,255	64·9
9. Gynæcological diseases	1,084	56·1
10. Diseases of nervous system and special sense ...	2,929	151·4
11. Skin diseases	553	28·1
12. Injuries and accidents	1,301	67·3
13. Acute inflammations	925	47·9
14. Chronic inflammations	297	15·4
15. Infective diseases... ..	598	30·9
16. Nephritis and Bright's Disease... ..	222	11·5
17. Congenital debility, &c.	349	18·1
18. Orthopædic	222	11·5
19. Other diseases	709	36·7
Total	19,341	1,000·0

A LARGE LONDON HOSPITAL.—PROPORTION OF CERTAIN DISEASES TO TOTAL CASES—IN-PATIENTS—1913.



Obviously these figures deal with cases of greater severity than those coming under the observation of insurance practitioners. As a rule a patient is less inclined to enter hospital than to consult his insurance doctor (upon whose advice he may consider himself as having some claim), and therefore a hospital return is likely to represent more serious conditions, especially as it is not customary to admit patients with incipient or relatively light disease. Hence this return shows, as we should expect, a higher proportion of tuberculosis, cancer and organic heart disease, and from the figures there also appears to be a substantial rise in digestive diseases and in disease of the nervous system, and a fall in respiratory disease. But here also there is much disease which might be prevented or postponed. Speaking generally, if these insurance practice and hospital returns are taken with the defects found in school children and recruits, and are compared with the death returns it will be found (1) that the conditions which impair the health, and even lead to the disablement of men, women and children, are not chiefly the conditions which kill them, though they may, in many cases, predispose to mortal disease, (2) that relatively little of the sickness is attributable directly to infectious disease, and (3) that a substantial proportion of this sickness is preventable.

(4) *National Service Department.*

30. The exigencies of the European War brought, voluntarily or compulsorily, the majority of the young men of the country to the recruiting station. Here, at the training camp and in the war zone, these men were subjected to medical examination of various kinds and degrees. The vast collections of data thus obtained by the military, national service, or pension medical authorities are not yet available. We know that investigations were made at one time or another, and for larger or smaller sections, which were concerned with the condition of the heart, the kidneys, and other organs, the teeth, the eyesight, the general physique, and so forth, and in regard to some of these matters certain findings are available. But, over and above any such special enquiries, there is the broad fact of the number of men submitting themselves for recruitment who were not physically fit enough to be drafted for training. They form a certain kind of index of the health of the people and of their upbringing in infancy, childhood and adolescence. The position is this: that the number of recruits placed in the lowest categories of ill-health or unfitness amounted approximately to not less than a million men (excluding men rejected after or during training), whom, by reason of their physical or mental disability, it was found impracticable to utilize for service in the military forces of the nation, and that the causes of this physical disability were chiefly some form of organic or structural disease.*

* Various enquiries were instituted during the war into the physical condition of men and women engaged in munition work by the Health of Munition Workers Committee, the Medical Research Committee, the Factory Department of the Home Office, the Commission on Women in Industry, &c. No

(5) *The Returns of the Registrar-General.*

31. The annual report of the Registrar-General is the final inventory of the physical condition of the English people. In its pages may be found the fullest digest available of the actual facts respecting the beginning and ending of life, the births and deaths—the great army passing in, the great army passing forth. Knowing approximately the causes of death, we can draw certain general deductions in regard to the physical state of the living. In this place it is only possible to refer briefly to the two fundamental events, birth and death.

The birth rate in 1917, the latest year under report, was 17·8 per 1,000, being the lowest on record, and 6·0 below that for 1914, the last year unaffected, in this respect, by war conditions. During the last 20 years of peace the birth rate fell from 29·6 (1894) to 23·8 (1914), namely 5·8 per 1,000; in the last three years it has fallen from 23·8 to 17·8, namely 6·0 per 1,000, just over 25 per cent. The highest birth rates usually occur in the small towns of Wales, the next highest in the manufacturing towns of the north and the lowest in the rural districts of the South of England. In 1917 the total number of births registered was 668,346 (or 117,174 fewer than in 1916), including 37,157 of illegitimate children.

Speaking generally, the birth rate in the country has now declined to the extent of one-half within the last forty years. In 1878 it was 35·6, in 1917 it was 17·8. This decline has not been uniformly distributed. The birth rate depends, of course, upon many factors, the age at marriage, fertility, social position, occupation, etc. Dr. T. H. C. Stevenson, the Medical Superintendent of Statistics, has shown that fertility decreases regularly as the size of the tenement increases till six or seven rooms are reached, and thereafter remains constant; that infant mortality decreases regularly as the size of the tenement increases, being for tenements of ten rooms or more less than half the average, and less than one-third of that in one-room tenements; that the saving of infant life in the more comfortable tenements compensates to only a slight extent for the lower fertility; and that fertility differs widely in different occupations, being for coal miners nearly twice that of doctors, and so forth. The birth rate is lower among the more prosperous classes. It is said that conscious limitation of fertility is widely practised in various forms.*

The death rate in England and Wales in 1917 was 13·5 per 1,000, being about the same as for the decennium 1905–1914. In 1917 there were registered 498,922 deaths; 64,483 deaths of infants under one year of age, yielded an infant mortality rate of 96 per 1,000 births or 11·9 per cent. below the average of the

doubt, the general conditions and strain of the war period exerted a deleterious effect upon the physique of the worker, but, with the exception of an increased incidence of tuberculosis and fatigue, the majority of workers stood the strain of long hours and increased labour better than was anticipated. This relatively favourable result was due in part to high wages, to the incentive of patriotism, and to generally improved industrial conditions.

* *The declining Birth-rate : its causes and effects, 1916.*

preceding ten years. The recent decline in the infant death rate (1913-17) has taken place throughout the first year, but least of all in the first month (at which time convulsions, congenital malformations, premature birth and atrophy are the four chief causes of death). On the other hand, diarrhoea and respiratory diseases, the chief causes of death in infancy after the first month, have yielded substantially to preventive measures. Of the total deaths, and excluding still-births, 236,581 (or 47 per cent.) occurred under 50 years of age.

BIRTH RATES, DEATH RATES, INFANT MORTALITY RATES.
(England and Wales) for 1899-1918.

Year.	Birth Rate (per 1000 living).	Infant Mortality Rate (per 1000 births).	Death Rate (per 1000 living).
1899	29·1	163	18·2
1900	28·7	154	18·2
1901	28·5	151	16·9
1902	28·5	133	16·2
1903	28·5	132	15·4
1904	28·0	145	16·2
1905	27·3	128	15·2
1906	27·2	132	15·3
1907	26·5	118	14·9
1908	26·7	120	14·5
1909	25·8	109	14·3
1910	25·1	105	13·2
1911	24·3	130	14·2
1912	23·9	95	13·0
1913	24·1	108	13·5
1914	23·8	105	13·7
1915	21·9†	110	14·8*
1916	20·9†	91	13·4*
1917	17·8†	96	13·5*
1918	17·7†	97	17·6*

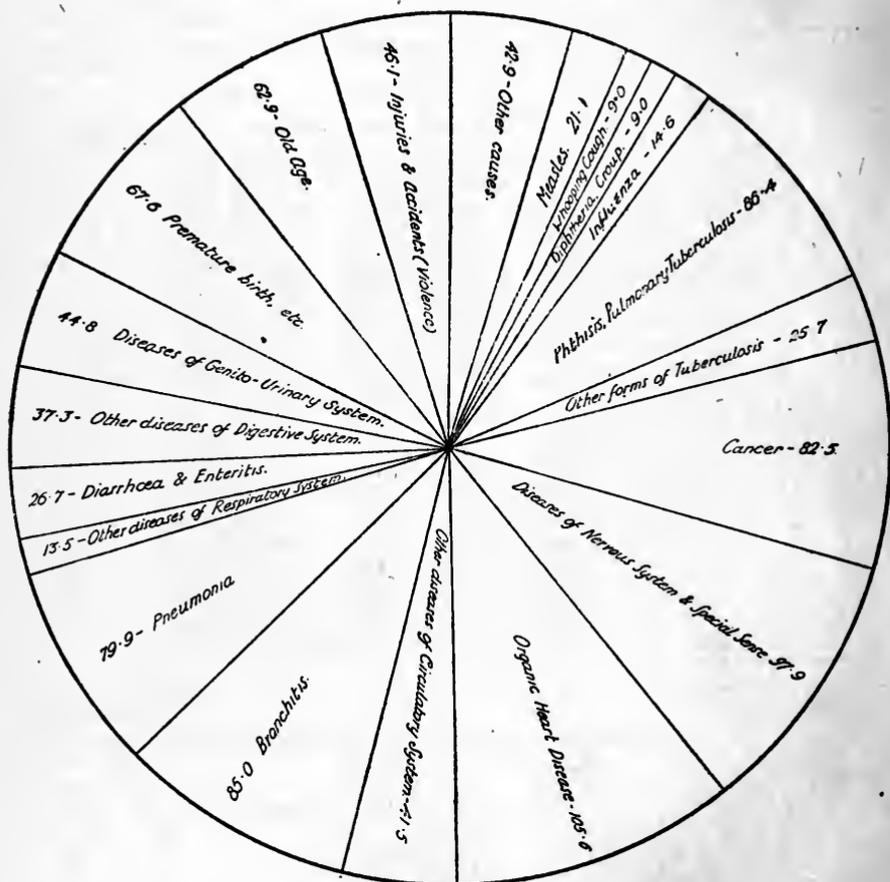
† Based upon populations specially estimated for this purpose.

* Based upon civilian deaths and estimated civilian population.

The principal causes of death at all ages are, in order, tuberculosis, organic heart disease, disease of the nervous system, bronchitis, cancer and malignant disease, pneumonia and congenital debility—not, it will be noted, the conditions which in the main form ground of sickness benefit under the Insurance Act. The remarkable decline in the death rate due to the principal epidemic diseases has been maintained.‡

‡ Comparing the annual mortality per million 1838-42 with 1917, small-pox has fallen from 576 to 0, measles from 539 to 308, scarlet fever and diphtheria from 797 to 154, whooping cough from 504 to 134, and typhoid from 1,053 (including typhus) to 28 per million.

ENGLAND AND WALES.—PROPORTION OF DEATHS FROM THE
PRINCIPAL CAUSES TO TOTAL DEATHS—1917.



England and Wales.—Deaths from Principal Causes, 1917.

Disease.	Number of Deaths.	Proportion per 1,000 Deaths from All Causes.
1. Measles	10,538	21·1
2. Whooping cough	4,509	9·0
3. Diphtheria, croup	4,498	9·0
4. Influenza	7,289	14·6
5. Phthisis, pulmonary tuberculosis	43,113	86·4
6. Other forms of tuberculosis	12,821	25·7
7. Cancer	41,158	82·5
8. Diseases of nervous system and special sense	48,845	97·9
9. Organic heart disease	52,692	105·6
10. Other diseases of circulatory system... ..	20,719	41·5
11. Bronchitis	42,407	85·0
12. Pneumonia	39,832	79·9
13. Other diseases of respiratory system... ..	6,738	13·5
14. Diarrhœa and enteritis	13,311	26·7
15. Other diseases of digestive system	18,609	37·3
16. Diseases of genito-urinary system	22,322	44·8
17. Premature Birth and diseases of early infancy	33,738	67·6
18. Old age	31,400	62·9
19. Injuries and accidents (violence)	22,975	46·1
20. Other causes	21,408	42·9
Total	498,922	1,000·0

This Table has been drawn up from the Report of the Registrar-General for 1917, in the same form as the tables of sickness returns, with an accompanying graph.

Conclusions.

32. The data from these five sources, taken as a whole, provide something in the nature of a physical survey of the English people, fuller in compass and more comprehensive than any former investigations have yielded. Whilst it is true that the death rate is declining and decimating scourges and famines are a thing of the past, at least as regards the British Islands, we cannot escape from the conclusion that there remains a serious amount of preventable sickness and avoidable disablement, the tendency of which must inevitably be to undermine the physical stamina of the people and reduce their capacity. Moreover, the nation is slow to realise the vast mass of disability and incompetency which results from widespread maladies, usually regarded as trivial and negligible, which may not reach the doctor and of which there is no record, such as anæmia, dyspepsia, constipation, septic wounds, accidents, colds, chilblains, eye-strain and dental inefficiency—and which do not appear in such returns as those quoted above.

Taking the whole record as it stands the following broad deductions may be drawn from the facts and figures (to which

reference is made in these pages) in regard to the physical condition of the English people:—

1. There is a steadily falling birth rate, which in 1917 reached a figure (17·8) gravely affecting the source of the nation;
2. There is a death rate (13·5) which shows a steady decline at all ages (1841-45 compared with 1911-15), and there is an increased expectation of life from birth upwards; nevertheless, nearly half the deaths occur under 50 years of age;
3. Although the infant mortality rate (96 per 1,000 births) is one of the lowest recorded, there is still unnecessary loss of life in infancy and before birth (abortion, miscarriage and still birth);
4. There is a relatively light burden of epidemic and infectious disease, which, with certain exceptions, is steadily decreasing in incidence and mortality, an indication of the victory of Preventive Medicine over some infectious diseases;
5. Tuberculosis, measles, acute rheumatism and influenza are, however, still prevalent and, with venereal disease, lead to much disablement and mortality;
6. There has been in recent years remarkable and continuous improvement in sanitary environment, though the problem of insufficient and unsuitable house accommodation remains;
7. The systematic medical examination of school children since 1908 has revealed a substantial degree of physical and mental impairment, both the existence and effects of which have been confirmed by the examination of recruits;
8. The expenditure on sickness and disablement benefit, and other returns respecting the system of national insurance, denote that more than half of the insured persons claim and receive treatment, and that a very serious amount of time is lost from employment (amounting to upwards of 270,000 years per annum) owing to invalidity or disablement, much of which arises from sickness and disease which is preventable.

The most impressive facts in this survey are the falling birth-rate and death-rate, the improving environment, the high proportion of deaths taking place under 50 years of age, and the vast burden, at all ages, of preventable invalidity. Thus, the problem lying immediately before Preventive Medicine is, first, to rear and maintain a healthy race of people, and, secondly, to continue its attack upon infection and to initiate an attack upon all forms of preventable sickness and invalidity. For invalidity, physical impairment or bodily disablement involving loss of capacity and even unemployability may be a greater evil and a heavier burden to a nation than a rise in the death rate. Our attention therefore must be directed not only against the death rate but against preventable morbidity and invalidity of all kinds.

SECTION V.

THE BROAD LINES OF REFORM.

(i) *Need for Synthesis and Integration in Medicine.*

33. The student of the history of general or particular movements in human affairs is well aware that at any given point in progressive thought he will find one or other of two characteristics dominant, namely, extension or consolidation. The extension reveals itself in a reaching-out after new conceptions and expression, analysis, differentiation and specialism. At other times there comes the need of summary, of unification, of synthesis as the governing idea—not necessarily of new discovery but of new and wider application and inter-relation. Sometimes both proceed simultaneously. The examples are numerous. In the practical affairs of the world there is, as we all know, the time of expansion of many forces of divergent direction, followed by the emergence of unity of command, of national oneness, or of inter-state federation. The same is true in social evolution; we have in the history of our own country the great synthetic periods—the age of King Alfred, the end of feudalism, the rise of Parliament, the Reformation, the introduction of printing, the steam engine, the industrial domination, the growth of communal action. In the history of English learning, too, there are abundant illustrations, reflective not seldom of foreign thought, of an underlying unity and aspiration towards a wider synthesis. In philosophy, the steps pass in orderly fashion through the problems of psychology, of knowledge, of evaluation, of being and cosmology. “Expansion and duration do mutually embrace and comprehend each other,” wrote Locke in his *Human Understanding*, “every part of space being in every part of duration, and every part of duration in every part of expansion.” In physics there was the great unification effected by the Newtonian mechanics, then a period of differentiation and analysis, another synthetic system crystallizing around the principle of the conservation of energy, again differentiation, and once more in our own time the tendency to synthesis indicated in the quantum hypothesis, the principle of relativity and other generalisations. In English literature, Chaucer lays the foundation of a unity by weaving together strands of French, Italian, and English origin, and the *Canterbury Tales* provide a sort of miniature, not of English poetry only, but of medieval literature; then there was the zenith of the Renaissance in the dramas of Shakespeare, followed in due course by a third synthetic period in the Romantic revival. The history of biology before Darwin shows a progressive analysis of structure and function which finds in the epoch he created a synthesis in the evolution idea. Even in the realm of Religion men seek for and aspire towards a synthesis composed of constituent elements which are, they hope, integrally related and possibly even unifiable. This search is not, perhaps, for fundamental verities so much as for co-ordinated truth.

34. In the history of medicine in England there are likewise abundant illustrations of summarising and synthetic periods. Even as regards the external form of the profession, we have the Medical Act of 1511, the foundation of the College of Physicians in 1518, the incorporation of the Barber Surgeons in 1540, the great Herbals of the sixteenth century—the precursors of the pharmacopœia—the charter of the Apothecaries of London in 1617, followed, in the nineteenth century, by the introduction of the Census (1801), the registration of births and deaths (1836), the General Medical Council (1858), and the public health acts from 1848 to our own day. Even more synthetic in ultimate result were the unifying work and methods (1) of Harvey; (2) of Sydenham, Glisson, Mayerne, Willis, Lower, Morton, and the great practitioners of the seventeenth century; (3) of Hunter and the school of pathology; (4) of Mead, Fothergill, Rogers, and the epidemiologists of the eighteenth century; (5) of Edward Jenner and the inoculationists; and (6) of Lister and his school in the early days of the Germ Theory. All through there has been analysis followed by synthesis, variation on the one hand and unity of type on the other, periods of new knowledge, seeds sown on stony ground but coming to their fruition in time of application and consolidation. So much fluctuation and agitation, ebbing and flowing, that we may sometimes despair of discerning any law in its movements, and yet they lead ultimately, in spite of heterogeneous materials and various histories and fortunes, to something in the nature of an enduring harmony. “On through ever-widening sweeps of differentiation and integration,” wrote an Oxford philosopher, “till the whole body of thought is seen in its organic unity and development, every fibre of it alive with relation to the whole in which it is a constituent element.”

35. A new time of summary and application, of inter-relation and synthetic unity, in Medicine seems to have arrived. “At this moment,” wrote Sir Clifford Allbutt recently, “Medicine has come to a new birth. . . . It is nothing less than its enlargement from an art of observation and empiricism to an applied science founded upon research; from a craft of tradition and sagacity to an applied science of analysis and law; from a descriptive code of surface phenomena to the discovery of deeper affinities; from a set of rules and axioms of quality to measurement of quantity.”* In other words, Medicine has lately passed through a period of gestation characterised by germination, new formations, sub-division and differentiation—not without its analytical, schismatic and centrifugal dangers—and it is come now in our day to the need of integration. For an underlying unity is necessary if we would avoid that disintegration and dissolution which follow when differentiation proceeds in one-sided fashion. *The predominant need, both in medical education and application is simplification and integration, first in the thought and understanding of the meaning and destiny of Medicine, secondly in practice.* This need lies at the basis of any new apprehension of Preventive Medicine.

* British Medical Journal April, 1919.

Biology, Physics and Chemistry.

36. The curriculum of the medical student contains a dozen separate subjects taught all too frequently in water-tight compartments; he is examined on the same basis and must in some degree desert each subject in turn to prepare for the next test; even in practice there is a tendency to early specialisation. My submission is that, in spite of certain advantages, this separateness and disjunction must as far as practicable be avoided. Consider the part played by the teaching of *biology* in the mind of the medical practitioner. The doctor who sees human medicine as the embodiment of comparative anatomy, physiology and pathology sees the great vision. To him the principles of selection and evolution become daily working axioms. With Hippocrates he works with and not against Nature; his patients are examples of the effect of her laws; his triumphs are her fruits; his practice is along the line of her method. But how few is the number of medical biologists, and how many are those who tend to become technicians only, swept by force of circumstances into an attitude of narrow specialism. "From overspecialisation scientific men are in a more parlous state than are the Humanists from neglect of classical tradition," writes Sir William Osler. "The salvation of science lies in a recognition of a new philosophy—the *scientia scientiarum*, of which Plato speaks: 'Now when all these studies reach the point of intercommunion and connection with one another and come to be considered in their mutual affinities, then, I think, and not till then, will the pursuit of them have a value.'"[†] Or consider the relation of *physics* to modern medicine. If we open a modern text-book or catechise a medical practitioner, we shall find that the measurement of physical properties, motion, pressure, tension, diffusion, osmosis, aeration, the action of colloids, and the flow of liquids, bear a new relation to the modern practice of Medicine; an even closer relation obtains in regard to the physics of heat and thermometry, of light and the laws of reflection and refraction, of electricity and the Rontgen rays. The application of these matters to remedial medicine is a daily routine in certain branches of work, and in all branches they profoundly affect our conception of the form, movement, and structure of the cell, of air pressure in the lungs and blood pressure in the circulatory system, of the passage of lymph, of renal and cutaneous excretion, of the conditions of the cerebro-spinal fluid, or of the secretions of the liver, the salivary and ductless glands. Even more intimate and far-reaching is the relation of the new *chemistry* to medical practice. "The old experimental method," writes Sir William Osler, "combined with the new chemistry, applied to disease has opened a glorious chapter." For here, too, there is immediate application in dietetics, in pharmacology and therapeutics, in surgery; there is also the profound effect on our understanding of fatigue, infection, and immunity, and above all of mentality and virility. Bio-chemistry is revolutionizing the whole of our conceptions of nutrition and assimilation.

[†] *The Old Humanities and the New Science*, 1919, p. 27.

For example, the new knowledge of *vitamines*, whether "water soluble B" of cereal seeds, or "fat soluble A," the growth factor of animal fats, or "water soluble C" of fruits and vegetables, or others yet to follow, alters our conception of nutrition and moves its centre of gravity to a factor hitherto unconsidered. It is not only protein, carbohydrate and fat which must now be thought of as capable of maintaining life and furnishing energy; it is also this precious accessory substance. If it be not present, whatever else there may be, nutrition may be absent, indeed even disease may supervene. This is the new light on the deficiency diseases—beri-beri, scurvy, rickets and malnutrition.

Physiology.

37. But *vitamines* are not alone the mystery. There are the familiar *internal secretions*, saliva (ptyalin), the gastric juice (pepsin), the pancreatic fluid (trypsin), and bile, exerting their digestive effect on food consumed, the exact bio-chemistry of which is being more fully worked out. In addition, there are the *hormones* (or "exciters"), chemical substances produced in cells in one part of the body and carried by the blood to other organs which they stimulate to active functioning. What is the relation of these hormones to the growth and development of the body? What is their relation to its powers of resistance to disease and in what way ought we to seek to integrate and synthesise our knowledge of their action in the advance of preventive medicine? For instance, the secretion of the *thyroid* is a necessary condition of the normal growth and functions of many tissues of the body, yet if present in excess exophthalmic goitre may arise, and if lacking, myxœdema or cretinism may supervene. The secretion of the *pituitary body* may promote growth in bony tissue, excite unstriated muscle, or affect the central nervous system. *Adrenalin*, active in excessively minute quantities, may raise the blood pressure, excite the functions of the sympathetic nervous system, and bring into action various specific tissues of the body; and there are a whole series of allied substances (Dale). The internal secretion of the *pancreas* appears to be concerned in the assimilation of carbohydrates. The hormones of the *reproductive organs* have a correlation with those of the thyroid and the thymus, and may affect the whole virility and mentality of the organism. Of the existence of these five typical secretions there is a growing recognition, but is any understanding of their place in Preventive Medicine gaining ground? Yet it would seem that, invisible and behind the scenes, these hormones may have a part to play in the defences of the body comparable with that of the *vitamines* in nutrition. In respect of both there is the question of nervous regulation of nutritional processes. What is the bio-chemistry of, what is the effect of, the conditions of temperature and blood current on the regulating centres of the brain? and what is the relation of bio-chemistry to the mind in health and disease?

38. Thus, Physiology is too little integrated with Medicine. The practitioner thinks in terms of morbid anatomy or perverted

function; he treats too often the symptoms which present themselves, insufficiently recognising that pathology and symptomatology have their groundwork in biology, physics and chemistry, as applied to the patient before him. In fact, the patient is a case of anatomy and physiology, to be interpreted and treated on grounds and by means which are in essence physical, chemical, and physiological. The science of physiology should be brought into closer touch with clinical and preventive medicine and surgery. A foundation can be laid in Professor Sherrington's course of experimental physiology at Oxford. There is the profound truth of the organic regulation by the nervous system; there is the relation now being more fully worked out between psychology and physiology in regard to the human mind. But the parts of the subject immediately applicable are innumerable. "In life," as Dr. Haldane has said, "the whole is in the parts and the past is in the present." Surgical shock, heart disease, transplantation of muscle and bone, many of the new orthopedic lines of treatment, the treatment of goitre, nerve suture, injuries of the spinal cord, the antiseptic treatment of wounds, the problems of disease in abdomen, thorax, or brain, the great field of psychoneurosis, psychology and mental disease—the effective and scientific treatment of all these conditions illustrates the direct application of physiology.

39. Once more, there is need for a closer integration between preventive and curative medicine. They are essentially parts of one process. In all cases the *cause* of disease, not in the abstract alone but in the particular patient under consideration, must be sought; the relation of the disease to what has gone before must be ascertained; the relation of the local signs of disease to the whole man and the whole disease, of which the local condition is but one expression; and the actual treatment provide must, as far as practicable, be preventive. Too frequently a case of disease is conceived as an entity separate and detached from its ancestry and dealt with on *ad hoc* lines. Tuberculosis, a common example, has behind it an ancestry of conditions, of previous disease or of predisposition, which must be faced in any sound remedial action. Malnutrition, measles, unresistant tissues, have played a part. The child is father of the man, and we cannot rightly deal with tuberculosis apart from the proper treatment of the disease in infancy and childhood, possibly the chief age-period of its infection and invasion, and certainly the opportunity of its treatment. Of endocarditis, diabetes, nephritis, duodenal ulcer, gall stones—turn where we will—the same ancestral story is to be told. Measles predisposes to tuberculosis, rheumatism is the forerunner of heart disease, scarlet fever of renal complication, influenza of pulmonary disease, malnutrition of rickets. Thus if medicine is to be made a powerful controlling factor not only must the various branches of medicine be integrated but it should be recognised that the chief manifestations of disease bear intimate relation to each other; and the treatment of one is the prevention of others, in a score of different fields curative medicine should be the basis of prevention and treatment the genesis of immunity. Our

whole understanding of Medicine should proceed, as Sir Clifford Allbutt has urged, "on Aristotle's double track, the track of the one into the many and of the many into the one." For "as the individual is but a link in the chain, so the human chain is a strand in the web of all living things. *We must know all disease to understand its several phases.* . . . In the fundamental phenomena of life in animal or plant there is a fundamental unity." Nor must the synthesis of the future be only one of conception and of interpretation; there must also be adequate provision of facilities for the medical man to practise the *whole* art of medicine, to correlate his medical and surgical knowledge, his preventive and curative efforts, to exercise his full wide function to the benefit of the community.

(ii) *Need for New Application in Medicine.*

40. The second predominant requirement in respect of Preventive Medicine has regard to application and organisation. We have seen that in recent years there has been an enormous increase in legislation on behalf of the health of the people. The nineteenth century was extremely fertile in this respect; and whilst there may well be occasion for unification and consolidation of the sanitary laws of the country, and even for further legislation, one of the principal needs is not statutory. As regards preventive medicine it is rather rearrangement and readjustment of medical practice. There is machinery, though not perhaps in all cases appropriate machinery, and there is knowledge. But the two are not together brought to bear on the focal point, for, as we have seen, preventable disease is not in fact being prevented and remediable disease and invalidity are not being adequately treated. I submit that the immediate necessities of the present period of application as regards Medicine are:—

- (i) Improvement in Medical Education.
- (ii) The provision of an adequate medical service.
- (iii) A systematic and co-ordinated attack on the problem which now presents itself.

41. The changes which have taken place in the evolution of medicine in England since the middle of last century have of themselves made essential some reform in the education of the medical man. There has been an immense growth of knowledge; to leave the curriculum approximately as it was two generations ago is to pour new wine into old wine skins. There has been something of a revolution in the public duties imposed upon the medical practitioner; to fail to equip him for these new duties is to send a soldier to battle unarmed. The financial, personal and social interest of the private citizen in medicine have been enormously increased by Insurance legislation; and thus has come about an extension of medical practice on behalf of the State undreamed of a generation ago. This is not the place to discuss the details of an improved system of medical education, which indeed has been suggested in outline elsewhere.*

* *Some Notes on Medical Education, 1918.* (Cd. 9124.)

42. All that is necessary here is to state that such reform constitutes an essential item in any national advance in the practice of Preventive Medicine, and that the changes should include (a) a strengthening, though not necessarily a lengthening, of the teaching of the vital subjects of anatomy, physiology and pathology, as the bedrock of Medicine; (b) a more thorough training in clinical medicine and surgery, and particularly in obstetrics—a fuller integration; a closer application of intermediate subjects and laboratory work to clinical subjects; “the medical sciences are independent,” said Huxley, “in proportion as they are imperfect”; (c) a more intimate personal study of the *beginnings* of disease, of its earliest signs and of its subjective symptoms, for no laboratory experiment or mechanical device can serve as a substitute for this knowledge, to which they are ancillary and auxiliary; (d) a wider apprehension and application of therapeutics (medication and other); (e) the practice of preventive medicine in all forms of clinical work; and (f) the provision of appropriate “post graduate” training, both as a method of revision and for the inclusion of certain special subjects now contained in the curriculum before graduation. Taking a wide review of Medicine in recent years certain clear characteristics emerge. There has been an immense advance in the application of physiology to the healing art, a growing knowledge of the effects of toxic influences in the body, an ever-increasing exercise and application of surgery, and a new understanding of the causes and inter-relations of disease.

43. A second requirement, urgent and insistent, is the provision of an adequate medical service for the people as a whole. The nation is not receiving the full benefit and advantage of modern Medicine. Many persons who need medical treatment or advice are not getting it, many who are being treated are not receiving *adequate* treatment. Human knowledge is as yet, alas, extremely partial, fragmentary and limited; but where it exists and where it is applicable to the remedy of disease or removal of disablement, it is the only sound business and the only true science to apply it, promptly, continuously and adequately. Yet, it is to be feared, that is what we are not doing, with the result that vast numbers of persons of all ages are physically impaired or incapacitated, or suffering from disease which is preventable or dying prematurely—a condition of things which is costly to the State, which undermines its stability and permanency, and which involves inexcusable waste of treasure and life.

44. There is a third requirement, direct application, and it may be stated in a sentence. The time has more than come for taking further steps in the organisation of a systematic and ordered attack on the strongholds of preventable disease—particularly that mass of crippling morbidity and invalidism which is undermining the capacity and efficiency of the people—an attack which will depend for its achievement upon a close partnership and co-operation between all branches of medicine, between the medical profession and the public, and between the governing authorities and those who are governed. We cannot

continue wisely to rely upon piecemeal effort, divided counsels, and conflicting authorities. If the nation desires ever to rid itself of the common enemy there must be unity both of purpose and action—and even so the task will be a long one.

“Let no man think that sudden in a minute
All is accomplished and the work is done;—
Though with thine earliest dawn thou shouldst begin it
Scarce were it ended in thy setting sun.”

45. I venture now to suggest for the consideration of my professional colleagues, on the one hand, and of that great body of opinion and power engaged in the local health government of this country, on the other, some general and particular propositions, it cannot be more than in outline, which in my view form a working basis for the practice of Preventive Medicine.

SECTION VI.

SOME OF THE ELEMENTS OF A NATIONAL POLICY.

46. It is proposed in the present section to suggest briefly some of the principal elements out of which may be constituted a national policy of Preventive Medicine. Such a presentation can only be provisional and contributory. It cannot be exhaustive or final. Even the construction of a provisional outline is encompassed by inherent difficulties. For instance, we are as yet far from possessing satisfactory knowledge of the scope and opportunity which lies before the science and art of medicine in its relation to the communal and social life of the people, yet before a comprehensive policy comes into being we must be assured of the validity, order and completeness of the body of knowledge and experience which is available. Again, much depends on the community itself, its intellectual apprehension, preparedness and willingness. Wise government depends on the consent and support of the governed, and these predicate an educated, enlightened and well-informed public opinion. It is true, as the motto of the New York Department of Health declares, that "Public Health is purchaseable"—but the purchase clearly involves desire to purchase, understanding of what is to be bought, and financial resources.

47. There is a third difficulty, in that no statement, however informal, can present a policy which can be executed by one instrument, whether that instrument be a Ministry of Health at the centre, a local authority, or an individual or set of individuals. Indeed, we cannot in this general way do more than discuss a sequence of ideas and propositions, of which some may be initiated, guided or aided by the State, some obviously fall within the province of the local authority, others lie as clearly in the sphere of individual predilection, practice, or duty. There are these three difficulties, to name no others, which we meet at the threshold of any attempt to formulate a comprehensive policy of Preventive Medicine, namely, the limitations of knowledge, the readiness of the community, and the distribution of executive duties.

48. Yet these reservations should not debar us from taking at least the first constructive steps. For there is a practical urgency in this matter; the problems we have been considering now await solution, indeed, they do not brook delay. If it be true, as many believe, that some regard Preventive Medicine—or, at least a Ministry of Health—as the panacea for human ill or national disability, it is high time to delimit its purpose and narrow its engagement within reasonable compass and to practicable measures. There are many forces and negligences now hurting the State, as there are many legitimate national aspirations, which lie outside the province of Medicine but which profoundly affect its contribution. If it be true, as many believe that there is abroad a conception of Preventive Medicine which, on the other hand, restricts its scope to environmental questions, even to what is popularly called "drains," it is again high time

to urge the wider claim. As the science and art of curative medicine is not comprised in the "bottle of medicine" idea, so also is Preventive Medicine not concerned only or chiefly with "drains"; nor can it prove adequate to the nation's needs if it is dependent, as too often in the past, upon piecemeal effort, spasmodic endeavour, or convulsive action inspired by emergency, fear, or panic. The health authorities all over the country—for counties, for great cities, for small villages—are now called upon to exercise large duties in behalf of the physical life and capacity of the people. It is essential they should have a clear and serviceable apprehension both of the problem of national health and of the means of its solution. How otherwise can they devise their schemes of reform? How else can they secure a sense of proportion and of sound setting, a vision both of the narrowness and of the width of their engagement? Obviously, the problem is complex—it involves, on the one hand, a practical proposition in local ways and means, in pounds, shillings and pence, and, on the other, large questions of heredity and nurture, of environment and personal hygiene, of the nature of disease and its prevention and remedy, of education and research. All the more important, therefore, is it that there should be, as the common possession of all, some knowledge of the power of control, a sense of proportion and sequence, discernment and good understanding, in short, the data of a national policy. Not all its items can be practised at once, but all its items should be in firm and correct setting; emergency action will still be necessary, but deliberate plan, foresight, ordered preparation must henceforth have their place. There must be both direction and co-operation—forward looking, steadily pursued, patient, relentless. Then emergency and temporary measures, necessary by the exigencies of circumstances, will fall into their subsidiary place, and not become the routine or dominant practice.

What then are the constituent parts of a national policy in Preventive Medicine to be borne in mind by central and local authority?

i.

Hereditv and Race.

49. The fundamental fact which lies at the foundation of Preventive Medicine is the healthy individual. Environment, infection, the accidents of life, and disease undoubtedly exert direct or indirect effect upon him, but it is his own body, with its growth and development, its resistant soil, its natural powers of defence, which forms the basis of health and of scientific prevention. To start a man fairly on life's journey he requires a sound foundation of physique. We have to think in terms of race, and thus it comes about that the idea of parentage and ancestry cannot be ignored. If we are to grow a sound and healthy race of men we must begin, where all true breeding begins, *at the source*. If we permit ourselves to favour and provide for the unguided propagation of a population of poor

physique or of persons marked from birth with the stigmata of alcohol, venereal disease or mental deficiency, we shall sooner or later discover that we are building on false foundations, and without taking sufficiently into our reckoning the Laws of Heredity, of transmission, and of ante-natal infection.

Alcoholism.

50. The excessive consumption of *Alcohol* in one form or another has exerted its baneful effect upon the human race for many centuries and in many lands. Its modes of action are various. It may affect the race by affecting vast numbers of individuals with a greater or less degree of physical or mental degeneration, accident or disease; it may render a man liable to venereal infection; it may, by devitalising the tissues of the body, reduce its powers of resistance to infection, as in tuberculosis or syphilis; it may shorten the expectation of life by as much as fifteen years; it may lead to neglect and malnutrition of the child of the dissolute parent; or it may possibly impair the reproductive cells of the parent and thus affect injuriously the offspring. Inquiries into the defective development, disease or early death in the children of alcoholic parents, or into the pathological condition of the reproductive organs of alcoholic subjects or alcoholised animals, yield significant evidence as to the potentiality of alcohol as an injurious agent.*

51. There are two methods of removing, or at least mitigating these physical evils of alcoholism, namely, individual abstinence and State control of the liquor trade. There is now indisputable evidence of the practical benefit which may result from either or both such means of Preventive Medicine. On the one hand the effect of individual abstinence from, or moderation in the consumption of, alcoholic beverages is a matter of common knowledge. On the other, recent evidence has been forthcoming of the value of State measures of control in the experience of the Liquor Control Board established in 1915. The principal measures taken by the Board on physiological lines were (a) the severe curtailment of the hours of sale of alcohol; (b) the provision of facilities for non-alcoholic refreshment in industrial canteens; (c) the prohibition of the sale of spirits of excessive strength; † (d) the prohibition of incentives to excessive consumption (such as "treating," credit sales, and canvassing for liquor orders). The social and physical results of this policy were remarkable and establish the fact that national alcoholism can be checked by suitable preventive measures.

"It is no longer doubtful," declares Lord D'Abernon, "that under an appropriate system of restriction a high level of temperance can be attained in this country, and that thus national efficiency can be enhanced, and general prosperity and happiness increased. But to attain these ends the regulation must be both restrictive and constructive, and the restrictions must involve a certain con-

* *Alcohol: Its action on the Human Organism*, 1918, pp. 101-104. See also *Alcoholism*, by W. C. Sullivan, M.D., 1906.

† On the varying effects of dilution of alcohol and conditions affecting its absorption, see Medical Research Committee's Report, No. 31, by Dr. E. Mellanby.

straint alike upon those who require no protection against themselves and those who do. The question is whether these sacrifices—if such they can be called—will be accepted by public opinion and by Parliament. Unless they are, all talk about an aspiration to a healthier and more efficient Britain becomes mere rhetoric.”*

The physical effect of the restrictions imposed by the Liquor Control Board were shown in increased sobriety and capacity, in lessened fatigue, and in a lowered death rate from all forms of alcoholism. The Registrar-General's returns state that in 1913 and 1914 (before the war and therefore before the Liquor restrictions) the number of deaths certified as due to or connected with alcoholism (excluding cirrhosis of the liver) in England and Wales were respectively 1,831 and 1,816. But in 1916 these fell to 953, in 1917 to 580, and in 1918 to 296, affecting both men and women. Even cirrhosis of the liver declined by 60 per cent. (from 1913 to 1918). The number of cases of attempted suicide also fell from 2,426 in 1913 to 810 in 1918. Yet more remarkable was the decline in delirium tremens in certain Poor Law Institutions by 65 per cent. in males and 76 per cent. in females in the second complete year following the imposition of the restrictions.† In the Registrar-General's Report for 1917 Dr. Stevenson points out that the remarkable decline in deaths from alcoholism in that year affected women (a decline of 63 per cent.), men over 45 years of age, and therefore beyond military service (58 per cent.), and deaths due to violence certified by coroners. The mere withdrawal of men for military service could not therefore have been the predominant factor.

52. We are not here concerned to advocate total abstinence from alcoholic beverages or any particular form of administrative restriction. Our case is the simple proposition that it is common knowledge that the excessive consumption of alcohol may lead to individual and “racial” poisoning, and that there are possible and practicable means of reducing its effect. Such means are a measure of Preventive Medicine which cannot be ignored or neglected if we would escape the physical evils of alcoholism.

Syphilis.

53. A second example of a disease affecting the race is *Syphilis*, which may be transmitted from a diseased mother and possibly from a diseased father without the mother being obviously affected. In the unborn embryo and in the child after birth congenital syphilis may be an even more serious disease than the acquired form, since it attacks tissues still in process of development. But whether congenital or acquired the disease plays havoc with the individual and the offspring. It is a frequent cause of sterility and of ante-natal death, producing abortion, miscarriage or still-birth; it plays its evil part in the

* *The Control of the Drink Trade in Britain* by Henry Carter, 1919, p. xii.

† Loc. cit., pp. 249-254. See also “Public Health and the Control of the Liquor Traffic,” *Jour. of State Medicine*, 1917, and the reports of the Liquor Board in June, 1919.

production of infant mortality;* it is also followed by various forms of congenital disease.† In the case of 175 pregnancies in 34 syphilitic mothers there were 104 premature births, stillbirths or deaths in early infancy, 41 seriously diseased offspring, and only 30 apparently healthy children (Mott). Syphilis is an extraordinary fertile source of disease in all parts of the body, affects it is estimated a substantial number of the whole population in the large cities of this country‡ and produces in its total area of destruction a heavy mortality. Gonorrhœa is even more prevalent, and the cause of widespread disablement, chronic disease and sterility.

54. Since 1905 we have known the cause of Syphilis. Further, the "Wassermann reaction" has provided a biochemical test for diagnosis, and Ehrlich and others have placed in our hands methods of effectual treatment. The duty which lies before us is therefore plain. It is to provide facilities for the prevention of the spread of this disease, for its early diagnosis and for its prompt and continuous treatment—accessible laboratories, means of diagnosis and research, treatment centres and clinics, increased facilities for the private practitioner, and the stamping out of quackery. Nor is that all—women police, co-operation between authorities concerned in social control, public education and enlightenment, the development of recreative schemes, a reasonable and sympathetic handling of the affected man or woman, and above all a high standard of moral life, are needed. In brief, the prevention of Syphilis is a proposition in administration, combined with an advance in under-graduate and post-graduate medical education in venereal diseases and, above all, in the education of the public and the patient.

Feeble-mindedness.

55. A third example of "racial" poison of a different and more obscure nature, is the form of mental deficiency known as *Feeble-mindedness*. With the exception of certain types of amentia due to definite lesions of the brain the bulk of feeble-mindedness must be looked upon as a definite form of "imbecility" due to an arrest in the normal development of the brain itself, an arrest characterized by an insufficient number of nerve cells, an imperfect formation of the cells and an inadequacy of association fibres of the cells and thus of the co-ordinating structure of the brain. The condition is therefore a retrogressive variation of the normal brain, permanent in nature and probably hereditary in cause. Feeble-mindedness may be due to unfavourable conditions affecting the germ plasm of the parent (insanity, epilepsy, syphilis, alcoholism, consanguinity, &c.); acquired causes or factors may affect the foetus *in utero* (mental stress, alcoholism, tuberculosis, syphilis, physical injury to foetus, &c.); and lastly, there may occur "acquired" cases in which it

* *Infant Mortality*, 1906, pp. 62-69.

† Report of Royal Commission on Venereal Disease, 1916 (Cd. 8189), pp. 29-31.

‡ Loc. cit., p. 23.

would appear that an infant may be born with a fairly normal brain tissue the subsequent development of which is arrested owing to unfavourable postnatal conditions or diseases.

56. Feeble-minded women are, on the whole, more prolific than normal parents and have larger families than the average. Here, therefore, we have a disease conveyable by heredity, relatively incurable and yet likely to recur in large families; in other words, a racial malady. Much can be done by proper training and custodial care to alleviate the social and physical condition of the feeble-minded person, but, at best, not more than a quarter to one-third of these cases can be taught to maintain themselves, wholly or partly, and with or without supervision. The Royal Commission on the Feeble-minded 1904 (reporting in 1908) estimated the number of feeble-minded persons in England and Wales to be approximately 150,000, of whom 48,000 were children. The magnitude of the problem is therefore obvious. The means of amelioration are training of the educable, custodial care of the ineducable, supervision and after care of both.

57. Here are three types of degenerative processes—and tuberculosis and lead poisoning might well be added—which may affect the individual in such a way or degree as to affect the race. In some form or other Preventive Medicine must handle them, separately and jointly, not forgetting that their inter-relationship is intimate. Alcoholism may lead its victim into venereal infection, venereal disease may lead to feeble-mindedness or insanity, feeble-mindedness may propagate itself and once more start the vicious circle. Hence the necessity of treating each disease specifically and adequately. But there is a clear case for doing more than this, and that such a view is widely held is indicated by suggestions which are made. Some recommend the prohibition of alcohol, others the castration of the syphilitic, others the incarceration of the feeble-minded, and yet others again a compulsory and statutory system of marriage health certificate. There may appear to be logical grounds for such recommendations, but they are impracticable and some of them are inexpedient. The problems to be solved are, in fact, of much deeper root, much more profoundly social in origin, much more far-reaching than many have supposed. They call for investigation, for more knowledge, for truer and more serious understanding. What is needed is nurture and education, and the study and practice of the science of eugenics—including the encouragement of worthy parenthood, the discouragement of unworthy—right through civilised society, at every age period, and in every class. Francis Galton urged that progress towards increased race efficiency could be made along two routes, (a) the scientific study of the laws of heredity and environment, and (b) widespread education in regard to the vital national importance of these matters and the depth of our present ignorance and negligence. But always concurrent with eugenics there must be the other mighty factor, nurture, education and the development of high character. The relationship between morality and preventive medicine is intimate and profound.

ii.

Maternity.

58. During the decennium 1908-1917 the average annual number of marriages in England and Wales was 283,255, and of births, 853,516. The average annual infant mortality rate per 1,000 of these births was 107, and the average number of mothers dying annually from conditions assigned to pregnancy or child-birth was 3,867. In 1917 the number of marriages was 258,855 (1·38 per 1,000); the number of births was 668,346 (17·8 per 1,000); the infant deaths numbered 64,483 (96 per 1,000 births); and the number of deaths assigned to pregnancy or child-birth was 2,598 (3·89 per 1,000 births). These are the essential available statistics regarding the source of the people. They show a low birth-rate and a relatively high death-rate. We are not obtaining the supply of new lives we ought to receive; that is the first aspect of the problem of maternity. We are subjected to a loss by death, both in mothers and children, which we can ill afford; that is the second aspect. Yet that is not the whole problem. For associated with the issue of maternity there is a burden of invalidism, suffering and incapacity which, though unrecorded in the national statistics, is exerting a serious effect upon the well-being of the community.* A vast number of women are made invalids for life, or lose a large part of their economic value, or become sterile, or die ultimately from injuries received or disease acquired while fulfilling or attempting to fulfil the function of motherhood. How great and widespread is this kind of physical disability has been brought to light in the excessive and unanticipated sickness returns of women claiming benefit under the National Insurance Act† and in the overcrowded women's departments of the general and special hospitals. Yet the function of reproduction and child-birth is, under satisfactory conditions, natural and physiological. Its exercise ought not to entail a high death or sickness rate or result in the physical impairment of the mother. Speaking generally, however, there is a serious and not decreasing burden of gynaecological disease now existing, major and minor in degree, traceable principally to two preventable conditions, venereal infection and neglected or unskilful midwifery practice. The problem of maternity in this country is, therefore, threefold:—

- (1) The potential fertility of married women is not yielding its due proportion of births. In other words, the nation is not getting its fair measure of new lives. This is, of course, due in part to profound social conditions lying outside the sphere of Preventive Medicine. But in part it is due to the hazard, the uncertainty, the absence of facilities and provision for child-birth. This aspect concerns the relation of Preventive Medicine to the birth-rate and the survival of the race.

* Maternity : Letters from Working Women, 1915.

† Report of Departmental Committee on Sickness Benefit Claims under the National Insurance Act (Cd. 7687), 1914, pp. 47-52.

- (2) Secondly, there is the high death-rate associated with child-birth, affecting the mother and the child.
- (3) Thirdly, there is the serious burden of disablement and invalidism due to lack of knowledge and to insufficient or unskilful medical and midwifery attendance. "Much of the suffering entailed in maternity, much of the damage to the life and health of women and children, would be got rid of if women married with some knowledge of what lay before them, and if they could obtain medical advice and supervision during the time of pregnancy and motherhood."* Still more would be got rid of if pregnancy and child-birth were adequately protected and safeguarded.

59. It is impossible to consider this situation—a situation characterised by some unreadiness and improvisation, and a good deal of incompetent midwifery—without being convinced of the necessity of State intervention in regard to the function of maternity. Yet it is only in recent years that the State, as such, has recognised its responsibility in this regard. It is true that midwifery has been practised in England for centuries, but up to the end of the eighteenth century midwives were unlicensed; though schools of obstetrics and lying-in hospitals existed, there was little or no systematic supervision of maternity. The Midwives Act of 1902 (amended in 1918) was designed "to secure the better training of midwives and to regulate their practice." But much remains to be done to ensure that every woman in child-birth shall receive proper and adequate attention—ante-natal, natal, post-natal. The midwifery and medical attendance thus made available must be competent. At each period such assistance is required; but, to mention the ante-natal only, who can doubt that skilled supervision and aid in regard to the general physical, abdominal and pelvic conditions (including examination of urine, etc.) throughout pregnancy and the puerperium, to pelvic measurements and contracted pelvis, to correction of malpresentation, or to the treatment of syphilis,† early toxæmia, cardiac conditions would save many mothers and infants? There is also the hygiene of child-birth and the post-natal period. A large proportion of midwifery practice is, and is likely to remain, in the hands of midwives (varying at present from 30 to 95 per cent. of total births); midwives are as a whole insufficiently trained to do justice to the onerous responsibilities which devolve upon them; and, moreover, the competent midwives are too few in number and not appropriately distributed geographically.‡ Nor is the training of the medical student in practical obstetrics satisfactory.§ In every medical school there is need for reform in this matter,|| particularly in regard to teaching ante-natal physiology,

* *Maternity loc. cit.*, p. 7.

† Sequeira, Adams and others have shown that the syphilitic pregnant woman and syphilitic newly-born infants can be treated satisfactorily.

‡ Report on Physical Welfare of Mothers and Children (Carnegie United Kingdom Trust), 1917, vol. 2 (Janet M. Campbell).

§ Some Notes on Medical Education in England, 1918 (Cd. 9124), pp. 80-84.

|| Procs. of Royal Society of Medicine, 1919, vol. xii, No. 4, pp. 35-74.

hygiene and pathology; the management of normal pregnancy; the more careful and systematic application of the principles of antiseptic surgery to obstetrics; supervision during the post-natal and nursing period; the management of the newly born child; the prevention of conjunctivitis and ophthalmia (which together with pelvic or vaginal infections may be due to the gonococcus, suppurative cocci or the bacillus coli). Such instruction should be given to much greater extent in residential institutions.

Since these words were written a Committee of Obstetricians have reported to the Royal Society of Medicine on the urgency of the question of improved teaching of obstetrics and gynaecology to medical students. In their report they use the following words:—

“ The provision of doctors highly trained in practical midwifery work, and the provision of adequate hospital facilities for dealing with serious complications of pregnancy, labour and the lying-in period, are matters which are intimately related to one another, and are of equal importance to the public health. A large increase in the present hospital accommodation for midwifery cases in London is as urgently needed as an improvement in the training of medical students. And, further, if by suitable arrangements better training in the management of infants could be associated with midwifery training, a great advance would be made in dealing with the difficult problem presented by the high rate of infant mortality. . . . A sound practical training in the recognition and treatment of pelvic disease is as important as the midwifery training itself. Young medical practitioners are probably less able to recognise common forms of gynaecological disease than they are common forms of medical or surgical disease. The results are very serious in regard not only to-life but also to the health, working efficiency and subsequent capacity for child bearing of the women of the country.”*

60. The first step, therefore, in the systematic and national organisation of the supervision of maternity is the adequate training of midwives and doctors for this work, thus bringing skill and experience to the bedside of every woman in labour. Even before the event of child-birth much may be done at Maternity Centres (the number of which is happily increasing) in the direction of securing ante-natal hygiene, domestic assistance, proper instruction, nutrition, and so forth. Maternity homes, hospitals and lying-in institutions are also urgently needed in all parts of the country—urban and rural—for normal cases which cannot properly or safely be dealt with in crowded tenements or inconvenient cottages, and for abnormal cases which need skilled nursing and medical treatment. A complete maternity scheme thus includes:—

- (a) an adequate medical, midwifery and nursing service;
- (b) the satisfactory and sufficient nutrition of the mother;
- (c) maternity centres and ante-natal supervision;
- (d) maternity home and hospital accommodation;
- (e) domestic aid before, at the time of, and after child-birth;
- (f) maternity benefit and other financial aid in certain cases;
and
- (g) notification of births and still-births.

* Loc. cit., pp. 108-134.

That seems to be the wise policy, and it should be made applicable in every district. But it raises, of course, large questions of social administration and amelioration, which will take much time and thought to work out satisfactorily in local areas.

iii.

Infant Welfare.

61. It is estimated that on the average, taking country and town together, approximately 80 per cent. of all infants are born free from obvious disease.* There would appear to be a "mean physical standard" which is the inheritance of the people as a whole, and that no matter how far certain sections of the people deviate from this standard by physical degeneration due to evil habits, poverty or insanitary environment, the tendency of the race as a whole appears to be to maintain the inherited average standard of health at the time of birth. But there is loss of ground immediately after birth in the form of a high death rate among infants under one year of age per 1,000 born, known as the *infant mortality rate*. The death-rate of infants is the most sensitive index we possess of physical welfare and of the effect of sanitary government. A high infant mortality rate implies (a) the loss of many infants; (b) the maiming of many surviving children, for conditions which kill some, injure others; (c) a high death-rate in the next four years of child life; (d) the existence of unhealthy conditions in the mothers and in the home life of the people.

62. In order to obtain a perspective view of this question the principal returns since 1851 may be tabulated thus:—

	England and Wales.			London.		
	Birth Rate per 1,000 of Pop.	Death Rate per 1,000 of Pop.	I.M.R.	Birth Rate per 1,000 of Pop.	Death Rate per 1,000 of Pop.	I.M.R.
1851-60	34·1	22·2	154	33·6	23·7	155
1861-70	35·2	22·5	154	35·4	24·4	162
1871-80	35·4	21·4	149	35·4	22·5	158
1881-90	32·4	19·1	142	33·2	20·5	152
1891-00	29·9	18·2	151	35·2	19·6	160
1901-10	27·2	15·4	127	27·5	15·6	126
1911-18	21·9	14·8	105	22·2	15·5	106

It is evident therefore that a substantial decline in infant mortality is taking place, a decline probably due, not so much to climatic change or sanitary improvement, as to "the quickening of the public conscience upon the subject of late years," a quickening which has expressed itself in wider knowledge and

* In 1906 an inquiry in Finsbury showed that in that central metropolitan area 73 per cent. of infants were born healthy.

greater care of child life.* To secure that advance and to maintain, or even accelerate it, is the duty of the community, first by an understanding of the problem, and then by a steady and continuous application of preventive measures.

63. A correct understanding depends upon a knowledge of the principal facts concerning infant mortality, which are these: that its incidence falls chiefly in the first three months and in the first week of the first three months; that in this country it is higher in urban than rural areas; higher in the north than in the south; that it is higher among illegitimate than legitimate children; that its incidence is dependent not upon density of population but upon local and domestic conditions characteristic of limited industrial areas or social classes of the community; that it is high among the poor and low among a better social class (in 1911 in England and Wales the infant mortality of all classes was 132 per 1,000 births, of unskilled workers 152, of the intermediate class 106, and of the middle and upper classes only 76); that the three chief causes of death in infancy are *developmental conditions* (immaturity, prematurity, debility, wasting and atrophy), *diarrhœal disease* and *respiratory disease*; that since 1901-13 there has been a significant decline affecting the whole of the first year but particularly in regard to deaths due to diarrhœal disease, then to respiratory disease and only much less so in respect of developmental disease.

64. It is these facts which indicate appropriate measures of prevention. Improved sanitary circumstances, attention to domestic and municipal cleanliness, education of girls and mothers in personal hygiene, sound and effective midwifery, the care, management and feeding of infants,† avoidance of the racial poisons, and above all attention to the physique of the mother—these are the essential steps. It is significant, and indeed remarkable, that the Registrar-General is able to report that the decline in infant mortality during the seventeen years of the present century has been 27 per cent. in the first three months (as compared with 1898-1902), 50 per cent. at 3—6 months, and 43 per cent. 6—12 months; that in the first twelve years of the century it has been 50 per cent. in the last 9 months of the year; and that it is in the first month only that the methods just named have not met with conspicuous success. This one narrow period of relative failure is probably due to inherent conditions, to shortness of the period of the application of preventive medicine, and to unsatisfactory midwifery. Environment improvement is always desirable, but broadly, the problem of infant mortality will be solved only in so far as the whole function of motherhood is fulfilled under favourable conditions. Hence, each local authority will do well to consider

* Report of Medical Officer of L.G.B. on *Infant and Child Mortality, 1910*, Cd. 5263, p. 43, et seq.

† Particularly breast-feeding, but not over-feeding. Regular feeding every four hours is best for mother and child. (*Minutes of Discussion on Pediatrics, 1919.*)

for its own area, in particular, the adequacy of the existing arrangements—

- (a) for a proper maternity service, including ante-natal care, (see p. 53);
- (b) for infant welfare centres (for consultations, home visiting and the education of the mother);
- (c) for infant treatment clinics;
- (d) for health visitors; and
- (e) for suitable accommodation in infant homes and hospitals.*

65. The mortality among little children aged 1-2 is from a third to a quarter less than under twelve months of age, and from 2.5 is still further greatly reduced (in spite of the mortality due to measles). In this pre-school age period there is, however, great need for preventive measures dealing with measles and whooping cough, rickets, mouth-breathing, squint and certain special children's maladies, particularly catarrhal and glandular conditions (due to overcrowding, airless rooms, contact, infection, faulty diet, &c.). A rich harvest will reward careful supervision and nurture at this age period.

iv.

The School-Child.

66. The Industrial Revolution in England was little short of a tragedy in respect of child life. Hardship, cruelty, disease, and early death placed their gross and indelible mark on the English child of a hundred years ago in a way and to a degree unknown to-day.† All that is past. Yet to-day, also, there is a problem of child life, and it is this. If we would rear a strong and virile race of people we require more children and healthier children as its foundation. Healthy maternity and healthy infancy are essential preliminary conditions; but until recently we have failed at this third, or childhood stage, to protect the child from diseases which arise from neglect of its body, to build up its physique, and to provide it as part of its education with an understanding and a practice of the laws of health.

The national system of the School Medical Service of England and Wales was instituted in 1908, and has thus completed its first decennium. An ancestry of causes and circumstances led up to the legislation which brought it into being. First, there were the impelling and cumulative lessons resulting from the growth of knowledge of the relation between the physique of the

* A clearly defined policy should also be framed for dealing with the mortality of illegitimate infants, including registration and inspection of lying-in homes, rescue homes, and other institutions receiving unmarried mothers, the provision of education and training under satisfactory conditions for the mothers, registration and supervision of foster mothers, and a review of the means by which unmarried mothers and their infants are dealt with under the Poor Law.

† Select Committee (Sir R. Peel) on State of Children employed in Manufactories, 1816; Select Committee on Employment of Boys in Sweeping Chimneys, 1817; House of Lords Committee on State of Children in Cotton Manufactories, 1819, &c.

child and its education, a principle appreciated, though not always acted upon, since the days of John Locke; secondly, there was the experience which had been gained under the two Acts providing for the care and education of defective children;* thirdly, there were two official reports of investigations into the physical condition of children of school age and their premature employment;† fourthly, there was a report on the physical condition of the people which revealed the now obvious fact that the foundation of the public health rests upon the health of the child-population;‡ and, lastly, this report was followed by an inquiry instituted by the Board of Education into the administrative issues and requirements of a system of school-feeding and medical inspection.§ The data thus collected furnished an overwhelming mass of evidence which, taken together, presented a convincing case both of the physical needs of necessitous and underfed school-children and of the administrative means of a system of medical inspection and supervision. Hence, in 1906, the Education (Provision of Meals) Act was passed to give power to Local Education Authorities to take certain prescribed steps for providing school-meals for necessitous children, and in the following year a clause was included in the Education (Administrative Provisions) Act of 1907 which imposed a duty of medical inspection and a power of treatment on the same Authorities.

67. From these beginnings has been built under the Board of Education|| a national system of health supervision of the school-child, further extended by the Education Act of 1918, and now comprising the following functions, undertaken by Local Education Authorities:—

- (1) The medical inspection and treatment of the child and adolescent (5–18 years) in all grades of schools (including medical and dental inspection and treatment clinics).
- (2) The sanitation of the school premises, the hygiene of education, and the control of infectious diseases.
- (3) Systematic physical training.
- (4) The provision of school-meals.
- (5) Special and open-air education for defective children (blind, deaf, cripple, mentally deficient, diseased, and debilitated).
- (6) Supervision of juvenile employment in relation to physique.

The School Medical Service has been designed as part of the public health service of the country, and is now available for all children and adolescents in schools of all classes. There are up-

* Elementary Education (Blind and Deaf Children) Act, 1893, and the Elementary Education (Defective and Epileptic Children) Act, 1899.

† Report of Inter-Departmental Committee on Employment of School Children, 1902; Report of Royal Commission on Physical Training in Scotland, 1903.

‡ Report of Inter-Departmental Committee on Physical Deterioration, 1904.

§ Report of Inter-Departmental Committee on Medical Inspection and Feeding of Children attending the Public Elementary Schools, 1905.

|| The Board of Education are also concerned in the education of health visitors, midwives, medical students, &c.

wards of 1,300 medical men and women and 1,700 school nurses engaged in this work; there are 580 school clinics for treatment, and in London alone upwards of 160,000 children receive medical treatment in the year; there are 460 special schools for the education and care of the 34,000 defective children.

68. This national system is only ten years old, but already great masses of disease and disablement are prevented or remedied, and organised medical assistance has become an integral part of the public duty of all Local Education Authorities and of their school doctors and school teachers. Hundreds of thousands of children annually are now receiving attention to their physical needs. The result has been an increase in the sense of responsibility of the parent—"the increased work undertaken by the State for the individual will mean that the parents have not to do less for themselves and their children, but more"—a fuller appreciation of the individuality of the child, and a larger understanding of the method and purpose of education. Above all, the School Medical Service has proved itself a branch of Preventive Medicine:

- (a) by giving a new emphasis to the importance of the *beginnings* of disease.
- (b) by reducing the results and disabling effects of disease in childhood.
- (c) by providing physical care and training in the age period between infancy and adolescence, and so laying the foundation for health in adult life; and
- (d) by establishing the fact that the health of the child is the foundation of the national health.

If the child be left the prey of neglected measles, scarlet fever, rheumatic fever, malnutrition, or dental decay, the results in adolescence and adult life are certain and inevitable, namely, tuberculosis, nephritis, cardiac disease, anæmia and debility, or an early loss of the teeth. The law of cause and effect operates universally and with precision. We obtain much of the disease and premature death which occurs between the ages of 18 and 58, first, because we neglect to deal with the origins of disease in childhood, and, secondly, because we fail in that period to sow the seeds of hygiene and healthy living—the insistence upon the essential elements of health, viz., fresh air, exercise, warmth, nutrition, cleanliness, habit. Thus, childhood is the time for the prevention of disease, the nipping of it in the bud, as well as for a sound education in a healthy way of life. The final issue of a comprehensive system of physical welfare before school life, during school life and in adolescence, is a citizen educated in hygiene, possessing a health-conscience, and trained in personal and social habits to avoid infection, to remove or ameliorate the conditions predisposing to disease, to live in accordance with the laws of health, and to understand that the individual body in health is the first line of defence against disease.

69. The findings of the medical inspection of school-children are recorded elsewhere* They show, happily, many healthy

* See Reports of Chief Medical Officer of the Board of Education, 1908-18.

children, a good promise for the future; but they show, also, much unnecessary impairment, which creates for the State expensive problems. Each Local Education Authority should have continually before them a clear view of the steps which are necessary from a medical point of view in order to secure the full value of the School Medical Service to every child of school age in their area. It cannot, I think, be doubted that the irreducible minimum which will yield the results that the nation requires is as follows:—

- (i) That every school-child shall periodically come under direct medical and dental supervision, and if found defective shall be "followed up."
- (ii) That every school-child found ill-nourished shall, somehow or other, be properly nourished, and every child found verminous shall, somehow or other, be cleansed.
- (iii) That for every sick, diseased, or defective child, skilled medical treatment shall be made available, either by the Local Education Authority or otherwise.
- (iv) That every child shall be educated in a well-ventilated schoolroom or classroom, or in some form of open-air schoolroom or classroom.
- (v) That every child shall have, daily, organised physical exercise of appropriate character.
- (vi) That no child of school age shall be employed for profit except under approved conditions.
- (vii) That the school environment and the means of education shall be such as can in no case exert unfavourable or injurious influences upon the health, growth, and development of the child.

These are simple propositions, but together they constitute a Minimum Standard of the physical claim of the individual child—of the child of the poor equally with the child of the rich—toward which the more enlightened Authorities are year by year making substantial progress.

v.

The Influence of Environment.

70. Long ago the Darwinian biologists following Weismann pointed out that there are two main factors in organic evolution, the nature of the organism and the nature of the conditions affecting the organism. The early exponents of Preventive Medicine laid their emphasis upon the latter. If we take up their writings we find them full of overflowing of this doctrine. In 1869 the Royal Sanitary Commission, on which sat the foremost physicians of the day, defined the scope of public health requirements—"the ordinary supply of what is necessary for civilised social life"—as concerned with water supply, sewerage, streets and highways, housing, removal of refuse, consumption of smoke, public lighting, inspection of food, provision for burial of the dead, registration of death and sickness. That was the advanced programme of Preventive Medicine half a century ago. Twenty-five years later a standard text book

included all these subjects with the following significant additions—the study of meteorology, animal and vegetable parasites, infection by bacteria, disinfection and the causes of specific disease. To-day, another twenty-five years later, the latest edition of that same text book adds infantile mortality, school hygiene, tropical disease, industrial hygiene, venereal disease and immunity. Now, here is something more than environment in the old sense of the term. Further, the conception of environment itself possesses a new meaning, more personal, intimate and integrated. In other words, Preventive Medicine is entering into its biological setting, which comprehends the nature of the organism, the nature of the environment *and their inter-relationship*. That inter-relationship, action and reaction, calls for much more research and investigation. Thus far we have merely learned some of its elements. We must not now allow the swing of the pendulum in favour of a fuller understanding of the nature of the organism to lead us to disregard the effect of the environment or think less of it, but, rather, to think more correctly of it and to study its operations more minutely. For in many cases it is the predominant factor. Three examples of the influence of environment upon health and disease may be named as illustrations of its relation to Preventive Medicine, a wholesome and sufficient water supply, adequate and healthy house accommodation, and the food supply.

Water Supply.

71. While polluted water has often been used by individuals with impunity, the question of its importance in relation to health and disease came to be more fully recognised as the relation of uncleanness to disease came to be understood and public water supplies were introduced. Formerly a sporadic case of disease, or death due to drinking contaminated water, was not recognised, but when epidemic disease followed the wide distribution of a water supply, attention was drawn to the importance of its purity in regard to the health of communities. For instance, Corfield collected particulars of more than 50 water-borne epidemics of typhoid fever between 1864 and 1902, and we now know that the first of preventive methods is to secure for a community a sufficient and wholesome water supply. “Among the circumstances which we find associated in outbreaks of typhoid fever,” wrote Sir John Simon in 1869, “there is none of more frequent occurrence, none which we are more entitled to consider directly causative of the disease, than the consumption of polluted water. It has been one of our most familiar experiences that excremental fouling of wells is, in this respect, among the worst dangers which can threaten the health of a community.” Some typhoid outbreaks have been traced to pollution of *shallow wells*, as at Guildford in 1867, in the Uxbridge Rural District in 1882, at Hitchin in 1883, at Beverley in 1884, and so on; others have been due to pollution of *deep wells*, as at Caterham in 1879 or at Watling in 1893 (1,315 cases). Other outbreaks have been due to pollution at the *spring*, as at Maidstone in 1897 (1,847 cases); or pollution of *streams and rivers*, as in

the Tees Valley in 1890, at King's Lynn in 1892, at Lincoln in 1905 (900 cases); or, again, contamination of the *ground water*, as at Munich, at Terling, in Essex, in 1867, and at various places in America; or, once more, to pollution of the water in the *mains*, as in the famous case of Caius College, Cambridge, in 1873. The illustrations are innumerable, the devastations in the early years of public supplies extensive; a polluted supply brought disease, a pure supply brought health.* "Many of the public improvements have coincided with reduction of typhoid," wrote Sir George Buchanan as long ago as 1866. "Though not with absolute constancy, drying of the soil of a town and reduction in the crowding of houses have been followed by reduction of fever. Much more important appears to be the substitution of an ample supply of good water for a scanty and impure supply; other things being equal, the towns in which this substitution has been completed have made most improvement." The improvement has occurred in the reduction of cholera, epidemic diarrhœa and dysentery, as well as typhoid; and there has been all over the country some improvement also in sufficiency. Effective supervision includes control of the sources, gathering grounds and catchment areas, of methods of filtration and storage, and of distribution adits and house cisterns, and to this end topographical, bacteriological and chemical examinations should be made regularly of all public water supplies. Happily there is now widespread recognition of this primary public health requirement.

Public Health and the Dwelling House.

72. The Housing Problem is two-fold in its relation to disease, namely, the *insufficiency* and *unsuitability* of the house accommodation available. Insufficiency leads to overcrowding; un-

* It should be explained that in many outbreaks of water-borne disease other environmental factors than the water supply play a part. A case in point is the present prevalence of typhoid fever (1919) in the Llanelly or Clydach Valley in the Crickhowell Rural District of Breconshire. Since 1872 typhoid fever has been endemic in these mining villages. There is a mismanaged and neglected sewage farm high up on the hill side, pollution from which is carried down the hill side; the conduit pipe which conveys the sewage to the farm runs along the 1,000 ft. contour line and consists of 9 in. earthenware pipes imperfectly jointed, and thus more sewage leaks down the hill side; there is no public water supply, but water is obtained by the miners' cottages standing below from dip-wells, local springs and streams which are readily contaminated with the diluted sewage; as there is inadequate and unsatisfactory privy accommodation, the soil surrounding the houses becomes fouled and the provisional water supply thus further polluted; as there is no satisfactory conservancy system, nuisances arising from "ash-pits, drains, sewers, muck-heaps, manure accumulations, animals improperly kept, overcrowded houses and other causes" are liable to contaminate still further the curtilages of the houses; as many of the cottages are damp, dilapidated or insanitary, the local pollution and filth of their surroundings is more likely to bear with it injury and ill-health to the occupants; and as there is no provision for the isolation of the sick, contact infection readily arises. Hence, though this may be a case of water-borne typhoid fever, there are various factors which call for remedy: the water supply, the sewage farm, the sewage conduit, the privies, the accumulation of refuse and lack of proper isolation accommodation for cases of infectious diseases. (See Reports of Local Government Board, 1849, 1866, 1872, 1901.)

suitability may be due to inadequate cubic capacity, absence of ventilation or insanitation. In the train of overcrowding, ill-ventilation or insanitation follows a mass of trouble, incapacity, disease and death. There is no subject in the whole range of Preventive Medicine in which the evidence is so general and incontrovertible as in regard to the ill effects of bad housing upon the human organism. Commission after Commission, and report after report, for a hundred years prove the case. If any further documentary evidence were needed in our own time it may be found in that masterly and terrible chapter of evidence, the Report of the Royal Commission on the Housing of the Industrial Population of Scotland, 1917. The reference to the matter in these pages may be brief. There are, broadly speaking, three evils of bad housing.

(a) There is *diminished personal cleanliness and physique* leading to debility, fatigue, unfitnes and reduced powers of resistance. The Royal Commission on Housing of 1885 reported that in districts characterised by bad housing, work-people lost on an average "about 20 days in the year from simple exhaustion. . . . That overcrowding lowers the general standard, that the people get depressed and weary. . . . The general deterioration in the health of the people is a worse feature of overcrowding even than the encouragement by it of infectious disease. It has the effect of reducing their stamina and thus producing consumption and diseases arising from general debility of the system whereby life is shortened."* The Glasgow School Board found that the children coming from one-room homes were the lowest in height and weight. The very expectation of life is reduced in badly-housed as compared with well-housed communities.†

(b) A second result of bad housing is that the *sickness rates* are relatively high, particularly for infectious, contagious and respiratory diseases. Sir Shirley Murphy showed in 1898 that in districts of London where overcrowding (more than two persons in one room in tenements of less than five rooms) was under 10 per cent. the death rate from pulmonary tuberculosis was 111 per 100,000 people; but where the overcrowding was over 25 per cent., the corresponding death rate was 209 to 259 per 100,000. In Glasgow the death rate from measles, whooping-cough and diphtheria was shown by Dr. Chalmers to be four times greater in one-apartment homes than in four-apartment homes and upwards. But the experience is universal. Bad housing increases the incidence of all infections, contagious and verminous conditions, of respiratory disease, and of anæmia, debility and constitutional maladies.

* First Report of Her Majesty's Commissioners for inquiring into the Housing of the Working Classes, 1889. (Cd. 4402), p. 25.

† Report of Medical Officer of Health for London, 1902, pp. 19-20.

(c) Thirdly, the general *death rates* are higher and the expectation of life is lower. The evidence is overwhelming, and it comes from all parts of the world—the worse the people are housed the higher will be the death rate. For example, in London, in 1906, the total death rate was 15·6, but in Finsbury it was 20·7, and in Hampstead 13·5. Further, in six of the sub-registration districts in Finsbury, it was under 12, and in five others it was over 30. There is not only a difference between central London and the suburbs, but between different districts of central London there is this marked divergence. Again, the infantile mortality rate (1891-1900) in London was 142 per 1,000 births in districts with under 10 per cent. of overcrowding (more than two in a room), but in districts with over 25 per cent. of overcrowding, it rose to 210-223 per 1,000 births. In 1906 the infantile mortality rate of London was 129 per 1,000 births; but in Finsbury it was 137, in Hampstead only 79. Even in Finsbury it varied widely, seven sub-divisions were under 70 per 1,000, but 19 sub-divisions were over 200 and four were over 300. Once more, the general death rate in Finsbury in that year (which was 20·7 for the whole borough) was 6·4 in homes of 4 rooms and upwards, but 39·0 in homes of one room. The following figures reported by Dr. Robertson, of Birmingham,* illustrate the whole case. They refer to two artisan areas in Birmingham, (1) with bad housing, (2) with fair to good accommodation, and the returns are for 1912-1916:—

	(1)	(2)
Population	154,662	133,623
Area (in acres)	1,921	2,998
No. of Houses	33,471	30,172
Birth Rate... ..	32·8	24·0
General Death Rate (1912-16)	21·1	12·3
Infantile Mortality Rate (per 1,000 births)	171·0	89·0
Consumptive Death Rate	1·95	1·11
Measles Death Rate	0·83	0·24
Diarrhoea Death Rate	1·46	0·36

It is, of course, obvious that many factors and influences operate to create these immense differences, but the principal is housing and all it entails for good or evil. When we come to examine these death rates we find (a) that they are due principally to an excess in the common infectious diseases, epidemic diarrhoea, and respiratory disease, and in infantile

mortality, and (b) that they are highest where the density of houses is greatest, where overcrowding is excessive, where there is a poor class of tenement house, where the house property is damp, dilapidated and insanitary, and where there is a high percentage of poverty and a low standard of life.*

73. What is it in the house accommodation which leads to these results? One factor no doubt is the gravitation to the lowest stratum of the physical and mental cripples and invalids of our civilisation. But this is not a complete explanation; such an environment will injure the best naturally endowed organism, and for the following reasons: First, it is the limited cubic capacity per person which exists in conditions of overcrowding. At the last Census in 1911 it was found that one-tenth of the population lived in overcrowded tenements. In night inspections in central London I have myself counted 7 or 8 persons, adults and children, sleeping in one small tenement room. In one street in 1901 the overcrowded tenements, as measured by the lenient standard of the byelaws, formed 73·4 per cent. of the whole. It requires no argument to prove the evil effect of such conditions, physical, mental and moral. "The one-room system," said Lord Shaftesbury, "is the one-bed system." Secondly, there is the absence of effective through ventilation—cool, fresh, moving air. Tatham, Darra Mair and many other observers have shown that the general death-rate in back-to-back houses (which have no through ventilation) is higher than in through-ventilated houses by 15 per cent., and that the phthisis death-rate is increased by 12 per cent. There can be little doubt that airless rooms, changes of temperature, dust and contact infection bear an intimate relationship, possibly causal, to the whole group of catarrhal and bronchitic diseases which contribute so heavily to invalidity and mortality. Lastly, there is insanitation—outside the house, ineffective methods of excreta disposal, insufficient scavenging of refuse, unpaved yards or streets; inside the house or curtilage, back-to-back houses, insanitary ashpits, privies or cesspits, damp walls, bad drainage, dilapidated structure and domestic insanitation. Thus filth, dust and effluvium contaminate everything and "breed infection." House insanitation is almost a scourge. What can be hoped for in family health with one water tap or one closet to half a dozen houses or tenements? In brief, the evil is one of gross uncleanness and overcrowding, and in their track health rarely follows.†

* Report on the Public Health of Finsbury for 1906, pp. 17-32.

† The essential points to be considered in estimating the quality of house accommodation include (a) number of houses per acre, (b) width of street and height of buildings, (c) relation of houses to each other, (d) suitability of soil and outlay, (e) general water supply, (f) drainage and sewerage, (g) paving and condition of curtilage, (h) the condition of the house itself, cubic capacity and height of rooms, lighting, ventilation, dryness, repair, etc., (i) sanitary accommodation, (j) house water supply, (k) arrangements for disposal of refuse and ashes (see Housing (Inspection of District) Regulations, 1910, No 919). As in factories differentiation should be made between *means* provided and *maintenance* and use of the means by occupier.

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Public Food Supply.

74. A third example of the effect of environment on health may be found in the *food supply*. That the consumption of unwholesome food may prove deleterious every school-boy knows after his first experience of unripe apples. That side of the question has been the common knowledge of humanity from primeval times. But three new factors have arisen, namely, the handling, preparation and transport of food supply for vast communities, the conveyance by means of food of bacterial or toxic infection and metallic poisons, owing to contamination or decomposition, and the new knowledge regarding tuberculosis and other specific diseases of animals communicable to man. For instance, in the middle of the last century, Dr. Michael Taylor, of Penrith, demonstrated milk-borne disease derived from disease in the cow or from contamination.* Again, during the last 70 years evidence has accumulated implicating oysters, cockles and other shell-fish, cheese, ice-cream, beer, hams, sausages, meat pies, potted meat, and many prepared and manufactured foods. Sometimes the poisoning is due to lead or arsenic, sometimes to bacterial infection, and not seldom to toxic bodies; the infection may be of human or animal origin. Hence arises the need for control, for hygienic preparation, and for an effective protection. But that is not all. Far more important to the health of a community than ideally sound food is sufficient food, adequate in quantity and suitable in quality and nutritive value. *Malnutrition is wider in incidence and more devastating in issue to a community than food-borne disease.* For proper nutrition lies at the foundation of a healthy and resistant body. The first fundamental fact concerning the relation of food to Preventive Medicine is therefore this of *nutrition*; which, though it finds its principal factor in food in appropriate quantity and quality (proteins, carbohydrates, fats, salts, vitamins) to repair the waste of the body, furnish energy and heat, and provide for growth, is also dependent upon other conditions. There must be healthy physiological processes of digestion, absorption, assimilation, which in their turn require a due proportion of rest and exercise, of oxygenation of the blood, and of excretion. Food is but one factor in metabolism, and the task of the worker in Preventive Medicine is not merely to keep the people alive, but to secure and maintain well-balanced nutrition. In order to do this it is necessary to safeguard the whole external and internal environment relative to food.

75. The second fundamental principle is the protection and control of the food supply. The form of control which is necessary in respect of food varies widely in respect of the article itself, its means of infection and its market. For example,

* We now know that between 30 and 40 per cent. of the cows slaughtered annually in England and Wales are affected with tuberculosis, and two per cent. of milch cows in this country have tuberculosis of the udder. The number of milch cows in the United Kingdom is approximately 4,000,000. Two per cent. would thus be 80,000; if each cow yields an average of not less than 450 gallons of milk per annum, it must be assumed that approximately 36 million gallons of milk are yielded every year from tuberculous udders.

milk for human consumption should be pure, clean, whole milk, unsophisticated and unadulterated, derived from healthy cows living under sanitary conditions; it should be obtained by clean methods of milking; strained, cooled and protected at the farm, in transit and in the home from all forms of infection or contamination, whether conveyed to it by the cow, the milker, the utensils or by external circumstances. Such control can be exercised—

- (a) by the *consumer*, if he demands pure milk and himself protects it from uncleanness;
- (b) by the *dairy trade*, if it conducts its business properly and in a clean and scientific way;
- (c) by *communal enterprise*, if it produces or demands "certified" milk; or
- (d) by the *sanitary authority*, if it puts into force its legal powers of control over adulteration, uncleanness and infection.*

The milk question is an excellent illustration of the kind of action that is necessary in regard to food control. Much milk now sold is dirty, tuberculous or adulterated; it is produced too largely under unwholesome conditions; the regulations controlling it are still too largely permissive and unsupervised; and there is need for considerable "speeding-up" all round. Broadly, the solution, here as elsewhere, is to be found in (i) more apposite and effective laws and regulations, (ii) a firmer administration in every area, and (iii) the education of the public. There are comparable means of dealing with unsound food and with polluted shell-fish.† Again, the whole business of the meat supply calls for supervision. Public abattoirs, thorough and uniform meat inspection, and the control of imported meat are necessary steps. Hence, though the Local Authority is interested, far more directly than it has hitherto recognised, with the nutrition of the population in its charge—for nutrition is the basis of health—it is directly and immediately responsible for the protection of the community from every form of poisoning, malnutrition or physical degeneration having its origin in an uncontrolled food supply—unsatisfactory meat, poultry, game, fish, fruit, vegetables, corn, bread, flour or milk exposed for sale, or deposited in any place for the purpose of sale or of preparation for the food of man.‡ This means, of course, adequate inspection and the seizure of bad food. But, as every medical officer of health knows, such a proposition raises far-reaching issues of the production or growth of the raw material, slaughtering and slaughterhouses, public abattoirs, a uniform system of meat examination, the control of imported meat, the transport of meat, the detection of early putrefaction and disease of animals communicable to man, and so on. Further, there are other conditions which must be considered, such as the manufacture of prepared foods, curing, canning, drying, the

* See Sale of Food and Drugs Acts, Consolidated Milk Act, 1915, &c.

† See Public Health (Unsound Food) and (Shellfish) Regulations of 1908 and 1915.

‡ Public Health Act, 1875, s. 116.

preservation of food; its contamination with metals or putrefaction agents, its storage and its cooking. Lastly, there is the whole wide question of food poisoning and food-borne disease, its character, incidence and prevention, and its relation to food premises, food industry and the national increase of a good and cheap food supply.

vi.

Industrial Hygiene.

76. Though for the majority of the population life seems to be a more or less ceaseless round of labour, it must not be forgotten that men labour to live and both their life and their labour are restricted if the conditions of labour be not satisfactory. The Industrial Revolution in England took men, women and children from the fields to the towns, from the chamber workshop to the mill, from an evil environment to a worse. It turned the discomforts and limitations of the poor into a rigid system, a system which left indelible marks upon the physique of the people. In the early part of the nineteenth century the State found that its children were being ruined in body and mind by the conditions and circumstances of their employment. "Working young children during the same stages as adults," said Sir Edwin Chadwick, "is always injurious overwork for young and growing children, whether the work be mental or moral." Official reports in 1816, 1819, 1832, and subsequent years furnish overwhelming medical evidence of the gravity of the physical injury due to the premature, prolonged or unsuitable employment of children. There is now a century of proof.* Nor was such employment affecting children only. The adult labourer was being injured also. "We manufacturers," wrote Robert Owen long ago, "are always perfecting our dead machinery, but of our living machinery we are taking no care." All through the first half of the nineteenth century evidence was accumulating in confirmation of that proposition both as regards men and women. "To use up or damage its women by setting them to hard wage labour in mill and workshop," wrote Mr. Hobson in 1914. "is probably the greatest human waste a nation can practise or permit." But everything depends on the conditions. In 1832 Dr. Turner Thackrah, in 1852 Mr. Finlaison the actuary, in 1857 Dr. Greenhow, and in 1862 the Medical Department of the Privy Council, investigated and reported upon the effect of occupation upon health, and through the agency of the Factory Department of the Home Office and otherwise such inquiries have continued and increased to 1918. Every industry indeed was found in greater or less degree to affect the death rate. Tatham showed that if the comparative mortality figure for the agricultural worker be 602, that for the shoemaker is 920, for the hairdresser 1,099, for the chimney sweep 1,311, for the glassmaker 1,487, for the leadworker 1,783, and for the filmaker 1,810. And the contrast is even more marked for sickness, disablement, and accident.

* Annual Report of Chief Medical Officer of Board of Education, 1917, Cd. 9206. p. 155.

It also has its relation to economy and output. "The most economical production is obtained by employing men only so long as they are at their best," wrote Sir William Mather in 1894, "when this stage is passed there is no true economy in their continued work." Thus the actual conduct of business is primarily dependent upon physical health.* For the simple fact is that without health there is no energy and without energy no output; and more important than output are the vigour, strength and vitality of the worker.†

77. The movement for reform began with the enlightened action of individual employers, and was continued by the State. It began with the control of the hours of labour, and it has comprehended within its purview the whole wide compass of industrial betterment and the welfare of the worker: (a) *the careful selection of workers* on engagement, and periodical medical supervision; (including observation as to output, lost time, sickness, physiological requirements, &c.); (b) *the hours of employment*—shifts, breaks, spells, pauses, holidays, Sunday work, night work, overtime; (c) *the factory or workshop environment*—design, structure, sanitation, cleanliness, heating, temperature, ventilation, lighting, sanitary accommodation, washing facilities, cloakrooms, seats, rest rooms, surgeries; (d) *the personal well-being of the worker*—the industrial employment of women,‡ incentive, food supply and drinking water, canteens, protective clothing, lifting weights, welfare conditions, rest, recreation; (e) *the effect of occupation upon health*—fatigue (due to excess in duration of labour, specialisation, repetition, strain or speed), sickness, injuries, accidents, industrial disease (poisoning by lead, phosphorus, arsenic, mercury, anthrax, dust, fumes, &c.). With reasonable care and attention to speed, strain, lighting, mechanical contrivance, &c., accidents can be reduced by 40 to 80 per cent., which on two million accidents per annum is a substantial contribution to preventive medicine. These matters concern 130,000 workshops and 150,000 factories, in which twelve million people spend a third of their lives. It cannot be otherwise than that this vast enterprise of industry must profoundly affect the health, physique and capacity of the whole body of workers. The administration of Hygiene carried out by medical officers, inspectors, certifying factory surgeons, and welfare workers on the one hand, and by proprietors, managers and employers on the other carries with it therefore a responsibility which if undischarged or disregarded incurs heavy damages. Whatever was the case before 1914, the experience of the war has demonstrated beyond all question that industrial hygiene forms an integral part of the practice of Preventive Medicine.

* "Economic processes are primarily physical in the efforts they evoke and in the needs they satisfy; the expenditure and recoupment of physical energy constitute the first and most prominent aspect of industry." (*Work and Wealth* J. A. Hobson, 1914, p. 13.)

† See also *Industrial Health and Efficiency*, 1918 (Final Report of the Health of Munition Workers Committee, 1915–1918, Cd. 9065).

‡ See Report of War Cabinet Commission on *Women in Industry*, 1919 (Cmd. 135), pp. 218–253 (Dr. Janet Campbell).

vii.

The Prevention and Treatment of Infectious Disease.

78. The glory of Preventive Medicine in our own time has been its victories over infective disease. The cause of a dozen forms has been discovered and the new knowledge applied. We have witnessed the isolation of the pathogenic bacteria, made possible by the Koch method of the solid culture medium, and in which Robert Koch's pupils and fellow workers, Löffler, Gaffky, Pfeiffer, participated; the study of protozoa, which started from Laveran's discovery of the germ of malaria; the discovery by Löffler, Frosch, Roux, Nocard, and others of the viruses which pass through filters; and the recognition of insects as intermediate hosts and transmitters of infectious diseases. Then there has been the study of the immunity theory first inaugurated by Metchnikoff, and which received a new impetus from the discovery of antitoxin by von Behring, through which a wide field of immunity and the investigation of serums was opened up, on which Pfeiffer, Bordet, Widal, Wassermann, Ehrlich, Wright, and others have worked with successful result. Some of the most valuable fruits of these labours from a practical point of view have been the diagnosis of diseases, first in the form of the Widal-Grüber reaction, and later the Wassermann syphilis reaction. Lastly, there has been the new work in prophylaxis, vaccination and cure of infective disease and the control of tropical scourges. Malaria is coming steadily under command; yellow fever can be harnessed. "The effects of these two discoveries" (the transmission of malaria by the *anopheles* and of yellow fever by the *stegomyia*) wrote Gorgas of the Panama Canal, "will be as far-reaching as those of any discoveries ever made in medicine, not even excluding the immortal works of Jenner and Lister. These discoveries enabled us to control entirely health conditions at Panama. . . . I believe we are on the eve of the occupation of the Tropics by the white man. If this be so, then great civilisations, in the course of time, will develop in tropical regions." If we pursue, in the same spirit, the cause and control of infection in Britain and in the West the temperate climates may show even greater advance. When Lord Macaulay compared the state of England at the death of Charles II. in 1685 with the middle of the nineteenth century, he wrote: "Some frightful diseases have now been extirpated by science and some have been banished by police. The term of human life has been lengthened over the whole kingdom, and especially in the towns. The difference in salubrity between the London of the nineteenth century and the London of the seventeenth century is very far greater than the difference between London in an ordinary year and London in a year of cholera."

79. The common infectious diseases in England are notifiable, and include smallpox, cholera, diphtheria; typhus, enteric, relapsing, scarlet, continued, cerebro-spinal and puerperal fevers; all forms of tuberculosis, measles, poliomyelitis,

The clinician meets with an atypical case presenting some typical signs and symptoms in accordance with previous standards but other quite exceptional characters. The epidemiologist finds surrounding his group of typical cases of scarlet fever, typhoid or influenza a zone of atypical cases, even a separate outbreak, produced by differences of seed or soil, and it may be these aberrant cases, these atypical epidemics, which carry infection and create the problem. Happily, also, they may serve to solve the problem. Facts such as these should lead us to hesitate before we proclaim every fresh manifestation of infectious disease to be a "new" disease, botulism, or what not. They should lead us to suspect "the track of the many into the one."

81. What are the fundamentals upon which we must build in grappling with infection? Let me recall them in simplest form. First, there is the *vera causa* of the bacteriologist, the infecting germ. We must know it and its ways biologically. Then we must learn of its typical forms, whether parasitic or saprophytic, and then we must discover the relation of the type and its allies to the normal microbial flora of the human body. If and when we know our enemy and his relation to our friends, we can proceed to the second fundamental issue, namely, the discovery of, and eventually the control of, the conditions which create or favour the pathogenicity of the invading bacillus. How various and diverse they are no one yet knows, though slowly we are learning to piece together the indictment against them. Thirdly, we must investigate the typical clinical manifestations of the infection and their atypical modifications or variants—all those concurrent, or *ante* or *post*, morbid conditions, however minute and transient they may appear, which accompany the outbreak and show similarities, correlations or affinities with it—not hastily concluding that such variants are "new" or different diseases, but seeking to learn the grounds of their alliance or concurrency. Fourthly, we must endeavour to learn of and then remove all predisposing conditions which favour the susceptibility of the individual or which weaken his natural defences. The resistant body of the patient is of no small account in our struggle with the invader, yet it is frequently neglected by the worker in preventive medicine. Ultimately, it may prove that the fortification of the host is, in the long run, the best means of defeating the enemy. In any case, it is certain that our efforts must always be directed to the removal of the conditions, in seed or soil, which make for disease. It is that, and not a frontal attack against an enemy in unknown strength, which is the sound strategy. Lastly, there is another point not to be forgotten. We must deal with the disease itself and its sequelæ. What is required in the future effectually to remove the damage done by these diseases is a fuller recognition of the fact that each infective disease must be dealt with in regard to its particular and specific effect. Notification and isolation, on which attention has hitherto, quite properly, been concentrated, are mere preliminaries to the real attack upon the stronghold of these diseases. The essential step is to address ourselves to the vulnerable point of each malady and to apply to it the direct and indirect means of preventive treatment appropriate to its character or site in the body.

Measles.

82. Let us consider how these principles work out. *Measles* is so universal in this country that few children escape it; certainly, between 80 and 90 per cent. of all children of 15 years of age have had an attack of the disease. The number of "first" notifications in England and Wales in 1918 was 414,000, which is substantially more than all the other notifiable diseases put together, and the deaths in the same year returned as due to measles were 10,538. In itself, it is not a highly fatal disease, but in its complications and sequelæ it is one of the most damaging and mortal of all the infectious diseases. In brief, it is not simply measles as such to which we must give attention, but to all it portends. Principal among the conditions which follow in its train are bronchitis, pleurisy, pneumonia and empyema, tuberculosis, malnutrition and retarded growth. ('A very common result of measles is cheesy degeneration of the mediastinal glands and a subsequent tuberculosis of the lungs' (Goodhart and Still). Whether measles chiefly produces conditions favourable to subsequent tuberculous infection or whether it acts chiefly by causing latent or pre-existing tuberculosis to flare up and become active is immaterial to the issue. Here we have, in any case, one of the most fertile forerunners of subsequent grave disablement. But there are other examples. "The materies morbi of scarlatina is particularly obnoxious to the kidneys," and thus an acute or chronic nephritis may ensue; rheumatic fever may leave behind it an infective valvular disease of the heart;* influenza leaves pneumonia, cardiac dilatation, and conditions arising from mixed infection; diphtheria may be followed by paralysis due to degeneration of the nerve fibres, and by insufficiency of the heart; and whooping cough by collapse of the lung. And what are we to say of the progeny of an attack of either of those universal and protean diseases, influenza, malaria, syphilis, or tuberculosis? They affect the whole body and, unless controlled, mark it for the rest of its days and not seldom with disablement and devastation. It is these *products* of infective disease which we must have in mind, and to remove them we must so deal with the whole nature of the disease as to extract its sting. In a word, this implies the practice of a curative medicine which is preventive in effect. Measles, scarlet fever, rheumatic fever, influenza, diphtheria, and whooping cough may be so treated, and are so treated under favourable circumstances and with sufficient skill, as to reduce, and in many cases remove, the very sequelæ which are their continuing and intrinsic evil for the great mass of the people. Hence, we need to make available for all that *better nursing*, that higher degree of *medical skill*, that closer *home attention*, which has hitherto been the lot of the favoured few. It is a long task and a complex one, but it must be attempted.

*In 1917 in England and Wales the deaths recorded as due to rheumatic fever were 1,456, but to valvular disease of the heart 24,808.

Tuberculosis.

83. We may go a step further and consider the application of these principles to tuberculosis and influenza, though, if space allowed, we ought also to consider syphilis, rheumatism, small-pox and septic infections. We notify *tuberculosis* in a general way (92,000 fresh cases in 1918), but we are failing to treat it effectually. Even notification is often neglected and too late to be of use; it must be prompt and specific in record, which means improved and earlier diagnosis by the practitioner. The tuberculosis dispensary must be so used as to be available as (a) a receiving house and diagnosis centre, (b) a clearing house and observation centre, (c) a treatment centre for certain cases, (d) a clinic for examination of contacts, (e) a centre for following up and after care until cure or arrest has been established, and (f) a bureau of information and education. If the practitioner can deal with his case at home so much the better, but in the great majority of cases that is impracticable. He must therefore be provided with facilities elsewhere, including the assistance of the tuberculosis officer. Then the four places or occasions of treatment, the home, the sanatorium, the hospital and the colony, must be handled in a much more thorough way than hitherto. There are approximately only 19,500 beds in sanatoria and hospitals in the United Kingdom now available for men, women and children suffering from tuberculosis. The treatment of tuberculosis is a prolonged and serious undertaking, and if it is to be dealt with adequately calls for vastly more care, accommodation and supervision than have yet been applied to it. A short sojourn in the old-fashioned type of sanatorium is often wasteful and ineffective. The training-colony method (as at Papworth in Cambridgeshire—a pioneer scheme which owes much to the gracious support of Her Majesty the Queen) and the village settlement should be extended and made available for larger numbers of patients.* Above all, a system of after care and following up must be organised in every area and no case should escape its supervision.

84. But the present scheme is not yet understood in its proper setting. The medical treatment of tuberculosis on national lines must be comprehensive, and a scheme of notification and sanatorium and colony treatment is but a part of the whole policy, which must be held in due perspective. It cannot be concerned only with the handling of the tuberculous person. It must be fundamentally preventive, and must recognise that latent tuberculous infection is so wide-spread as to be almost universal. There are grounds for believing that its seeds are sown chiefly in childhood. Certainly, its activity bears a close relation to malnutrition, to nutritive processes, to other diseases, and to environmental conditions. Housing, industrial life and the milk supply must be considered, and public education, general sanitation, cheap bread and a hygienic way of life have much to do with the solution of the problem.

* See Report to Local Government Board on Colony treatment of Tuberculosis 1919 (Dr. J. E. Chapman.)

Above everything we must fortify the individual; for if it be true that the disease is almost universal, it follows that the majority of people have the power to overcome it. We must do everything we can to increase that power. Yet here is an Authority satisfied to do nothing more than require notification; here is another which, in addition, supports and pays for an indifferent sanatorium; here is a third which possesses a "scheme," including notification, dispensary, sanatorium provision, and a tuberculosis hospital, but it neglects entirely all following up of cases, all true prevention, even its housing obligations, and has never given a thought to the relation of the nutrition and physical well-being of the people in its charge to the incidence of tuberculosis among them. Yet these things are fundamental. The lack of understanding and of organisation in regard to tuberculosis is even yet great and serious, and wide in extent. It must be said frankly that many Authorities directly responsible for dealing with this disease are at present merely playing with it. There is supineness, there is lack of knowledge, co-ordination and concentration. There are only 250 tuberculosis officers in the whole country (some of whom work quite apart from the medical officer of health), only 20,000 available beds (including surgical), only half a dozen colonies; and yet there are 50,000 deaths and 90,000 fresh notifications recorded every year. It is obvious therefore that much remains to be done. The standard of diagnosis in tuberculosis, the scope and duties of the tuberculosis officer and tuberculosis nurse, the management of residential institutions, the education of the patient and his after-care, the relation of the disease to industry and tuberculous milk, the investigation of local high incidence, the subject of non-pulmonary and surgical tuberculosis—all these questions call for careful attention and some of them for immediate action.

Influenza.

85. Influenza has been identified historically for several centuries, appearing and causing great havoc in many countries at intervals which may have been so prolonged as to create the impression on its reappearance that a "new" disease had emerged. It has been associated with the English Sweats of 1485-1551, and was undoubtedly met with by Sydenham, Willis, and the seventeenth-century epidemiologists, as one of a group of correlated infections, prevailing epidemically in successive years. In the nineteenth century, came pandemics of influenza.* Prior to 1890 few deaths had been registered as due to influenza since 1848; in the three years 1890-92, 4,523, 16,686 and 15,737 deaths successively were ascribed to this cause.† Since then influenza has continued to be returned as a common cause of death each year, the lowest number of deaths returned under

* The question of the inter-relationship or identity of this disease with its allies has been recently ably discussed by Dr. Hamer in an official report on *Influenza* to the London County Council, 1919, No. 1963.

† For an exhaustive account of the epidemic of 1889-92 see Dr. Franklin Parsons' two Reports to the Local Government Board. (Cd. 6387 and Cd. 7051.)

this heading in England and Wales in any year being 3,753 in 1896 and 4,334 in 1911, as compared with 12,417 in 1899, 16,245 in 1900, 10,112 in 1908, 10,471 in 1915, and 104,738 in 1918.

86. The disease, in its initial stages, often affects the lungs with small hæmorrhages and infiltration of the lung substance, leading on to various degrees of pneumonia, pleurisy, and purulent bronchitis. The whole process is septicæmic with various secondary infections and complications. Hence arise differing clinical forms, toxic or typhoid, cerebral or mental, rheumatoid, gastro-intestinal, pneumonic. The symptoms differ accordingly, fever, respiratory manifestations from bronchitis to pneumonia, nervous, cardiac and mental symptoms being predominant. Towards the latter part of the pandemic of 1889-92 Pfeiffer described a bacillus which he had discovered. The fact that this bacillus, if it be not the causal micro-organism of influenza, produces much of the mischief in this disease, is confirmed by its presence in large numbers in immediate relation to minute lesions occurring in the lung and the excretions. It is occasionally discovered in bronchial secretions and elsewhere when there is no suspicion of influenza, and in a considerable number of outbreaks, indistinguishable clinically from influenza, the Pfeiffer bacillus has not been found, or in only a small minority of the total cases. The predominant organisms recently (1915-1919) found in influenza have been diplococci, micrococcus catarrhalis, the pneumococcus, or a hæmolytic streptococcus. Our knowledge of the modes in which the infection of influenza is spread is very imperfect. We only know that, especially during the febrile stage, the saliva and the nasal and bronchial mucus contain elements contagious to man and virulent to certain animals, such as monkeys. Certain facts have been reported, from which it would seem that not only monkeys, but also domestic animals, particularly cats, dogs, and horses, were attacked by influenza during epidemics among human beings, and might have been vehicles or agents in the diffusion of the virus. The *risk* of infection depends on close personal contact and possibly "drop infection," whilst the *severity* of infection seems related to lowered resistance and possibly increased virulence. It would seem that influenza confers on man an immunity of only slight degree and short duration. Trials in preventive vaccination, bacteriotherapy and serumtherapy made by various experimentalists have as yet given only imperfect results. It cannot be otherwise, since (the specific virus of influenza being unknown to us) these trials could be carried out only with various non-specific organisms, such as the bacillus of Pfeiffer, pneumococci, streptococci, &c. Vaccines or sera prepared from those organisms appear to act only on the secondary bacterial conditions associated with influenza.

87. The recent epidemic presented itself in three waves, affecting persons, in the main, between 16 and 40 years of age. The first wave reached its maximum in June and July, 1918, the second in October and November of the same year, and the third in February and March of 1919. In London alone it carried off 18,000 persons, and in India six millions. The disease

spread rapidly throughout Europe, Asia, Africa, and Australia, and though most fatal in its second wave, had, on the whole, a fatality relatively slight compared with its severity of incidence and attack. No doubt, the excessive mortality of the second wave was in part due to seasonal conditions, shortage of food and fuel, and aggregations and movements of population. Whilst, therefore, certain conditions affected the epidemic which lie beyond human control, a significant feature of influenza, which the epidemic confirmed, is the dependence of its prevalence on personal infection due to (a) aggregations of susceptible persons, (b) in ill-ventilated and overcrowded conditions, (c) and of relatively low resistance. It is also significant that simple measures, when practised, were effectual in avoiding or reducing the degree of infection. Fresh air, "nasal drill," antiseptic applications to the nose and throat, physical exercise, ample food supply and segregation, avoidance of fatigue, chill, and alcoholic excess, probably sufficed in many cases to prevent attack from the disease.

viii.

The Prevention and Treatment of Non-Infectious Disease.

88. For many years the administration and practice of Preventive Medicine has been confined, largely, to two principal spheres: that of the environment and that of infectious disease. In recent times there has been an organised extension to the sphere of maternity and child welfare. The time seems to have come for a similar further enlargement of the understanding which shall include *all* disease which is preventable within the conception of Preventive Medicine. We have already seen that the ordinary infectious diseases contribute only a fraction of the disablement and invalidity which is undermining the public health, and that the real battle lies elsewhere. Looking over the world generally, the modern infective scourges of the human family are tuberculosis, malaria, plague and influenza. Yet even so, the vast bulk of invalidity is due to other morbid conditions. Abortion, miscarriage and still-births are due principally to conditions other than these infective scourges. Infant mortality is caused, in the main, by prematurity and atrophy, by respiratory disease and by digestive disorders. The bulk of the disabilities of child life are due to measles, rickets, catarrhal conditions, defects of the senses, dental decay and malnutrition. The war has revealed that the physical defects of recruits were general impairment, dental decay, flat-foot, poor eyesight and indigestion. Sickness benefit under the Insurance Act is paid principally among men for bronchitis and indigestion, for diseases of the nervous system, for debility, neuralgia and neurasthenia, for skin disease, anæmia and a dozen forms of sepsis; and among women the disabling conditions are anæmia, intestinal stasis, catarrhal and gynecological maladies, and dyspepsia. Even when we come to the hospital categories and the death returns we find we have to add, not infectious diseases

chiefly, but disorders of the heart and kidney, cancer, and injuries. It is, of course, true that many of the conditions here named find their origin in infective processes, but it is clear that a comprehensive understanding of Preventive Medicine must include much disease not classified as infectious and all disease which is preventable. For it is such conditions which are undermining the health of the people, for which vast numbers of recruits were rejected, and which lead to an appalling waste of time, capacity and production. As types of diseases which are usually conceived as non-infectious (though infection cannot always be excluded) and yet which present knowledge justifies us in considering, in part at least, to be preventable, we may briefly consider heart disease, rickets, mental disease, dental caries, certain forms of indigestion, and some surgical conditions. This group is by no means exhaustive, but it illustrates both some of the great systems of the body in respect of pathology and some of the principal disabling or mortal diseases which are more or less preventable.

Heart Disease.

89. One of the largest contributors to the death rate between the years 40-60 is heart disease. In 1917 the Registrar General reported that 69,015 persons died of diseases of the circulation, of whom upwards of 16,089 died between 40 and 60. Yet cardiac disease under 60 years of age is, in large measure, a preventable disease. In childhood and youth the undeveloped circulatory system is unstable, both in the heart itself and in the nervous control of the heart; there is a low and inequable vaso-motor tone, easily disturbed, and there is a considerable range of physiological variation which must not be mistaken for evidence of disease. At and after the age of 4 or 5 years rheumatic fever, scarlet fever, pyæmia and pneumococcal infection begin to exert effects on the circulatory system which, if neglected, may readily become permanent. In adult life, there must be added fatigue, degeneration of the arteries, chronic bronchitis, emphysema, renal disease, alcoholism, syphilis, and the direct effect of bodily and mechanical strain on a heart enfeebled by infection. "The dominant factor," says Dr. Lewis, "is invasion of the heart by infective organisms or their product, and a consequent weakening of the myocardium. . . . When it is thoroughly grasped that infection has more to do in heart failure than has strain or a mechanical defect in the heart itself, at all stages of the disease, in its initiation, in its development and in its progress to immediate circulatory embarrassment and death, then and only then is the natural history of heart disease understood."* The symptomatology of heart disease has been defined with equal precision by Sir James Mackenzie. "The heart's efficiency," he says, "can be ascertained by recognising the manner in which it responds to effort. The first sign of heart failure is shown by a sensation of distress on the individual

* *The Soldier's Heart and the Effort Syndrome*, 1918, p. 37.

undertaking some effort he was accustomed to perform in comfort. The chief sensations of distress produced by the exhaustion of the heart are breathlessness or a sense of constriction across the chest or pain."*

90. Heart disease may thus be a form or expression of an infective process. And the heart thus infected fails because the heart muscle is weakened and unhealthy, and its capacity to pump is reduced. Murmurs, enlargement, irritability, irregularity, even alterations in blood pressure as well as many of the symptoms of heart trouble, are in large degree due to mechanical effects of myocardial involvement. Heart disease is broadly, disease of the heart muscle and its nervous mechanism of control, and it is caused by conditions which are in the main preventable, at least in the earlier years of life. For over and above infection, there is the large group of secondary conditions of the heart following on primary lesions elsewhere in the body. There is the mechanical strain on the heart resulting from high arterial tension due to certain occupations, strain, the plethoric habit, or gout or renal disease; great vicissitudes of temperature and exposure to weather may tax the accommodating power of the heart; violent or exceptional exertion, and unfavourable hygienic conditions tend to malnutrition and degeneration of the heart muscle; excessive use of alcohol or tobacco; † a dietary and a sedentary habit which lead to obesity and chronic renal trouble lead also to cardiac disease. The prevention of organic heart disease thus becomes partly the escape from the sequelæ of infection and partly the avoidance of mechanical and vital strains cast on the circulatory system by secondary conditions due to pathological processes in the body, accentuated not seldom by the habit or occupation of the patient; for whilst the modern understanding of heart disease lays its chief emphasis on infection and the condition of the myocardial muscle, the effect of these collateral conditions cannot be ignored.

Preventive medicine suggests, first, the prophylaxis of infection and reduction of the factors inimical to the heart; secondly, the avoidance of the ill-effects of dilatation and irregularity due to pressure on an organ upon which an infective process has already set its mark, in other words, to relieve its burden; and thirdly, what may be described as the physiological treatment of early cardiac disease to ward off untoward results and strengthen the myocardial muscle (by supervision, in youth and adolescence, of cases of infectious disease, rheumatic fever, and disordered action of the heart, by rest, fresh air, exercise and hygiene treatment), by elimination of toxic influences and by increasing natural resistance. Judicious exercise up to the point of discomfort, breathlessness, or pain is one of the most useful forms of treatment. Both

* *The Future of Medicine*, by Sir James Mackenzie, M.D., F.R.S., 1919, p. 116.

† A large recruiting depot recently (1919) reported that disorders of the heart were becoming frequent and serious owing to cigarette smoking: 75 per cent. of boys aged 17-20 were reported as smoking greatly in excess.

organic and functional pathological conditions of the heart afford striking illustration of disease as a *process*. The patient seeks medical advice always at a given stage, almost invariably at a late stage, and what is necessary in order to reduce the heavy tax now made both on the capacity and on the vitality of a community in respect of heart disease is something of a new attitude towards it, an attitude which seeks to understand (a) the origin, (b) the differentiation between organic and functional factors, operating often in the same patient, (c) the relationship of the heart condition to the whole morbid process going on in the body, (d) the bearing which the habit and occupation of the patient have on these factors, and the beneficial effect of a hygienic régime and a course of prophylactic treatment upon them and (e) above all the proper following up and "assessment" of the case. Here, however, I am pleading, not for any particular form of specific treatment of heart disease, which is not my concern at the moment, but for a new attitude towards it which shall be etiological and prophylactic in spirit, a comprehension which shall embrace a larger appreciation of its preventability and a wider understanding of the relations of social, domestic and industrial life to its occurrence, and which shall apply and adapt the new methods of estimation and assessment which have proved so valuable during the war.

Rickets.

91. Rickets is another example of non-infectious malady which may be in large degree preventable. Its anatomical, clinical and pathological characters were first authoritatively described in England by Francis Glisson in his *Tractatus de Rachitide* in 1650. The disease has for long been prevalent in this country and, though relatively non-fatal, is one of the most fertile of the crippling and disabling diseases of early childhood. Undoubtedly it is a constitutional condition, though the hyperplasia of cartilage and the defective formation of osseous tissue is its outstanding manifestation. Whilst the disease does not greatly affect the bills of mortality it is a serious factor in national inefficiency, for it leads both to structural malformation of bones and teeth and to a lowered power of resistance in vast numbers of children in urban populations. Two theories as to its causation have long been held. The truth probably lies in their combination. The first declares that rickets is due to undue confinement, with lack of fresh air and sunlight, and possibly even of exercise, associated therewith being poverty, overcrowding and domestic insanitation. The second or dietetic theory propounds the cause to be the absence or deficiency of certain accessory foods, in particular a deficiency of a fat-soluble vitamine, in conjunction with a relative excess of carbohydrates. Now here we have, whichever theory be substantiated, a disease which has been allowed, for far too long a period, free course among us. Yet it is preventable. Proper housing, an open-air habit of life and adequate parental care would fully meet the environmental theory; on the other hand, the provision of a sufficient quantity and quality of "the fat-soluble growth

factor" would meet, in part at least, the dietetic theory. The problem, in short, is compassable. Improved hygiene plus a diet for children of full-cream milk (fluid or dried), butter, beef-fat, eggs, cod-liver oil, other fish oils, and green leaf vegetables would go a long way to banish rickets, and with it a whole progeny of defective and debilitated childhood. The problem of rickets is thus a typical problem of preventive medicine, and it must be added that a comprehensive grappling with it has been neglected for generations. It is doubtful if there is a single public health authority in this country which has set itself systematically to attempt the solution. Yet its solution would open the door to the proper handling of other forms of deficiency disease (pellagra, scurvy and various forms of malnutrition) as well as introduce a new application of Preventive Medicine.

Mental Disease.

92. "Soundness of mind," wrote Sir Thomas Clouston, of Edinburgh, "is the master key to all human effort and progress." That surely is the proper view point from which to consider the work of preventive medicine in relation to lunacy and mental disorder. First, we must seek to maintain the mental health and capacity of the people; secondly, the whole problem of mental inefficiency must be handled from the preventive side; thirdly, more attention must be given to *early* mental disorder, to intermittent and recurrent cases, and to mental aberration associated with other disease; and fourthly, the prevention and treatment of mental disorder must be pursued along the lines of psychology and physiology. Hitherto, it would almost appear that we permit conditions of life and labour which tend to create lunacy—at an average rate of 22,000 certified cases per annum—and then when lunacy has matured, and become certifiable, we incarcerate the lunatic (125,000 notified insane persons being under care in England and Wales) at an annual cost of upwards of £4,000,000. In addition to the certified lunatics we have, it has been estimated, 150,000 persons (including 48,000 children) who suffer from Feeble-mindedness,* and probably not less than 10 per cent. of the population are "dull and backward" as judged by educational tests.† To these formidable figures must be added a great mass of minor mental affliction, psycho-neuroses and neurasthenia. Taken in sum total mental disease and incompetence is a serious drain on the capacity of the nation. Yet much of it is directly preventable.

93. In Pinel's classification there were four groups of insanity, *melancholia, mania, dementia and amentia*. Since his day there have been suggested numerous subdivisions and differentiations of these classic terms, various forms of insanity (confusional, maniacal, delusional), amentia, dementia, psycho-neuroses, &c. Diagnosis becomes always more analytical, but

* Report of Royal Commission on the Feeble-minded, 1908.

† Report of Chief Medical Officer of Board of Education, 1917, pp. 29, 30, and 100 and 102.

the causes remain. Heredity, imperfect evolution, congenitalism, temperament, previous attacks, and what have been called the "crises of life," puberty, adolescence and the climacteric, are the predisposing conditions; and the exciting causes are disease (*e.g.*, syphilis, epilepsy, and influenza), brain poisons and lesions, alcoholism, mental stress, privation and the puerperal state. In a sentence, the causes are heredity and stress. The Board of Control found that the etiological factors of 12,605 cases of first attack of insanity showed in men the principal causes in order to be alcohol (25·4 per cent.), heredity, mental stress, syphilis, and senility (11·6 per cent.); and in women the principal causes in order were heredity (28·0 per cent.), mental stress, senility, puberty and the climacteric (15·9 per cent.), and alcohol (10·3 per cent.). Whatever may be said of some of these, it is certain that alcohol, syphilis and mental stress are within man's direct control. "The hope of reducing the amount of insanity in the country lies more in the steps which may be taken *for preventing the occurrence of the disease and for its treatment in the initial stages* than in improved methods of treatment when the disease has become confirmed."* That is the case for Preventive Medicine, but it must apply to all grades and degrees, from mental retardation to insanity, from mental disease which is nervous in origin to nervous disease which is mental in origin. The whole field of pathological psychology must be viewed as one problem, from childhood to old age, and we must no longer wait for mental disease to be both created and brought to maturity before action is taken.

94. Here, as elsewhere, we must seek to begin at the beginning. An understanding of eugenic principles and practice, a new aptitude and alertness in the physician, a new type of clinic, special hospital and institution—"early treatment centres"—a system of "voluntary boarders" in approved homes and institutions, a wider education of the public in what causes and constitutes mental incapacity, a larger apprehension of the meaning of self-control—all this is necessary if we would prevent mental disease. It is obvious that such a policy raises many questions of science, law and administration. But the experience of the war and of our colleagues in America (at the Phipps clinic at Baltimore and the psychiatric hospital at Boston) all points in one direction, namely, the practicability of establishing suitable psychiatric clinics in this country for dealing with early cases of mental and nervous disorder. Such clinics may be *ad hoc* or associated with existing general hospitals, and for in-patients as well as out-patients. They should be properly equipped with a special medical and nursing staff, with facilities for consultation, and free from powers of detention or the control of the Poor Law. Hospitals, other than asylums or Poor Law infirmaries, are likewise needed for mental as for other diseases, such as the Maudsley Hospital in South London. Both at clinics and hospitals there should be facilities

* Fourth Annual Report of the Board of Control for Lunacy and Mental Deficiency, 1917; (102), Part II., p. 7.

for medical investigation, diagnosis and education as well as for treatment. These incipient cases of mental disease must be detected, long before the stage of "certification," and subjected at an early stage to classification, treatment, training, following up. And the causes of mental disorder must be grappled with. It is not only a medical problem which thus faces us, but a social one. Alcoholism, prostitution, venereal disease, neglected environment and evil habit must receive attention. And in the wider sphere of practical medicine we must detect, by the newer methods of psychology, incipient mental disability and disorder, whether associated with bodily disease or not—sensory and motor symptoms, neurasthenia, hysteria, psychoneuroses, depression, and all the borderland signs of degeneracy—and having detected these signs we must act with the vigilance we should apply in incipient tuberculosis or heart disease, and with ample appreciation of the benefits of open air, exercise and the hygienic way of life.

Dental Caries.

95. The School Medical Service has demonstrated beyond all doubt wide-spread dental defect among children of school age, 50 per cent. of whom require dental treatment. The Departmental Committee on Sickness Benefit claims under the National Insurance Act pointed out the prevalence of dental caries among insured persons, which produces "much sickness of various kinds, resulting in a drain on the sickness benefit funds." The Prudential Approved Societies have stated that "neglect of teeth trouble is the cause of quite half of the ill-health found among the industrial classes." The Army Medical Council have reported on the loss of man power to the State owing to defective dentition. In the Scottish Command it was estimated that "44 per cent. of the men are dentally unfit, *i.e.*, they lack the minimum of dental efficiency which will ensure effective mastication of food." In the Western Command, from April, 1917, to March, 1918, between 80-90 per cent. of the recruits were in need of dental treatment. (Recruits, aged 18-19, 83 per cent., recruits, aged 19-44, 93 per cent.) In the Northern Command, 84 per cent. of recruits, aged 19-24, were suffering from decayed teeth. In the general population it was found that the condition of the teeth of the women was worse even than that of the men.* There can be no doubt, therefore, of the prevalence of dental disease. Some of it is of minor importance, but much of it is so serious in degree that it leads to subsequent disease. Toothache, pyorrhœa, and oral sepsis are the earliest local manifestations, but they are not terminal conditions. The glands of the neck become affected, mastication is interfered with, anæmia and toxæmia occur, and they are followed by general maladies in different parts of the body, gastro-intestinal trouble, arthritis, and neurasthenia. The tale of trouble which follows dental disease may be long and grave. Yet it is a directly preventable

* Report of Departmental Committee on Dentists Act, 1919, Cmd. 33, pp. 17-23.

condition. Cleanliness, a detergent diet, and early conservative dentistry would solve the problem. To secure that solution it is necessary to provide, from the earliest years of childhood, facilities for obtaining adequate inspection and treatment. It must be said at once that this solution, and there appears to be no other, involves somewhat far-reaching reform of the whole dental service of the community. The steps of such reform have been stated in full elsewhere,* and necessitate large extensions of the school medical service and the health insurance system, and the establishment of a public dental service in various areas. But the fundamental position is clear—if it be accepted that it is the duty of the State to ensure, in the national interest, that its citizens shall be maintained in good health and working efficiency, then adequate arrangements for keeping the bulk of the people in a sound dental condition are essential to this end.

Indigestion and Alimentary Disease.

96. "Defects and derangements of digestion," said Sir William Roberts more than 30 years ago to his class of medical students in Owens College, Manchester, "are among the most common of human ailments. They not only complicate almost every variety of disease, but they constitute by themselves a serious torment to a large number of otherwise healthy people. Not a few of those who bear a large and vigorous part in the world's work, and mayhap reach a green old age, are plagued half their days with dyspeptic troubles." The facts presented in a previous section of this memorandum fully confirm this opinion. Whether we select the insurance patient, the hospital patient, or the cause of the final event, it will be seen how large a proportion of the sickness and death there recorded is due to some form of indigestion or alimentary disease. Yet, hitherto, Preventive Medicine has had little or nothing to say in respect of this enormous and so largely preventable group of disease.

97. The process of digestion is physiological. Man must take daily a certain amount of food in order to furnish heat, energy and the repair of waste of tissue, the value of the food being measured not by that consumed but by that assimilated. The degree of assimilation will depend on the nature of the diet and the power of digestion of the body. By the process of digestion in the mouth, the stomach, and the intestine, the food-stuffs are altered to fit them for absorption, by which they may "become blood" and replenish all parts of the body and become also its framework. What cannot so be used is, with other waste products of metabolism, cast out of the body. The process is part of all animal life, and with one exception is the most universal of all natural functions. But there is this difference between supplying the body with food and the lungs with air, that man has a wider freedom of choice as to time, occasion and material in supplying food to his body than air, and this is one of the reasons why the alimentary system is more unfairly treated than the respiratory. For unfairly treated it is; and many,

* *Loc. cit.*, pp. 36-56.

perhaps most, of the ills which men suffer from disordered function or disease of the alimentary system are due to ignorance or neglect. They are conditions which are therefore avoidable. "Prevent indigestion," said Sir Lauder Brunton, "rather than cure it."

98. An examination of the patients who seek medical advice on account of dyspepsia or other disease of the alimentary canal will serve to classify them as follows:—

- (a) Structural, inflammatory or infective disease;
- (b) Functional indisposition, atonic or irritative (acid) dyspepsia due to errors of diet, gastric insufficiency, etc.;
- (c) Neuro-pathic dyspepsia;
- (d) Morbid conditions of the alimentary canal associated with primary disease elsewhere.

Organic trouble of the nature of gastric or duodenal ulcer, malignant or other disease, is often due to an infection, obstruction or irritation in some other part of the alimentary canal, with or without absorption of toxins. They are, not seldom, secondary conditions, which began with a relatively mild, transient and recurrent but entirely preventable disturbance of the digestive process—in the stomach, in the intestine or in the appendix. The vast bulk of disabling indigestion which brings patients in tens of thousands daily to the doctors and to the hospitals consists of dyspeptic indisposition of a functional nature. But owing to neglect of treatment, incorrect treatment, ignorance of hygiene or persistence in faulty habits, the bulk of it continues to be more or less a disablement throughout life, and some of it, more of it than we generally assume, leads to secondary and ultimately fatal disease.

99. But the problem is not as simple as it looks, and if Preventive Medicine is to play its part there must be a fuller understanding of the two-fold issue which it raises. For, first, there is an issue concerning the dietary of man; and, secondly, there is the question of the functioning and habit of his body. The food customs of mankind are an outcome of profound instincts and century-long experience—dependent upon the fruits of the earth, temperature and tropical climate, social conditions, religion, predilection, a score of factors, habits and tastes. The consumption of rice, oatmeal or meat varies nationally. In this country we eat more meat than most other nations, and our meat and fish consumption is rapidly increasing; in recent years also the use of fruit foods has enormously developed; sweets, jams, sauces, pickles, spices and prepared foods have also increased in consumption; and fine milled flour bread is used in a variety of forms. Again, our food is subjected to elaborate cooking processes, though not equally thorough in action or degree. Perhaps the most remarkable development is the addition to our cereal, farinaceous and flesh diet of innumerable articles and beverages commonly assumed to be "stimulant" in action, such as tea, coffee and alcohol. These articles are not in themselves nutritive, but they dilute and change the food with which they are mixed in diet, and they exert effects on the alimentary tract itself.

Indeed, the excessive consumption of tea and alcohol furnishes two of the principal causes of dyspepsia. Here, then, we have the subject of dietary as it affects health. "As much mischief in the form of actual disease, of impaired vigour and of shortened life, accrues to civilised man," said Sir Henry Thompson, the surgeon, "from erroneous habits in eating as from the habitual use of alcoholic drink, considerable as I know the evil of that to be. . . . More than one-half of the chronic complaints which embitter the middle and latter part of life is due to avoidable errors in diet."

100. The second issue is the functioning and habit of the individual. The normal physiological action of the digestive system depends upon health, exercise, taste and idiosyncrasy—"one man's meat is another man's poison"—and the diet must be revised to meet the changes in the type of nutrition which naturally takes place as the individual travels from youth to age. Sir W. Roberts laid down as a rule in regard to regulation of diet the two-fold question: *Do you like it, and does it agree with you?* There is much to be said for it as a combined question, though knowledge and experience are necessary for its answer. "The palate," he used to say, "is placed like a dietetic conscience at the entrance gate of food, and its appointed function is to pass summary judgment on the wholesomeness or unwholesomeness of the articles presented to it. It is, of course, not infallible—no instinct is—but so close and true are the sympathies of the palate with the stomach and the rest of the organism, that its dictates are entitled to the utmost deference." Even here tradition, upbringing, habit and cultivation play their part. The more important question is, does your selected food agree with you? Does it produce energy, heat and well-being? and is its use accompanied by any ill results to body or mind? There are other aspects of habit which must not be forgotten, and which unquestionably have a large share in the production of disease. For instance, (a) the irregularity of meals and the consumption of food in between them, (b) the unvariated monotony of the regular meals, (c) the failure to masticate, owing to defective teeth or other cause, (d) the habit of drinking with meals and washing down food, (e) the habit of bolting food, like posting letters, (f) over-eating, (g) chronic constipation, (h) swallowing air at the time of eating, and (i) the abuse of alcoholic beverages. This list of plain and obvious practices seems hardly worthy of formal mention, but it records the eating habits of vast masses of the people, habits which, though they may appear to be trivial, lead unquestionably to a great and increasing burden of disablement and disease.

101. The office of Preventive Medicine in regard to disease of the digestive system is to adjust the national standards of diet to the special peculiarities and changing needs of the individual; to deal with the beginnings of disease, and so diminish that heavy burden of suffering and death which follows upon organic disease of the alimentary canal; and to educate in the hygiene of dietetics and digestion, with a view not only to preventing the "deficiency" diseases, dyspepsia, alcoholism, intestinal stasis

and infective processes in the alimentary canal, but to building up a well-nourished and resistant body.

Preventive Surgery.

102. Let me say at once that, from my standpoint, whilst I regard surgery as one of the foremost means of Preventive Medicine, I recognise that it is, in the main, primarily curative. Yet one of its purposes is to prevent or remove the causes and conditions of disease and disablement, and that is the purpose also of Preventive Medicine. In a sense, no branch of Medicine has done more to prevent disease within the last two generations than surgery. First, the whole principle of modern surgery is the prevention and abolition of sepsis. The object of surgical intervention is not infrequently the removal of a focus of suppuration or infection, and its method and spirit is directed to the abolition of the septic process. "The antiseptic system of treatment," said Lister in 1869, "consists of such management of a surgical case as shall effectually prevent the occurrence of putrefaction in the part concerned." Secondly, the direct action of surgery is often an inquiry into the origin and nature of the conditions of disease, and its history in various directions marks it out as a truly experimental science, a method of research, by which new knowledge is acquired of the character of disease and the means of its prevention. Thirdly, the object of surgery is the removal of diseased tissues and the prevention of malpositions, malformations, functional disability, or deformity. Lastly, the surgeon, like the physician, follows the great teaching of Hippocrates in the ancient world and of John Hunter in the modern world, that restoration and healing in the human body are effected by powers inherent in the living organism. The surgeon, like the physician, can only serve and assist nature by placing the body and its organs at her service, by removing obstructions from her path, by supplementing and aiding her processes, and by fortifying the body defences against the onslaughts of infection or trauma. In my view all this is of the essence of Preventive Medicine. It is an alliance with Nature against dysgenic forces—it engages the enemy and indirectly, at least in some of its aspects, it strengthens the defences of the citadel. The occasions when surgery fulfills these purposes are numerous. Abdominal surgery in the hands of Sir Arbuthnot Lane, Sir Berkeley Moynihan and others, has proved its case as a preventive possibility in various conditions, indeed it has altered our conceptions of the origin of gastric and intestinal trouble and of its means of cure; genito-urinary surgery has become more and more preventive in purpose; gynæcology has done much to correct the results of the negligence of midwifery and the injuries of venereal disease; a fuller application of surgery to obstetrics is steadily removing the dangers of child-birth and its maternal sequelæ; the ancient operation of circumcision is clearly preventive in aim, and so is the medical cure of hernia, particularly its congenital form; many minor surgical interventions, for hydrocele, varicose veins, septic wounds, flat foot, &c., are also preventive; the removal of fibrous adenoids has prevented phy-

sical and mental impairment in the school child; the new treatment of fractures and dislocations has returned many disabled men to the ranks of industry in full efficiency; the surgical treatment of tuberculosis has opened a new life to the tuberculous cripple; the surgery of the eye and the prophylaxis of *ophthalmia neonatorum* have prevented blindness; and the work of the modern orthopædist has revolutionised our ideas of what repair may be made to mean.

103. There is no more remarkable instance of the association of preventive and curative medicine than the recent advance in Orthopædics (*ὀρθός*, straight and *παῖδιον*, a little child) under the leadership of Sir Robert Jones and his colleagues. Beginning with the treatment of common deformities of children, such as club foot and knock-knee, it has enlarged its borders to deal by manipulation, by operation, and by reconstruction and re-education with all disabilities of the locomotor system, whether arising from disease or from injury, with a view to the recovery and re-establishment of function. Its conquests in regard to war injuries have been extraordinary. They have concerned in the first place all types of deformity; then the remedial treatment of paralysis of the radial, musculo-spiral, popliteal and other nerves; then tenotomy and transplantation of fascia, tendon, nerve, and muscle; even the grafting of toes in place of lost fingers and of the great toe for the thumb, and the plastic treatment of frostbite. A new art of prosthetics has arisen, and, still more important, a revolution has taken place in the methods of reconstruction and recovery of function, and in this country alone upwards of a million men have been thus treated. When we come to consider this progress we shall find that it is built upon sound foundations laid long ago by John Hunter. He saw human anatomy as a part of all anatomy, and his studies and dissections of the animal world taught him the inherent powers of growth, adaptation and recovery of all living tissues—and that thus, structure might repair itself and function would follow if properly encouraged. Following Hunter's principles came the early orthopædists of the nineteenth century, Little, Hugh Owen Thomas, and Duchenne. Little, who himself had a club foot, introduced tenotomy in England in 1837; he recognised that all deformities were not "congenital" but were due to disordered muscular action and that in addition to cutting the contracted muscle subsequent scientific after-care was necessary. The contribution of Thomas, the inventor of the splint, to orthopædic practice was the immobilisation of the affected limb by "indirect fixation" without compression, and the completion of cure by voluntary movement. In our own time, Sir Arbuthnot Lane and others have studied the effect of strain on body tissues and have applied the new knowledge of nerve, muscle and bone regeneration to orthopædics, with the result that a recognised form of practice has been adopted. It consists of two parts, first, *reconstruction*, and secondly, *re-education*. The reconstruction is commenced by the anatomical restoration, the re-approximation of the ends of the broken bone, repair of the damaged part and replacement of the functioning organ; secondly, the true axis of the

limb must be obtained to correct the error in alignment; thirdly, there must be indirect fixation to secure rest and in such a position as to retain the best functional attitude; and lastly, when all inflammation, pain and reaction have disappeared, re-education of function may commence. Re-education of function is partly physical and partly mental. It begins with massage and faradisation to stimulate circulation and nutrition in wasted muscles; then voluntary movement, physical drill, gymnastics and hydrotherapy; and lastly, re-education by co-ordinative and purposive movement in the workshop or at the orthopædic centre.*

104. Here, as it seems to me, we have a further extension of the spirit of Preventive Medicine—curative, preventive, re-constructive, educational. It begins with the beginning of disease and not with its end results, and it prevents deformity and disability; it is the restoration of function. Moreover, it is a model of "team" work, and the complete integration. Chemistry, physics, electricity, biology; anatomy, physiology, pathology, and pharmacology; medicine, surgery and therapeutics—they are all here, interdependent in proportion as they are perfect, all brought to the crucial point and transmuted into redemptive power of educational and economic value. This sort of reconstructive medicine now awaits application to some of our great civil problems of disablement and of crippling, and though not preventive medicine in its narrowest meaning is full of suggestion, good promise and hope. It marks an epoch in English medicine.

ix.

Public Education in Hygiene.

105. An essential part of any national health policy is the instruction in the principles and practice of hygiene of the great mass of the people. In this as in other spheres of human affairs ignorance is the chief curse. We are only now, as knowledge grows, becoming aware of the immeasurable part played by ignorance in the realm of disease. It is hardly too much to say that in proportion as knowledge spreads in a population, disease and incapacity decline, and this becomes more evident as the gross forms of pandemic disease are overcome. As in the individual so in the community, knowledge is the sheet anchor of preventive medicine—knowledge of the way of health, knowledge of the causes and channels of disease, knowledge of remedy. *The great reforms to which reference is made in these pages are dependent for their achievement upon an enlightened and responsive people.*

106. One of the characteristics of the Dark Ages was the prevalence of fatalism. Men felt crushed by circumstances; they

* Such a centre or clinic contains (a) provision for out-patient treatment by massage, electrotherapy, hydrotherapy, etc.; (b) facilities for re-education and training in a trade (splint making, rug making, designing, wood work, leather work, tailoring, metal work, printing, etc.); (c) hostels and billets, and (d) an employment bureau.

seemed helpless in the presence of pestilence and misery, and for centuries they existed under a sense of impending disasters which they could neither foresee nor prevent. Disease seemed to them something occult, supernatural, beyond their understanding or control. The cataclysm of the European War and the scourges of influenza and plague which have swept through the Empire have, in their degree, exerted in our own time a somewhat similar effect. Let men once feel that external circumstances control their fate, and their attitude to reform and progress is one of despair. Let them once recognise, on the other hand, that in large and increasing measure they are masters of their own destiny, and their life takes on a new, more hopeful and purposive aspect. Education is then seen in its true light, its true potentiality. It becomes the instrument of reform, and in no sphere of national well-being is this more necessary than in relation to Preventive Medicine. We now have a compulsory and universal national system of education; an integral part of it should be a knowledge of the principles of health. We have already neglected this subject too long, and we are paying the heavy price of neglect. It is desirable to give to the whole child and adolescent population, of all social classes and grades, first, *a body of facts* concerning personal health, and secondly, *an experience of the practice* of hygiene. The two elements should be taught together, for only thus can a working and practical knowledge be acquired. The teaching of theory only will avail nothing; from the earliest age the individual should be trained in the habit of healthy living.

107. Four illustrations of the method of instruction may be named:—

- (1) the general practice of hygiene;
- (2) the teaching of mothercraft to elder girls;
- (3) physical education; and
- (4) the method of open-air education.

In the use of these methods, medical terminology and technique should be avoided, and little direct instruction should be attempted in the details of the signs, symptoms or treatment of disease. The instruction should be simple, positive and practical.

(i) *The Practice of Hygiene.*

108. At the present time hygiene is taught in the elementary schools, and, therefore, forms one of the subjects of training for the student entering the teaching profession.* In the school itself the subject, whether taught incidentally or in the form of set lessons, should be undertaken in a practical way. To inculcate cleanliness, the practice of cleanliness is necessary—clean heads and bodies, the use of the toothbrush and the school bath, a clean alimentary system, the avoidance of verminous conditions,

* The official syllabus issued by the Board of Education in 1919 consists of eight sections, dealing with the condition of health in childhood, the senses and their training, the practice of hygiene, the common ailments of school children, the physically or mentally defective child, the welfare of infants and young children, the work of the school medical service, and the school building and its surroundings. There is also a separate syllabus for the teaching of temperance.

a clean schoolroom, and so forth; the value of fresh air must be taught by the regular and continuous ventilation of the schoolroom, life in the open air, proper breathing exercises, &c.; the same applies to the value of exercise, food, rest; each subject must be as far as possible practised by the learner. But much more than this is needed. In the first place, the adolescent and adult population require a training in hygiene, in continuation schools and voluntary institutions for the extension of university and technical education or elsewhere; and in the second place, the instruction thus provided must be Applied Hygiene, including information on the daily practice of health, physical exercise, clothing, rest, food and dietetics, sex-hygiene, the protection and use of milk, the prevention of indigestion, bronchitis, alcoholism, tuberculosis or venereal disease, domestic sanitation, and the importance of the treatment of disease at its beginnings.* All through the country in a hundred thousand factories and workshops there is urgent need of education in regard to health and physiological efficiency. A representative employer (of 6,000 persons) writes that "the effect of the teaching of hygiene in relation to industrial life has unquestionably been beneficial in two respects, first, it has tended to better health in the persons selected and in the maintenance of a higher standard of health in the factory, and secondly, it has helped to reduce industrial fatigue, and through limiting loss of work through illness has, without doubt, increased output. I attribute the improved physique of the boys," he adds, "to systematic physical training provided in the factory, to adequate facilities for regular meals, and to the development of camp life. I am convinced that the proper physical care of the worker is not only called for from humanitarian motives, but is a sound commercial proposition, and I hope that under the new Education Act there will be enormous development."

(ii) *The Teaching of Mothercraft.*

109. The health and proper care of the child depend primarily upon Motherhood. If the school girls of this generation are to become the wise mothers of the next they must be taught the elements of Mothercraft. That seems a simple and self-evident proposition, but its truth does not seem to be generally accepted. Yet it would be difficult to exaggerate the importance, and even urgency of the teaching of Mothercraft to girls and young women. If every woman understood the ordinary care and management of herself and her baby, much discomfort, malnutrition, sickness and even subsequent mortality would be avoided, and the burden of maternal suffering would be immensely relieved. The more unsatisfactory and unwholesome the

* Extremely valuable educational work of this nature is being carried out at the present time by certain well known voluntary associations established for the specific purpose, such as the National Council for Combating Venereal Diseases, the National Association for the Prevention of Tuberculosis, the National Clean Milk Society and the various societies leagued together in the Central Council of Child Welfare. Closely akin is the health work of the Boy Scouts movement. All this educational enterprise and organisation form an invaluable and integral part of national Preventive Medicine.

housing conditions the more necessary is it for a working mother to know how to keep her baby in reasonably good health, partly for its personal well-being, but also for her own sake, so that in her over-full life she may be spared the avoidable anxiety and trouble caused by sickness due to improper care of herself and her child. It may be admitted at once that a knowledge of Mothercraft is not a cure for all evils associated with infant mortality, but when one observes what sound common-sense, well-informed understanding and methodical care can do for the mother and baby in the most unpromising surroundings, it seems deplorable that any mother should lack the elementary knowledge and equipment necessary to enable her to give herself and her baby the best chance of life and health. We cannot compel her to put knowledge into practice, but we can at least see that she has had ample opportunity of learning the first principles of maternity and of realising the suffering to herself and her children which neglect of certain observances may cause. "The infant cannot indeed be saved by the State," wrote Mr. Herbert Samuel in 1915, when President of the Local Government Board. "It can only be saved by the mother. But the mother can be helped and can be taught by the State."

110. The health, and even the life, of the infant is dependent primarily upon its mother,—upon her health and strength, her capacity in domesticity, her knowledge of the care and management of infancy, and her control of its food and environment. There can be no doubt or question about this. The fundamental requirement in regard to healthy infancy, which is the door of childhood and school life, is *healthy motherhood* combined with *the art and practice of Mothercraft*. The teaching of Mothercraft may be divided conveniently into three periods, (1) Instruction to elder girls at the elementary schools (12 to 14 years of age), (2) to girls from 14 to 18 years of age in secondary and continuation schools, and (3) to married women at schools for mothers and maternity centres. In each of these periods the two main issues must be kept in mind, namely, the health of the girl herself as a future and potential mother, and her knowledge and practice of infant care.

111. Whilst there is need for various types of institution for promulgating this gospel of healthy infancy—infant welfare clinics, schools for mothers, maternity centres, and the School Medical Service—the evidence is accumulating, in spite of prejudice or ill-informed criticism, in favour of the application of educational methods and the spread of knowledge. Ignorance—

- (a) of the principles and practice of maternal hygiene,
- (b) of the common causes of disease,
- (c) of the means of prevention, and
- (d) of the adaptation and adjustment of conditions of environment to the individual child,

remains the principal operating factor, in the vast majority of cases, in the production of preventable disease. Many an illiterate and poverty-stricken mother is, in a domestic sense, competent and well informed in these matters; many a mother

in highly-civilised circumstances is incompetent and ignorant. Competent maternity wherever it occurs is generally a remedy, though not the only remedy; incompetent maternity is always a disability. But to say that maternal ignorance is thus a fundamental issue is not to condemn the mother or allocate culpability; the culpability probably lies elsewhere. Nor does it ignore the manifold influences of environment. It states, what cannot be gainsaid or denied, *that education in maternal hygiene, a homely capacity to control domestic influences and circumstances and the growth and spread of a knowledge of health lie at the root of the matter.*

(iii) *Physical Education.*

112. In order to build up a sound physique the nation also needs to have available a complete scheme of educational and recreative gymnastics, that is a system of carefully chosen, graduated exercises, designed on physiological principles, to train both body and brain, and combined with games, swimming, field sports, and dancing. A beginning has been made, and the new Syllabus of Physical Training issued by the Board of Education (1919) contains material for national adoption. But more time and attention must be given to the matter, if it is to have any real effect on the physique of the child and adolescent population. Any schemes adopted must be elastic and recreative. The work of the Army Gymnastic Staff in England, and in France during the war, will undoubtedly have far-reaching results on the recreative side of physical training for children and adolescents as well as for soldiers. The playing of games in a comprehensive and organised way for their mental and physical effect has never before been fully attempted as part of any schemes of physical training. The overwhelming success which has attended the general introduction of games behind the lines in France suggests that we have made far too little use of our national aptitude and love for games in the education and training of the young and as a means of wholesome recreation for the adult.

113. It may be hoped that Local Education Authorities will at once take steps to ensure (1) that a large variety of simple suitable games are taught as part of the ordinary physical training in the elementary and continuation schools; (2) that more use is made of parks and open spaces for the playing of organised games; (3) that, where practicable, playing fields are acquired for the use of school children in and out of school hours; (4) that holiday or school camps and physical training centres are provided under the Education Act, 1918 (S. 17) for young persons under 18 years of age; (5) that the girls have equal opportunities with the boys; and (6) that evening play centres are established. Substantial advance has recently been made in the institution of Evening Play Centres. They have successfully inaugurated schemes for evening play and recreation which are significant of a broader conception of their value and represent the beginnings of much more complete and comprehensive facilities for social and physical well-being of adults as well as children.

(iv) *Open Air Education.*

114. During the past five years the nation has had a valuable object lesson of the benefits to be derived from an open-air life. Thousands of men who have been withdrawn from the urban areas of the country to undergo camp training in the Army have manifested an obvious and substantial improvement in their physical condition. No one can measure the national gain that will accrue from this increased physical well-being, even as no one can estimate the loss in defective and devitalised man-power which the nation has sustained for many years, due to the lack of appreciation, and even systematic neglect, of the value to the human body of fresh air and sunlight. The open-air school is a simple and economical way of applying a method of natural education to the susceptible body and mind of the child or adolescent, who is also sensibly taught under such favourable conditions to recognize and value some of the fundamental principles which underlie a hygienic way of life. *Fresh air, exercise, cleanliness, rest, regular meals, careful supervision* form a series of conditions as certain in their beneficial physical effect as they are conducive to the creation of a mental atmosphere favourable to the opening mind. As Walt Whitman sang in the *Song of the Open Road*,

"Now I see the secret of the making of the best persons,
It is to grow in the open air."

115. Every elementary school has its quota of dull or backward children, debilitated and anæmic, malnourished, stunted and weakly children, handicapped by a physical infirmity which renders them unable to derive reasonable benefit from their schooling, and for whom the best possible treatment is an open-air school. It is impossible to say how many such children exist, but it is estimated at not less than 10 per cent. or 600,000. The present provision supplies accommodation for less than 2,000. The need for the extension by Local Education Authorities of their present facilities for open-air education is, therefore, urgent. In a large number of cases some adaptation of the existing premises would suffice, in others playground classes could be started. Elaborate and expensive buildings are not required, provided that suitable arrangements are made whereby the children are kept warm, dry, and well-fed. The essential point is life in the open air—a new way of living, the practice of hygiene, the restoration to the town child of the wholesomeness of life.*

116. These four methods of education in hygiene are submitted for the consideration of local authorities. They are, of course,

* The application of the open-air method of education takes the form of—
(1) Classes held in the playgrounds of Schools, for the instruction of children who are normal or suffering from malnutrition or other physical defects; (2) Classes held in public parks or open spaces for children and adolescents; (3) "School journeys," from one day to three weeks' instruction at the seaside or in the country; (4) Holiday schools and camps for children and adolescents; (5) Open-air class-rooms in Schools; (6) Open-air Day Special Schools; and (7) Open-air residential schools of recovery for the treatment and education of children suffering from severe debility or other disabling conditions.

only illustrations, but in principle they are widely applicable.—to adults as well as children. One thing is certain, no substantial advance can be made in this country in the practice of Preventive Medicine apart from the will of the people, which can only be guided rightly by knowledge and practice in hygiene. We have witnessed a nation organised for war, we require a nation organised for the purpose of national health.

X.

Investigation in Relation to Preventive Medicine.

117. Among the duties of the Minister of Health is included "the initiation and direction of Research."* This sound proposition implies that no scheme of practice in Preventive Medicine is complete unless it includes opportunity and provision for investigation and the acquisition of new knowledge. Such work may be classified for the purposes of practical convenience in four general groups.

- (a) Analysis and the examination of the content of water, milk, sputum, blood, &c.
- (b) Research of a more elaborate kind principally undertaken in well-equipped laboratories.
- (c) Clinical and personal study of disease in the individual
- (d) "Field" and communal investigations of disease and mortality.

On the one hand, chemical, physical, and bacteriological analysis of specimens relating to Medicine, particularly in regard to diagnosis and the determination of content, is being carried out in laboratories throughout the country, and though its aims are of necessity relatively narrow, practical and immediate, most valuable knowledge might be derived from it if it were more closely associated and jointly reviewed. On the other hand, elaborate and prolonged research work having for its object the advancement of medical science, and a minute and extensive inquiry into first principles, is being organised by the Medical Research Committee in a great variety of ways and places.† This invaluable work which has so abundantly justified itself does not, however, in its present form entirely cover the great field of investigation which lies before us. There remain the two other groups of inquiry which, though already partly covered by the work of the Medical Research Committee, call for development and continuation by another kind of investigation, which, happily for the progress of Medicine in this country, has always received attention. Speaking generally, it is the third and fourth groups which seem to lie more particularly in the province of Preventive Medicine—clinical, epidemiological, and communal; though such work is not and cannot be wholly separable from the work of the Committee, itself an institution of Preventive Medicine.

* Ministry of Health Act, 1919, Section 2.

† Similar work is undertaken at the Pasteur Institute in Paris, the Koch Institute in Berlin and the Rockefeller Laboratory in New York.

118. One of the distinguishing and peculiar services rendered by the Central Medical Department in early days was the "field" research and investigation work which it performed and inspired. In 1839, in order that the Registrar-General might turn to scientific use the vast stores of medical data flowing into his hands, Dr. William Farr was appointed "Compiler of Abstracts," and from that time onwards for forty years he rendered invaluable service to the State by summarizing the facts and deducing the conclusions to which they led. In 1855 Mr. Simon was appointed Medical Officer of the new Board of Health (1855-58), becoming in due course Medical Officer of the Privy Council (1858-71) and eventually of the Local Government Board (1871-76). For upwards of twenty years, therefore, these two great pioneers worked alongside each other, the one nominally on the statistical, the other nominally on the administrative side of State Medicine. The result was a remarkable series of field investigations, the standard of which has not since been surpassed.* The findings of these inquiries form a substantial part of the foundations of the practice of Preventive Medicine in England, though at first sight they appeared to have no practical effect. That is a common characteristic of sound scientific work; its value is not apparent, but latent. It is preparatory to action; the seed must be placed in the ground if fruit would be obtained. Systematic investigation, experiment, and disinterested epidemiological inquiry is the life blood of Preventive Medicine. It extends the boundaries of our knowledge of disease, and our knowledge is still dangerously fragmentary and incomplete; it provides the facts of the case for legislation and administration; and it furnishes assistance in the great business of education, of foresight and of forecasting. Too often epidemics of disease in this country have caught us unawares, unready and unprepared. Yet their course follows the unvarying natural law of cause and effect. It is not disease which is capricious; that is rather the characteristic of the observer. It is part of the purpose of a scientific scheme of national health to reduce caprice, chance, and surprise to a minimum and to establish in their place firm and growing knowledge. Workers in Preventive Medicine must not find themselves unprepared with their plan of campaign or an adequate survey of the terrain, until the enemy has published his ultimatum, and it is too late. Nor is the acquisition of new knowledge by research and investigation alone a function of a central department. The problems of medicine arise where the patient lives, his home and workplace are the fields of inquiry; and the medical practitioner is the man to carry out partly or wholly the investigations which are necessary. Harvey, Sydenham, Willis, Morton, and John Hunter were all practitioners; and in our own day practitioners have repeatedly demonstrated

* There were Farr's "Letters" and decennial supplements to the Registrar General on the one hand, and on the other the reports of systematic investigations throughout England as to preventable disease and the 'necessaries of health.' (Greenhow, Buchanan, Edward Smith, Whitley, Ballard, Radcliffe, and others.)

both their desire and capacity to undertake investigation work. The incidence of disease of the heart or respiratory system, pathological fatigue, digestive disorder, nervous maladies, the epidemic diarrhœa of infants, or incipient mental disease can be best determined by the practitioner or the school doctor; even yet we do not pay sufficient regard to the causes of abortion, miscarriage, or still-birth; the almost universally bad condition of the teeth remains partly unexplained; that vast mass of unnamed and undetected physical unfitness, malnutrition, disablement and impairment which undermine the capacity of a nation can be best investigated and handled in local areas. There is also a large region of research into tuberculosis lying before the Tuberculosis Officer; a similar large area of inquiry into syphilis and all forms of venereal disease, their incidence, prevention and treatment falls to the sphere of the Venereal Disease Officer or practitioner; and the field of investigation lying before the Medical Officer of Health is almost boundless. These are everyday problems of Preventive Medicine, for investigation and research are no prerogative of the hospital ward or the laboratory.

119. For the purpose of illustration and suggestion some of the wide channels of investigation may be mentioned. Take the bills of mortality. They record the number of deaths in registration districts per annum and the certified cause of death. Their validity depends, of course, upon the accuracy of the diagnosis or of *post mortem* findings, and hence in the last resort upon the skill and knowledge of the medical man. But taking them as approximately indicating the cause of death we may learn much from their study. Instead of accepting a total of, say, 1,000 deaths and its resultant death-rate, in a given area, we must proceed to analysis and differentiation in order to answer the following questions:—

- (1) What is the relation of the total number of deaths to the total population and the section of the population mainly contributing the deaths?
- (2) What are the causes of death when fully classified? and how many of them are due to infection? (The problems of cause and infection form subsequent issues.)
- (3) What is their distribution in sub-districts, streets, courts, alleys, slums?
- (4) What is their distribution in houses, tenements and rooms? and what is the relation to soil or topographical situation?
- (5) What is the age incidence of death at all age periods, and, under one year, in months and weeks? how many of the deaths may be considered premature? what is the number, incidence and distribution of the still-births?
- (6) What is the sex distribution? and what is its relation to different diseases?
- (7) What influence does overcrowding and domestic insanitation bear to the deaths recorded?
- (8) What influence is exerted on the death rate by diet, alcoholism, and social and economic conditions of the family?
- (9) What is the relation between occupation, industrial conditions and fatigue and the deaths of a district? and between the deaths and the factories, workshops, workplaces and homes where the occupation is followed?
- (10) What is the influence of climate, season, month and day of death upon the death rate? Why is it that infant deaths from overlying and other causes have a tendency to occur at

the week-end, when there is most leisure and most wages in the home?

- (11) What is the number and character of the deaths due to conditions originating in childhood, or to heredity, diathesis or disposition of body?
- (12) What is the number and character of the deaths, which have occurred in the area which appear to be due in large degree to inadequate treatment?

Here there are a dozen points suggestive of the sort of inductive inquiry which may be found to throw light on the causes and conditions of a high death rate. But a deductive inquiry is also necessary in all areas, in order not to miss the operations of general or even universal conditions upon the particular and the local. Thus, to understand its *meaning* to the community it is necessary to study and differentiate the mortality to the utmost limit; then to apply to what Radcliffe 50 years ago called "the constant foci of infection" the means of treatment. To state a mere general death rate is of little more value in its sphere than to state in the sphere of medical practice that a person is ill and that a patient stands before us. Yet all over the country hundreds of official reporters content themselves with the statement that the death rate of their area is such and such a figure. But it is not sufficient to inform the patient that he is a patient; it is necessary to get down to the minutest facts regarding his heredity, history and physical condition, bringing to our assistance all the aids of diagnosis; then to deduce; then to apply appropriate remedies. In other words, the community is a patient.

120. Somewhat similar and even more searching investigations are necessary in other directions, of which the following may be named as illustrations:—

- (a) *Infancy.* Causes and conditions affecting the birth rate.
 Nutrition in relation to developmental disease.
 Effect of congenital and infant disease on childhood.
 Causes and conditions of infantile diarrhoea and other epidemic diseases of children.
 Maternal and infant mortality.
 Morbid conditions of the mucous membranes (adenoids, tonsils, intestinal catarrh, &c.).
- (b) *Nutrition.* The foundations of nutrition (food, warmth, exercise, nurture, hygiene).
 Dietary in relation to nutrition and dyspepsia.
 Dietary and energy—the food of the industrial worker.
 Food poisoning: deleterious foods, forms of adulteration.
 Relation of food to age, sex, climate, assimilation and deficiency diseases (rickets, scurvy, &c.); relation to chronic disease such as cancer.
- (c) *Industrial health problems.* (See pars. 76 and 77, p. 67.)
- (d) *Infection.* Causes of high, low and variable virulence and infectivity.
 Factors affecting susceptibility or resistance of the individual.
 The immunity of the individual.
 The sequelæ of infectious disease.
 Infection of the nervous system.
 Mode of infection and means of treatment of influenza.
 Tuberculous infection in childhood.
 The carrier—acute, chronic, and intermittent.
 Catarrh, "common cold," coryza—its cause and incidence; its relation to other catarrhal diseases.

- The normal bacterial flora of the nose and throat.
 Prophylaxis of disease in the individual.
 Social, industrial and environmental factors influencing infection.
- (e) *Epidemiology*. Causes of recurring waves and cycles of infection.
 Factors affecting susceptibility or otherwise of a community.
 Age incidence of disease prevalence and its cycles.
 Immunity of communities.
 Seasonal fluctuations: age distribution, incidence, fatality.
 Field investigation of cholera, plague, malaria, dysentery, &c., in Britain and elsewhere.
 Field investigation of coryza and influenza, cerebro-spinal fever, poliomyelitis, encephalitis, rheumatic fever, diphtheria, &c., and the inter-relationship of disease.
 Field investigation of rheumatic fever.
 Constituent factors in control of tuberculosis.
- (f) *Dental caries*. Incidence, cause, prevention.
- (g) *Non-infectious disease*.
 Beginnings of disease.
 Physiological scope of various organs of the body.
 The study of signs and symptoms: how produced, significance and prognosis.
 Effect of drugs, modification by disease.
 Study of the functional efficiency of organs.
 Heart disease in the child and adolescent.
 The incidence, causes, treatment and prevention of nervous diseases, alimentary disease (duodenal ulcer, colitis, &c.), nephritis, bronchitis, &c. The relation of bronchitis to ill-ventilation and the domestic habits of the people.

This is the sort of work which lies before us, the comprehensive study of *the facts as they are* in daily life and environment and not only as they are in the laboratory. It is in the field, in general practice, in the study of epidemics, in the workshop, in the home as well as in the laboratory that truth is to be found—*in situ*. It is the great opportunity for “group” or “team” work, for here clinician and laboratory worker, social student and epidemiologist, practitioner and specialist, statistician and administrator join together in their quest. There is foresight, preparation, co-operation. “In the field of observation,” said Pasteur, “chance only favours the mind which is prepared.” In the spirit of such investigation we get not only co-ordination of search but an even more alert and keen practitioner, growing in mind and heart, with an ever-expanding understanding of the width and greatness of his calling.

121. By this means also we may foresee and forecast, and thus lay the foundations of a Medical Intelligence Service, an instrument so long desired and so long lacking in England. I desire with the utmost emphasis to impress upon my colleagues the great truth that the spirit of research, of investigation, of the finding and following of new learning is the monopoly of none and the inspiration of all. The dead hand of traditional authority stifled freedom of thought in Medicine for fifteen hundred years. It did so because in human nature the dislike of change, the fear of the unknown, the avoidance of personal responsibility are deep and strong. These instincts are still potent, they respond readily to the suggestion that investigation is only an affair of laboratory experts. Those who argue thus are the mediæval traditionalists in new guise. The field of knowledge is so great

that all cannot be equally familiar with every part of it, and some specialisation is inevitable. But the duty of the specialist is not to play providence to the medical practitioner, not to take investigation out of his hands, not to undervalue the quest of truth in spheres other than his own, but to suggest and advise how the problems confronting the practitioner or the practical worker in Preventive Medicine may be solved, or at least brought nearer to solution—to guide, aid and supplement, and to look forward into the unknown. Such I conceive to be a principal duty of a medical intelligence service. It will have its central officers no doubt, but it should be dependent also upon the investigations, the acquisition and interpretation of knowledge of the medical practitioner. Only by some such wide scheme of co-operative association can we hope to cultivate all through the medical profession a true love of learning, the diffusion of knowledge, and an extension of the frontiers of life.

Conclusion.

122. Thus, in brief outline, the provisional articles of a national policy in Preventive Medicine, the principal elements in an ordered sequence, may be named as follows:—

- i. Eugenics and the principles of sound breeding.
- ii. Maternity, and the care, protection and encouragement of the function of motherhood.
- iii. Infant welfare and the reduction of infant mortality.
- iv. The health and physique of the school child and adolescent.
- v. Sanitation and an improved personal and domestic environment.
- vi. Industrial hygiene, the health of the worker in the workshop.
- vii. The prevention and treatment of Infectious Disease.
- viii. The prevention and treatment of Non-infectious Disease.
- ix. The education of the people in Hygiene.
- x. Research, inquiry and investigation; and the extension of the boundaries of knowledge.

It is obvious that these ten subjects though placed in ordered sequence overlap and overflow each other; it is equally obvious that such interrelation is mutually valuable throughout. Further, it is clear that preventive and curative medicine are here in intimate association. We repeat, we are not, in the present memorandum, concerned with a definition of one subject in the medical curriculum, termed "Public Health"; we are concerned rather with Preventive Medicine, that is medicine which is *preventive* in purpose, and which embodies the whole of medicine as regards disease which is preventable, especially in its beginnings rather than its end-results. It includes racial problems, maternity and non-infectious diseases

as well as questions of environment and infection. It includes the cure of disease in its early stages as well as its avoidance. A programme of this nature, when accepted by the practitioner of medicine may be of assistance in the codification of his thoughts and aims, in bringing his mind in touch with the wide and national purposes of modern medicine, and in making his practice more preventive though not less curative. "The prevention of disease," writes the Editor of the *Lancet*, "is as much the role of the practitioner as is the cure and care of patients."* When accepted by a local authority as an expression of its understanding of the practice of Preventive Medicine, such a programme can only find fulfilment by degrees, must be modified in detail according to the character of the area to which it is applied, and will be achieved by varied means and differing methods and by numerous agents, unofficial and voluntary as well as official and statutory. But whatever be the diversities of administration this broad fact remains, that until and unless the practice of Preventive Medicine be inclusive, comprehensive, systematic and continuous, it is idle to expect to reap its full measure of benefit. Merely to deal with one of these ten items, or indeed with half a dozen of them, and leave the others disregarded is to court failure and deserve it. We must begin at the beginning, which is *education*; then we must pursue our course, without haste but without rest, with foresight and circumspection, with open-mindedness and forward-looking thought, holding our problems in correct proportion and perspective, and always with the consent and understanding of the community. Only thus can we continually adapt and modify, within the compass of a practical scheme, in accordance with new knowledge.

It is clear that such a policy as that which is here outlined calls for an adequate medical service and the appropriate administrative machinery, and to a brief consideration of these matters we must now turn. The adequacy of medical service depends primarily upon the competency, technique and sphere of the medical man; the effectiveness of administration depends perhaps most largely upon a proper appreciation of the knowledge, readiness and will of the English people as expressed in Parliament, in our representative institutions, and in our system of local government, its history, statutory obligations and way of working, and the relation of voluntary agencies to it.

* *Lancet*, August 2, 1919, p. 205.

SECTION VII.

AN ADEQUATE MEDICAL SERVICE.

123. We have now seen in outline the purposes of Preventive Medicine, the problems which await it and the principles of reform and of their application. There remains the consideration of the means of action, namely, the provision of an adequate medical service and of the administrative machinery which is appropriate. Here, too, we find much accomplished by those who have gone before us; here, too, the stage of evolution at which we have arrived indicates that the next steps are co-ordination re-adjustment and development rather than revolution. Nor can they all be taken forthwith or all together. The history of English medicine and its institutions runs back over centuries. Its progress must be slow and steady. There is no panacea for ills so complex; there is no quick and short route to the ideal. We must walk with circumspection, not forgetting the ancient traditions, yet not confined by them.

(i) *The Medical Practitioner.*

124. The foundation of a medical service is the medical practitioner. He is its pivot, its anchor, its instrument. If he is competent it has the first surety of success; if he is ineffective or ill-equipped, it must fail. His competency is not only his learning and knowledge, but his practical capacity, his clinical skill and experience, above all his resourcefulness, adaptability, common sense, tact and imagination, firmly established and set in integrity and high character. These are individual virtues, and the medical practitioner is individualistic in upbringing and in genius. He should safely hold the secrets of his client, and he should have ample opportunity of rendering the full personal worth of his counsel to his patients. The social and individual relationship between doctor and patient is invaluable in the treatment of disease. His responsibility and his growth in individual worth are of first-rate importance. "Any change, whether effected from within or imposed from without," writes Sir John Tweedy, "that restrains the liberty or lessens the responsibility of a medical man, or hampers the free play of his intellectual activities, will be detrimental to the authority and usefulness of medicine, and prejudicial to the interests of public health and national welfare."

125. *Post-graduate Education.* — But other conditions are necessary. First, means must be provided for the medical practitioner to continue his education and keep himself well informed as to the advances of medicine. His science must expand with his art. So rapidly does medicine progress that unless a doctor continues his medical education all through his years of practice he soon gets out of date or fails to grow in capacity. The advance of medicine is continuous, and the practitioner should be provided with ever enlarging facilities for the acquisition of knowledge and for the carrying on of his practice, especially if the practice lie away from a well equipped hospital

or large town. There are new drugs, new methods of diagnosis and treatment, new means of prevention, an ever-expanding differentiation of medicine and its allied sciences, and new applications of old principles, which make it essential that the practitioner should have ample opportunity of refreshing his faculties, revising his methods and extending his knowledge. Hence provision is necessary for various forms of post-graduate instruction, associated with the medical schools (where they exist) or with the local hospital.

126. Three points should receive attention in the organisation of such post-graduate courses. First, there are the subjects of study. The general practitioner needs most of all a revision course in clinical diagnosis and treatment—subjective symptoms, physical signs, the use of a few necessary instruments of precision, some knowledge of the extent and limitation of laboratory tests, radiography, above all clinical integration and judgment—special tuition in tuberculosis and venereal disease, the detection and management of early mental cases, differential diagnosis in surgery, disorders of digestion, ophthalmology, and the great group of conditions known as “war neuroses.”

For example, in regard to *tuberculosis*, practitioners should be afforded increased facilities to attend the practice of dispensaries, sanatoria, hospitals and other institutions for dealing with the disease. It is of great importance that the appointment of Tuberculosis Officers under the local sanitary authority should *not* remove or lessen the responsibility of the practitioner and his equipment to deal with this disease. A post-graduate course should include the consideration of the pathological, clinical and preventive aspects of the problem—the life history of the bacillus, determination of its presence, the place of immunisation, the morbid anatomy of the disease, newer clinical methods, prognosis, and the working of the dispensary, sanatorium and colony system. Again, *psychiatry* is a subject in which the practitioner desires instruction. The General Hospitals do not make provision for the treatment of mental diseases, cases of which are referred to the Poor Law Authorities for temporary care or to asylums for custody. Even in the case of patients who can afford to pay for maintenance, there are civil disabilities which usually preclude early treatment. Yet facilities for *early* treatment are most urgently needed all over the country, for at present neither treatment by private practitioner nor institution is available. Something is to be gained by the practitioner receiving intermittent instruction at asylums, but the solution seems to be the establishment in connection with medical schools and hospitals of special clinics for mental disease, as in Germany and America (and particularly for early cases), with or without beds. Such centres could be used for treatment of such cases, for instruction of practitioners, for the remand of doubtful and criminal cases, for study of social conditions affecting lunacy, and for investigation. Again, post-graduate *surgery* is largely a neglected field. Yet the practitioner requires revisionary instruction in the treatment of fractures and dislocations, in the newer methods of wound treatment, in diseases of the eye, ear, nose and throat, in the differentiation and management of abdominal emergency, urinary disease, neuroses and malignant conditions. Once more, there is *venereal disease*. Here again it is important that the general practitioner should feel competent to deal with the disease. Its adequate treatment can never be accomplished only by hospital attendance or institutional treatment. The hope of dealing with it lies in the practitioner. He must be able to diagnose, understand or interpret the Wassermann test, and take his full share in the treatment of syphilis and gonorrhœa.

127. Secondly, in organizing post-graduate study for the practitioner the arrangements must allow (a) for tuition apart from the ordinary medical student, (b) for an appropriate association of laboratory and clinical work in the courses proposed, and (c) for the facilities provided to be conveniently accessible in respect of time, place and fee. In the past the practitioner has not responded to the intermittent provision made for his further instruction because these three points have not been sufficiently regarded. They involve a local organisation in counties or similar areas, *associated with the local hospital*, to which greater access should be obtainable by practitioners of the district, at which clinical demonstrations and conferences should be held by the staff (or visiting consultants or practitioners), not on exceptional or curious cases, but on the ordinary patients, on routine autopsies, and on clinical methods. Such hospitals should also become organised centres for providing clinical, bacteriological, pathological and radiographic facilities for the practitioners of the neighbourhood. A local hospital library and museum will add to the interest and value of such work.

128. Lastly, attention must be given to the principles governing the conduct and character of post-graduate courses. The courses must be comprehensive and well arranged, and taken by students able to appreciate, understand and apply the teaching given. The quality of the work should reach university standard in respect of the teaching staff, the syllabus, and the sustained character and homogeneity of the treatment of the subject. Perfunctory, irregular or merely didactic instruction will fail, as it deserves. Above all, such courses must be practical, providing each student with an experience which is directly valuable to him in the better discharge of his professional duty, enabling him to make fuller use of his own clinical opportunities. There are now medical schools or facilities for clinical instruction at 20 or 30 populous centres in England and Wales, and in almost every county and in every large town arrangements could be made with local hospitals for post-graduate work. What is necessary is the organisation of all the clinical work thus represented on behalf of thousands of medical practitioners, having its local centres in well-appointed hospitals, laboratories and clinics in county and town. The benefit accruing to the practitioner and to the patient by such a scheme of educational co-operation is difficult to over-estimate, for its immediate effect would be better treatment for the patient and improved medical equipment. The fact is that owing to lack of foresight and organisation incredible waste of opportunity is going on in regard to this field, and nothing like full value is being derived from the practitioner. The nation badly needs all the best medical work, both treatment and research, and all the best medical education which is, or can be made, available. A great part of the population are submitting themselves to medical treatment by professional men trained 20 or 30 years ago, many of whom, though they have experience, lack suitable opportunity of revising their knowledge and equipment.

129. *Increased Practitioner Facilities.*—The second urgent requirement of the medical practitioner is increased facility for

practising his profession adequately in regard to (a) laboratory equipment, (b) consultant advice and assistance, and (c) co-operation with medical colleagues in the vicinity, in the form commonly described as "team" or "group" work. Laboratories are now established by many county councils and municipal bodies, and also of course exist at all medical schools and well-equipped hospitals.* But work at pathological laboratories should be carried out in close partnership with the clinician, and therefore clinical laboratories must be sufficiently numerous and local for ready reference and frequent consultation. Such local or branch laboratories should be associated with larger central laboratories, but the particular need at present is laboratory provision and consultation within reasonable reach of the practitioner. Again, the fact that the advance of Medicine has not only carried the range of its science and art beyond the capacity of the individual mind and the individual hand but has demonstrated that the accurate diagnosis or adequate treatment of disease is dependent upon a series of studies or inquiries which cannot always be performed by one busy practitioner, makes it necessary to provide for consultation and co-operation. "No man, be his faculties what they may," writes Sir Clifford Allbutt, "can be at once physicist, biochemist, pathologist, practitioner and sanitarian." Take the case of disease in the alimentary system. There must be, even for its diagnosis, careful clinical examination, radiography, chemical and also pathological analysis of the gastric or bowel contents, the use of special instruments, test meals, and so forth. Its adequate treatment may require prolonged medical attention or surgical intervention and in any case competent nursing. Clearly the case cannot always be handled by one man; laboratory investigation, consultation and "team" work are all necessary. But the practitioner must not on that account lose interest in his case. Such team work should be the supreme opportunity of education.

130. There is no way of continuing the education of a medical practitioner better or more effectively *than by providing him with the means to help himself*. For too long he has struggled on against desperate, indeed almost hopeless, conditions—without assistance, guidance or co-operation which is readily available, without laboratory facilities, without nurses, without ample clinic and hospital accommodation. All that the State *appears* to him to have done is to take away his patients—tuberculosis, school children, venereal disease—instead of strengthening his position, equipment and capacity to deal with them himself. It is difficult to exaggerate the importance, both to Medicine and to the State, of the position of the practitioner. No imposing institutes or hospitals will bring the healing art into the homes of the people; that can be done only by the practitioner. No philosophy will of itself integrate, simplify and unify Medicine; that can be achieved only in the person of the practitioner. Incipient and early disease comes only to him and to the school doctor. If it is to be diagnosed before structural change occurs,

* See Report of Departmental Committee on Tuberculosis, 1912, Cd. 6654, pp. 126-136

they must do it—by the careful observation of subjective symptoms and their meaning, by the use of laboratory methods as aids to their own clinical labours, and by the study of the whole art and science of prognosis and prevention. “The general practitioner’s outlook needs to be more comprehensive,” writes Sir Bertrand Dawson. “In him should be realised the correlation of preventive and curative medicine. He should concern himself with measures for the maintenance of health as well as the curing of disease; he must be brought into the position of a rightful leader and skilled adviser in all that appertains to the social service and welfare of his district; in matters of health he should be the father of his people.”*

(ii) *Auxiliary Services.*

131. In the adequate practice of Medicine the private medical practitioner is not the only agent. Closely associated with him are the midwife, the nurse, the health visitor, the sanitary inspector, the dispenser, and the expert workers in electric treatment, massage and remedial exercises. In all parts of the country many thousands of cases of illness require for their adequate treatment the services of a nurse or expert masseur. The proper training, registration, employment and distribution of these invaluable coadjutors calls for consideration in any national scheme of preventive and curative medicine. These professions ancillary to medicine have of course been well represented for many years, but there is need at the present time for more thorough and prolonged training and for appropriate arrangements for bringing, in association with the local authority, such services to the aid of the patient.†

(iii) *Clinics and Dispensaries.*

132. The Poor Law Act of 1601 was designed to provide for the relief of the “lame, impotent, old, blind and such other among them being poor and not able to work,” and when in 1834 the Poor Law Commissioners inquired into the public medical services they found that a system of medical relief had grown up throughout the country providing medical aid through district medical officers and at dispensaries.‡ Provident dispensaries, contract practice and medical clubs also arose, and all these agencies were at work, unequally but widely, when the National Insurance Act was passed in 1911. Many of them of course continue, but a new kind of dispensary was introduced in the advent of the “School Clinic” under the Education Act of 1907, and the yet earlier Tuberculosis Dispensary for dealing with persons suffering from that disease.

* *The Nation's Welfare* (1918), p. 17.

† Regulations have recently been issued (by the Board of Education) for the training of midwives and health visitors. The registration and supervision of Nursing Homes should also be considered.

‡ For an historical account of the treatment of the sick poor in England see *English Sanitary Institutions* (Sir J. Simon) and *English Poor Law and The State and the Doctor* (Sidney and Beatrice Webb).

133. The Clinic, as generally understood, is an out-patient department, with or without beds, established *ad hoc* for the diagnosis or treatment of disease.* It possesses a medical staff (part or whole time), a nursing staff, competent, trained assistants, and suitable special equipment. At the present time the following examples of this institution may be named :

1. Tuberculosis Dispensary (380).
2. School Clinic (medical and dental) (580).
3. Maternity and Infant Welfare Centre (1,600).
4. Venereal Disease Clinic (150).
5. Other Special Clinics (mental diseases, orthopædic, &c.).

It is evident that the practice of these institutions is not always identical. In some, educational work is predominant; in others examination, consultation and observation; in others direct treatment is the principal purpose. All these clinics serve, however, to furnish types of assistance and advice which cannot usually be rendered by the general practitioner; they all provide for such "team" work as may be found practicable both between doctors and between doctors and auxiliary officers; they all act as receiving house and centre of diagnosis, as clearing house and centre of observation, as curative centre, as clinic for examination of "contacts" in the case of infectious maladies, as centre for after-care and following up, and as bureau of information and education. Now these are invaluable characteristics and they represent an essential factor in the organisation of a public medical service. The immense popularity of the School Clinic and the maternity and infant welfare centre furnishes indisputable evidence of their necessity. Neither mothers nor children go to these places for amusement; they go because of the substantial and prompt assistance they receive. It is obvious that clinics for tuberculosis, for venereal disease, for mental disorder, or for orthopædics cannot be popular in the same degree. But they too are essential, at least in the present stage of the development of a public medical service.

134. The clinic system will undoubtedly extend and develop. It is desirable that it should expand on the lines which will include essential principles. First, among these is the necessity of efficiency and prompt, sympathetic assistance. Nothing can justify the establishment of unsatisfactory and unpopular institutions which fail to meet the needs of the patient. Secondly, the private practitioner should take his full share in their work and service, which should be closely associated with his domiciliary practice. He should send suitable cases and he should work, as far as his special qualifications allow, either on the staff or otherwise, in close association with the clinic. Thirdly, appropriate combination or differentiation of functions of the various forms of clinic should be considered. Lastly, these clinics should serve as educational centres, demonstrating the oneness of preventive and curative medicine, true "health centres." It is not necessary that clinics for all of the five above-named purposes

* It should be distinguished from the "clinics" in medical schools, the prime purpose of which is education or demonstration.

should be "housed" each in a separate institution. Indeed, there may be obvious advantages of economy and of efficiency in establishing a combined centre, where at specified times any of these conditions may be dealt with, even as there are advantages in weaving together different forms of clinic in association with a hospital or other institution having bed accommodation. Most types of clinic may need subsidiary clinics or branches, and certain types should always be associated with or attached to a well-equipped hospital. In the consideration of an extension of the clinic system, regard should be had to need for dealing with the diseases of women and children in particular. In many areas there is urgent need for gynaecological clinics, dental clinics, and special clinics for adolescents and for disabled soldiers.

(iv) *Hospitals and Residential Institutions.*

135. The earliest charitable institutions in England were houses of hospitality, which was rightly regarded as a religious obligation. Hospices for indigent persons were founded in the tenth century, but in 1170 the pilgrimages to the shrine of St. Thomas of Canterbury led to the foundation of a further type, and in the fourteenth century yet another kind of hospital was established for vagrants, paupers and the sick poor. Alongside this slow growth, almshouses, lazar-houses and refuges for the insane began to be created, in due course the famous hospitals of St. Bartholomew and St. Thomas were founded, and in the eighteenth century many of the great London hospitals were built.* The poor law infirmaries and the isolation hospitals for cases of infectious disease must also be included. Now, if to-day we take any given sanitary area, we find a larger or smaller collection of residential institutions for the treatment of disease. A large county area will contain general and special hospitals of various sizes and purposes (general, county and cottage hospitals, poor law infirmaries, isolation hospitals for infectious diseases, hospitals and sanatoria for tuberculosis, hospitals and asylums for mental disease, lying-in institutions, hospitals or homes for women and children, and hospitals for special diseases—venereal, skin, eye, ear and throat, orthopædic, &c.). The poor law, the sanitary authority or philanthropy are the chief sources of origin; the Church, the State and Science have all had their share. If we map out our imaginary county, we shall discover that the hospital institutions are dotted about with but little regard to the present needs of the population. Ancient and mediæval reasons account for distribution, a score of accidental factors, other than the essential factor, have played their part. There is entire absence here, redundance there; sound representative government here, but arbitrary and capricious control there;

* See *The Mediæval Hospitals of England* (Clay), and the records of Charing Cross Hospital (Hunter) and St. Bartholomew's (Moore). The monumental work of Sir Norman Moore, *The History of St. Bartholomew's Hospital* (2 vols., 1918), represents the highest standard of historical record of a great hospital and illustrates in exceptional degree the varied and complex origins from which the English hospital arose.

here is an open door and a crowded out-patient department, there is a "letter" system at work and no out-patient accommodation; here is no waiting list, for the hospital is stranded on the shore of the oblivious years; there is a waiting list of hundreds of cases provisionally promised admittance in six or eight months' time—if the patient live so long; here is rate aid and there is none; here is modern treatment and there is mediæval; here an almoner, there none; here efficient nursing, there inefficient; here is sympathy and there something not far removed from penalty; here district co-ordination, there none; complete medical adequacy here, mediæval inadequacy there. That is the essential factor, *adequacy*; adequacy in relation to population, a proposition in quantity, in relation to the medical needs of that population, a matter of quality.

136. There is, in fact, no general hospital system in England. There are hospitals; and in respect of the poor law institutions and the isolation hospitals there is organisation.* But when we turn to reflect upon the general hospital system we shall find it unorganised and insufficient. Consider, for example, the inadequacy of the number of general hospital beds per population, or the number of beds for early mental cases, or the number of beds for pulmonary and surgical tuberculosis, or the number of beds for maternity. Yet this question of accommodation for the institutional treatment of normal and abnormal cases of confinement stands in the front rank of national requirements in respect of maternity. The great centres of population are in need of two-fold provision, maternity hospital accommodation for abnormal cases, maternity home accommodation for normal cases which cannot be normally or even safely dealt with in overcrowded, insanitary or unsuitable tenements. Relatively speaking the need for similar provision in rural districts is equally great. Many rural districts are wholly without such accommodation, and in others it is inadequate. What is required is, say, not less than one maternity bed per 2,000 of the population, possibly attached to or associated with the local hospital or headquarters of the district nurses. There should be a small general ward, a confinement ward, an isolation or observation ward, and where possible single wards for patients able to pay larger fees. A competent midwife-matron should be in charge, and the medical practitioner should attend his own cases. What is true for maternity is equally true for surgery. In urban and rural districts there is need for adequate provision for emergency and minor surgery, a network of clinics and hospitals.

137. It is obvious that a complete and satisfactory hospital system cannot be provided for many years. But a beginning may be made. In the first place, the whole question of proper

* Prior to the war the number of hospital beds available for public use in England and Wales was reported to be at least 311,000. Of these 39,000 were for fever and small pox, 10,000 were for tuberculosis, 109,000 were for insane in asylums, 12,000 for feeble-minded; these beds were provided by Public Health Authorities. There were also at least 94,000 beds provided by Poor Law Authorities, and at least 45,000 provided in voluntary hospitals. (Report of Medical Officer of Local Government Board, 1917-1918, Cd. 9169, p. xvi.)

hospital accommodation should receive formal and deliberate consideration in every sanitary area. A careful survey should be made, which comprehends the whole case: the existing provision of all kinds (general, maternity, surgical, children, &c.), the total medical needs of the area, the new accommodation which is necessary, its character, degree and relative urgency. The old idea that only critical, advanced or emergency cases should be admitted to hospital must be discarded. Essential treatment, not otherwise obtainable, should be the criterion. Then, secondly, even before new hospitals are built, steps should be taken to co-ordinate and bring together in co-operative action the existing accommodation of the area, to determine its relation to available accommodation outside the area, its relation to a system of clinics, to medical practice of all kinds, to midwifery and nursing, to the poor law accommodation and so forth, within the area. The hospitals of an area should be re-organised on a basis of a central hospital, having auxiliary and special hospitals associated with it, a co-ordinated network. Thirdly, the out-patient departments attached to the hospitals of an area should be examined as to their adequacy. The waiting lists of patients should be considered and the possibilities of treatment investigated. Some of these patients may be able to afford to pay for treatment, and this will raise the further question whether some hospital accommodation should not be available for "paying cases." In any case a long waiting list is an anachronism, itself a condemnation of our inadequate hospital provision. Lastly, the hospital service of an area must be brought into much closer relation with the medical practice of the area: (a) some practitioners should be on the staff of the hospital, (b) all should look to it as a centre both of education and of assistance in the discharge of their professional work, and (c) all should be enabled to send their cases to its wards, not only, as now, the critical or surgical cases, but many others that really stand in need of efficient hospital treatment, observation, dietary, nursing, massage, &c.*

(v.) *An Improved Dental Service.*

138. One of the most important branches of Preventive Medicine is that concerned with dentistry. Whether we consider dental caries and its results as revealed by the School Medical Service, the rejection of recruits for the Army, or the excessive sickness under the National Insurance Act, the conclusion is inevitable that an adequate medical service must include improved facilities for dental treatment. Briefly, this means more qualified dentists, the prohibition of dental practice by persons not duly registered, and greatly extended facilities for treatment. The registered dentists of the United Kingdom are wholly insufficient in number. The causes of the shortage of registered dentists are mainly two:—first, the present state of the law allows the practice of dentistry by unregistered persons who have not qualified

* See *Lancet* (June 14th, 1919), Dr. C. E. S. Fleming; and also *The Nation's Welfare*, by Sir Bertrand Dawson, 1918.

for the profession by a prescribed course of instruction, training and examination, and this discourages proper qualification and registration; secondly, there is the long and costly course of instruction for qualification. Further, the qualified dentists are distributed unevenly, in accordance with the demands of the upper and middle classes. The great mass of the population receive very little treatment from qualified dentists, who naturally gravitate to the urban centres where high fees are obtainable or lucrative practice is probable. It is evident therefore, that some amendment is needed in the Dentists Act of 1878, but two further reforms are equally necessary. First, public opinion must be enlightened as to the necessity of sound teeth and their proper care, if personal health is to be secured and maintained. Dental sepsis is unquestionably related to serious disease, glandular involvement, neurasthenia, anæmia and toxæmia, gastric trouble and dyspepsia, various infections, microbic poisoning, malnutrition and so forth. It is thus a common cause of disablement and incapacity, even though it be not a direct contributor to the death rate. Hence there is need for education. Secondly, greater provision should be made in the poor law service, at maternity centres, at school clinics and elsewhere for early conservative dentistry.

139. Here then are five typical elements or factors which are constituent parts of any adequate medical service on behalf of the sick. It will be recognised at once that they are all, in greater or less degree, in existence. They do not call for creation; they call rather for readjustment, correlation and development. At present all these factors are sporadic, incidental, isolated, almost occasional. Above all, an adequate medical service must seek to fulfil and conjoin all the varied elements of a national health policy, environmental and personal. There must be no divorce between the epidemiologist and the practitioner. Their purpose is ultimately the same. Sanitation, maternal and child welfare, industrial hygiene, medical practice, health education, epidemiology, research and investigation, the prevention of disease—it is “the track of the one into the many and the many into the one.” To be made really effective in the national interest and well-being the “many” must be woven into one piece, the warp and woof of one texture, they must be fitted together as parts of one machine, they must be brought into living association as members of one organism. To accomplish this there must be partnership, at the centre and right out to the circumference, between medical men and laymen, between science and administration.

SECTION VIII.

SOME PRINCIPLES OF MEDICAL ADMINISTRATIVE MACHINERY.

140. The sanitary government of England is partly central and partly local. Speaking generally, the function of the central is supervisory and of the local, executive. "The principle of local self-government has been generally recognised as the essence of our national vigour. Local administration under central superintendence is the distinguishing feature of our government. The theory is, that all that can, should be done by local authority and that the public expenditure should be chiefly controlled by those who contribute to it. Whatever concerns the whole nation must be dealt with nationally, while whatever concerns the district must be dealt with by the district."* The history of the varying expression of these two principles during the last eighty years is recorded elsewhere,† and it is unnecessary to recapitulate.

That long and chequered history has found its consummation in the Ministry of Health Act, 1919, and these pages must have reference only to the present position. There are, however, two general matters which must be named, first, the underlying principle of sanitary government (though not of sanitary government alone), and secondly, its limitations. The positive principle which is so vital to the administration of a medical service is that the method of government, be it central or local, shall have regard to the content of medicine and its progress. When Dr. Richard Mead issued his quarantine recommendations in 1720, their administration was a different proposition from that which now demands our attention. Then, as now, there was some vision of the *preventive* aspect of medicine; then, as now, environment played the part of a prime factor; then, as now, a local executive had to be provided for. But to-day, two hundred years have accumulated for us a wider knowledge of disease—its causes and means of prevention—and an immense volume of administrative experience and political practice. This has profoundly changed the situation and made it necessary to have regard, both centrally and locally, to the principle that (a) governmental action shall closely follow the commonly accepted knowledge of disease and its prevention, (b) it shall be inspired and controlled by the consent of the governed, (c) it shall be guided, as far as may be, by the will of the people finding its expression through representative institutions, and (d) it shall be carried into practice by a partnership of central and local government, and of professional and lay opinion. The fundamental reason for this kind of government is that the practice of preventive medicine involves not science only, but far-reaching personal and social considerations, which affect not only the habits, occupation and susceptibility of the individual, but the capacity, security and even the existence of the nation.

* Report of Royal Sanitary Commission, 1871, p. 16.

† *English Sanitary Institutions*, Sir J. Simon, pp. 178-432. *Public Health*, a Survey. (Reconstruction Pamphlet, No. 23, 1919.)

Some Principles of Central Government.

141. Some further light is cast upon this question of the principles of central government by the Committee recently appointed to inquire into governmental function, of which the chairman was Lord Haldane. In concluding the first part of their Report the Committee summarised their view of the main principles to be borne in mind, in the following words:—

- “(a) Further provision is needed in the sphere of civil
 “ government for the continuous acquisition of know-
 “ ledge and the prosecution of research, in order to
 “ furnish a proper basis for policy.
- “(b) The distribution of business between administrative
 “ departments should be governed by the nature of
 “ the service which is assigned to each Department.
 “ But close regard should be paid to the necessity for
 “ co-operation between departments in dealing with
 “ business of common interest.
- “(c) In the organisation of individual departments special
 “ importance should be attached to securing proper
 “ consideration of proposals for expenditure, unim-
 “ paired Ministerial responsibility, co-operation with
 “ advisory bodies in matters which bring departments
 “ into contact with the public, and the extended
 “ employment of qualified women.
- “(d) A more efficient public service may expose the State
 “ to the evils of bureaucracy unless the reality of
 “ Parliamentary control is so enforced as to keep
 “ pace with any improvement in departmental
 “ methods.

“ In making these suggestions we are aware that an efficient
 “ departmental system working in satisfactory relations with
 “ Parliament cannot be established or maintained on lines laid
 “ down in advance by any committee of enquiry. Whatever
 “ validity may attach in the abstract to the principles which we
 “ have ventured to suggest, their practical efficacy will depend
 “ upon the zeal and discretion with which they are applied from
 “ day to day by Parliament, by Ministers, and by the officers of
 “ departments, the living forces whose spirit is essential to any
 “ form of government that is more than a machine.”*

Now here from a more general point of view the same sort of principle is advanced, and its application to the administration of Preventive Medicine is obvious.

142. So much for the positive side. A word must be added as to the negative, namely, the limitations of government so prescribed, particularly in relation to medical service. It means

- (a) a considerable degree of uniformity;
 (b) a standard of objective and of work which constitutes something of the nature of a *national minimum* of what is both necessary and practicable in all areas,

* Report of the Machinery of Government Committee, 1918, Cd. 9230, p. 16.

- rather than what might be desirable if carried out by the most enlightened and competent authorities;
- (c) the undertaking only of what is immediately practical and obviously beneficial, rather than the adoption of a medical system of higher scientific value and statistical accuracy, but less obviously ameliorative or remedial in purpose;
 - (d) the achievement of its ends within the limits of law and through the goodwill and understanding of local authorities;
 - (e) a regard for public economy, for the adaptation of means to ends in each locality, and for the application of remedies appropriate and proportionate to the problems to be solved; and
 - (f) an appreciation of the relative spheres of the State and the individual, of statutory and voluntary service, and of central and local authority.

The validity of most of these propositions will be obvious, nor is it necessary in this place to furnish argument in their support. They are in some degree a safeguard and a security; but it is equally obvious that loyalty to them imposes somewhat severe restrictions upon the sphere and compass of a national health system. It is important that this should be recognised by all concerned, but particularly by those who assume that in the sphere of national health anyone may propose any course which seems good to him. Investigation, research, even experimental work there must be, if there is to be progress, but both authorities and medical men will do well to bear in mind the necessity of paying regard to the relation which their proposals for an adequate medical service bear to the district as a whole or to the nation as a whole. Schemes in themselves admirable are not always, on this account, practicable.

143. The medical problem to be solved, both centrally and locally, is one of *simplification* and *unification*. At the centre there have been anomalous extensions for three generations—the Poor Law Board, the Board of Health of 1848-58, the Privy Council Committee 1858-1871, and the Local Government Board 1871-1919, acting as the central medical department of the Government; then as the years passed and medicine came into closer touch with the State, other central offices formed medical departments or were assigned medical duties, the Home Office, the Board of Education, the Board of Trade, the Board of Agriculture, the National Insurance Commission, and so on, till at last a score of central offices discharged some kindred medical duties. At the periphery a similar multiplication occurred of Authorities concerned with health—the Board of Guardians, the local Sanitary Authority, the local Education Authority, the Insurance Committee, the Pensions Committee, &c., involving in their compass local bodies connected with the County (or shire), the hundred (or wapentake), the borough, the urban and rural districts and even the parish. The result was inevitable confusion and overlapping, both centrally and locally.

Let us consider what happens and what this means in day by day practice:—

“ Although provision is made generally for the tuberculous members of the population at large, separate provision is made through separate authorities for tuberculous school children, tuberculous paupers, tuberculous disabled soldiers and sailors, tuberculous insured persons, and tuberculous dependants of insured persons. While provision is made generally for the treatment of mental defectives amongst the population at large, separate provision is made through separate authorities for mentally defective school children and mentally defective paupers. A mother, though entitled (if insured) to medical attendance from her insurance doctor under the Insurance Committee for a portion of her pregnancy period (but not at confinement), may be able to obtain advice and assistance from the Maternity and Child Welfare Scheme of another authority before and after confinement, obtains maternity benefit from an approved society in respect of confinement (for attendance at which she has had to make private arrangements), and later resumes her right to attendance by the insurance doctor.

“ A disabled soldier, if insured, may be entitled to medical attendance from two authorities simultaneously for the disability on account of which he was invalided. Thus, while the attendance will for the most part be provided under the Insurance authority, it may be supplemented by the Pensions authority. But, the extent of his disability for pension purposes is considered by a medical staff employed either by the Pensions authority or by the Ministry of National Service. If he is suffering from a venereal disease, he would be handed over to the care of the County or County Borough Council: if from tuberculosis, to the care of schemes jointly administered by the County or County Borough Council and Insurance Committee. In either case his own insurance doctor would nevertheless be supposed to retain some responsibility for his treatment. Lastly, in the event of his contracting some other notifiable infectious disease, he may be taken charge of by yet another body, the local sanitary authority.

“ The ordinary insured wage-earner is entitled to medical attendance in his home under the Insurance Committee; his wife and infant child may get medical advice at the Maternity and Child Welfare clinic of the County or County Borough Council, his children of school age are medically inspected during school attendance, and may be treated at the school clinic by the staff of the local education authority. If, however, his wife or children need medical attendance not so provided, he must arrange privately with a doctor at his own expense or send them to the out-patient department of a voluntary hospital at the expense of charitable funds. But if vaccination is necessary, he can get this done by the Vaccination Officer of the Guardians, and if either he or any of his family require residential treatment, admission must be sought to the in-patient department of a voluntary hospital. Should destitution occur for any reason, a different set of medical officers and of residential institutions will come upon the scene under the Poor Law. His infant children pass in due course from the purview of the Child Welfare clinic to that of the School clinic, and later, on attaining the age of 16, to the care of the insurance practitioner. Finally, while different practitioners have been striving, in separate watertight compartments under arrangements made by widely different authorities according to widely different (and sometimes conflicting) principles, to cope with the many forms of disease or subtly disabling ill-health to which the wage-earner and his family may be subject, yet the prime causes of their sickness, the conditions of the man's employment and of the factory in which he works, the sanitary conditions of the tenement and slum in which perforce the family dwell, the food and milk which are their sustenance, are the care of other separate authorities. These know as little

of the results of their action or inaction upon the human objects of their responsibility as the several doctors who are struggling with the consequences know of one another's labour."*

144. No one can read this summary of local confusion without being convinced of the need for simplification and unification; and this leads us to the question of the medical administration of Preventive Medicine. Such administration has both a medical and non-medical aspect. This memorandum is not, however, concerned with the large and essential sphere of non-medical administration represented at the centre by secretaries, assistant secretaries, lawyers and clerks, and in the locality by the clerk of the county council, the town clerk and their respective advisers and assistants. It is concerned only with certain medical aspects of the situation.

Central Medical Administration.

145. First we will speak of the central machinery. The Ministry of Health has been established to unify and co-ordinate the health policy and activities of central government. Speaking generally, its functions may be set out briefly as follows:—

- (i) to advise, supervise and regulate the health and housing work of local authorities, providing grants in aid of financial expenditure for the fulfilment of certain functions;
- (ii) to aid in the acquisition of knowledge and the prosecution of investigations both in the advancement and application of medical science, forming a medical intelligence service;
- (iii) to advise upon, guide or initiate health legislation;
- (iv) to co-ordinate the health work of central government;
- (v) to furnish advice and assistance in regard to foreign and imperial health matters;
- (vi) to foster and encourage the practice of Preventive Medicine.

It is clear that any one or all of these brief propositions could be expanded to cover a wide ground, and powers exist in the Act for extending the authority of the Ministry in various directions. But, in a word, its chief business is unification and co-ordination; its chief purpose sound national progress. The responsibility of the Ministry is partly central, partly local. Centrally it is, at present, concerned with (a) general sanitation, housing, epidemiology and infectious diseases, (b) the prevention and treatment of tuberculosis and venereal disease, (c) food control in respect of disease, (d) maternity and infant welfare, and (e) health insurance and other public medical services. Centrally, too, it must seek to co-ordinate the medical work of other Departments, the Board of Education for the school child, the Home Office for industrial hygiene, the Board of Agriculture for food control, the Ministry of Pensions, the Board of Trade, &c.

146. Speaking particularly, we may summarize the actual terms of the Ministry of Health Act, 1919, the object of which

* *Public Health: the Present Problem and the Ministry of Health*, p. 4. (Reconstruction Pamphlet, No. 23, 1919.)

was the creation of a Ministry of Health to promote the health of the people [Section 1] and to guide all health activities to a single goal. Its principal provisions may be set out thus:—

I.—*The Duties of the Minister of Health.* (Sections 2 and 5.)

- (a) To take all such steps as may be desirable to secure the preparation, effective carrying out, and co-ordination of measures conducive to the health of the people, including—
- (i) the prevention and cure of diseases;
 - (ii) the avoidance of fraud in connection with alleged remedies;
 - (iii) the treatment of physical and mental defects;
 - (iv) the treatment and care of the blind;
 - (v) the initiation and direction of research;
 - (vi) the collection, preparation, publication, and dissemination of information and statistics;
 - (vii) the training of persons for health services.
- (b) To constitute a Board of Health in Wales; the Board and any officer who is a member thereof shall act under the directions, and comply with the instructions of the Minister.

II.—*Scope of Ministry.* (Sections 3 and 4.)

(1) There shall be transferred to the Minister—

- (a) powers and duties of Local Government Board (the “non-health” functions may be re-transferred by Order in Council to other departments);
- (b) powers and duties of Insurance Commissioners and the Welsh Insurance Commissioners (provided that the duties of the Medical Research Committee shall be carried on by or under the direction of a Committee of the Privy Council);
- (c) powers of Board of Education with respect to
 - (i) health of expectant and nursing mothers;
 - (ii) health of children who have not attained the age of five years and are not in attendance at schools recognised by the Board of Education;
- (d) powers and duties of the Board of Education with respect to the medical inspection and treatment of children and young persons under Section 13 (1) (b) of the Education (Administrative Provisions) Act, 1907, as amended and extended by the Education Act, 1918 (subject to a *proviso* as to the carrying out of the work by the Board

- of Education according to the standard laid down by the Ministry of Health);
- (e) powers of Privy Council and of the Lord President under Midwives Acts, 1902 and 1918;
- (f) powers hitherto exercised by the Secretary of State under Part I of the Children Act, 1908.
- (2) There may be transferred to the Minister by Order in Council—
- (a) all or any of the powers and duties of the Minister of Pensions with respect to health;
- (b) all or any of the powers and duties of the Secretary of State under the enactments relating to lunacy and mental deficiency;
- (c) all other powers and duties in England and Wales of any Government Department relating to matters affecting or incidental to the health of the people.
- (3) There may be established by Order in Council Consultative Councils for giving advice and assistance to the Minister.*

* In addition to the powers conferred by the Ministry of Health Act, Parliament has since 1875 passed various Public Health Acts, which have for their purpose the practice of preventive medicine, and the administration of which falls within the province of the Ministry of Health or other Departments concerned with the public health. The most important of these Acts are:—

1. Public Health Act, 1875 (sanitation, infectious diseases and hospitals, prevention of epidemic diseases, etc.); 1878 (water); 1879 (interments); 1882 (fruit pickers' lodgings); 1883 (support of sewers); 1885 (ships, etc.); 1888 (buildings in streets); 1890 (Amendment Act); 1891 (London); 1896 (ports); 1904; 1907 (regulations as to food); 1907 (Amendment Act); 1908; 1913 (prevention and treatment of disease);
2. Sale of Food and Drugs Acts, 1875; 1879 (Amendment Act); 1899;
3. Rivers Pollution Prevention Acts, 1876; 1893;
4. Canal Boats Acts, 1877; 1884;
5. Housing of the Working Classes Acts, 1885; 1890; 1894; 1900; 1903;
6. Local Government Acts, 1888; 1894; 1903 (transfer of powers); 1913 (adjustments);
7. Infectious Diseases (Prevention) Act, 1890; 1899 (notification);
8. Factory and Workshop Acts, 1891; 1901; 1907;
9. Isolation Hospitals Acts, 1893; 1901;
10. Education Acts, 1893 (blind and deaf children); 1899 (defective and epileptic children); 1906 (provision of meals); 1907 (administrative provisions); 1909 (medical treatment); 1914 (provision of meals); 1914 (defective and epileptic children); 1919 (medical inspection and treatment of children and young persons, etc.);
11. Cleansing of Persons Act, 1897;
12. Midwives Acts, 1902; 1918;
13. Employment of Children Act, 1903;
14. Notification of Births Act, 1907; 1915 (Extension Act);
15. Children Act, 1908;
16. Housing and Town Planning, etc., Acts, 1909; 1914; 1914 (No. 2); 1919;
17. National Insurance Acts, 1911; 1917 (Part I. Amendment); 1918; 1919;
18. Mental Deficiency Act, 1913;
19. Milk and Dairies Act, 1914; 1915 (Consolidation Act);
20. Venereal Disease Act, 1917;
21. Maternity and Child Welfare Act, 1918.

147. Whilst it would be improper for me in the present Memorandum to discuss the internal organisation of the Ministry of Health there are two particular aspects of its work to which reference may be made. In the first place its scope will, of necessity, have to be wider and more comprehensive than the scope of the former Medical Department of the Local Government Board. Not only is there the natural expansion of Preventive Medicine with the growth of knowledge and application, but *new duties of medical treatment* must also be undertaken. Sir Arthur Newsholme has stated how this enlarged sphere has arisen in his last Report to the Local Government Board:—

“It is evident that the State is directly interested in promoting further action to raise the general standard of health of the community, and to prevent the occurrence of avoidable disease. The extent to which it will proceed must be determined by general considerations; but there can be no reasonable doubt that carefully prepared and well administered expenditure on a national scale, having these objects in view, would be the most profitable investment which the State could make.

The history of the progress already made by local authorities in the control of disease is instructive as bearing on the future. Two stages are visible in the progress of preventive medicine. There emerged first the crude generalization that local insanitary conditions, irrespective of specific infection, caused the epidemic diseases then devastating the population. The earlier sanitary reforms in this country were carried out under the influence of this doctrine; and it would ill become us to belittle the importance of this first approximation to truth, in view of the great results in decrease of disease due to its application. The most striking illustration of this is the history of enteric fever.

A more complete analysis of events showed, however, that these reforms reduced disease largely by preventing the access of germs of disease to food, especially milk, and to water; and experience soon showed the need for medical organization of the treatment and isolation of the infectious sick as a means of preventing infection, to be carried on simultaneously with the prevention of nuisances.

In the past the dread of spread of infection has been a more powerful motive of reform than the fear of pauperization of the patient and his family; but we have in recent years reached the third stage, in which Government Departments and Local Authorities alike appreciate that, quite apart from the spread of infection, the community is vitally concerned in the maintenance and improvement of the health of each of its members. The Public Health Act of 1875 drew no line of demarcation between communicable and non-communicable diseases in regard to hospital provision; and there has never been justification for regarding the former as of communal and the latter as only of individual interest. *The prompt and early detection and treatment of disease in its widest definition is one of the chief means for securing social efficiency*, and the better organization of the treatment of the sick from whatever disease they are suffering must, therefore, be regarded as a chief object of public health administration.”*

* Report of Medical Officer of Local Government Board, 1917-1918. Cd. 9169, p. 13. Sir Arthur Newsholme adds: “It is obvious that the creation of a Ministry of Health will not in itself save a single life. *A Ministry of Health can only effect good in so far as it is able to improve the machinery of local and central health government, to amalgamate overlapping or incomplete agencies locally and centrally, and thus to simplify the stages through which proposals for reform need to pass.* With this must be associated *greater driving power in the*

148. Secondly, there is the question of *imperial and international medical work* in regard to which definite responsibilities rest upon the Ministry of Health. The Local Government Board, and before its day the Privy Council, found one of its most honourable health services in the action it has taken to prevent epidemic diseases outside Britain. This implies continual vigilance in obtaining information as to epidemic foci in different parts of the world, utilising all possible sources of information for this purpose, and warning and preparing the local and port sanitary officers for what may be in front of them. When epidemics arise, the resources of the Ministry should be made available as a matter of course in association with the Foreign Office and the Consular Service. Knowledge must be acquired and kept current in respect of the incidence of plague, cholera, influenza, smallpox, yellow fever, malaria and exotic diseases throughout the world. For knowledge leads to control, and to control these diseases is to control the Tropics, and make these zones of the earth available for human habitation and expansion.

Further, through successive international conferences British representatives have urged the adoption of scientific lines of preventive action in regard to epidemic diseases which may be carried by ship, which on the one hand would be safe and expedient, and, on the other, would cause the minimum of interference with passenger traffic and maritime commerce. Successive international conventions have more and more followed British guidance in this matter, making mutual agreements which would avoid the vexations and dislocations of business which used to result from what was formerly known as "quarantine." Not only is it desirable to improve international communications for the practical purpose of following up and preventing epidemics, but there are many other health subjects on which international understandings (formal or informal) would be of great value to all concerned. The study of death statistics, for example, would be made more valuable by closer correspondence in the nomenclature of disease and the causes of death and by a uniform system of tabulation; measures to secure better health of the mercantile marine, and particularly to deal with venereal diseases in sailors, would obviously be assisted by international arrangements for their supervision and treatment at different ports; the question of pilgrimages within or affecting the Empire; an international pharmacopœia; the control of anthrax, poisonous drugs and food standards; the principles of hygiene in the Tropics; co-operation with the international League of Red Cross Societies in its civilian relief and public medical services; the new health work emerging before the League of Nations—all these questions of international health will demand fuller consideration as inter-communication increases between all parts of the Empire and between the nations of the world.

machinery, temptations to inertia being removed, and monetary inducements to better work rendered available. In the end, all this is dependent on public opinion, including willingness to pay for what is required."

Local Medical Administration.

149. It is not, however, the Ministry of Health but the local authority in whose hands will rest the main business of the execution of a national health policy. It is in the local area, in direct touch with the patient, that the integration of medicine is to be achieved. It is there that early diagnosis and a prompt and adequate medical service is to find its fulfilment. It is there that the systematic and continuous attack is to be made, for there is the fighting line. It is there and not in Whitehall that the actual battle will be lost or won. Eugenics, maternity, child welfare, industrial hygiene, the problems of environment, the prevention of disease, the education of the public—these matters can only be dealt with where the people are born and live and work and die.

150. Although the local administrative situation is still indeterminate in form or even function, it is desirable to state at least tentatively some of the general administrative principles which should govern the practice of preventive medicine in each area. First, there is the important question of the *unit of health government*—at present the county council, the county borough, the municipal borough, the urban and rural district all take their share and in relation with them we have a poor law authority, a sanitary authority, a local education authority, an insurance committee, a pensions committee and so forth, as functioning instruments of local governing bodies. All England and Wales is thus mapped out, the area of one authority being often superimposed, so to speak, upon another. Clearly, there would be advantage in having one authority for all health purposes—for a poor law medical service, sanitation, education, insurance and pensions—and towards unification of this nature many are looking. But the question is large and complex, and there are many considerations to which regard must be paid in prescribing a unit of sanitary government, including its history, size, population, urbanisation, character, intercommunication, rating, relation to local and central government and so forth. If a large local unit be contemplated it would be necessary to provide for the encouragement of a consciousness of community of interest and aim in the smaller contributory or constituent divisions, with appropriate delegation of powers or functions in accordance with services to be rendered. If a small local unit be contemplated many analogous questions would arise. All I desire to do here is to name the general principle of unification as one to which attention must be given. There is a second somewhat similar commonsense requirement, namely, *uniformity of administration* in all comparable areas. For instance, here is an area where the milk supply is under more or less control, the byres are inspected, the cows tested, the dairying relatively clean, but in the adjoining area the farmers may go as they please; here, again, the housing question is grappled with and owners of insanitary property are brought to book, but elsewhere little or nothing is done; here is an area where infant welfare is counted by the authority to be an essential part of the communal well-being, but in the near neighbourhood it is considered to be a

matter of parental responsibility with which the authority has no concern; here is an educational authority which treats 80 per cent. of its ailing and defective children, but over its boundary another authority is satisfied with 20 per cent. and the authority immediately beyond has hitherto done nothing in regard to the provision of medical or dental treatment; once more, here is a city where tuberculosis and venereal disease receive more or less adequate treatment, promptly and sympathetically, but patients suffering from these maladies in the adjoining county must take their chance. These inequalities have only to be stated to ensure disapproval. Some codification of sanitary law is necessary, some education and stimulation of the authority may be required, and closer co-ordination and encouragement of voluntary agencies, but above all an equable, just and fairly uniform system of administration must be secured.

151. A third principle takes us at once into matters of medical organisation. In an adequate public medical service there must be, in each area, a *structural and co-ordinated body of competent medical men* charged with its administration. Clearly, there would have to be one or more responsible Medical Officers or Medical Organisers, and associated with them, advisers and practitioners experienced in the various aspects of practical medicine—investigation, sanitation, tuberculosis, venereal disease, school medical work, general and insurance practice and so forth. Federated with such a body of workers, rendering whole or part time service in the organisation, as seems best, there would be midwives, nurses, health visitors, sanitary inspectors, and other professional experts and advisers. All these workers have their place in a comprehensive local scheme, and without them there is, by so much, incompleteness. They are the representatives of an adequate medical service, integrators and co-operators. In their hands lies the immediate future of preventive medicine in their area. Hence they should take a responsible view of their duties. On this point my colleagues will perhaps allow me, by way of suggestion, to say that for us who are medical officers of health, or engaged in medical administrative work, the new situation demands something of a wider spirit. Medicine is, as we have seen, at a new birth. We too must grow. "We must either take the helm," said Dr. Robertson, the distinguished medical officer of Birmingham, "or give it to a better trained medical officer."*

* Presidential address to the Society of Medical Officers of Health, 1916-17. (*Public Health*, November, 1916, p. 33.)

In *Some Notes on Medical Education in England*, 1918 (Cd. 9124, pp. 102-106) there is set out a claim for the inclusion in the curriculum of the medical student of certain subjects concerned with preventive medicine. The submission there made is that the general medical practitioner requires an understanding of this subject. The proposition submitted here, on the contrary, is that the worker in preventive medicine requires an understanding of the sphere and purposes of the practitioner. Hitherto, the medical officer of health has, in accordance with regulation, concerned himself largely with sanitation, sanitary law and byelaws, with housing

152. The man who is to "take the helm" in any area in this great enterprise, be he who he may, must have a large apprehension both of his opportunity and his function. He must possess not only the clear and comprehensive vision which can

"look into the seeds of time
And say which grain will grow and which will not,"

and workplaces, with midwives, health visitors and sanitary inspectors, with food and drugs, with infectious disease, with water supply, river pollution, drainage, sewerage, &c., with refuse and nuisances and offensive trades, with vital statistics and blue-books, with mortality and the burial of the dead. All this is sound, but it is not the whole truth, and in many cases medical officers of health have shown an understanding of Medicine and the social life of the people wider in compass than the ordinary practitioner. What seems now to be taking place is the enlargement of the sphere of the medical officer of health and of all specialists in the public health service, an enlargement into which happily so many of them have already entered. But for the interest of the student preparing to serve the State in this branch of his profession rather than in general or special practice, I venture to suggest an addition to the subjects of study named above of certain aspects of Medicine which the sanitarian and public health official have not hitherto always regarded as within their province:—

- (1) The new meaning and scope of Preventive Medicine.
- (2) The central and local administrative machinery of the Public Health Service.
- (3) The study of anthropology, eugenics, physiology and pathology in relation to Preventive Medicine.
- (4) Maternity
- (5) Infant and child welfare
- (6) Adolescence
- (7) The industrial worker, juvenile employment, fatigue, industrial welfare, the employment of women.
- (8) The basis of personal hygiene—cleanliness, rest and work, physical training and equipment, nutrition, the open air life.
- (9) Dietetics and their relation to preventive medicine. Alcohol and alcoholism.
- (10) The new knowledge of infection, immunity and the principles of epidemiology.
- (11) Diseases of animals and insects communicable to man.
- (12) The study of the prevention and treatment of infectious disease—measles, whooping cough, epidemic diarrhoea, influenza, rheumatic fever.
- (13) The study of the prevention and treatment of diseases generally considered to be "non-infectious": *e.g.*, the disabling maladies (dental caries, indigestion, catarrh, anæmia, malnutrition, impaired eyesight), heart disease, bronchitis and pneumonia, alimentary disease, rickets, neuroses, mental disorder, septic disease, gynæcological conditions, skin disease.
- (14) The study of the prevention of abortion, miscarriage and still birth.
- (15) The relation of medical practice to the State: consulting, private, insurance, poor law and institutional practice. Necessity for definite active, continuous and sympathetic co-operation between the medical officer of health and the medical practitioner.
- (16) Insurance benefit: medical, sanatorium, sickness, disablement, maternity, and additional. The work of approved societies and insurance committees.
- (17) The whole question of a public medical service: medical practice, clinics, hospitals, auxiliary services (nurses, midwives, health visitors, &c.); maternity, infant welfare, school medical service, industrial and factory hygiene, insurance, old age; special services for special diseases (tuberculosis, venereal, &c.).

but he must have courage, discernment and abnegation and patience. For, first, *preventive and curative medicine have to be brought together and practised in harmony*. The extension of the public health service in respect of tuberculosis, venereal disease, insurance work, maternity and infant welfare, the school child, and industrial hygiene, means that every medical practitioner is a workman for the public health, a missionary of an imperial cause. He may seize the occasion with gladness or he may protest, but he cannot escape. Secondly, there must be not only a co-ordination of medical men, *but also of the institutions in which they work*—the private surgery, the laboratory, the clinic, the out-patient department, the hospital. Institutions are things to be adapted and directed by persons, in order to reach prescribed ends. They are instruments which must be fashioned to secure, with certainty, the purposes for which they are designed. Thirdly, there must be true and active understanding, co-operation and goodwill between the official element of government and that great and invaluable *voluntary element* which exists, happily for this country, in every district of the land. These conditions mean that, in every area, the principal medical organiser and all other responsible medical officers charged with these duties should be men of wide and liberal sympathy, trained in administrative work, accustomed to handle problems of environment and sanitation in the broadest sense, but able also to be "clinical" in understanding and in spirit, able to integrate all branches of medicine, "the one into the many and the many into the one." Clearly, one man cannot do everything or be specialist in all departments, but one man can have a fair and proper view of the wholeness of medicine, and so do his work as to allow for the "give and take," the strain and counter-strain, necessary in all sound construction. It is a problem in construction—the patients, doctors, institutions, and knowledge are all there, what is needed is inter-dependence, co-operation, joint action. The result will be a true foundation in every part of the land for the practice of preventive medicine.

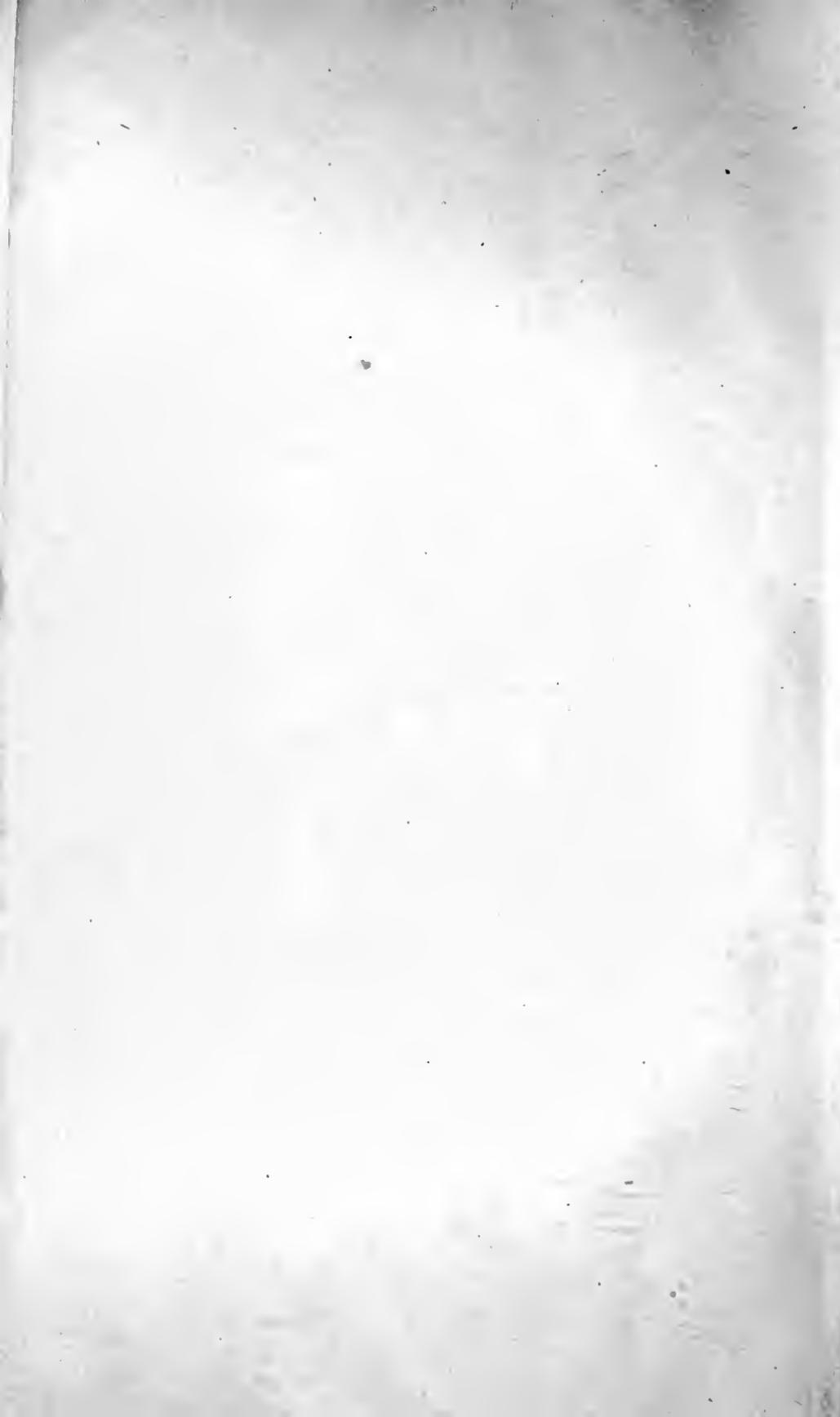
153. Thus the sound mind in the sound body, the full capacity and opportunity of labour, the true *joie de vivre* which springs from all-round health, may in some larger and more liberal measure become established in the homes of the English people.

154. It has been said that we stand to-day at the door of opportunity, and that upon us of this generation has been imposed the duty of laying the foundations of a new epoch. It is true that other and better men have gone before us and we enter into their labours, as other and better men will follow us and enter into ours. But our responsibility is none the less sure. Knowledge, clearness of mind, the broad vision, strength of will and sympathy of heart have been in the past, and they will be in the future, the inspiration of all high human

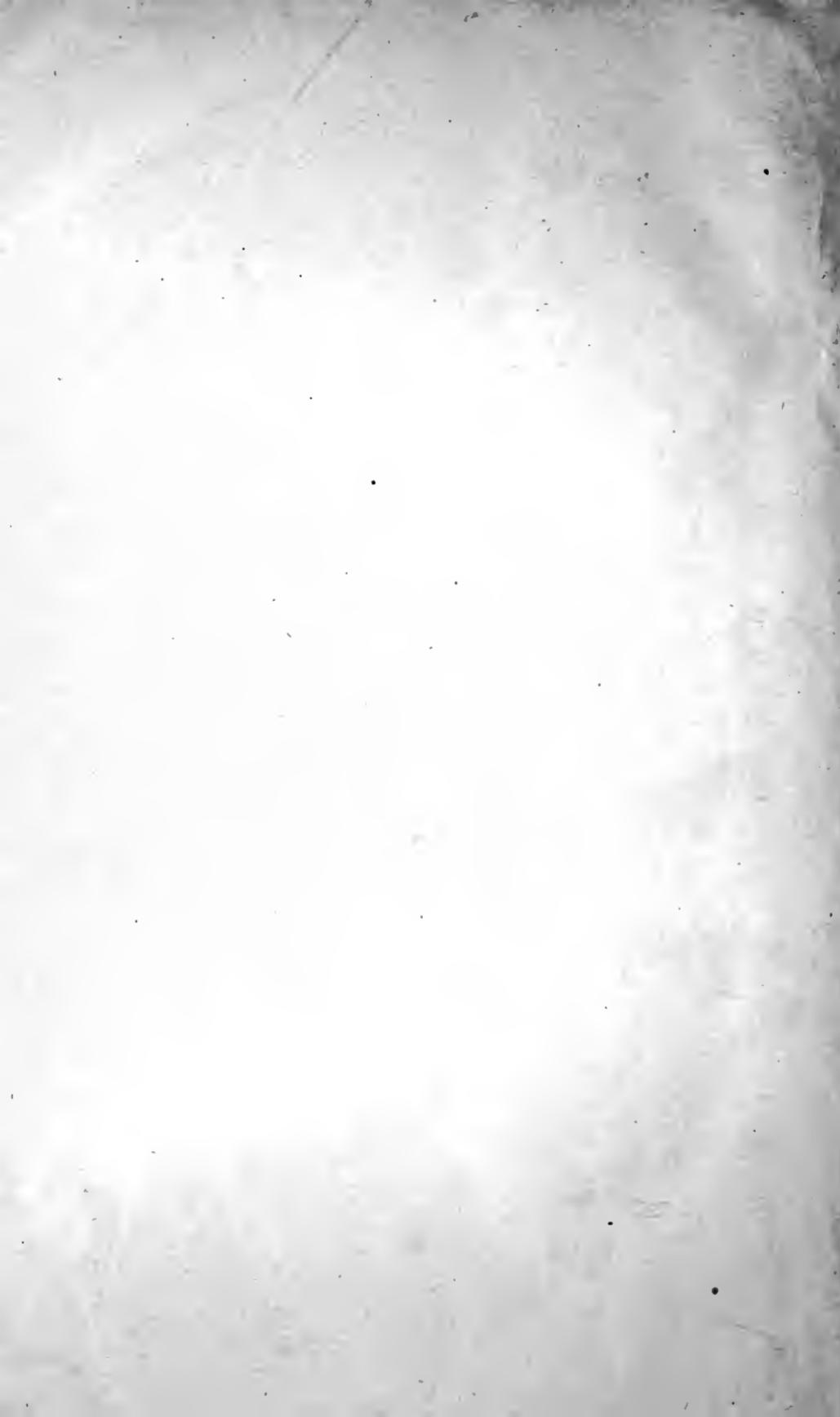
endeavour. As a student and a workman, I avow my belief that in order to reach their fulfilment the science and art of Preventive Medicine need the same inspiration. No far-reaching medical reform is separable from social reform, which in its turn finds its source in the highest aspirations of the people. Thus, here on this common physical plane, here or nowhere, the issue must be determined and the ancient ideal of Hippocrates attained —“ the love of humanity associated with the love of craft.” For the impairment of the physique of the human body is the impairment of intellectual and moral fibre, and the body is the tabernacle of the spirit of man.

G. N.











MINISTRY OF HEALTH.

AN OUTLINE OF THE PRACTICE
OF PREVENTIVE MEDICINE.

A Memorandum addressed to the Minister of Health

by

SIR GEORGE NEWMAN, K.C.B., M.D., D.C.L., F.R.C.P.,

Chief Medical Officer of the Ministry of Health.

Presented to Parliament by Command of His Majesty.



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