SECTION I.

SANITARY SCIENCE & PREVENTIVE MEDICINE.

ADDRESS,

By George Wilson, M.A., M.D., F.R.S.E.,

President of the Section.

In addressing you to-day, my first duty is to thank the Council of The Sanitary Institute for the honour they have conferred on me in inviting me to preside over this section of the Congress. It is an honour which I can assure you I accepted with no small amount of diffidence, and even now I feel that perhaps my best presidential contribution to our proceedings would be to sit here as a respectful listener. But it has always been customary on these occasions for the Presidents of the several sections of the Congress to deliver an address, and I am afraid I would lay myself open to a charge of something akin to indolence if I ventured to depart from this custom. I must therefore crave your indulgence for a brief space, and will frankly assume that neither in the selection of my subject nor in its treatment will you expect anything very striking or very new; that in fact, you will be contented with what may be called some general talk on the subject matter of our section. I will endeavour to bear in mind too, that while addressing you I have the opportunity afforded me of appealing to a wider audience, and that in the selection of a suitable theme, I ought to pay due regard to that consideration. Chiefly, then, in that point of view, and with intentions of a practical kind which I hope will explain themselves as I proceed, I have decided to offer you some remarks on "The Policy of Prevention in some of its Social and Sanitary Aspects."

In commenting upon such a well-worn theme as this, I must trust to you for indulgent criticism, because the problems involved

are in themselves so varied and intricate, and the field thrown open for survey is so extensive, that in a short address it is only possible to touch on isolated phases of the subject. Now I need hardly say at the outset that the policy of prevention to be effectual implies a clear knowledge of the causes of disease. These were so ably discussed by Prof. Russell Reynolds in his address to this section of the Congress held at Bolton two years ago, in so far as they relate to domestic hygiene, that if I allude briefly to some of them, I do so only for purposes of practical application. First, then, let us glance at the long roll of diseased conditions and premature death which depend upon the laws of heredity:—hereditary consumption, scrofula, gout, syphilis, cancer; hereditary insanity and nervous ailments; hereditary criminality; hereditary intemperance; hereditary vagrancy. Or let us consider for a moment the multitudes of maimed and doomed offspring which result from other unsuitable or imprudent marriages, apart from those of diseased or unhealthy parentage. Now, without discussing over-population theories, it is evident that when a man marries, no matter what his age may be, at a time when he can barely earn his own subsistence, and when he has no other resources to look forward to, he runs the risk of begetting a family which he cannot rear without the aid of pauper relief. The consequence is, that this unthriftiness in marriage, prevailing as it does among the ignorant and degenerate, leads too often to intentional neglect of the children amounting to culpable homicide. It largely accounts for that inhuman form of false thrift, which, under the name of infant life-assurance is spreading its baneful influence even into innocent village communities, and not only tempts to neglect, but too often seals the doom of the hapless offspring. But public feeling is gradually being aroused to the enormity of this insidious onslaught on infant-life, and there are at last hopes of effective legislative interference.

But cannot legislative interference go a step further? It is very doubtful whether public opinion is yet so far advanced as to warrant the legislature in enforcing a certificate of health on the part of persons about to marry; but I do think the time is at hand to put some check on the appalling waste of infant life which disgraces our civilization by prohibiting any man to marry unless he can produce reasonable proof that he is in a position to maintain a wife, and by absolutely prohibiting the marriage of any man who is still an infant in the eye of the law,—that is, under the age of twenty-one years. It is true that in this instance the law insists upon the consent of the parents or guardians, but as regards the artisan and labouring classes, among whom early marriages, with all their baneful

consequences, are so prevalent, such a condition is a mere mockery. Indeed, as regards all classes, it may be said that too early marriages—like marriages which take place too late in life, if not infertile—result in the birth of children afflicted with a lowered vitality. And not only so, but how often do we see the very young mother become a permanent invalid, barely able, if at all, to nurse her children, and through the ill-health induced by a too early marriage, imparting to her offspring a vitiated heritage. So numerous are cases of this description, that physicians who have carefully studied the subject maintain that no woman should marry before she is twenty-one years of age; and as regards the other sex, it may generally be said that the responsibilities of married life would be all the more safely faced if marriage were delayed till the age of twenty-five. But here I am afraid I am touching on ground which perhaps lies outside the scope of the policy of prevention. Let me only say in passing, that the Church, which holds the sacred rite of marriage under its special sanction and protection, has a vast mission field before it in which to preach and teach those undeviating laws of heredity which stamp their impress for weal or for woe on every child which is born, and on every succeeding generation.

This, however, by the way; let me rather refer to the vast amount of sickness which might be averted and the number of lives which might be prolonged to mature age if ordinary medical practice were based as much on preventive as on curative lines. And this, perhaps, applies as much to hereditary proclivities and ailments as it does to the ordinary diseases of daily life; for the power of the physician to combat inherited disease lies not only in warning against ill-assorted marriages, but implies (and here I quote Professor Russell Reynolds) "the special guidance of tainted children by all measures that can be used or devised for the purpose, by controlling moral, mental, social, and physical education, and regimen of life. This must be commenced before birth, continued in the nursery, and school room, and maintained during manhood, and even to declining years."

But apart from the inherent causes of disease which are included under the general term *heredity*, there is a long list of other causes which, beginning with parental neglect or ignorance in the rearing of children, or in early training, are in after years largely under individual control, and are therefore, in the strict sense of the word, avoidable. For underlying the whole art of prevention is this great truth which has been established by the researches of the physiologist that the animal organism is intended by nature to pass through a prescribed

period of existence from natural birth to natural death, and that it is incapable in itself of originating any of the manifestations of disease. We have, therefore, to look outside the body for influences or agents which operate as causes of disease in all its multiform phases. The great bulk of these belong to the domain of domestic hygiene, and depend mainly on a personal disregard of the laws of health, often through ignorance, sometimes through indifference, while many of them are associated with the usages and exactions of society. I need not attempt any scientific classification of these causes of disease, but the mere enumeration of the more prominent amongst them will suffice to prove how wide and varied is the list, and what a fruitful source they are of preventable disease and premature death:—errors in diet, abuse of the luxuries of life, worry and over-work, idleness, want of self-control, irregular modes of life, errors in clothing, and, above all, intemperance. It is these causes of disease, and not so much those which come more or less under legislative control, which help to keep the ordinary medical attendant busy, and which crowd the consulting rooms of the fashionable physician.

It is true that diseases resulting from impurities in air and water, unwholesome or insufficient food, and zymotic contagions still contribute largely to ordinary medical practice, but year by year they are becoming less prevalent, and all along the victims have been most numerous among persons receiving pauper relief, or among those entitled to the benefits of clubs or dispensaries.

But, with regard to ordinary family practice, the incongruity which, with all due deference, I would submit is this:—that while preventive medicine, whether in its social or legislative aspects, owes all its success to medical research, the teaching of it is practically ignored in most of our medical schools, and the practice of it is detrimental to the pecuniary interests of the profession. To speak plainly, there is no disguising the fact that so long as the family medical practitioner continues to be paid to attend only on people when they are ill, and not to conserve the health of the household, there will be a constant drag on public health progress. He earns his living by disease, and so far as he prevents it he is placed in the unfortunate position of being out of pocket. He is, therefore, exposed to this temptation—a temptation which, I am proud to say, is scorned by the profession generally,—that, when called upon to treat cases of preventable disease, whether social, sanitary, or communicable, he need give no warnings nor insist upon any precautions.

I do not blame:—the fault lies in a system of practice which

depends upon the regrettable fact that, in spite of advancing knowledge, public credulity in the power of cure still reigns paramount, while public faith in prevention is practically dormant. I venture to assert that there are few medical practitioners who would have the courage, when called upon to attend a case of illness in which a change of regimen is alone required and medicine useless, to order the regimen and omit to prescribe the medicine. Whether he requires it or not, the average patient must have medicine in some shape or form, or he believes he is badly treated. Homœopathic globules are as harmless and will often do him as much good as anything else he can swallow, for after all, in the great majority of cases, the so-called cures are to a large extent faith-cures:—the *vis medicatrix naturæ* does the work, and the doctor merely assists nature's efforts. Not that I wish in the slightest degree to decry the triumphs of therapeutic art; I admit to the fullest extent that the physician can always alleviate and often cure; all I wish to insist upon is this:—that the power of cure is infinitesimal when compared with the power of control.

But I refrain from saying hard things. Let me rather point out briefly how curative and preventive medicine may go hand in hand for the promotion of public health and the abatement of human suffering. And this is a matter in which the public themselves must take the initiative. It is a question which has been previously discussed by others as well as myself, and by others much more than myself, notably by Dr. Ogle, of Derby, who has long advocated this change in family practice. All that is required to bring about the change is this—that the ordinary medical attendant should be paid by an annual stipend or retaining fee, and not according to the number of visits which he may deem it necessary to make during illness. This system is largely followed in India and other places abroad, and no difficulty is experienced in settling what shall be the annual fee for professional services rendered in this way. It is true that in this country the same kind of practice prevails to a certain extent. For example, the proprietors of mines and other large works pay medical men so much a year to attend on their workpeople; while members of sick clubs, friendly societies, provident dispensaries, and paupers are also attended in this way; but the misfortune is that the great majority of these appointments are scandalously underpaid, because they are regarded by medical men as stepping-stones to general practice.

And now as regards the advantages of this system of medical providence or health-assurance as it has been called, from a preventive point of view. In the first place, then, the medical attendant would inquire into the health-history of the household, so that he might take precautions against inherited tendencies, or warn against bad habits, errors in diet and clothing, and the numerous risks to health which are common in daily life. In the second place, he would interest himself in the sanitary condition of the home and its surroundings, so that any defects might be at once inquired into and remedied. In the third place, he would make it his duty to call from time to time without being sent for, to see how the different members of the household were going on, and would thus have the opportunity of sometimes detecting ailments in the bud, so to speak, which, if not attended to at once, might lead to serious illnesses. In the fourth place, he would take every precaution in cases of infectious disease, and would have no scruples in giving timely warning to the sanitary officials for the protection of the public health.

As regards the profession itself, as the late Dr. Farr so forcibly put it, "Service would be greater, pay higher and easier, and consulting practice would remain what it is." There would be no longer any temptation to the running up of long bills on very slight pretences, there would be much less opportunity for the practice of quackery of all kinds, and altogether the dignity of the profession would be raised, and its usefulness greatly extended. Nor need there be any difficulties encountered in speedily bringing about this change in medical practice if the public generally can only be made to appreciate the vast amount of good which would inevitably result. Heads of households and private individuals in the upper and middle classes would of course pay any annual fee which might be agreed upon, while those belonging to the artisan and labouring classes could secure health assurance and medical attendance by enrolling themselves as members of sick clubs, friendly societies, and provident dispensaries.

But I need not enter into fuller details. If I have been tempted to dwell somewhat at length on this phase of the policy of prevention, it is because I am fully persuaded, and cannot help saying that in these days of advanced and advancing knowledge of the causation of disease, general medical practice as it has hitherto been conducted is an anachronism, and indirectly a stumbling-block to public health progress.

Let me now, however, turn to the sanitary aspect of my subject as illustrated in the domain of public hygiene or state medicine. It is in this direction that the policy of prevention has been attended by the most gratifying results, and year by year becomes fuller of hope and promise. In preventive, just as in curative medicine, it sometimes happens that consequences of immense value follow a chance hit of discovery, or some happy

inductive inspiration as Jenner's great discovery of vaccination as a protection against small-pox, but as a rule we can only know how to prevent by first knowing how to cause. And this study of causes, in proportion as it is conclusive and exact, can only be based on the lines of strict scientific experiment and research. On the one hand we have the comparatively few experiments which are conducted in our pathological laboratories on animals, and on the other, we have the numberless crude experiments conducted on man under the ordinary social and physical conditions of life, which are illustrated in the prevalence of particular diseases, or in special outbreaks of disease. In the former class of experiments—those on animals, the physiologist operates with a special virus or deliberately prepared cause in order that he may study its effects; in the latter class of experiments—those upon man, the trained expert tries to trace certain effects as represented by particular diseases back to their exact cause or causes.

Now I am not going to detain you by entering into any detailed account of the laboratory experiments, which may justly be regarded as having largely assisted in the policy of prevention; but I may be permitted to say in passing, that the studies, notably of M. Pasteur, beginning with the facts of fermentation and putrefaction, and proceeding onwards to inoculation by different kinds of attenuated virus, have opened up fields of research of the greatest promise. He, along with Koch in Germany and Klein in this country, supported by a large following of earnest investigators, has gone far to prove that what has hitherto been called "the germ theory of disease," is rapidly approaching a positive demonstration; that indeed as regards some of the diseases, which spread and destroy by their powers of infection, the specific germs, or micro-organisms, can be separated from the blood or excretions, studied and photographed under the microscope, and cultivated in test tubes with as much precision as the gardener can his seeds. They have also shown in their experiments on animals that by successive cultivations the destructive power of these micro-organisms can be so minimised that inoculations with the attenuated virus, while of full protective power against the specific diseases, produce very little constitutional disturbance in the animal experimented on. Thus it has been proved in respect to that fatal disease, anthrax, which sometimes devastates whole herds of cattle on the continent, and which is not uncommon in this country, and is communicable to man, that the virus can be so mitigated that an animal inoculated with it, instead of being exposed to almost certain death, has in reality no serious illness, and is protected from any future liability to the disease. So, too, with another

disease, which is known as chicken or fowl cholera. M. Pasteur has demonstrated that vaccinations with the attenuated virus of this fatal poultry disease protects against future attacks without causing any symptoms of serious ailment. In these experiments we have illustrations of the protective power which the attenuated virus of certain diseases may exercise in their prevention, just as vaccine lymph, which may be regarded as the attenuated virus of small-pox, acts as a preventive against that fell and dreaded disease.

With regard to M. Pasteur's more recent work in respect to the prevention of hydrophobia in persons bitten by mad dogs, perhaps it is still necessary to speak with a certain amount of reservation. For my own part, I cannot help believing that the statistical results of his treatment so powerfully support his theory, that it becomes a duty to afford persons bitten by rabid animals the opportunity of submitting themselves to this form of protective inoculation. In referring to this question I know I am alluding to a subject which is still open to much contention; but I think it may be fairly asserted that while the risk of any harm resulting from inoculation is infinitesimal, the chances of escape from an attack of that terrible disease, hydrophobia, are enormously increased.

But experimental work on animals has recently raised other issues of immense importance, and more especially in respect to the propagation of certain diseases of animals to man. For example, the experiments with the bacillus of tubercle—the characteristic micro-organism of that most fatal disease, consumption—open up questions of the gravest kind in respect to our milk supplies, and, in no small degree, to our consumption of butcher-meat. It is well-known that tuberculosis or consumption prevails to a very large extent in crowded dairies, that milk from tuberculous cows is largely consumed, and that the flesh of many of these animals when slaughtered, is eaten as human food. Now, it has been proved by microscopic research, that the micro-organisms characteristic of this disease can be detected in the milk of the animals so affected, and in their flesh. It has further been proved that animals fed on tuberculous flesh speedily contract the disease, and there are strong presumptive grounds opened up by other experiments for believing that animals fed on tuberculous milk become likewise infected.

Then again, there has recently been raised the grave question, which the President of the Congress so forcibly illustrated in his address of last evening, whether cows do not suffer from a disease which is identical with the scarlatina or scarlet fever of the human subject, and whether this disease may not be communicable by the infection of a specific micro-organism. Dr.

Klein's experiments on animals in connection with a well-known outbreak of scarlatina at Hendon, which was investigated by Mr. Power, of the Local Government Board, certainly strongly corroborate this view, though the evidence cannot be said to be conclusive.

But the policy of prevention in its sanitary aspects, may still be said to owe all its success to the long series of skilled inquiries into the distribution of disease throughout England and the circumstances by which it is regulated, which in the first instance were more intimately associated with the labours of Sir Edwin Chadwick, and later on with the distinguished public services of Sir John Simon. It would occupy too much of the time at my disposal were I to attempt to give even a brief sketch of the largeness of scope and variety of these inquiries—inquiries into the sanitary condition of our large towns, the housing of the poor, industrial occupations, excesses of disease resulting from conditions of filth, polluted water-supplies, defective drainage, unwholesome or tainted food and the like; but I may be allowed in passing to refer in general terms to the practical outcome of several of the more recent of them, as illustrating that wider field of research to which I have alluded, namely, the tracing of effects back to their causes.

Reverting, for example, to the dangers attaching to our milk supplies, it has been proved that whether or not there is a cow disease, which is communicable as scarlatina to man, there have been several outbreaks of diphtheritic sore throat, which have been clearly traced to some diseased condition of the cow, probably affecting the udder or teats. We know, too, that in numerous outbreaks of scarlatina, milk has been the medium in which the contagium of the disease has been distributed; and we also know that in many outbreaks of typhoid fever the disease has been propagated by washing out the milk cans or diluting the milk with sewage-polluted water, or water tainted by the specific typhoid contagium. Indeed, the dangers which lurk in our milk supplies have been so clearly established by numerous inquiries into special outbreaks of disease, that many maintain that the only safe preventive measure is always to boil the milk so soon as it is received into the household; while, as a public preventive measure, the State has rendered it obligatory on all sanitary authorities to enforce the provisions of the Cowsheds, Milkshops, and Dairies' Order: an order which, I regret to say, has hitherto been practically ignored in most parts of the country.

But I am afraid I am wandering somewhat from the strict lines of my subject. I have, however, introduced these instances as illustrations more or less instructive in themselves of the

methods of research which are essential to effectual sanitary defence and sound sanitary legislation:—first, the trained expert inquires into the causes, and supplies the exact knowledge as to the mode of propagation and means of prevention, and then the legislature, by various enactments (almost all of which have been passed within the last forty years), undertakes that the knowledge thus acquired shall become useful for the protection of the community. I need not refer in detail either to the wide scope of these laws or to the administrative machinery by which they should be carried out; but I may say in passing, that if the intentions and principles which they affirm were carried into full effect, they would speedily reduce to quite insignificant proportions the very large amount of preventable disease associated with sanitary defects or sanitary shortcomings which still exists. These causes of preventable disease have been grouped into two great classes, namely, local conditions of filth and nuisance, polluting air and water, and reckless dissemination of contagion. And, as regards both these wide fields of disease causation, large powers have been conferred on sanitary authorities, and obligations expressly imposed on them to remove the former and to see that means of isolation and other protective checks are fully and fairly carried out in respect to the latter. Not that I wish to infer that progress has not on the whole been very gratifying—indeed, the statistical returns of the Registrar-General furnish the fullest proof that the lowering of the general death-rate has been steady and continuous ever since the passing of the Public Health Act, 1872, when it may be said the administrative machinery of sanitation was first set in motion throughout the country by the establishment of urban and rural sanitary authorities, and the appointment of sanitary officials. Thus the average death-rate of the country during the five years ending 1870 was 22·4 per 1,000 of the population; during the five years ending 1875 it was 20·9; during the five years ending 1880 it was 20·0; during the five years ending 1885 it was 19·3, while the average during the last three years has been still further reduced to 18·7 per 1,000. This reduction from the average of 22·4 per 1,000 during the five years ending 1870 to the average of 18·7 during the past three years, represents an annual saving of 95,000 lives.

Or again, if we compare the average death-rate from the seven principal zymotic diseases for the same periods, I find that the reduction in round numbers represents an annual saving of 30,000 lives.

All this I admit is very gratifying, but it is when comparison is made between the death-audits of districts in which the Sanitary Acts are intelligently and conscientiously carried out, and

those of districts in which they are still practically ignored, that we can appreciate still more fully the enormous saving of life and prevention of human suffering which yet await improved sanitation. But even in the healthiest rural districts, the abominations of foul privy cess-pits or deep midden ash-pits polluting the air and endangering wells are still far too plentiful, while leaky drains are a constantly recurring source of nuisance. And these dangers to health are unfortunately perpetuated in respect to new dwellings, because the great majority of rural districts possess no urban powers, and have therefore no control over the structural details of the dwellings themselves or of drains and closet-accommodation. It is true that the Public Health (Water) Act insists upon a proper water-supply, but so long as there are no by-laws to regulate those other important details, risks of nuisance and well-pollution will continue.

These are questions which sooner or later must force themselves on the attention of the newly constituted County Councils, but there are others of perhaps greater moment. For though I am very pleased to be able to say from my own experience and what I know of other districts, that in spite of legal defects and local shortcomings, sound sanitary progress has been made in many parts of the country, there is no disguising the fact that in the great majority of small urban and rural districts a do-nothing policy is still tolerated, if not encouraged. And this is mainly due to the fact that the unfair incidence in rating naturally enlists the opposition of farmers and others to any village schemes of drainage or water-supply from which they themselves derive no direct benefit.

Then, too, there is another great stumbling-block to sanitary progress in small urban and rural districts to which I would allude with all due deference. Sanitary officials are plentiful enough; indeed, there can be no question that the country is over-officered, but they are not always well-trained, and when well-trained they are not sufficiently protected for the full and fair discharge of their duties. The great majority of the sanitary inspectors are elected from year to year or for short terms, while with comparatively few exceptions the medical officers of health are still further hampered by the conditions involved in carrying on general medical practice. I know I am trenching on somewhat delicate ground in once more alluding to the relations of the medical profession to the policy of prevention, but I cannot help asserting that in small urban or rural districts medical officers of health who are in active general practice are heavily handicapped in the discharge of their duties. If, as in some cases, they endeavour to discharge them efficiently and without fear or favour, they run the risk of

coming into collision with some of their best patients, and in any case they cannot expect the cordial co-operation and support of their rivals in practice. They are generally paid to do little, and as a rule they do not feel bound to exceed the limits laid down by their salaries. This was abundantly proved by the reports of the special inspectors who were sent by the Local Government Board throughout the greater part of the country some two or three years ago to inquire into the state of preparation of various sanitary authorities against an invasion of cholera. I am proud to say there are many exceptions, but the exceptions prove the rule; and a zealous and conscientious officer always runs the risk, when the period of re-election comes round, of being relegated back to the sole charge of his patients. It should be remembered that on the medical officer of health depends in very large degree the motive power of sanitation, and for this purpose he should not only be well-trained, but he should be appointed over an area large enough to occupy his whole time, and be debarred from private practice. As to the question of cost, nothing is more certain than that the system under which the medical service of the country generally has been hitherto carried out exhibits an unnecessary waste of resources, and that a much smaller number of officials properly organised would do much larger and more effective work, and, in all probability, at considerably less cost to the ratepayers.

I have been induced to refer more particularly to these obstacles and difficulties connected with rural sanitation because public health progress in the larger towns, considering the enormous difficulties which had to be faced, has made much more rapid strides than in smaller towns and scattered country villages. But in towns and villages alike, though in villages far more than in towns, the policy of prevention must always depend in great measure upon the sanitary condition of the home and its surroundings; and this applies as much to the mansion as it does to the humbler dwelling, and often more so. When people move into other houses they are generally assured in the most explicit terms that the sanitary condition is in every respect most satisfactory, but how often does it happen that in a comparatively short time the doctor has to be called in for indefinite ailments, bad throats, or something worse? Cases of this description are so notoriously frequent that it should be laid down as a rule that every tenant in search of a house should have the sanitary condition carefully inquired into by some competent official, and any defects removed before he takes possession. In London, Edinburgh, and several other large towns, there are Sanitary Protection Associations, which under-

take to make such inspections, but it would, I think, be a wise economy on the part of sanitary authorities generally if they themselves should undertake this most necessary work by appointing their surveyors, or other properly trained officials, at fixed salaries, and charging fees on a fixed scale, which could be regulated according to rateable value—the fees, of course, to be handed over to the sanitary authorities. Such inspection should also be made to apply to all schools, whether public or private, to hotels, boarding houses, and lodging houses.

With regard to the public control of that other large group of diseases, namely, those depending on reckless dissemination of contagion, I need only refer in the briefest terms, because I am afraid I have already trespassed too much on your time and patience. But, briefly, the principles on which effective prevention must be based are timely information as regards all cases of dangerous infectious disease, and prompt isolation, either at the home of the patient, when that is possible, or in hospitals set apart for the purpose.

The Infectious Diseases (Notification) Act, which, as the President explained in his address of last evening, was so hurriedly rushed through its final clauses, at the close of the past session of Parliament, would doubtless ensure the first great desideratum of timely information if it were generally adopted throughout the country. But, unfortunately, it is only made compulsory in respect to the metropolis, and it is left to other sanitary authorities to adopt it or not as they choose. In all probability the Act will be adopted by all towns of any considerable size, but I very much fear that the great majority of small urban and rural authorities will quietly ignore its provisions so long as its adoption remains permissive. The Act to be productive of full national benefit ought to have been made compulsory throughout the whole country, for it is manifest that if only adopted here and there while it is rejected in contiguous districts, its usefulness as a preventive measure will be greatly curtailed, and its administration in many localities will be rendered unsound and invidious. But, as the President informed us last evening, it would have been impossible to pass the measure except in this permissive garb, and we can only hope that the pressure of public opinion, wherever the sense of public duty is lacking, will lead to its general adoption. At all events, I feel sure of this, that wherever the Act is adopted medical practitioners will loyally do their part in carrying out its provisions.

The other important desideratum of providing proper hospital accommodation has already been met, or is being met in almost all large towns, and in some rural districts, but in respect to these, it would I think be a wise economy if County Councils were empowered to provide a portion of the initial outlay, and to combine districts for the purpose of erecting such hospitals. For it should be remembered that many of the most dangerous cases of infectious disease which crop up in rural districts, occur among the wandering population, among tramps, persons in canal boats, and caravan people, who do not belong to any particular district.

Such are some of the thoughts and convictions on this all-important subject which I have endeavoured in somewhat tangled fashion to lay before you, and if I have succeeded in making them yours as well as my own, they will on that account, I hope, be deemed all the more worthy of public attention. For the policy of prevention appeals to the sympathies, and demands the hearty co-operation of all classes, and more especially of the upper and middle, that they may help those of the lower who cannot yet help themselves. And if in this cathedral city I venture once more to enlist the services of the Church on our side, it is because as a medical officer of health of a large district, I know how warmly clergymen interest themselves in the care of the sick under their charge, and because I cannot forget the noble example of that Apostle of health, the late Canon Kingsley. I believe no man, whether clergyman or layman, did more in his day to popularise sanitary science, to render it a subject of constant discussion in the press and on the public platform, and to introduce the teaching of physiology and the laws of health, into our public and elementary schools. Thanks to him and other pioneers of public health progress, popular education in this direction is fast becoming a strong force on our side, and though sanitary legislation may continue faulty, and sanitary administration lax, advancing knowledge of health and its requirements will become more and more our mainstay in lessening man's physical difficulties and mitigating his sufferings. Such knowledge will surely grow until it permeates all classes, and the workman of the future will be as ready to strike against being cheated in health as he now strikes against being cheated in wages.

On "The History and Results of Fifteen Years' Sanitation in the City of Worcester," by W. STRANGE, M.D., Medical Officer of Health.

THE paper which I am now about to read to the Congress, and which, by the courtesy of the Council, has been placed first on the list, does not pretend to be a scientific one. It deals simply with the history of the sanitary work which has been in progress since the year 1873 in this city, and that chiefly from the point of view of medical hygiene, taking the dwelling-house as the unit in sanitary amelioration. I shall therefore not deal, except in very general terms, with the great questions of Main Drainage and Water Supply, knowing that in those important subjects you will be addressed, in the course of the Congress, by men much more able to do them justice than I can pretend to be. My object simply is to show what our Sanitary Authority, aided by its officers, one and all, have been able to accomplish with willing minds and a conscientious appreciation of their duties to the public.

Worcester, like most other towns in England, did not appoint a medical officer of health until the Act of 1872 rendered such appointment imperative. The person the authority appointed was myself, consequently I have had the work of sanitary amelioration, as regards my own department, in my own hands from that time to this. My qualifications for the appointment were the fact that I had assisted Dr., now Sir Lyon Playfair, in investigating the sanitary condition of some of the large towns in Lancashire under Mr. Chadwick's commission, and had written an "Address to the middle and working classes on the excessive sickness and mortality prevalent in large towns," in 1845. I may mention also, that I sketched out a scheme for the Sanitary Supervision of the whole Kingdom, some items of which are only now beginning to obtain adoption in some of the clauses of the County Councils Act. This sketch appeared in the *Medical Gazette* of 1846, and obtained the recognition of such old and tried sanitary reformers as the late Dr. Stewart, of London, Dr. Rumsey, of Cheltenham, and others. At the time of my appointment I was practising in this city and county as a physician, on the staff of our County Hospital and City Dispensary, and am so still. I may mention that I have never experienced the slightest friction between myself and my brother practitioners in the performance of my duties as

Medical Officer of Health, caused by the fact of my so practising; nor, indeed, I think I may say, from any other circumstance. On the contrary, I have always met with very cordial co-operation from them, especially in the matter of reporting cases of infectious disease, although at present they receive no remuneration for such reports, as they are not compelled by law to make them.

I have been furnished from the first with weekly returns of all deaths, and, for a short time, was supplied with copies of the Union Medical Officers' Reports of Sickness; but, after a short trial, these latter returns were given up, the Health Committee not thinking them worth the sum paid for them.

I have had the support and co-operation, during the whole tenure of my office, of an active and intelligent Health Committee, with the same industrious and painstaking Chairman, and of a learned and vigilant Town-clerk as legal adviser. We have now, since the enlargement of the city boundary, two Nuisance Inspectors, one of whom devotes his time to a regular house-to-house inspection, whilst the other, the senior, supervises the general work of the office, attending to every case as it arises, and acting as the Executive Officer of the Health Committee. The population in 1881 was 33,201, and is now, with the enlarged area, about 43,000.

We have also, as my colleague, Dr. Horace Swete, as Public Analyst for the county and the city.

Worcester is an old city, dating from the time of the Romans, if not earlier. It was a walled town, and, therefore, compressed within narrow limits. Its poorer population was crowded in narrow courts and alleys, behind the dwellings of the more opulent classes, with little light and fresh air, and plenty of dirt and filth of all descriptions. Although, of course, some amelioration was made during the centuries before this, the sanitary condition of large parts of the city, twenty years ago, was about as bad as it could be. I, fortunately, possess a record of its condition at the time of the passing of the Act of 1866. We were, at that time, threatened with an epidemic of the cholera, not the first by any means which had attacked this city. A Vigilance Committee was appointed to examine into the real state of the city, and in a report written by myself and presented by that Committee to the Town Council, I find the following items:—"The visitors, who made a house-to-house inspection, discovered and reported over *one thousand nuisances;* comprising dwellings overcrowded by two or even three families living in them; overflowing privies and cess-pits of enormous size; houses unconnected with any sewer, supplied with water from surface wells, in most cases polluted with sewage and

drainage; courts unpaved, unlighted, and unventilated; windows not made to open, and the interior of the dwellings filthy with the absorbed matters of years. Epidemics of zymotic disease are frequent; in one quarter alone scarlet fever was said to have carried off three hundred persons; and the report goes on to say, that epidemics which are intensified, if not caused, by accumulations of filth, and the use of polluted water, strike hard when they visit this city. That typhoid fever is *endemic* in Worcester, and is clearly caused by foul drains and privies, and the use of polluted well-water." The death-rate at that time ranged from 26 to 27 per 1,000 or thereabouts. At the time of my taking office, in 1873, it was 25·5.

The first proceeding to be taken was naturally that of obtaining information. A house-to-house survey was made, by which notice was taken of the numbers living in each house; the numbers living in courts and alleys; the condition of the dwellings as regards cleanliness and waterproof; of the drainage and water supply; of the soil, paving, etc., of streets and courts; and other similar facts, such as privies, w.c.'s., and cess-pits.

As a short summary of the condition of the population discovered by this survey, I may state that the number living in courts was 3,145, occupying only 1,656 sleeping rooms, many of them containing more than one family—911 families living in 441 houses. The inmates of 466 houses used water from superficial wells situate on these premises. 1847 common privies, with their immense and foul pits, supplied the wants of the courts, alleys, and other crowded parts of the city. Many of these privies did duty for the inmates of three houses, or from twenty to thirty individuals each. There was no regular removal of the contents of these pits, which were emptied only when they became unbearable, and when the farmers could find time to send their carts for them. The streets were badly paved, and the soil in the lower and closer parts of the town was almost always damp and polluted with foul organic matters. To the credit side of the account must be placed the recent supply, complete and constant, of good water from the river Severn—a new system of sewers, which has since been extended to every part of the city, and the connection of the house drains with the sewers was being rapidly carried forward. There was also one Inspector of Nuisances.

The recommendations which I made to the Sanitary Authority as the outcome of this enquiry, were nine in number, namely:—

1. The improvement of the courts and alleys (where these could not be abandoned), and other crowded places by every practicable means.

2. The closing of such houses as were unfit for habitation, and the compulsory repair of others.

3. The compulsory drainage of every house into the City sewers.

4. The provision of tap (or Severn) water to every house at present supplied by well, and the closing of that well, in case it can be shown that the water in it is impure, and likely to continue so.

5. The regular and efficient supply and care of gullies and ventilators in the sewers, and the connection of all house drains with the sewers.

6. The enforcement of the law against overcrowding.

7. The improvement and alteration of the system of privy accommodation, both as to structure and number.

8. The institution of a system of cleansing all privies and cess-pits, so as to insure the rapid and frequent removal of their contents by the Sanitary authority itself, and the encouragement, especially in new buildings, of the erection of water closets.

9. The erection of a mortuary and post-mortem room.

This report was dated August 19th, 1874.

10. The providing a suitable Hospital for infectious cases, by fitting up a large house which had been previously used as a small-pox hospital, and which has proved admirably suited to the purpose, was recommended by me and agreed to immediately after the adoption of the above report.

If I have wearied my audience with these preliminary details, my excuse must be that I have wished to show how easily all the worst sanitary evils may be remedied, and an unwholesome and dirty town made clean, healthy, and pleasant to live in, by the enforcement of the law, steadily, incessantly, with tact, and in some cases forbearance, by the authorities, and by vigilant and active sanitary officers.

The first necessity for health in a population is a plentiful supply of good water. Our earlier fathers knew this fact well, and never built a house without first securing good water. It was the reckless and rapid building in all manner of places, careless of any other condition, so that the dwellings were placed near enough to the places of work, which culminated about the middle of this century in large towns, or parts of towns, where this and almost every other sanitary necessity were totally neglected and passed over. The next necessity is proper and sufficient drainage.

With these two prime requisites to hand, the problem of

converting Worcester from a malodorous, dirty, and unhealthy city, to one sweet, clean, and salubrious, was one to be solved *ambulando*. Constant inspection, immediate removal of nuisances, frequent cleansing, abolition of cess-pits, &c., enforcing the law against overcrowding, and the education of the people upon such points as ventilation of bedrooms, cleansing of walls and ceilings, washing of back yards and courts, and attention to defects in privies and water-closets, was the first work taken in hand.

My duties at this time were to act as an inspector chiefly, making myself acquainted with the condition of the interior of every house where insanitary conditions were likely to exist; insisting upon the duty of the *tenant* and not the landlord to keep the interior clean and whitewashed, as well as compelling landlords, by a slight straining of the law, perhaps, at that time, to keep the walls, roofs, and pavings of the houses and yards in good repair. As the result of this inspection, there is scarcely a house in the poorer parts of the city which has not been overhauled by myself, and some of the worst and most dilapidated have been attended to several times over.

As regards ventilation of houses, &c., I gave lectures in the schoolrooms, which were well attended, and some decided improvement was observable afterwards.

Owners and builders, although they scarcely ever resisted the law, were slow in seeing their advantages in these improvements. But the extensive migration of the better part of the working classes to the suburbs, abandoning their crowded hovels in courts and alleys, which set in at this time as the result partly of a rising desire for better things, and partly to obtain better air for their children, opened their eyes to their real interests. The horrible nuisance of the immense privies and cesspits was next attacked, and by slow degrees at first, quickening afterwards, we made the people ashamed of these common latrines, and all their filthy and indecent accompaniments. At first little way was made in this respect, on account of a pending injunction against us by the towns lower down the river, who accused us of polluting the river from which they, as well as we, drew their supply of drinking water. It is a nasty and disgusting thing for any town, or even house, to do, to throw all its slops, refuse, and ordure into a stream from which human beings habitually drink. This, however, we did, and are still doing, awaiting the time when experts shall have agreed upon the best mode of disposal of these matters without creating a greater nuisance than the one they propose to abate.

We took heart, however, when we were assured by eminent

chemists that all the dangerous elements of our sewage disappeared by oxidation before it had passed sufficiently far along the stream to reach our next neighbours! I am not chemist enough to decide whether or no this dictum is entirely reliable. But, whether it be so or not, the idea of drinking even *converted* sewage is still disgusting and offensive to all sensitive people; and therefore the sanitary authority of Worcester is exceedingly exercised in its mind upon this subject at the present moment. I think that the authority would rejoice if, as the outcome of all our labour and interest in forwarding the success of this Congress, some of the learned gentlemen who listen to this our cry for help, would help us out of this "slough of despond" by successfully solving the riddle I have just stated. Charity begins at home, and what many people are waiting to be assured of is, whether we can so dispose of our sewage otherwise than by throwing it into the river (a sewage farm being a great *crux*) without doing as much violence to the health, and the feelings of our own inhabitants, as we are now doing to those of our neighbours. We are bound to grapple with this subject *at once*, under promise to the Local Government Board. Plans have been obtained, and different modes of sewage disposal have been well discussed; and still we are awaiting the advent of the Hercules who shall cleanse our Augean stable.

With regard to our water supply, it is and has been for many years constant and abundant in quantity. It is filtered, and every house is, or may be, supplied with it at the very moderate cost of 5d. per 1,000 gallons. Nevertheless, being drawn from the river Severn, it is open to the charge of being more or less polluted by the drainage of many towns, fields, and farm-yards. With regard to the possibility of removing or neutralizing these noxious matters, opinions, as you are aware, differ.

Pending the adjustment of scientific opinion on this point, we have lately cast about to see if a purer water could not be obtained than that derived from the Severn. Amongst the Lickey Hills, between here and Birmingham, water is obtained from artesian wells of the very purest quality, and we have discussed the question of substituting this water, in whole or in part, for that of the river Severn.

The principal point to be decided in going to the Lickey Hills, was whether the supply would be sufficiently abundant and permanent. With regard to the latter, nothing but a prolonged experiment would satisfy any scientific person on this point. Our authority, at the present moment, is not disposed to run the risk of failure in these two respects, even if the cost and terms could be made agreeable. They seem resolved to continue the use of the Severn water, with a

determination, I believe, and hope, of using the best mode of filtration obtainable, and to provide additional storage room, so as to dispense with the necessity of daily pumping in time of flood.

You will doubtless say, alas for the inhabitants of the towns below you! But we really intend to grapple with both questions, viz., that of sewage disposal, so as not to create a nuisance to ourselves or neighbours; and that of purification of the Severn, and of the water we use.

Our main drainage, begun 35 years ago, is now carried into every street; and every house-drain, with a very few exceptions, is connected with a sewer. In some places, owing to the almost dead level on which parts of the city are built, there is not sufficient fall. This evil, however, time and experience have taught us to remedy by extra flushing. Flushing-tanks have been placed at the head of nearly every sewer, and at many junctions, and others are added at any spot which seems to require them.

The greatest benefit can be traced to this extension of flushing, scarcely any complaint now being made of bad smells from the street ventilators. It remains now only to cause the house-drains to pass their contents into the sewers more rapidly and effectually than, in many cases, they do at present. For, as you will admit, this last item of drainage is a most important one. Ventilation of the sewers into the streets can do no harm if the contents of the sewers are not allowed to decompose. But blocked house-drains, and the consequent return of gases into the closets, bath-rooms, and kitchens, of dwelling-houses, are, in my experience, the most frequent cause of typhoid, diphtheria, diarrhœa, sore throat, or other cognate forms of disease that we have to contend with.

To entirely prevent this evil is almost impossible; for ruptures, subsidences, or blocking of drains are of daily occurrence, and require all the vigilance of the inspector. Next to seeing that house-drains are well laid and properly connected, the first object is to get all the water available passed into them. Hence, I am against the small cisterns, holding only two gallons or so, which builders are now placing in the water-closets of our cottages. This quantity, often let down at a dribble, will not remove hardened solid masses, especially when mixed with cloth, hair, wood, and other substances which children and careless women throw into drains. I consider the existence of any kind of trap *within* a *small* dwelling to be a nuisance of itself, and certain, sooner or later, to cause mischief. The only safety of the poor from being decimated by typhoid and its allied diseases, is the fact that all their closets are out of doors. Accordingly, we have declared every sink and trap,

indoors, to be a recurring nuisance, and have cleared them away almost entirely.

In most old houses, and all new ones, sinks now discharge on to gratings out of doors. The down-cast water pipes, which were formerly almost universally led directly into the house-drains, are also made to discharge in the open, as well as pipes from baths, &c. The only danger of sewer gas in a dwelling now remaining to us is the existence of water-closets and their pipes in the better class of houses. Defects in these are continually occurring, and generally no notice is taken until a case of typhoid calls for the inspector. Happy are the inmates of a house where there is no water-closet at all; or, at all events, in proximity to bed or living rooms. All such as exist should be strictly cut off from the dwelling, and ventilated, and ventilating only into the outer air.

One of the most valuable adjuncts to good sanitation is the possession of a hospital for the reception of cases of zymotic disease. Without this it is useless to struggle against the spread of these diseases, or to hope to prevent their germs being sown broadcast amongst the population. And I cannot understand how so many large towns have got on all these years without such a prime necessity. Of what use is a law for compulsorily reporting cases of infectious disease, if there be no place to isolate them in, when reported and discovered? As to giving advice to the mothers not to allow their infected children to mix with others, or to keep them from school until danger of infection is past, it is utterly useless. We seek to get hold of all first cases of scarlet fever and of measles as quickly as possible; and, as we make no charge for maintenance, we meet with practically no resistance; indeed, so popular has our Infectious Hospital become that application for admission is made to us in many of these cases immediately by the parents themselves.

One of the greatest advantages which the hospital affords is the reception of cases of typhoid fever. Typhoid is a disease which depends, for the recovery of the sufferer from it, almost entirely upon the nursing. Early, constant, judicious, and effective nursing is the cure *par excellence* for typhoid. Our success in this particular has amazed myself. For the last three years we have not had a death from typhoid in our hospital out of 36 cases, except those of two infants moribund when brought to the hospital. So skilful is our hospital nurse, that I could safely leave a patient, after the first two or three days, to her really tender mercies. No expense has ever been begrudged by our authority to make our hospital efficient, and our County Hospital now sends its infectious cases to it.

The present condition of our city then, you will well believe,

offers a striking contrast to what it did in the year 1866, or even in 1872. We have cleansed and dried the soil by paving the courts and backyards, and by the abolition of cess-pits; by good house and privy drainage; by the substitution, almost universal now, of water-closets for the old-fashioned privies; and by the paving of most of the streets with granolithic pavement. We have an ample supply of river water, and have abolished nearly every well in the city; we have improved the air of dwellings by removing sinks and traps to the outside, and also by cutting off the rain-water pipes from the drains. To these measures may be added the endeavour to prevent the decomposition of sewage in the main sewers, by efficient flushing. With regard to house-drains in cottage property, I have come to the conclusion that the syphon placed between the closet or yard and the junction with the main sewer, is a mistake. They are constantly becoming partially or wholly blocked by things thrown down the drains, and thus the closets and drains become choked, and danger immediately ensues.

It is only right to say that several new influences have been at work during the last ten or twelve years, tending to the lessening of the amount of disease and the tendency to death, amongst the population of Worcester. Two of these, the Provident Dispensary and the Nursing Institution, have certainly contributed largely to the reduction of the death-rate amongst the poorer classes. Any poor person can now obtain the services of a trained nurse, free of charge.

I am aware that I have now exhausted the time allotted to me. I am anxious, however, with your kind indulgence, in a very few words, to tell you what effect our sanitation has had upon the health, comfort, and lives of the inhabitants. At the beginning, in the year 1872, the death-rate was 25·5. Last year it was 18·74, or a reduction of nearly seven per 1,000, on a population of 43,000, a saving of *three hundred* lives per annum. This year, up to date, the rate is only 14·5, and every year holds out a prospect of still further reduction.

But of more consequence than the death-rate, which is still kept too high by the abnormal deaths of infants, is the improvement in the general health of the population. Not only do we never see persons scarred with the foul marks of small-pox, but cases of scrofula, rickets, diseases of joints, and phthisis pulmonalis have greatly declined, both in number and severity. Rheumatism, which was once a famous Worcester complaint, is also much more rare. But it is in respect of zymotic diseases that our sanitary efforts have borne the most fruit. I have already told you that on one occasion an epidemic of scarlet fever carried off three hundred persons in this city. We no

longer fear an epidemic of scarlet fever. Typhoid fever, which was said in the report of 1868 to be endemic in Worcester, has been so reduced in severity, as to enable me to make the statement in regard to our hospital, which I did a few minutes ago. And as regards numbers, the tables at the end of this paper will show a corresponding reduction.

A disease strongly marking the condition of the sanitary work in a town is said to be the summer diarrhœa of children. I cannot give you exact figures in this category before the year 1874, but I remember the time when the diarrhœa of children was a formidable item in the mortality. Now, in most years, it gives us no trouble at all. And I think I am not wrong in making the statement that most diathetic diseases have been robbed of great part of their severity by the more wholesome conditions which now surround the patient.

I have drawn up a table showing the progress made in diminishing, first, the general death-rate, and second, the zymotic death-rate, for the years 1874 to 1888. As I have already hinted, sanitary improvement in Worcester has not been by leaps and bounds, but steadily progressive. At first somewhat tentative, it became more active as we found public opinion keeping pace with us. For the first four or five years but little impression was made upon the death-rate. Then, in 1879, a start was made which has gone on increasing until the present moment. And I think I can trace each item of improvement as the direct outcome of some progress in our sanitary action. Thus, the removal of privies and cess-pits, which went on slowly at first, became much more active in 1879-80, and about this time also, the authority undertook the cleansing of such places as remained. Hundreds of these filthy structures were cleared away, and the pits filled up, and now but few of them remain. In connection with this, note the extraordinary drop in the mortality from scarlet fever and measles which occurred in 1879. In the years 1875-8, we had an average of 52 deaths from these two zymotics. In those of 1879-85, it drops to 17 in the year. Then an addition of some 10,000 is made to the population living in undrained or badly drained districts, all with privies and cess-pits, and the average number reaches to 23, but now, this year, when the drainage and water supply of the new districts is nearly complete, we have, so far, only 2 deaths from these diseases!

The course of typhoid fever has not been quite so favourable. It would appear, at first sight, that the number of deaths from typhoid has been singularly uniform all along. Not so, however. The first seven years give an average of 13 deaths. Then, in 1884, we had a sudden outbreak of the disease, consequent

upon the pollution of the Severn by the sewage of Kidderminster, where, at the time, an epidemic of typhoid was raging. There were 31 deaths from this cause in the course of the Autumn and Spring of 1883-4. Since this time, a great fall in the numbers has taken place, and in the last three years, the average number of deaths, allowing for increase of population, would have been, when compared with former gains, only 9.

But the most interesting thing to be noted in regard to typhoid is the extraordinary mildness of the cases of late years. Amongst patients removed to our hospital, there was not a single death, in three years, with the exception of the two moribund infants before referred to! Instead of diarrhœa, haemorrhage, &c., we have constipation, with scarcely any intestinal symptoms, and few or no spots.

In connection with these facts, we shall find the same condition of things in the case of the summer diarrhœa of infants. In the years 1874-8 before the abolition of privies, and the drying of the soil by paving the courts, alleys, and back-yards of houses, the average number of deaths was 53. In the next 4 years, it was 36, and in the next 3 years, after the addition to the population, if reduced to the same ratio as before, it would have been 24 only. This year, the number has been 18, or at the former ratio, only 14, half of which occurred in the winter, and therefore bore no distinct relation to ordinary summer diarrhœa.

The most unsatisfactory thing about our death-rate is the great mortality amongst infants under 1 year of age. In this one respect we are behind most of the towns situate similarly to ourselves, and it has caused us much anxiety to find a remedy for it. The time at my disposal does not admit of my going into this subject at the close of my paper. I will illustrate it simply by contrast. I take the deaths of the present quarter of this confessedly very healthy year. Out of 123 deaths there were under 1 year of age, 39; and under 5, 8; 5 and under 15, 4; 15 and under 25, 8; 25 and under 60, 28; over 60, 46; of which last 17 were over 70, and 10 over 80 years of age; thus leaving 48 only as dying between 1 and 60 years of age. Therefore, barring excessive mortality of infants, which, however, we have seen is not due to summer diarrhœa, may not this city be congratulated on the great strides it has made in true sanitary work, resulting in the improved health and comfort of its inhabitants, in the freedom of its youth and manhood from fatal diseases; and especially on the fact that old age—60, 70, 80, and even 90 years, is reached by one-third of all the inhabitants.

TABLE

Showing the Death Rates, Zymotic Rates, and total number of Deaths from Zymotic (or Infectious) Diseases, in the Years 1874–1889.

Years.	Death Rate.	Zymotic Rate.	Actual Number of Zymotics.	
1874	22·30	3·0	95	1st Period. Average General Rate 24·3. Average Zymotic Rate 3·9.
1875	25·58	4·2	135	
1876	23·37	4·2	134	
1877	24·45	4·6	150	
1878	24·45	3·6	116	
1879	21·17	1·4	45	2nd Period. Average General Rate 20·64. Average Zymotic Rate 2·14.
1880	20·90	3·4	109	
1881	20·60	2·26	77	
1882	19·73	2·55	86	
1883	21·00	1·7	58	
1884	20·90	1·7	59	
1885	20·22	2·0	69	
1886	21·85	1·83	79	3rd Period. Average General Rate 20·53. Average Zymotic Rate 1·88.
1887	21·00	1·83	79	
1888	18·74	1·9	83	
1889	14.50	0·79	29	
To Sept. 24, Estimated to Dec. 31.	16·30			

APPENDIX.

Some years ago the Town Council requested me to furnish them with the death-rate of the city forty years ago, and since. I was unable to comply with this request owing to the absence of the necessary documents. I have lately been furnished with the Supplement to the Thirty-fifth Annual Report of the Registrar-General, which contains the information required to answer the question put to me by the Town Council.

Table 1, following, shows the Annual death-rate of the city in the three decennia, 1841–50; 1851–60; 1861–70.

Table 2 gives the exact number of deaths from the several Zymotic, or infectious diseases, in the ten years, 1861–70; that is the years immediately preceding the passing of the Public Health Act of 1872. A comparison of these numbers with those given in the tables above, showing the deaths from the same causes during the last fifteen years, will speak for itself, and will require no comment.

Table I.

Extracts from the Supplement to the Thirty-fifth Annual Report of the Registrar-General, published in 1875.

Average Annual Death Rate, 1841–70.

10 Years from 1841–50	10 Years from 1851–60	10 Years from 1861–70	Mean of 30 Years
24	23	25	24

Average Annual Death Rate from Zymotic diseases in the years 1861-70, 5·39.

Table II.

Total Deaths in the 10 *years*, 1861–70, *from the following Zymotic diseases.*

Population: Males, 15026; *Females*, 16667; *Total*, 31693.

Disease	Males	Females	Total	Average per Ann.
Small-pox	41	28	69	6·9
Measles	58	71	129	12·9
Scarlet Fever	209	195	404	40·4
Diphtheria	18	25	43	4·3
Whooping Cough ..	65	67	132	13·2
Fevers, chiefly Typhoid..	232	218	450	45·0
Diarrhœa and Cholera ..	243	251	494	48·4
Totals	866	855	1721	172·1
Total of all Deaths in the 10 years	4040	3804	7844	784·4

Average Death Rate of 10 years, 24·74.

Mr. Washington Lyon (London) said he noticed that Dr. Strange said there was no death from small-pox. Might he ask, was vaccination universal in Worcester? Did that account for it?

Dr. A. Carpenter (Croydon) said that it reflected considerable credit on the Mayor and Corporation to have secured the services of Dr. Strange for their medical officer, because he had carried out his work according to what he had contended in his paper to be the first duty of a Medical Officer of Health, namely, to recognise that the foundation and the unit of sanitary work was the individual house. It was requisite for the purpose of carrying out sanitary work properly, to pay particular attention to the individual house. If a medical officer did not do that it was not likely he would succeed in the work he had undertaken. Dr. Strange had proved to him in his remarks conclusively, that he understood what he had to do, and that he had done it thoroughly, because it was only by getting that information that he was able to grapple with the difficulties that were likely to arise in dealing with sanitary matters among the people. There was another point in Dr. Strange's paper which struck him with considerable force, and that was the reference to the efforts that were being made by the Corporation under his direction for the exclusion from the houses of all communication with the sewers. Evidence which had been obtained of the effect of the exclusion specially from the houses of the working classes, showed it had an important bearing on the health of the district. He could not help but think a source of considerable amount of the success which had attended Dr. Strange's efforts in Worcester, was due to that fact; because where there was no connection between the sewer and the interior of the house, the prevention of a certain amount of contamination from that source, had shown itself in a diminished zymotic rate. Then Dr. Strange referred to the difficulties that were involved in the work of constructing sewers. That was an extraordinary difficulty it was true, and until it became positive law on the part of the local authority, that no sewer should be laid underground that was not put down on a solid basis—on a concrete foundation—so that there would be no fall of the sewer and no consequent leakage of any kind or sort, they would never get rid of that difficulty in connection with the construction of house-drains. If this course had not been adopted in Worcester, he would strongly urge upon the local authority the adoption of a bye-law requiring that no single drain should be constructed, except on a solid bottom, and they must be careful to keep the roots of trees away from the line of pipes. There was another point in the paper with regard to the conditions of the dwellings of the poor. His observation, which had been very cursory of the poor of the district, told him to infer, from the appearance of the people, that there was a great want of ventilation in the interior of their dwellings. That was a point to which a certain amount of attention should be paid, for the purpose of getting rid of some of those tendencies which were manifest among the poor, arising from the want of fresh air. The aspect of the

children in the streets was more anæmic than he liked to see, but, at the same time, he congratulated the Corporation and citizens of Worcester on the results which had followed the application of sanitary laws in the district.

The Mayor of Worcester* said the question as to the desirability of not pouring the contents of the sewers into the Severn had been raised. As a principle he did not think anyone could deny that it was correct. But at the same time they maintained that they were doing no particular harm. He thought the death-rate in the returns from the last report of the Medical Officer of Health, 14 per 1000, was not very serious. The proper course, if they wished to ensure the purity of streams and rivers was to begin at the fountain head and work down. It would be of very little value for Worcester to arrange for the disposal of its sewage by precipitation or irrigation, assuming that a large amount of pollution was taking place higher up the river in Wales, at Shrewsbury, and other places. He entirely agreed with remarks that had been made as to the great value of the disconnection of all house-drains from the main sewers. That disconnection should be two-fold—first by water traps, and secondly by air traps. Where possible he would recommend strongly that the traps should be duplicated. The air traps should certainly be duplicated, and if possible the water traps, so that if the pressure of sewer gas were considerable it would meet with two obstacles to its progress into a house, and thereby a double security would be afforded. In Worcester there had been complaints about disagreeable smells arising from the street gratings of sewers; wherever it was possible ventilating shafts had been erected. They found a great difficulty in obtaining permission to erect these shafts, many people said it was very objectionable to have the smell as they passed along the streets. But he maintained it was much more objectionable to have the sewer gas filtering through the houses. In the streets the gases mixed with large volumes of air and were rendered less hurtful. As the pipes in a house became affected by the increased temperature through heating, unless they were properly trapped the warm air of the house attracted all the sewer gases into the house; so that the higher the temperature of the house the larger the escape and volume of sewage gases. They would be glad to receive suggestions from members present with regard to the proposed sewage works for the city. They thought in the particular case of Worcester precipitation was by far the best system, looking at its situation and certain local circumstances; possibly a small piece of land in addition might be used for irrigation purposes or passing off the effluent. He was hoping they might have heard some discussion of the electrical process of precipitation.

Dr H. Swete (Worcester) said, in answer to the remarks of the last speaker, that though the pollution of the river Severn above

* Mr. Alderman Ernest Day.

Worcester was a serious matter to that city, especially when the sewage of Kidderminster was occasionally poured into it, yet he considered that there was not that danger to the towns *below* Worcester. At a time when an epidemic of typhoid was raging in Kidderminster the inhabitants of Worcester were for three days in terrible danger through the whole of the sewage of Kidderminster being allowed through an inadvertence to flow into the river. It was a curious fact, derived not only from his own analysis but from those of other chemists more eminent than himself, that the sewage of Worcester, a city with 44,000 inhabitants, with its manufactories, could not be detected at Tewkesbury, sixteen miles further down the river. He attributed this to the dilution and oxidation of the waters of the Teme, a river that was only polluted by the small towns of Knighton, Malow, and Tenbury, or, as some people thought, by the underground springs in the river and vegetable and animal organisms feeding on the sewage. He considered that the supply of water to Worcester should therefore be taken from the Teme and not from the Severn, although personally he hoped the day would soon come when sewage would not be allowed to enter the Severn at all.

Dr. W. Strange (Worcester), replying, said, in answer to Mr. Washington Lyon, some time ago he examined every child in the public schools in Worcester. He proposed to do it again to see whether vaccination had been carried out, and he found that 95 per cent. of the children had been vaccinated. He thought that Authorities were quite alive to the necessity of proper vaccination. He was quite sure the Local Authorities would decide how they would deal with the question of sewage as quickly as possible. The hospital which had been referred to was a private house, in which about ten rooms were available, so that they could divide the sexes, and the children from the adults. They could divide the house between two diseases such as scarlet fever and typhoid. They had one or two cases where persons had gone in afflicted with one disease, and had taken another. However, nothing serious had occurred from it. It was impossible in one building to avoid the risk of nurses taking a disease from one ward to another. When they had had typhoid and scarlet fever in the house at the same time they separated them as far as possible, dividing the nursing staff. It had been asked why they continued to pour the diseased germs of Worcester into the river. It was simply through an accident in the first instance, which resulted in the sewage finding its way into the Kidderminster water, which produced the epidemic of typhoid there; and when an effort was made to correct that, they made another mistake and poured the typhoid germs into the river for two or three days. To show what the effect of that was, they had in the close of the autumn and in the succeeding winter and spring a large number of typhoid cases, which he had no doubt resulted from the transmission of the germs by the river. If it was asked why the epidemic continued in Worcester during the winter and the spring, he could only attribute it to the faulty system of filtering which caught and held the diseased germs.

This was a danger which always threatened them in filtering. He would beg to be excused answering the question of Mr. White as to precipitation. He did not treat upon it. The Mayor of Worcester had kindly assisted him in answering some of the questions put to him. He hoped the Mayor would excuse him for saying that Local Authorities would not be doing their duty until they grappled with the sewage disposal question, and took out all the bad materials now going into the Severn. He was sorry to differ from Dr. Swete, but he did decidedly differ from him as to the sewage. If the water at Tewkesbury were better than at Worcester after receiving the drainage of 50,000 or 60,000 people, then the pollution of rivers was the best thing they could possibly have. It might be well to go and live at Tewkesbury, and enjoy the stuff the Worcester people threw into the river. It was no argument to say, what was the use of Worcester diverting the sewage of the city from the Severn while pollution was going on higher up the river by towns in Wales. Worcester was the largest city on the river Severn. Why, then, should they not set the example? If they were to set to work, the towns above them, Kidderminster, Shrewsbury, and Welshpool, must be ashamed of themselves if they did not follow the example.

On "The Sanitary Aspects of the Pottery Manufacture," by JOHN T. ARLIDGE, M.D. and A.B.Lond.

IT may be asserted of every manufacture and trade, that it presents more or fewer features peculiar to itself, which affect, in a greater or less degree, the health of those engaged in it.

This fact is indisputable, but it has not arrested the attention of sanitarians as it ought to have done. It has, on the part of medical men, led to few researches concerning the consequences attendant upon the pursuit of different occupations, or the causes producing them, and yet these latter are as patent when looked for as any disease-producing factors known to the profession.

These prefatory observations might be readily, and not unprofitably extended, but the limit of twenty minutes allotted to a communication by the rules of the association, enforces their curtailment, and I will at once proceed to sketch the sanitary aspects of the Pottery manufacture, as I have had the honour of being asked to do by the Council of the Sanitary Institute.

Now it so happens that Potters as a class of artisans are remarkable for a high mortality, a circumstance which, of itself should challenge inquiry in order to ascertain the cause. And when inquiry is started, we encounter at once numerous questions for solution, both by medical men and by sanitarians. The former are called upon to specially study the disorders attendant upon the occupation, and the latter to investigate by what sanitary measures the occurrence of those disorders may be best met. At the threshold of their investigations they will perceive that they have, in the industry under consideration, to deal with many different branches differing among themselves in the matter of causation of disease, and in that of the health conditions to be rectified, as much almost as any distinctly marked trades do from each other.

However, three primary divisions may be readily distinguished: 1, the branch occupied in the making of ware from the clay; 2, that concerned in glazing and firing it; and 3, that devoted to its ornamentation, by painting, gilding, and printing. The last named department is known as the decorating or finishing division; whilst the first mentioned is pre-eminently the occupation of Potters properly so called. The second branch is intermediate between these two, including processes appertaining to each, in the hands of workmen known as oven- and kiln-men, and as dippers and placers.

These primary divisions of the pottery manufacture are themselves separable into subsidiary sections, presenting sanitary conditions of very varied character. To enumerate these secondary branches, and to note the peculiar health relations of each, would carry me far beyond the compass of this present paper.

I propose to treat my subject under three heads, viz.:

1. The materials employed;
2. The processes of the manufacture; and
3. The circumstances incidental to it; that is, those which affect the health of the artisans, but are non-essential to the industry.

And first, as to *the materials employed*, regarded from a sanitary point of view, it goes without saying that the "clay," out of which all ware—whether china or earthenware—is formed, ranks first in importance.

In remote ages potters' clay was clay in the ordinary acceptation of the word, or a natural aluminous compound from sedimentary deposits. But such is not the clay now used in the potteries; some of like kind, indeed, brought from Dorsetshire, enters as a component of the fictile material worked up. But the more important constituents are the so-called Cornish clay and stone imported from Cornwall.

These substances consist of decomposed granite. The clay is prepared by many washings and prolonged exposure to the air, whereby it acquires great whiteness, and is easily reducible to fine powder. As may be inferred from its origin, the proportion of alumina in it is small as compared with the contained silica. Here, then, we find potters subjected to a silicious material, which, in the process of manufacture, largely escapes as dust, and permeates the air they have to breathe.

The several clays in use differ in quality, and in the preparation of the basic material, technically styled "the body," out of which the future ware is to be fashioned, these are mixed together, in proportions differing with the different views and purposes of manufacturers. So it happens that some "bodies" are more silicious than others; as happens with the material used in making the special ware called "granite."

This being the case, we can understand that some clay compounds will prove more injurious to workmen than others. Moreover, there are wide variations in the degree of exposure to dust, depending upon the character of the work followed by different hands.

The principal sufferers from dust are the potters, properly so called, to wit, the *throwers*, who work with the well-known and most venerable machine, the potter's wheel; the *pressers*, who are distinguished as "flat" or "hollow ware" pressers, according to the character of the articles they manufacture; the "turners," who, by means of an ordinary lathe, give smoothness to the surfaces and edges of the ware as it comes to them from the pressers.

In the case of flat ware—plates and cups,—a plan of giving smoothness to the surface has of recent years been introduced, under the name of "*towing;*" the process consisting in holding with sufficient firmness a piece of tow on the surface, whilst the article operated upon is rotated on a small turn-table with great velocity. This proceeding, I hardly need remark, is attended by the copious evolution of dust.

Subordinate departments of the potter's art are represented by the occupation of fixing on cups, tea-pots, or other hollow ware, the handles and spouts. This makes the business of "*handlers.*"

All these workpeople in pursuing their special craft give origin to more or less dust which floats in the air around them, settles on their clothes and every object in their workshops, and gets drawn by inspiration within the bronchial tubes, and, in time, finds its way into the lung tissue itself.

The pottery manufacture, therefore, is distinctly of an insanitary nature by reason of its dust-producing conditions; and

it becomes the duty of the sanitarian to devise measures to lessen those conditions, and to obviate their activity in provoking lung disease.

Another material that finds a place in the making of pottery is *flint*. The flints used are derived from the shingle on the northern shores of France, or from the deposits, occurring in strata, in our own chalk hills. For the use of the potter they are calcined and then very finely ground into a light white powder. Prepared flint enters into the composition of the clay body, and is used also largely in the china business, to surround the cups and saucers, or other porcelain articles, when placed in the boxes—technically called "saggars,"—in which they are to be "fired."

The addition of flint to the clay "body" necessarily implies an aggravation of the evils following upon the inhalation of the dust; and with regard to the men engaged in "placing" the ware in the saggars, we at once see how seriously they are exposed to breathing the flint powder. The like exposure again attends them when, after its firing, the ware has to be removed from the saggars.

But the operation of flint as an element of disease does not cease with the last-named act. Some of that substance adheres so intimately to the china that it requires to be brushed and beaten off;—a most health-destroying business pursued by women, call "*scourers.*" As may be surmised, such workwomen are recruited from a class of a more or less necessitous grade, whose aim is to earn wages rather than to prolong life.

The sanitary ills of the potter's trade are unfortunately increased by yet another material. I refer to the metal lead, which is largely used, in the form of the carbonate and of litharge, to make the "glaze" that gives lustre and smoothness to ware, and renders it impervious to moisture. It likewise enters into the composition of many colours used for the purpose of decoration. To make the history of lead complete I must advert to another potter's material, viz., borax. This is innocent enough in itself, but it occurs in very bad company; that is, with the salts of lead just now mentioned. Borax has excellent chemical properties, fusing with metallic oxides and earths to make a glass-like substance. The possession of these properties brings it into use in the pottery manufacture to form, upon fusion with the lead salts, some china clay, and occasionally other ingredients, a vitreous mass, which, after being finely ground and mixed with water, produces a thick milky fluid—the "glaze."

The business of glazing is very simple, consisting in plunging the ware into the glaze for a second, and then withdrawing it;

any excess taken up dropping off by gravitation, or else removed by a piece of sponge in the hands of an assistant. The process is termed "dipping," and the operator "the dipper." The porous ware absorbs superficially a coating of glaze, and when this is subjected to heat in a kiln, it becomes vitrified and intimately adherent to the surface in the form of an enamel.

To reach this condition it is necessary to pass, as I have intimated, the dipped ware through fire. With this end in view the several articles are arranged in saggars, just as in the case of those turned out of hand by the throwers and pressers, precedent to the first firing. The consequence is that another set of men, called "gloss placers," are brought into contact with the poisonous glaze, and often fall victims to it. But it is no uncommon circumstance for a man to pursue the double calling of oven-man and placer.

I just now alluded to lead salts as colouring agents. They serve also another purpose, viz., that of acting as a flux to other colours. The preparation and mixing of colours is consequently a business exposing those occupied with it to the dangers of lead. But the poisonous colours become a source of plumbism to a far wider circle of workpeople, viz., among the decorators of earthenware and china. Now and again those who paint with oil colours show the disease; but the most frequent sufferers are the majolica painters—mostly females,—who use colours more heavily charged with the metal, ground up with water, and laid on more roughly and thickly than in enamel painting.

Further, lead colours are often used in a dry state, prior to firing, being dusted on the surface to be coloured by a process known as "ground-laying." Here, consequently, the poisonous material is in a shape to facilitate its inhalation and swallowing, apart from its possible absorption by the skin.

What has been stated in respect to lead colours comprises the major part of the facts attaching to colouring materials, in general, with regard to their sanitary character. Other metallic colours are indeed in considerable use, for instance, cobalt and salts of gold, copper, and tin; but when no lead is present in combination no definite ill results are traceable to them:—for one reason that their employment is on a comparatively small scale. Arsenic forms very brilliant salts, but, happily for potters, it is volatilized by heat, and arsenical colours in consequence become destroyed. Yet, for some recondite reason or other, small quantities of this virulent poison are occasionally introduced in certain mixtures by some manufacturers and colour makers. Lastly, mercury has its uses, but mainly to make an amalgam with gold.

This brief review of materials used in the pottery manufacture must suffice, and I pass on to consider the general sanitary conditions associated with the occupation. Of these, heat occupies the foremost place. The workshops of pressers—the most numerous class of workmen—become unduly heated by the necessary presence of the drying closets, placed close to the working bench for the sake of convenience. These closets are kept highly heated by hot pipes for the purpose of drying, to a certain extent, the newly-made clay utensils and the moulds upon which they are made. The closets, indeed, have swing doors, but these are so constantly opened by the lads called "mould-runners,"—who carry the ware with its mould from the presser as fast as it is made,—that they can only partially prevent hot air escaping into the shop.

We cannot fail to perceive in this state of things a cause of damage to health, super-added to the effects of dust, in the production of general muscular debility, with fatigue and sweating. At the same time the heat favours the development, and, by rarefying the air, also the inhalation of dust. A saving condition of placers' labour is that it is intermittent. Again, the printers in following their occupation, are exposed to a considerable temperature, for the press is highly heated, and close to it is the hot plate necessary to spreading the ink on the copper plates to be printed from. The printers are very few in number, but with them work many women, who rub the printed pattern on the ware, and are called "transferrers," and a still larger number of girls who are busied in roughly cutting out the patterns from thin paper on which they are printed, and who from this employment, are termed "paper cutters."

Lastly, other sufferers with heat are the men occupied about the ovens and kilns, in firing and tending them; and, when after some two or three days the baking or firing is completed, in withdrawing the contents. The work of oven-men does not impose constant nearness to their fires, and the greatest exposure attends the operation of oven-drawing, especially when there are urgent orders, and the ware is drawn whilst still very hot.

Heat is not alone operative, for there is beside it, exposure to strong currents of cold air, particularly in the case of ovens placed outside the main building of a factory. Hence, as might be surmised, the workmen in question are very liable to colds, and especially to local rheumatism.

The working appliances of a pottery are some of them not without possible effect on the health of the artizans. Where not done by steam power, the turning of the potter's wheel by hand is a laborious, though intermittent task, and usually performed by women. When there is strength for it, the work

presents no tangible cause of ill health, but unfortunately the strongest women are not those always selected.

The same thing may be asserted of "lathe treading," but in this occupation it is far too common to employ young girls about the age of puberty, to whom constant standing and jumping with one foot on the treddle of the lathe, is a too severe exertion for many, and productive of ill health.

The attitude of the workmen is also a sanitary incident to be noticed. In both throwing and pressing, the arms are brought to the sides whilst the chest is bent forward. In this circumstance we recognize a cause of narrow chest, imperfect expansion and inefficient filling of the lungs; at the same time one hand and arm, in the case of throwers, being more exercised, and this, too, at a different level to the other, we get uneven shoulders—one more raised than the other.

Another element contributory to depraved health is the sedentary nature of the occupation of many branches of the manufacture. We find this in the case of handlers, who put handles and spouts on the articles made, and in one or two minor operations. But it is seen on a large scale among those employed in the finishing department, who are busied in painting and burnishing, and in the decorative processes at large. All these employés sit continually at their work. The majority by far are women, and therefore it is not surprising to find the great prevalence among them of the common results of an in-door occupation entailing almost constant sitting: for instance, dyspepsia, anæmia, constipation, and derangements of function pertaining to females.

It remains now for me to say a few words *respecting health conditions, not necessarily connected* with the labour pursued; most of these obtain among manufactures of all sorts.

The proportion in which the two sexes are employed, and that of the young in relation to the full-grown, are circumstances which make their effects felt in manufacturing statistics. Until the Factory Act was extended to the pottery trade, children of eight years and under were put to work and employed for any time, whether night or day, that might suit the will of their immediate employers, whom, I may note, were the workmen needing their assistance. Happily, none are at the present period allowed to work half time under ten years old, nor any for full time who are under fourteen; exception however being made in the instance of those who have reached thirteen and have passed a prescribed standard at school, and then only if the certifying surgeon is satisfied respecting their physical strength and freedom from disease. In these particulars, therefore, we have an example of

sanitary improvement brought about by parliamentary action; but this external influence cannot be made operative in numerous matters influencing health injuriously. It unfortunately cannot make unsteady men steady, or those clean in their persons and work who have no conception of the necessity of being so, or those who are reckless careful in the presence of danger, or those who find close hot shops agreeable and who oppose the introduction of fresh air, sensible to the value of ventilation. Consequently we come across work-places and shops strewn with dust and bits of clay; men and boys badly clad and exposed to cold and wet; those using lead neglecting cleanliness and all precautions in its use taught by experience; and, lastly, both men and women, in all departments, whose greatest dread is fresh air, and who stuff up most assiduously any ventilators constructed to afford it to them.

Again, abundant insanitary conditions are too frequently to be found in the workmen's homes, in their habits when outside the factories, and in the food they make use of. But these and other like circumstances are not peculiar to potters, but prevail more or less among all workers in factories.

Though not an exhaustive account, sufficient has, I consider, been put forward to illustrate the sanitary aspects of the Pottery manufacture. We have observed the sources of danger to health in the materials employed—in the clay, flint, lead and colouring matters; in some of the processes as carried out—in the high temperatures so often involved, and in the modes of working. Over and above all such intrinsic conditions we have briefly called attention also to collateral or extrinsic circumstances affecting the well-being of pottery artizans. But of all the causes of illness to be discovered, dust from the clay stands pre-eminent, and happily it is one that can be overcome to a great extent by those means of ventilation and of extraction modern mechanical science has brought to so great perfection.

I will conclude by adding that there have been vast changes for the better during the last twenty years and upwards that the Factory laws have been enforced. Child-labour has been greatly curtailed, work rendered much more regular, and that at night practically almost abolished; numerous new factories, well built and roomy, have taken the place of dilapidated, damp and confined structures; machinery has been introduced, reducing materially the number of unskilled hands employed, facilitating work and giving it greater development; means of ventilation by fans and other contrivances have been adopted in most factories where there is steam power, with a consequent enormous reduction of the most active cause of illness, the inhalation of dust; and, as might be anticipated,

improvements in the mechanical and general sanitary conditions of their labour have been accompanied by a perceptible material and moral advancement of the employed. There is, nevertheless, ample scope for more; and ever onward progress may surely be looked for in proportion as more correct notions of sanitation extend themselves among all classes; as the ingenuity of mechanicians improves the appliances of labour and invents means for lessening evils attaching to it, and as education spreads and succeeds, instructing artizans in their true interests, both in respect to morals and to health.

Dr. G. H. Fosbroke said those who had listened to the paper had been instructed and interested. Dr. Arlidge had thoroughly described to them the evils accruing to the manufacture of pottery. He would like to call the attention of the Congress to another danger he had had some evidence of after pottery had been sent out and sold. His attention having been called to an outbreak of lead poisoning in his district, he found that home-made wines were largely consumed by the poor, and were generally made in the commonest class of earthenware pans, which were badly glazed and improperly burnt. Some six or seven persons he knew of were affected by lead poisoning, and he traced the origin of the outbreak to the fact that the wine had been made in such pans, and had been allowed to remain therein for some weeks to ferment. He was not able to obtain an analysis of the wine, but the circumstantial evidence was so strong that he had no doubt about it. Had Dr. Arlidge any similar experience?

Dr. Arlidge (Stoke-on-Trent) said, in reply to Dr. Fosbroke, that glaze, commonly used in pottery, is composed of lead and borax and some china clay, and that when this glaze coating ware is exposed to acids, and probably also to alkaline solutions for considerable periods, a decomposition occurred, setting free the lead, which then became a source of poisoning. Anyone could convince himself of this by applying one of the stronger acids to a glazed cup, saucer, or plate; and cases of plumbism are on record following the long action of salt or brine upon the coarser ware used for pickling. But some at least of this coarse ware is glazed by salt, and is therefore harmless.

On "The Transmission by Flesh Foods of Disease from Animals to Man," by William E. A. Axon, F.R.S.L.

There has of recent years been an active Vegetarian propaganda in this country, and a greatly increased number of persons have adopted that system of dietetics, and many more, whilst not wholly Vegetarian, are so to a very large extent. Vegetarians have always contended, that however healthy in a natural state, yet, under the conditions in which animals are bred and brought to the meat market, their flesh must necessarily in many cases be diseased, and become a source of disease to the consumers; and the present trend of medical and sanitary science is in the direction of the position so taken. The recent decision in the Glasgow Sheriff's Court, by which tuberculous animals are judicially declared to be "unfit for human food," is a striking justification of the Vegetarian position, and may well prove to be the beginning of a new era in the history of sanitary science.

Flesh-meat may become a source of disease in several distinct ways. There may be an injurious influence resulting from the decomposition of the animal tissues after death, or they may have been affected by poisonous substances taken into the system during the animal's lifetime, or be tainted by parasitic or other diseases. There are numerous cases on record of death or illness from all these causes, but obviously the last is the most important to be considered in relation to the food supply of the nation.

There is no room to doubt the communicability of disease from the flesh eaten to the flesh-eater. Oxen, pigs, sheep, hares, deer, &c., are liable to become infested with tapeworm by swallowing the ova in their food. These eggs are hatched in the intestinal canal, and the young worms pierce the mucous membrane and the walls of the intestines, and so pass into the tissue, where they are surrounded by a sort of bladder. When eaten by man, these cysticerci have a further development, and are transformed in the human alimentary canal into the fully-matured tapeworm. One frequently fatal disease, hydatids, arises from the injection into the human system of the ova of the tapeworm (*tenia echinococcus*). That which is called measles in the pig is neither more nor less than the cysticerci bursting from their envelopment. The bladder worms infect calves, but the creatures do not survive when their hosts have reached the adult stage, and many thousand

pieces of beef have been examined without a cysticercus being found. Perfect cooking is said to destroy the vitality of the tapeworm, and to render it innocuous in food. Another horrible parasitic disease is trichiniasis, resulting from the small worm known as *trichina spiralis*. Dr. R. P. B. Taaffe says of this: "When the flesh of an animal which contains trichinæ is eaten, the young brood of trichinæ which are born pierce the mucous membrane of the alimentary canal and are conveyed by means of the blood-vessels and lymphatics, and distributed to all parts of the body; a pork chop will show them, whereas measles are principally found about the neck. It takes a space of four days for the brood to become distributed, during which time, if the infection is discovered, they can be dislodged, the remedy considered best being large doses of calomel. A portion of a muscle, taken after death from a child 4½ years old, was examined, and in one grain of the muscle 100 trichinæ were found. The muscles of an adult weigh 40lb., and, if infected in the same proportion as were that of the child, would contain 28,000,000 of trichinæ, quite a population to carry about; taking each of the trichinæ to measure about five to six millimetres in length, the 28,000,000 in a line would give 140,000,000 millimetres, or 90 English miles. One pig has been known to infect 158 persons, of whom 28 died."

The trichinæ, as a rule, are destroyed by cooking, but where this is not perfect there is danger, and accidents, sometimes fatal, are not infrequent.

Apart from parasitical infection, what are the diseases communicable from animals to man? There is some evidence as to cattle plague and swine-typhoid, but it is not so clear as to those of which we are now to speak. Dr. Gamgee says that the transmission to man of foot-and-mouth disease admits of no doubt. The same is true of the various anthracoid maladies. Anthrax can be conveyed by food, and is a specially fatal disease. There is at least a strong fear that erysipelas in animals is also sometimes transferred to man.

Lastly, and most important of all, there can now be no doubt that man may become the victim of tuberculosis from eating the flesh of animals infected with that disease. Tubercle is unfortunately very extensively prevalent amongst cattle reared for human food, and it is not always capable of detection during the lifetime of the diseased animal. Tuberculous meat is therefore constantly present in the markets, and often in enormous quantities. One of the first to call attention to the subject in this country was Dr. Henry Behrend, who, in 1880, wrote an excellent paper on the "Communicability to Man of

Diseases from Animals used as Food," of which, at my suggestion, the Vegetarian Society circulated several thousand copies in a cheap form. He has returned to the subject in an article in the *Nineteenth Century*, September, 1889, on "Diseases Caught from Butchers' Meat." The literature of the subject is growing rapidly, but Dr. Behrend's papers and Dr. Taaffe's address at the Brighton Health Congress, in 1881, on the "Propagation of Disease through Food and Drink," form good résumés, and Dr. C. F. Folsom's paper on "Our Meat Supply and Public Health" (Boston, 1875) is an excellent summary of the subject before the communicability of tuberculosis was generally allowed. In 1882 came Koch's discovery of the tubercle-bacillus. His experiments clearly showed that the disease could be induced by the transfer of tubercle from affected animals to others previously free from disease. So when the tubercle-bacillus, artificially cultivated, was introduced into the circulation of healthy animals, the bacillus was reproduced and tuberculosis resulted. The identity of the tuberculosis of man and of animals has been established by Dr. Creighton and other observers. The testimony alike of English and foreign physiologists and pathologists is that tubercle can be transmitted by the ingestion of the flesh and milk of diseased cattle.

Now, the undisputed fact that tuberculosis can be imparted to the human subject by the use of the flesh of cattle affected by tubercle is one of the greatest and gravest importance, for a large proportion of cattle have the disease, and it is one of the deadliest enemies of the human race. Painfully familiar is the dreaded name of "consumption," the popular designation of the class of disease that is responsible for one-fifth of the whole mortality of this country. In Paris it is said to be the weapon with which Death strikes down one quarter of his victims.

The Congress on Tuberculosis, held at Paris in 1888, called for the legal enforcement of the principle that the flesh of tuberculous animals should not be permitted to be sold, but should be seized and destroyed. A Departmental Committee of the Privy Council has, in this country, pronounced an equally emphatic condemnation, saying, that "although the bacilli may be found but rarely in the flesh, still the chance of their being present, either there or in the blood, is too probable to ever allow of the flesh of a tuberculous animal being used for food under any circumstances, either for man or the lower animals." This total prohibition of the sale of tuberculous flesh is now endeavoured to be enforced in Edinburgh and some other places, and an initial Glasgow attempt has led to a judicial inquiry by way of a test case before Sheriff Berry, when the whole subject was thoroughly debated on scientific and sanitary

grounds. The result is, that after hearing the evidence of experts on both sides of the question, the action of the local authorities is upheld, and the sale of tuberculous flesh is thus declared illegal.

Here it may be well to quote the remark of the *Lancet* (August 24th, 1889, p. 385): "Nevertheless, the doctrine of the infectivity of tubercle, and of the bacillus as the *fons et origo mali*, was so strenuously and widely adopted (so far as we can gather, only one expert confessed that he did not 'believe' in it), and had so much weight assigned to it, that it undoubtedly largely influenced the view taken by the judge. Yet it would have been quite possible to have argued the case and gained it without reference to the bacillus at all, and seeing how obscure is yet the question of its precise mode of action, this course might even have been adopted with advantage." That is to say, that whilst the bacillary theory is generally accepted, the evidence as to the communicability of disease by animal food does not depend upon that theory, but is independent of it.

The Jews, obedient to the laws of Moses, have always rejected tuberculous flesh, and are notoriously less subject to consumption than their Gentile neighbours. The chief rabbi of France says that sometimes 26 out of 30 slaughtered cattle have to be condemned. Some years ago it was stated that 80 per cent. of the cattle sent to the Metropolitan Dead Meat Market was more or less tuberculous. In Hanover 8,000 lbs. of tuberculous flesh was condemned in one month. Out of the animals slaughtered for the London Jews, 40 per cent. of oxen, 29 of calves, and 23 per cent. of sheep were rejected. According to some recently-published statistics of the Berlin markets, of oxen and cows there were 1,296 tuberculous out of 98,397, or 1·36 per cent.; of pigs about 1 in 1,300; of calves about 1 in 4,000; and of sheep and goats 1 in 5,000. The proportion of tuberculous cattle in the Glasgow market was given at ½ per cent. (*Lancet*, 24th August, 1889).

This brings us to the economical aspect of the question. The late Professor Leone Levi estimated the national expenditure on flesh-meat at £99,800,000; but if all tuberculous flesh is to be evicted from the markets it must lead to a great increase in the price of that which is left. Can the nation afford the addition of say another £25,000,000 to its butcher's bill? On a Vegetarian dietary the same amount of nutriment can be obtained at about one-tenth of the cost. Flesh food is thus dear as well as dangerous, and the substitution of clean and wholesome vegetable foodstuffs would increase alike the health and wealth of the community.

On "The Public Health in India, with special reference to the European Army," by Sir H. S. CUNNINGHAM, K.C.I.E.

INDIA presents an interesting field to the sanitarian. Its wide area, its vast population, the uniformity of some of its conditions, the endless variety and wide diversity of others, the maladies which, in some portions of the country find their abiding home, the devastating epidemics which from time to time sweep across its plains—all offer admirable opportunities for observing the laws of life and health, disease and death on a grand scale. The statistics, now for many years assiduously collected and formulated by the Government, though still admittedly incomplete, are enough to establish many important results; while as regards several well-defined groups of the population—the army, the jails, and a few large municipalities—the observations have been exact and exhaustive, and the conclusions arrived at are of high scientific importance. A Government which rules over 1,500,000 square miles of territory and 250,000,000 of mankind—which yearly registers and tabulates 5,500,000 deaths among its subjects—which minutely scrutinizes the physical condition of between 60,000 and 70,000 European soldiers, 100,000 native troops, and a jail population of 80,000—whose officials each year conduct more than 5,000,000 of successful vaccinations—which annually relieves 11,000,000 patients in its public institutions—can scarcely fail to contribute from so wide an experience some valuable additions to the world's stock of hygienic information. The present is, moreover, a period of exceptional interest; for the Indian Government has recently introduced several fundamental reforms into the sanitary administration of the country. In July, 1888, it provided for the constitution of a sanitary Board in each Province, whose function it should be, not only to advise the Government on sanitary questions, but to act as the executive agency through which the Government orders in this department will be carried out. This arrangement had been long urged in India as a first essential of sanitary improvement. It was originally recommended by the Royal Commission in 1863, and was adopted, and, unfortunately, after a brief and imperfect trial, abandoned in 1865. This great reform—one of the most valuable legacies of Lord Dufferin's humane and enlightened *régime*—is supplemented

by others for stimulating and guiding the action of local bodies, and for supplying the necessary loans for sanitary undertakings, an omission which has hitherto been fatal to all projects of structural improvement. If loyally and energetically carried out, the new Government policy will revolutionize the sanitary condition of the country.*

That condition is, by this time, pretty accurately known in its general outlines, though many of the details have still to be filled up. We find the usual characteristics of a population living at a low level, without the knowledge or resources to protect itself against disease; its numbers, on the one hand reduced by enormous mortality, and on the other recruited by a birth-rate, which religion and custom, prompted by the instinct of self-preservation, combine to maintain at as high a rate as possible. The general recognition of the duty of early marriage, so imperatively enjoined by social usage, has, no doubt, arisen from the desire of communities—which war, famine and pestilence were frequently threatening with extinction—to guard themselves effectually against such a contingency. The registered birth-rate rises as high as 38 and 40 per mille in several provinces. The registered death-rate, which, for the whole Empire, averages 20 per mille, is recognised by all experts as recording scarcely more than half the real mortality. Three important provinces, where registration is carried out with some approach to exactness, had, in 1887, a death-rate ranging between 34 and 44·8 per mille; but mortuary statistics, in many instances—notably the great province of Bengal—record but a fraction of the real numbers, and this reduces the general average to a point far short of the actual numbers. It is certain, however, that death-rates of 50 and 60 per mille frequently prevail in many large cities and over considerable areas. In the N.W. provinces, in 1887, three Districts—areas as large as an English county—gave death-rates of 57, 66, and 71. In 19 of the 49 Districts the deaths exceeded the births, the excess in several instances exceeding 20 per cent. In 20 towns the mortality ranged between 50 and 85 per mille. In the Punjab 49 municipalities gave a death-rate of 46 per mille; and in a tract of country where, it must be feared, canal irrigation has added to the natural unhealthiness, the ratio rose to 61 per mille. Still higher rates have at times prevailed in some of the filthy villages which, to the disgrace of the Bengal Government, have

* It is a curious illustration of the rate at which things move in India that, up to a short time ago, the Bengal Government had failed to carry out the orders of the Government of India, passed in July, 1888.

been allowed, for many years past, to encircle the capital of India with a cordon of nastiness and disease.

Dealing, however, only with the recorded mortality of 1887, we find that the 3,500,000 of deaths out of 5,500,000 are attributed to fever. Bengal and the N.W. provinces each lost over 1,000,000 from this cause, a ratio of 16 and 25 per cent. of the total mortality; while in the Punjab and elsewhere an almost equally high rate of fever deaths was reached. Cholera, which is always responsible for a much smaller mortality than fever, swept off 474,000 lives in the entire country, of which Bengal contributed 172,000 and the N.W. provinces 200,000. There were 65,700 deaths from small-pox, the ratio sinking in Bengal as low as 0·05 per mille, and in no British province reaching one per mille. In fact, fever is the great destructive agency in India, compared with which all others appear insignificant. For this the climate to a large extent accounts. A great portion of the country is flooded or saturated during the monsoon, and its surface, covered with decayed vegetation, drying gradually under a powerful sun, presents all the most favourable conditions for malaria. In many instances the operations of the agriculturist enhance and prolong the natural saturation of the soil. In not a few, it must be confessed with regret, the evil has been aggravated by the engineering operations of the Government, which have resulted in over-saturating the soil, raising the subsoil water level to a dangerous height, and blocking up the natural water-escapes of the country by roads, railways and embankments, in which no proper allowance has been made for the surface water-flow.

In his last report, Dr. Gregg, the Sanitary Commissioner for Bengal, estimates that 22,000,000 people out of a total population of 66,000,000, suffered, in the course of the year, from fever. He points out that, flat as is the general surface of the soil, most of the towns and villages are situated on comparatively high ground, on the banks of rivers, with a natural flow away, so that the means of drainage exist, if they were not artificially impeded; and he records his opinion, as the result of many years' experience, that the existing culverts are totally inadequate and that their numbers should be at least doubled. The Bengal Government admits the justice of the charge when it observes, with reference to the Sanitary Commissioner's complaint, that "the waterway allowed in railway and road embankments is calculated rather with reference to the stability of the work than the sanitary requirements of the locality."

In upper India the ravages of fever in the water-logged localities around the great canals have long been notorious. They were forcibly described last year by Dr. T. H. Thornton,

a distinguished Bengal civilian, in an address to the Society of Arts.* Nothing, of course, can have been further from the intention of the Government than to contribute to so lamentable a result, and nothing can better indicate the paramount importance of efficient expert sanitary superintendence in a country, where, as in India, a mistake or oversight may involve wholesale disaster. Great structural works of drainage are often financially impossible; but there are humbler remedies, which would do much to reduce the fever death-roll of India. One of these is an improved water supply. At present the Indian peasant too frequently gets his drinking water from shallow wells, into which every form of surface pollution quickly finds its way; or from tanks, which are receptacles of the drainage of the village, and become in time little better than collections of rather strong sewage. Modern science has devised numerous effective means of water-purification by means of filtration. Many of the water plants of India have great oxygenising properties, and if the existing tanks were fenced off from contact, protected from surface impurity, and the water passed through filter beds before reaching the point of supply, an enormous improvement might be effected in the health of the population. No such experiment has ever as yet, so far as I am aware, been tried; indeed, it is only in a few of the principal towns that any attempt at a proper water supply has been attempted. Many important cities had not, as recently as 1887, accomplished this first essential of sanitation. Benares, Agra, Allahabad, Lucknow, Patna, Umritsur, Delhi, and Cawnpoor were among the notable delinquents. Delhi has long been a notoriously unhealthy station for European troops. In 1887 the rate of admission to hospital was 2557·2 per mille, and an average daily-sick rate of 85 per mille, and the death-rate 14·5 per mille. Benares had an admission-rate of 1442·1 per mille, and a death-rate of 30: Cawnpoor an admission-rate of 2019·8 and an average of daily sick of 90: Umritsur had an admission of 2619·3 per mille, a daily sick average of 108, and a death-rate of 25·5 per mille.† It would be curious to know what has been the money cost to the British Government of the valuable lives thrown away at these and similarly situated stations, by the persistent neglect of the first conditions of healthy existence.

The statistics show distinctly that the mortality among the

* Journal of the Society of Arts, March 23rd, 1888. See also Report of Sanitary Commissioner for the N. W. P. for 1887, sections 44—55.

† See Table XX. in 24th Annual Report of the Sanitary Commissioner with Government of India.

general population is enormous; but the evidence is no less distinct that this mortality is to a large extent preventable. Obscure as are the laws which govern the prevalence of epidemics, and greatly as cholera and other like diseases may baffle the attempt of science to analyse the means of their generation and propagation, there is no room for doubt as to the efficiency of sanitary measures in curtailing their effects. Small-pox gives way before vigorous vaccination; and though a considerable per-centage of new births still escape the process, the disease has practically disappeared from many parts of India. Fever subsides wherever the super-saturation of the soil and other circumstances conducing to malaria are removed. Cholera, even in its endemic home and at the height of an epidemic period, fights shy of localities and communities which have protected themselves by sanitary precautions, such as pure water and careful removal of surface filth, against its inroads.* Wherever, in India, sanitation at all on the scale usual in England has been carried out, the death-rate has speedily sunk to nearly the English level. We are thus led to the conviction that, by measures within the practical competence of the Government and public in India, by reasonable expenditure and adequate and well-considered arrangements, a near approach to the English ratio may, and some day will, be attained. Such a change would save annually some four or five millions of lives, which are at present sacrificed to preventable disease, and, on the generally accepted ratio of disease to death, would obviate some 80 or 100 million cases of preventable disease. It seems to follow that, if this or anything like this be the case, the loss to the wage-earning community through premature death and needless disease, must be something vastly in excess of any expenditure which the necessary sanitary improvements could involve, and that an amount of human suffering—the vastness of which it almost baffles the imagination to conceive—is needlessly incurred. Thus considered, sanitary reform stands prominent among schemes for the amelioration of human life, such as occupy the Indian Government, and deserves infinitely more attention than it has been usual to accord to it. For it must be admitted that, while, as regards special bodies, such as the army and jail population, substantial improvement has been achieved, no practical impression has yet been made on the conditions which affect the general health of the community. In some instances there is good reason to fear that the action

* See Memorandum by Surgeon-Major G. Hutcheson on "Cholera as a preventable disease." Appendix B to 24th Report of the Sanitary Commissioner with Government of India.

of the Government has tended, as in the case of canals, very seriously to its deterioration. In its last Memorandum,* the Army Sanitary Commission, in calling attention to the enormous prevalence of epidemic disease in India, pointed out that 38 million victims, in a single decade, have succumbed to diseases of the mitigable or preventable order, such as have been combated with such success in other countries as to have practically disappeared, except in the milder forms in which they now occasion part of the ordinary mortality.

Such is the general nature of the task which lies before the Government in respect of the general population—one, surely, of vast importance to the well-being and happiness of mankind. A vaster it would be, I think, difficult to imagine. Little or nothing towards its accomplishment has hitherto been achieved, except to prepare the ground by showing its necessity, by proving by actual demonstration in several independent instances that its accomplishment is not practically impossible, and by providing the machinery by which, if public opinion be sufficiently stimulated to set it in action, its accomplishment might be realized.

I now come to the special subject of this paper, the health of the European force in India. In 1863 the Royal Commission reported that the death-rate of European troops in India had, for the period antecedent to their appointment, been at the rate of 69 per mille, that such an expenditure of life was perfectly unnecessary; and they indicated certain reforms which would reduce the rate to 20 per mille, and, ultimately, when the general sanitary condition of the country was improved, to 10 per mille. The first of these anticipations have been abundantly fulfilled, and some approach has been made to the attainment of the second. The decade, 1870–9, gave a death ratio of 19·3 per mille, and in 1883 the ratio of 10·8 per mille showed a close approximation to the lowest ratio which the Commission had indicated as achievable. Since then the ratio has ranged between 12·5 and 15·1 per mille; and though the death-rate was higher in 1887 than in some preceding years, the combined loss from death and invaliding showed a substantial gain on the preceding decade.

Ratio per Mille.

	Deaths.	Invaliding.	Combined Loss.
1870-9	19·3	43	62
1887	14·2	23	37

Against these satisfactory results must, however, be placed

* Memorandum of the Army Sanitary Commission for 1885.

some unfavourable circumstances which show that the task of the sanitary reformer with the European army is yet far from completion. The ratio of admission to hospital has, in several recent years, exceeded 1,500 per mille, a higher ratio than in the preceding decade; and the ratio of daily sick, which for 1870-9, stood at 60 per mille, has for three years risen to 70 or more.

Ratio per Mille of Daily Sick.

1885 ... 71
1886 ... 75
1887 ... 70
} irrespective of the force on active service in Burmah.

It is obvious that an army, in which every man goes into hospital once and a half times in the course of the year, and which has continually 70 men out of every thousand on the sick list; and which, between death and invaliding annually loses 37 men out of every thousand, has something still to learn as to the special circumstances of the soil and climate, and as to the way in which the unfavorable sanitary conditions of the East may best be met. Whether the result be attributable to the larger proportion of young soldiers, or to the shorter period for which they remain in the country, there would seem grounds for believing that the liability to certain diseases is on the increase. Take, for instance, the heading of "fevers"—a class of disease—which accounts for a third of the entire mortality of the European army in India. The statistics for recent years are anything but reassuring. The death-rate from enteric fever in the Bengal army, which for the decade 1870–9 had stood at 2·28 per mille, stood, in 1886, at 5·7 per mille, and at 4·09 in 1887. The Madras and Bombay armies, also, exhibit higher death-ratios from enteric fever, while the death-rate from fevers of all classes, showed, in every Presidency, a substantial increase.

Death-rate from all Fevers per Mille.

	Bengal.	Madras.	Bombay.
1870-9	4·02	2·04	2·89
1886	6·69	4·74	4·43
1887	4·85	3·49	4·30

Such a state of things cannot but occasion anxiety to those whose care it is to render the European army as efficient an instrument as it is necessarily costly. If increased youthfulness be the explanation, it becomes all the more important to ascertain the causes which render youth especially liable to unhealthy influences, and the mode in which these can be most effectually

counteracted. "A young army," observed the Sanitary Commission in its last Memorandum, "involves, as one of its conditions of service, the most rigid attention to every sanitary requirement. The necessity of thorough ventilation, good drainage, dry barracks, the effectual removal of all surface filth, the improvement of localities by subsoil drainage, has long been universally admitted; but it is questionable whether there is not room in almost all branches for the more thorough and systematic recognition of their bearing on the health of a regiment."* A carefully selected dietary, first-rate rations, the discouragement of intemperance, and of the large consumption of alcoholic drinks which, though falling short of intemperance, tends to undermine the constitution in an Eastern climate, rations issued before fatiguing duty, a change of clothes when the soldier comes in heated from parade, well-placed, well-contrived, and well-ventilated barracks, a more general location at Hill Stations, more opportunities of useful and interesting employment —all these have been mentioned by military experts as matters which call for attention, and which might be made to contribute to an improved standard of health in the army. It is, moreover, absolutely essential that if a high standard of health is to be achieved, the country in which troops are located should not be allowed to remain in a pestilential condition. In Lucknow, for instance, the fever death-rate in the European force was especially high, 4·7 per mille; but this is easily explained by the circumstance that the fever death-rate for the civil population of the town was 29 per mille, and for the district 26 per mille. No precautions can effectually safeguard the army from deadly influences which operate thus powerfully on the population by which it is surrounded, and of which it forms a part.

Hitherto we have dwelt with attempts—hearty, and for the most part successful—to protect the European soldier from the diseases to which his artificial life in a tropical climate and his unsanitary surroundings render him especially liable. There is, unhappily, one class of diseases which we not only do not do our best to diminish, but which we deliberately encourage, if the abandonment of known means of mitigation and prevention deserves the name of encouragment. It is well known that there has been of late years, and especially since 1877, an alarming increase of venereal disease in the European army of India. The admission-rate has risen from a range between 166 and 196 per mille in the years 1871–1874 to 389 per

* See also Minute by Sir H. Yule, K.C.B., published in Report on Sanitary Measures in India. Vol. XXI., p. 178.

mille for 1886, and 361 per mille for 1887.* Various causes are assigned for this increase. Owing to the abandonment of restrictive measures in England, regiments arrive in India in a more highly diseased condition than in former years. The proportion of young men is larger: in 1877 men under twenty-four years of age contributed only 33·5 per cent. of the force; in 1885 they contributed 47·8 per cent. The proportion of married men has sunk from 10·37 in 1876 to 3·84 in 1888. The shorter term of service and the more frequent movement of troops to various parts of the country are also believed to have contributed to the same result. Be the explanation what it may, the facts are undisputed. In 1887 we had 63,000 European troops in India, nearly half of them under twenty-four years old, all of them but a fraction—less than 4 per cent.—condemned by the rules of the service to celibacy, and removed from whatever humanising influences a home life may have possessed. Of this force no less than 23,100 men were admitted to hospital in the course of 1887 for venereal disease; of these no less than 9,000 were for various forms of syphilis, a disease which so seriously undermines the constitution that we have it on the authority of an Inspector-General of Hospitals, that fully two-thirds of the men who suffer from it are invalided within five years.† The following table shows the increase in each army since 1872:—

ADMISSION RATIO PER MILLE.

	Syphilis. 1872.	Syphilis. 1887.	Other Venereal Diseases. 1872.	Other Venereal Diseases. 1887.
Bengal army	84·5	166·9	98·0	188·9
Madras „	94·6	209·3	68·8	124·8
Bombay „	68·4	175·4	82·0	189·8

The military authorities in India are thus confronted with the fact that out of every 1,000 men in the European army 361 are treated in hospital in the course of the year for venereal disease. Allowing twenty days on the average for each case, we get a total loss of 462,000 days of active service, and if in addition to this, it is remembered that in nearly 9,000 cases—those of the graver forms of the disease—the man's constitution receives a permanent shock, and the chances of his being invalided are seriously enhanced, it is obvious that the strength of the army as a fighting machine is seriously impaired.

The matter has, for many years, attracted the earnest

* See Blue Book Return, East India, Contagious Diseases, 1888.

† Dr. Duncan McPherson. See Note by the Surgeon-General and Sanitary Commissioner with Government of India. Blue Book, Contagious Diseases, 1888, p. 79.

attention of the Government, and various legislative enactments have been passed, providing for the supervision and control of the prostitutes with whom the British soldier is likely to consort. The strong feeling which exists in this country against any interference with prostitution, resulted, last year, in a resolution of the House of Commons, which amounted practically to the abolition of all the existing machinery of control and supervision. One principle laid down was that no woman should be liable to compulsory examination; another that there should be no system of licensing and so recognising prostitution. The Secretary of State's despatch in conformity with this resolution was a striking instance of the powerlessness of the Indian Council to resist English popular opinion acting on the Government of the day. The despatch was negatived by a majority of 9 members of the Council to 4; Sir John Strachey recording as his ground of dissent that "the inevitable result of these orders must be the complete abandonment of all efforts to protect the troops against one of the most serious dangers to which they are exposed, and that increase of disease must follow, with great diminution to the efficiency of the army." The Secretary of State, however, informed the Council that the despatch had been already sanctioned by the Cabinet, and that, despite the disapproval of the majority of the Council, he intended to send it to India.*

The Government of India is now endeavouring, subject to these important restrictions, to frame rules which may, to some extent, check the alarming growth of disease which has followed the removal of control. On a recent occasion at Simla, the Military Member of Council and the Commander-in-Chief concurred in describing the results of the recent change as disastrous to the army.

His Excellency, the Commander-in-Chief, showed by a comparison of the year 1883, when the Contagious Diseases Acts were in full force, and the present year, how serious the increase of disease had been in the Bengal army. "From this return," he said, "I find that at no station in 1883 did the number of venereal cases of sick in hospital reach 30 per cent.; at only two stations was it over 25 per cent.; while at some stations it was under 12 per cent. In June of this year at thirteen stations the percentage was more than 50, at a great many it was just under 50, and at the majority of the remainder it was 30 and over." Putting the same facts in another way: in July, 1883, the proportion of soldiers in hospital with venereal disease to the whole force was 1·77 per cent., in July of this year it was 3·5

* See Minutes of Dissent—Parliamentary Paper 220. 13th June, 1888.

per cent., or about double. Moreover the 1,548 men, who constituted the percentage, did not by any means represent the whole amount of disease attributable to this cause, as—owing to a change in the classification—a large percentage of the diseases, thus occasioned, are now returned under other heads.

The Viceroy, who expressed his warm concurrence in the views of his colleagues, directed attention to the serious restriction imposed on the Indian authorities by the Resolution of the House of Commons, and insisted on the absolute necessity of providing effectual measures "for preventing this particular form of disease from being propagated, which it appears to be at present without let or hindrance" . . . "To say that we are not to take steps of this kind appears to me to be tantamount to claiming for a class of disease, which is probably attended with more disastrous consequences than any other, with reference to its immediate and its remoter effects, an immunity which is not claimed for any other kind of contagious malady."

Two objections are urged by the opponents of the control of prostitution in Indian cantonments: one, that the control has been ineffectual; and next that, even though it may be effectual, it involves hardship and degradation on the class of women who come within its scope. As to the first of these it is, happily, possible to give a categorical reply. Practical experience has demonstrated, beyond the possibility of dispute, that control, even if incomplete and inadequate, does exercise a potent effect in reducing the amount of disease. The history of the subject in Calcutta amounts to demonstration. The Act was put in force in that city in 1869; it was suspended in part of the city in November 1881, and in the entire city in March 1883. The following figures tell their own tale with sufficient explicitness.

GARRISON OF FORT WILLIAM.

	Ratio per cent. Primary Syphilis.	All Venereal Diseases.
1869	10·0	25·0
....		
1873	1·4	7·4
1874	1·4	9·4
1875	2·3	10·3
....		
1883	10·9	28·0
1884	30·2	58·14
1885	15·10	31·6

From these figures it is apparent that, in 1873–4, syphilitic

disease had sunk from a high ratio—10 per cent., to a low one —1·4 per cent. In 1883 it springs to nearly 11 per cent., and 1884 to 30 per cent., while 58 per cent. of the garrison are affected, with one form or other of venereal disease.

Another convincing experiment was tried by the Government in 1885. Doubts having been expressed as to the efficacy of the Lock Hospital system, the military authorities determined to close a certain number experimentally. The result, as described by the Surgeon-General of India was as follows:—"13,443 men were left without protection, and, in consequence, in every thousand of the men 192 more admissions for venereal disease than the average of the preceding ten years during which they were protected." In order to be more precise the Surgeon-General deducts 61·2 per mille, which may, he considers, be attributed to the natural increase of an especially unhealthy year. "The result of the experiment means that 130·8 men per mille of those who garrisoned cantonments where lock hospitals were closed, contracted venereal disease, who would not have suffered had the hospitals remained open. As the strength of the army was 56,967, this again means that the experiment caused 7,451 more admissions than would otherwise have taken place, and assuming, as before, that each case remained, on an average, 20 days in hospital, this would represent 149,020 days of inefficiency."

On the whole the statistics adduced by the Surgeon-General are absolutely conclusive as to the enormous efficacy of preventive measures in checking disease of this order in the army. Let anyone who is inclined to feel sceptical on the point consult his Memorandum, and especially his summary of the history of the subject at p. 87 of the Blue Book. It is, I think, impossible, after perusal of this document, to feel any reasonable doubt that we have it in our power wherever we choose to enforce the necessary restrictions to put an end practically to the more serious classes of venereal disease in the army,—in other words, to rescue nearly 11,000 men annually from various forms of syphilis.

Of the effects of this disease on a European constitution in an Eastern climate there is, unhappily, no room for doubt. I have already quoted the opinion of Inspector-General McPherson that fully two-thirds of the men who suffer this disease are invalided within five years. As each soldier costs the Government £150 before he arrives at an Indian Cantonment, this in itself is no small consideration. But the claims on the ground of humanity are infinitely stronger. There is, in the first place, the unquestioned fact that the disease is hereditary as well as contagious, and that innocent women and children

have frequently to suffer for the husband or father's indiscretion. As regards the patient himself the Viceroy spoke advisedly when he described the disease as "probably attended by more disastrous consequences than any other with reference to its immediate and its remoter effects."

The Surgeon-General of the Bombay army in supporting H.R.H. the Commander-in-Chief in his protest against any interference with the existing rules, gives a really appalling account of the after consequences of this dreadful malady. After mentioning the conditions in which it does directly endanger life, he proceeds—"It is, however, indirectly and remotely that syphilis proves so very destructive to life. Indirectly, there is no disease which causes greater mortality as well as all kinds of misery." In questioning patients as to their previous history, how often is it found that the first link in the chain dragging them to the grave is syphilis? M. Ricord regarded it as the "most terrible contagion which ever threatened mankind," and Ricord's experience was immense. It is tertiary or remote syphilis which is the most destructive. Diseases of the eye, especially iritis, often ending in blindness; diseases of the spinal chord, terminating in paralysis; diseases of the brain, ending in a similar condition; diseases of the heart, the forerunner of dropsy, all result from syphilis. In a recent address on cardiac maladies before the British Medical Association, Sir Dyer Duckworth stated, "Later on in military life the influence of syphilis comes in and aneurism results. In short, disease of most internal organs has been fully traced to those degenerations and formations which result from venereal." In particular the Surgeon-General indicates liver-disease, dysentery and fever as much more closely connected with a syphilitic taint than is ordinarily imagined to be the case.

Such is the malady which, as matters now stand, we intentionally and deliberately inflict on 11,000 British soldiers in India every year. We do it with our eyes open: we know how to produce the result, we know how to prevent it: we advisedly choose the former course. Did ever folly perpetrate a more cruel absurdity?

As to the moral aspect of the question, I desire to speak with all respect to the motives and feelings of those whose agitation has been instrumental in bringing about the present lamentable state of things in the British army. I value morality as highly as they do; I regard the dignity of woman and the sanctity of virtue with as sedulous a reverence as theirs; but I maintain that to take 70,000 young English peasants at the time of life when animal passion is most imperative; to carry them away from all their natural surroundings, to enforce on them a life

of celibacy, and to plant them down in stations, where, owing to the absence of precautions which, though proved to be effectual, we deliberately refuse to take, it is absolutely certain that incontinence will be followed by a loathesome and dangerous disease, is to commit an act of folly and cruelty of which every Englishman has reason to be heartily ashamed. It is no question of female degradation, because the low class of prostitutes with whom the soldiers consort, can only be benefited by any arrangements which rescue them from loathesome disease and suffering. In many cases the women themselves recognize the advantage of protection from what is the curse and terror of their lives, as is proved by the fact that a daily average of about a hundred prostitutes still spontaneously frequent the Calcutta Lock Hospital; the only difference being that, whereas, under the compulsory system, the women were taken at an early stage, and the "worst forms of the disease had practically disappeared,"* the Lock Hospital is now, the officer in charge informs me, filled with wretched creatures, who creep in—a living mass of pollution—to end the protracted torture of existence.

There can be no doubt that the graver forms of venereal disease might be banished from our Indian army by reasonable precautions—reasonably, humanely and decently administered throughout European cantonments; but equally there can be no doubt that, handicapped as it is by the Resolution of the House of Commons, the Indian Government cannot enforce these precautions; and representing, as I know that I do, the views of many experienced officials, who have the interests of the army at heart,—of many eminent medical men who know the real facts of the case and the lamentable results of the recent Resolution of the House of Commons, and of large numbers of laymen who object to exposing thousands of their countrymen to unnecessary suffering and disease,—I desire to protest, in the name of common sense and humanity, against a policy which practical experience has shown to be disastrous, and which sacrifices real and tangible advantage to morbid sentiment and spurious morality.

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* See evidence of Surgeon-General Payne, quoted in Blue Book, "Contagious Diseases," p. 63.

On the "Unsanitary Conditions of Domestic Animals," by A. LE GRAND.

ABSTRACT.

In spite of laudable efforts to improve the lot of domestic animals, it is astonishing to what a small extent advance in this direction has been made. The sanitary condition of animals that contribute to our daily food is of the most vital importance. First comes the cow. Its milk serves for our daily nourishment from the cradle to the grave, and many are indebted to it for their very existence for the first few months after birth. Looked at from the most selfish view, it is essential that such an indispensable animal should be kept in a healthy state. Of the condition of cows kept on grazing land, and driven night and morning into sheds, there is little to complain, except that frequently their only drinking fountain is a dirty mud hole contaminated by field drainage. The unwholesome effect of such water upon cattle hardly needs comment, and is it to be expected that cows drinking such foul fluid can yield wholesome milk? The farmyard well is more often than not polluted, while the horse-pond is frequently little better than the mud hole. In and near towns the cows exist in sheds, pent up for months without exercise; their existence is one monotony of standing, eating, lying down, and chewing the cud. Instead of pasturage their foods are more or less artificial, such as oilcake and brewers' grains, only occasionally varied by green herbage. In the summer, fermentation rapidly sets up in grains to the detriment of the cow so fed. Except in first-class metropolitan dairies, cow houses are insufficiently lighted, and seldom a ray of sunshine enters them, and yet daylight and sunshine have as much to do with the health of an animal as good food and exercise.

Many of the foregoing remarks apply equally to the ox or sheep. The condition of an ordinary straw yard should not be overlooked, and for a number of animals to be standing all day long knee deep in rotting manure is, to say the least, both unnatural and injurious. Hard as is the state of a pent-up cow, it is Princely compared with the pig. Rarely he may be seen happily grazing in an orchard, varying his fare with fresh windfalls, for he is often too dainty to touch the apple that has laid too long on the ground. So far as food goes the average

farm pig has little to complain of, but his domicile is simply disgusting. He has scarcely room to turn in the uncovered part of his sty, and so must wallow in filth, and his feeding trough being in the same compartment becomes inevitably contaminated. The covered portion of the sty is, if anything, smaller, and, in point of cleanliness, little better than the uncovered part. The fate of the suburban pig in poor districts is still worse. The stench of the garbage they are fed upon from reeking tubs makes the chance of their furnishing wholesome food for man very remote. Their food includes slaughter-house offal, refuse and leavings of hotels and dining-rooms, including, as often as not, pork as well as other meat. This is collected daily in carts which, from their appearance, it is safe to say are never cleaned. In summer time the stench of these carts quickly warns the passer by of their approach, and the food put in them at once commences to ferment and decompose. Can it be wondered at that trichina, fevers, and divers other diseases are rife among pigs thus herded and fed. Is it not reasonable to infer that diseases are engendered in those who eat the flesh of these pigs?

Brief reference may also be made to the conditions of those animals which minister to our necessities or pleasures other than by yielding food. Even the horse, though mainly well cared for, is often no more intelligently shod than it was 100 years back. In the average stable there is want of sufficient room and ventilation which causes the strong smell of ammonia, and an absence of adequate light appears to be the general rule. The cubic feet necessary for a healthy stable seem to be little considered. Passing notice may also be given to that companion and friend of man—the dog. Many of these are over-fed, and get little or no exercise. Some are chained up from one year's end to the other, getting no exercise at all. Kept in such a condition, the dog becomes a most offensive and unwholesome animal, and its state must be one of great misery, conducing most certainly to disease, possibly hydrophobia, and in some cases to dangerous ferocity. Even the sanitary condition of the hounds shows something wanting, as occasionally a whole pack is annihilated by disease, probably caused by their being herded together. Other animals might be enumerated, but sufficient has been cited for making no apology necessary for bringing the subject before such a Society as the Sanitary Institute.

On "Athletics and Gymnastics in Use and Abuse," by WILLIAM WHITE, F.S.A., F.R.I.B.A.

It must not be thought that an architect is travelling out of his proper province in addressing this Institute on a subject which has not even a remote relation to constructive sanitation. Professional men and others of a sedentary occupation, ought to be specially interested in all that relates to the edification of their bodily structure, and to the due fulfilment of the duties of their calling. Happily at the present day, with our increased aids to mental culture, we are taught the vast importance of physical development also.

It has been supposed that severe bodily exercise contributes to the development of exceptionally great intellectual power. This has been maintained mainly on the ground that bodily movement is recreative from mental exertion. Great names have been quoted as illustrating and corroborating this supposition. And some of our highest academical honours have been gained by men who have also been amongst the most noted for boating, cricket, football, pedestrianism, or other athletic exercises. But the doctrine must be taken only for what it is worth; for we find that many have done themselves irreparable injury by indulging in over-violent exercises whilst engaged in severe mental strain. The fact is that muscular equally with mental exertion is exhaustive of brain power; and it is held by many medical men now that all who are deeply engaged in study should give themselves only moderate but regular daily exercise, never approaching to exhaustion. We must not burn the candle at both ends. There may be exceptions when men endowed with great physical as well as mental energy have seemed able to do almost anything with impunity. These are the men who come before the world as athletes in mind as well as in body, but it is by no means the common lot of men.

I suppose no race at the present day has greater physical energy and bodily endurance than our own. And this, as characteristic of the English nation, finds not only expression but expansion and perpetuation in our national pastimes. Men have at times practised severe, if ill-advised, special training for competitive purposes. To such an extent was this carried some years ago, that in order to promote the fullest formation of

muscle, the food of boating crews was made to consist chiefly of uncooked beef browned over on the outside. Like the Spartans of old, they were ready to submit to severe discipline, but the discipline was neither wholesome nor agreeable. At the present day the limitations and allowances of diet are much better understood, and are more *intelligently* acted upon by *intelligent* men. The old system had its uses, in the promotion of moral discipline, and in the survival of the fittest. Many failed under it; the weak ones went to the wall, whilst those whose good constitution enabled them to bear up under it became the foremost in their day in their respective pursuits. Such training is not now thought needful, or indeed good; and athletes are subjected to little more than the observance of the ordinary rules of health. But stimulants should not be taken either before or during any great exertion, and it is essential that all food, especially farinaceous and other soft substances, should be thoroughly masticated. In some Oxford training, pastry is forbidden, and more than a half-pint of beer.

A sanitary condition is that in which all the forces of the body are equally balanced; disease is that in which some one or more of the parts are defective, or else over-developed. And in athletic sports and manly games many young men have been, and still are being, seriously and permanently injured in bodily health as well as in mental vigour, merely because being ignorant of this they have neglected or refused to take proper precautions. Even growing children have been left too much to their own inexperienced instincts of what they may or may not be able to bear. All, however, seem to be impressed with the idea that active exercise is the one thing needful, and that the more severe the strain imposed upon the body the better it is likely to be for them. They are by no means impressed with the same regard to the restraints requisite to impart vigour to the constitution.

From our earliest childhood we have been taught that the best exercise for everyone is that most easily attainable one of walking. But it really is not so; and unless children are strong and in perfect health, long and forced walks are absolutely injurious. Undue exertion is thrown upon the legs and dorsal muscles without any compensating influence upon other parts of the body; such is the system of coercive exercise given in educational establishments which perversely and perseveringly adhere to what may be fitly called "pedagogical pedestrianism." Growing children, even in open spaces and where they might with advantage enjoy a little freedom, are still condemned to the old rule of a monotonous, tedious, and wearisome tramp. A child's instinctive exercise is romping and

play, by which every muscle is brought into healthy motion; and with the adult equally the same amount of diversity of motion is needful for the maintenance of his health. The arms, the shoulders, and the back, must have their equal share in the work.

Now let us look for a moment at the difference between mountain climbing and the ordinary "constitutional." Along the high road we may find in perfection the monotony of muscular action, with its corresponding tedium and fatigue. In mountaineering we may find the most enjoyable recreation that is to be had. We come face to face with the grandest and loveliest forms and features of nature, in the freshest and purest air, and with the delights of the free exercise of our limbs. But further than this, which is more to our present purpose, the inequalities of the way, and the active use of the alpen-stock, bring fully into play the whole muscular system. Even those who by habit of life, or by want of vigour and endurance may not be fitted for such work, can solace themselves with shorter excursions and lower elevations, which, however, they will find equally beneficial, as being the best suited to their respective needs, and perhaps on these accounts also equally enjoyable. But, unfortunately, there are many who fail to find the benefit and the pleasure which they ought to derive, merely through their lack of knowledge, or of will, to follow the course which the laws of health and the instincts of common sense would point out.

The injurious effects of violent movements may perhaps be the best seen by the reverse picture, in the invigorating and curative effects of regularly recurring movements properly and systematically directed, to give relief not only to muscular defects or injuries but also to many diseases. In medical cases the principle upon which such movements are prescribed is not by treating the injured, overstrained, or defective local members only, but by general treatment also. Great care is required to avoid throwing undue strain upon any set of muscles or functions; and the more equally and thoroughly the whole of the muscular system is exercised and strengthened, the greater will be the curative effect.

The various games now played in England are well adapted for the exercise of the whole body, but probably one of the best we have is lawn tennis as giving freer scope for the exercise of the arms and body, in all positions, without necessity for excess of muscular strain. For the vigorous and robust a great deal may be said in favour of the modern mode of football and cricket; but for mere healthy exercise these games have ceased to be so generally useful as they were

formerly, on account of the roughness, violence, and needless dangers which seem to have become inseparable from them. This is especially the case in football, which has given scope for the display of brute force rather than of rational sport and scientific action, and to such an extent as to create even in reasonable and sensible persons a prejudice against it altogether.

It would be difficult to exaggerate the importance of attending to small details for the preservation and promotion of health, whether in all that the athletic world opens up to us, or in the training of the young to fit them for it. At the same time we should be especially careful to guard against the encouragement of what is called "coddling." Remember, careful mother, that the natural tendency of coddling is to weaken the will and to lessen the powers not only of the endurance of bodily ills, but also of the resistance of moral evil, besides making your youthful prodigy fearful of fresh air and cold water, or of any little inconvenience. But others, recognising the moral obligation of self-denial for the promotion of health, have advocated what is popularly known as the "hardening process." Our young people are to be braced against all feeling of cold or of discomfort; they are habitually to disregard sudden changes of temperature, draughts, and chilling influences of every sort. Doubtless it has proved a boon to such as could stand it, making them practically independent of trifles which tend to habits of self-indulgence. But this again has led full many a time to a reckless disregard for things which are really requisite for self-preservation. Young men ostentatiously give up overcoats and comforters; they profess a singular disdain for cold and wet, and for the discomforts incidental to outdoor pursuits in a severe and trying climate; they rise to a sense of superiority to all around them, which often leads to failure, and a consequent recourse to the very coddling from which it has been their laudable endeavour to escape. Thus the hardening process becomes but one degree better than coddling, not one whit less injurious and foolish. It may be better as promoting self-denial; but even this requires to be properly directed, or the hardening process will prove to have but a softening effect upon those who cannot endure it. Even a strong constitution may be permanently injured by reckless exposure. The very fearlessness which commonly accompanies a good constitution may thus become a source of weakness and of danger, particularly when combined with a vain desire to display it. I should be sorry to seem to depreciate or to discourage in the slightest degree the active energy and endurance which are the glory of the rising generation, as they have been of the past; but there are many who will enter recklessly upon a course of violent

exercise, or of severe self-discipline, with no previous training, and with no special fitness for it; and I wish to combat the notion that undue exposure and discomfort will necessarily fit and prepare the young and the weak for severe strain or for habits of endurance. I contend that chronic ailments ought to be met with chronic treatment, and by a careful avoidance of such accidents and circumstances as may have a natural tendency to increase them. I remember, as a child, the reply made to my mother by one of her maids, whom she scolded for exposing herself to the cold wind on the wet grass without protection whilst hanging up clothes: "Oh, ma'am! I'm sure it can't make no difference, for I 'most always has a bad cold."

And I wish to emphasize the principle of self-protection, in those athletic and gymnastic exercises which are undertaken more especially for the benefit of the health. The weak parts of the constitution require guarding and strengthening, not over-working and straining. Chances of injury should be avoided for fear of its permanently weakening effects. When I say "for fear," I use the term only in its popular not in its proper sense, for if there were but more proper fear there would be less danger. A severe chill, for instance, has induced bronchial, pulmonary, or muscular injuries, which have rendered the system through life certainly not less susceptible of subsequent attacks, but very much more so.

But again, nervous fear of consequences may make us only the more susceptible of the very evils which we dread. It is said that an active sanguine conviction that we shall not suffer from an accidental exposure, to cold or wet for instance, has an exciting and wholesome effect upon nerve action which tends to keep up the circulation and strength. This comfortable conviction may be of considerable value and use, just as a man may be induced to try his utmost to keep himself awake in order to prevent his being frozen to death. Still, it would be mere trifling to suppose that such a temperament will save us from the effects of imprudence or chill.

A course of gymnastics then, if properly regulated, is beneficial for the maintenance of health, as well as for its recovery when lost. Other nations have, till recently, been far in advance of us in this. In Col. Ling, the true soldier, scientist, poet, and Christian, Sweden produced the pioneer, to be followed by Germany and France. In Sweden all children have to go through a course of what is there known by the name of "Health or Educational Gymnastics," directed by properly qualified teachers, whether with or without apparatus; and it is Sweden that has established a highly scientific code of medical movements, as formulated by Ling himself, for the relief or cure of

diseases which can scarcely be reached by medicine alone, such as spinal curvature, diseases of the heart, and derangements of the nervous system or vital organs. In England at the present day Massage (which is also used in Ling's system) has been much employed, and too frequently ill-done, or over-done, by many, it is to be feared, who have had only a mechanical training, little knowledge of physiology, none perhaps of anatomy and pathology, and absolutely no experience of the movements often required to give permanent effect to the massage. A few English medical men have availed themselves of its aid, but Ling's system, in its entirety, has as yet received but little or no recognition here. A few properly qualified Swedes, of both sexes, may be found in London. And there are several others who are carrying out a development of their own rather than Ling's system. Several English medical men have visited the Royal Central Institute at Stockholm, but I believe none have gone through the whole course.

To the biennial medical course at Stockholm, established for the training of twenty Swedish women, three or four foreigners are admitted, but as yet only one English lady* has passed through it and obtained her diploma. A second, I am glad to say, has now been accepted as a student; let us hope this may be the beginning of a far more extended use of the system in England.

Now that the subject attracts so much attention, it may be of interest to note that both massage and movements were freely used by the ancient Greeks and Romans for medical no less than for athletic purposes. Happily educational gymnastics are being now introduced more and more into our board schools. Gymnasia have a promising prospect, and their promotion is worthy of the aid of this Institute. Amongst the notices upon the County Council's Bill, I rejoiced to see one made (by Lord Charles Beresford I think it was) that a public gymnasium should be provided for all populations of 10,000. But without waiting for this a great deal is being done in various parts to carry out this system by voluntary means, and we may hope that ere long people generally will learn to take it up and profit by it.

Mr. Frederick Scott (Manchester) said he was connected with an institution in Manchester which illustrated very well the uses of gymnastics as described by the last speaker. This was the gymnasium erected at considerable expense in a densely populated part of the

* The author's daughter.

city by the Committee for Providing Open Spaces for Recreation. One of the original objects of this society was to induce the Corporation to allow available parts of the public parks to be used for active games. These parks have been almost exclusively maintained as ornamental grounds, and the society had been unable so far to induce the Corporation to take the desired step. But in order to show a lead to the Corporation they had purchased and suitably laid out a field, now freely used for cricket, football, &c., and it was with the same purpose of demonstrating its utility to the Corporation that they built the gymnasium and employed a skilled instructor. This latter provision he deemed essential to the successful use of gymnastic exercise as an aid to health, for without intelligent direction gymnastics were as likely to be harmful as the reverse. The use of the out-door gymnasia in the public parks was not without drawbacks, but at a recreation ground furnished by the society he referred to, which was under the charge of a suitable man to direct the use of the appliances, excellent results had been obtained. The covered gymnasium had been remarkably successful; they had trained there about 2,000 youths in six years, many of whom were "corner boys" or "scuttlers," who at one time were constantly being brought before the magistrates for rough behaviour in the streets. Now no one could go to the assaults-at-arms without being struck by the "shapely form," spoken of by Canon Creighton, and the generally graceful bearing of the youths. The regard for order acquired by them was also remarkable. There was a gallery in the place, and the public were allowed in to see the exercises of the lads. At first some of the persons who came ignored certain rules as to "Silence," "No Smoking," &c., and made rude comments upon the performances of beginners, but lads who had themselves been very rough when admitted soon became most exacting as to the observance of propriety, and acted as their own policemen, by "chucking out" a few times those who persisted in misbehaving themselves. As a result, the order amongst the on-lookers is now, as a rule, all that could be desired. In order to ascertain the results of the training, he (Mr. Scott) had asked the instructor to take some measurements of the chest on the youths, and several cases were recorded where the girth of the chest had, after three months' training, increased as much as from one and a half to two inches. They had, too, a remarkable testimony from the Chief Constable of Manchester as to the effect this institution exercised in promoting order in the district. Whereas the police before its establishment had great trouble in repressing disorder created by youths, now the district was remarkable for its comparatively quiet and orderly character. He (Mr. Scott) did not think there had been a single instance of injury to health from practice in the gymnasium, except in a few cases of accident—as, for instance, when a novice using the trapeze during the absence of the instructor fell and broke his arm. His experience of this gymnasium enabled him to state that the results had been uniformly good, so that within the restrictions named by Mr. White he thought the

practice of athletic and gymnastic exercises could only be a benefit from a sanitary, an æsthetic, and a moral point of view.

The PRESIDENT (Dr. G. Wilson) said he thought Mr. White attached too great danger to athletics as carried on at the universities. He thought there was no cause of disease which was followed by so many elements of a doubtful kind as neglect of exercise. He was strongly of opinion that every healthy man ought to take an amount of exercise equivalent to at least a walk of eight miles every day, and every healthy woman ought to take exercise equivalent to a walk of six miles a day. He was very much surprised that the High Girls' School at Worcester had no gymnasium. He did not know whether they were exercised in the way of pedagogic pedestrianism—which Mr. White had brought before them, but he hoped that long before they visited Worcester again the High School for Girls would at all events be provided with a gymnasium.

On "Woman as a Help-mate in Sanitary Reform," by THE MAYORESS OF WORCESTER (Mrs. Ernest Day).

IN complying with the request to write a short paper on one branch of the wide subject of "Woman's work relating to sanitation and household management," I must at once disclaim any intention of attempting direct teaching. My only excuse for occupying your time at all is the desire I feel to encourage others to seek information, for doing which the present opportunity offers such unusual facilities.

One of the principal objects of such a Congress as this would fail if women held themselves aloof, thinking it did not affect their life work. The growing advantages which we women of the present day enjoy, in better education and higher development of our intellectual faculties, increase our responsibilities. One of the legitimate ambitions of woman is to become more fully the intelligent companion and mental help-mate of man; but I fear that in our effort to cultivate this hitherto rather neglected side of our nature we are sometimes in danger of losing sight of the importance of the more material and less attractive duties which come immediately within our peculiar province.

After all, if we, as wives and mothers, do not wisely govern

our homes, making them the abodes of real peace and happiness, we woefully fail in our mission in life.

Perhaps, here and there, a woman possessed of real genius may be pardoned for neglecting these obvious and every-day duties; but such women are brilliant exceptions, and it is hardly to be wished that they should be other than exceptions. Without desiring to go back to the days of endless toil in unproductive needlework, may we not with advantage imitate the devotion of our grandmothers to home problems, which is gradually becoming a rare accomplishment, and may we not do this in a far more intelligent and helpful manner than they did?

No liberal-minded man wishes his wife to be *merely* a superior cook, or nurse, and, on the other hand, no woman ought to feel herself thoroughly educated, and competent to become a wife, unless she has a theoretical and practical knowledge of the laws that make the health and happiness of her household.

When the preparation of our food, and the management of our homes, depend solely on the slip-shod knowledge obtained from tradition, confined to dogmas which do not touch the understanding, it is a poor thing; but when the knowledge is based on regard to scientific fact, it becomes a study not unworthy of intelligent pursuit.

In an age when women are so anxious to take up outside work, when the inequality between the sexes is becoming less marked, are we not somewhat in danger of losing the substance for the shadow? There is such a wide field of useful labour before us, where we may fairly claim more aptitude than men, where our thorough proficiency must tend to make us such a tremendous influence for good, if once we grasp the full possibilities of the situation; possibilities, which we sometimes neglect as beneath our notice, while we struggle and agitate for a larger share of man's work, forgetting that until we are perfect in our own immediate sphere, we are hardly fit to incur fresh responsibilities.

Is it not, therefore, a positive duty, incumbent on all who have the guidance and education of girls, to see that they are brought up with a thorough knowledge of the elementary laws of domestic hygiene? Too often the young lady of the present day considers the personal supervision of domestic details, which affect the sanitary condition of the house, as beneath her; but if we accept Dr. Richardson's views of the duty of modern women:—"to know the first principles of animal physics and life; to learn the house and its perfect management; to learn the simpler problems relating to the fatal diseases; to ordain the training of the young; to grasp the elements of the three

psycho-physical problems—the human temperament, the moral contagions with their prevention, and the heredities of disease with their prevention," we shall have attained to something beyond superficial acquirements; and we shall not be less cultivated or refined because we have a thorough comprehension of the laws which govern our bodies, and the sanitary details which conduce to health.

Pure air, pure water, and a properly selected diet, are alike necessary for a healthy life; if these could be obtained most of the diseases which afflict the human race would disappear. Food alone plays such an important part in the welfare of mankind, that a true knowledge of its properties should be widely taught. When we consider the wear and tear of the human frame, and know in what proportion we require the different foods—flesh-formers, warmth-givers, minerals, and liquids, we shall cease to look upon even the ordering of dinner as a trivial matter, and we shall, I think, find common-place details dignified beyond our expectations. The use in undue proportion of any one kind of food, however good, means to some extent loss of health and vigour; a right choice of food becomes, then, of importance to us all; but to the woman who has to supply the wants of a family at the smallest possible expenditure the knowledge becomes infinitely more essential; it would be difficult to over-estimate to her its importance, and it would be, I fear, equally difficult to exaggerate the intense ignorance and lack of interest shewn by those most affected. Dr. Richardson says "if woman only knew what foods were requisite to feed the skeleton, or bony frame-work of the living body, while that skeleton is in the course of growth, and if she would act upon the knowledge, as she most certainly would if she possessed it, there would hardly be one deformed child left in the land in one or two generations."

All we who have any experience amongst the poor, know how much the lack of good home-management affects the happiness and health of our towns. Conventionality of a determined kind meets us at every step in our efforts to educate the wife of the working man, in respect to economy, and the laws of health. We need only instance the waste that goes on daily in the preparation of food, and the want of judgment displayed in its selection. It is difficult to persuade women to any new departure in their manner of house management. "They have always done a thing this way, their mothers did it before them," and they distrust any new-fangled notions which seem to involve more trouble.

An idea which prevails is that meat is the great desideratum; the nourishment contained in fish, milk, peas, beans, lentils,

and other pulse plants is overlooked. It is true that the cookery lectures have done much, but much still remains to be done in popularising the information, and in this direction women may become real missionaries to their uninstructed sisters. May they not, by the introduction of short, bright, homely lectures on cooking and the elementary rules of domestic hygiene, at mothers' meetings and in the various clubs provided for the social recreation and instruction of girls, bring about many wise reforms? Where it is impossible to get any lady to speak to the women or girls, I would suggest the reading aloud of some of the popularly written tracts on the subject, published by the "Ladies' Sanitary Association" or the "National Health Society;" but these will fall very short of the good they may effect, if the reader be not thoroughly and practically acquainted with the subject, and able to enter into friendly chat over the individual difficulties which may arise. To explain my meaning by a simple illustration:—It is not interesting to tell a woman that she should make beef tea by cutting up the meat into small pieces, pouring on to it cold water, and simmering. These are facts, but how easy it will be for the girl, without any previous practical experience, to forget the apparently unimportant detail of whether the water be cold or boiling, and thus defeat the desired object. If, on the contrary, we have intelligent perception of the subject, we shall first explain, what, doubtless, most of my hearers know perfectly well, that all meat contains a large proportion of albumen, that this albumen hardens in boiling, and prevents the extraction of the nutritive properties contained in the meat. Once this principle is grasped no mistake can be made.

Give to an inexperienced girl, understanding this first principle, two legs of mutton; tell her to boil one and make soup of the other; she will not be at fault; she will know that in the one case it is desirable to retain in the joint all the nutritive properties; that in order to do this the outside albumen must be set, or hardened, at once by contact with water at boiling point; but she will also know that too long a subjection to such heat will toughen and harden, not only the exterior albumen—which is good as preventing the emission of juices,—but will render the whole joint hard and difficult of digestion; therefore, by the exercise of thought she will deduce effect from cause, with the result of a well cooked dinner.

If I may be pardoned, one more illustration:—Tell a girl that in preparing root vegetables, such as potatoes, carrots, etc., she should peel them very thinly, she will probably think the advice is actuated by parsimony, and is unworthy of attention; explain to her that the greatest nourishment lies immediately

under the skin, and she will see the force of the instruction, and follow it intelligently.

From my experience of girls I should say it is hopeless to expect to interest or influence them by a string of axioms, however excellent they may be. What we want is to arouse their understandings and to make them think for themselves.

The prejudice which so often exists, for instance, against soup, is, I believe, mainly attributable to its faulty preparation. We all admit the superiority of our French friends in this department. With them no scrap is wasted; the careful housewife does not throw away the water in which vegetables have been boiled, and into which so much of the gluten and mineral properties have passed, but keeps it as a foundation for future use in the form of stock.

A wide field of usefulness lies before the district visitor, with the necessary tact and knowledge to give advice without giving offence. We must remember it is much easier to speak of things generally in a lecture or address than individally in the cottage. No woman likes remarks to be made on the dirtiness of her house, but if it can be explained that dust really consists of tiny particles of decaying matter, which are taken into the lungs with the air we breathe, she will see a good reason for trying to keep free from it. It is difficult, with due regard to the sensitiveness of the poor, to speak of the lack of personal cleanliness; but the importance of cleansing the surface of the body may well be urged on the score of health. As Miss Nightingale says, "even in the poorest homes a basin of warm water, a piece of soap, and a towel can be procured." And if we could impress on mothers the necessity of bringing up their children to practice the habit of daily ablution from their earliest life, it would become a second nature, and would conduce immensely to their health, happiness, and vigour.

Sir Edwin Chadwick gives us the following result of his experience on the subject:—"In one orphan institution the progress made by the application of sanitary factors was thus denoted: The death-rate amongst the children was 12 in a 1000. The impurity of the air was removed by better drainage, and the death-rate reduced to 8 in a 1000. A further advance was made by daily head-to-foot ablutions of the children with tepid water, and a complete skin cleanliness maintained, when the death-rate was reduced to 4 in a 1000." He further dwells on the economy of cleanliness, stating that the food that would be required for four children that are unwashed would serve five that are washed.

It is often impossible to obtain an adequate supply of fresh air in the crowded houses of the poor, even when we can induce them to sleep with their bed-room windows partially opened; but with regard to cleanliness of the house, the person, and the clothes, very much is in the hands of the mother and the daughter of the family.

In conclusion, I would again reiterate that my aim in writing this paper is simply to induce other women to take advantage of the present opportunity the Congress affords us of acquiring knowledge for ourselves, and adopting suggestions as to the best means of distributing this knowledge amongst those outside the direct reach of the Congress teaching.

Dr. Richardson said, some years ago, at one of these meetings: "It is from the million centres we call the 'home' that sanitary science must have its true birth. It is from those centres the river of health must rise. We men may hold our Congress year after year, decade after decade; we may establish our schools; we may whip our lawgivers to action of certain kinds; we may be ever so earnest, ever so persistent, ever so clever; but we shall never move a step, in a profitable direction, until we carry the women with us heart and soul."

Could we not, with this end in view, endeavour to establish a Ladies' branch of "The Sanitary Institute" in this City and County, which might be productive of permanent results in the amelioration of the lives of those we would benefit, through that wide-reaching charity which gives to every human being in want, a claim on our sympathy and devotion?

On "The desirability of establishing a Sanitary Association in Worcester in connection with The Sanitary Institute," by HENRY HOWARD.

WORCESTERSHIRE, from a sanitary point of view, presents perhaps stronger contrasts than most other counties. Within its borders it claims Malvern, "the healthiest watering place in the kingdom," Droitwich, with a cure of immemorial fame, whilst it has to acknowledge whole districts where the lives of its working poor run on under conditions so unfavourable to health that each year in consequence hundreds sicken and die.

Statistics enforce these contrasts.

Malvern has a death-rate from zymotic disease of 1 in 8,000.

Some of the rural sanitary districts have also reasonably low death-rates.

But over the whole county the death-rate from zymotic disease, in spite of the effect upon the averages of the favourable instances above-mentioned, is nearly 15 to 8000 living, and the death-rate from typhoid alone is actually higher than in London!

These facts claim the attention of the skilled sanitarian, and require the application of advanced sanitary science.

Other papers read at this Congress are for the instruction of the members of the Institute and the public. In this I desire to be the mouthpiece of those who have come here anxious to learn where to find a remedy for this state of things, and to claim your assistance in their search for it.

The work to be done is a great and patriotic work, which, if carried through, should worthily and permanently record the fortunate visit of the Institute to Worcester—not only in its own "transactions," but in the hearts and grateful memories of those who now "groan and sweat under a weary life." These contrasts must cease: and we believe that not in vain shall we look to you for those valuable practical suggestions which will assist the attainment of this desired result.

Let us, in Worcester, join hands with you in London, either as a branch association, or in some other way as may seem best. Let the treasures of your science, the skill of your distinguished sanitary engineers, the devoted energy, the leisure of your learned specialists be united with, on our part, determination in the application of the provisions of the Public Health Act, and earnestness in making the most of the sanitary powers conferred upon the County Council; and thus by our joint efforts let us make Worcestershire the standard illustration of applied sanitary science, the ideal healthy county of England. Would not such a positive practical success secure for the Sanitary Institute the confidence of the enlightened intelligence of this country, and make it, with such a record, the most powerful and popular association of the day.

But accurate detailed knowledge is absolutely necessary as a condition precedent to action, and as a first step we appear to want a report by competent persons on the sanitary condition of the county, especially having reference to the condition, and sanitary arrangements of the dwellings of the poor in those populous places which have all the faults, whilst as yet possessing none of the organisation of small towns.

Such a report should deal with all public, and where possible, private sources of water supply, unhealthy conditions of employment should not be allowed to pass unnoticed, and the pollution of streams, and the disposal of sewage should claim attention. In many cases valuable facts would be found in

some of the excellent reports of the medical officers of health, though occasionally these reports confirm the proverb's truth, "A muzzled cat was never a good mouser."

Is not this first step, this report, within the compass of our united powers? The action that would follow its publication would hasten, if not attain, ideal sanitary perfection; but without such information to guide us, no progress can be made, and it can be obtained only by an organized, not by an individual effort. We are only at the commencement of the march of sanitation. True we may look back and count a few forward steps, some great successes; but the wisest cannot picture the grandeur of the age of perfect national health.

The fact that the annual mortality from zymotic disease in England during the past twenty years has been reduced by three-fourths may fill our hearts with buoyant hope, lovely as the rainbow on the dew of the spent thundercloud; yet the victory is not complete. Humanity is advancing but slowly over the vast mountain-barrier between the dismal land of needless sickness, and misery, and death, to the happy country of uninterrupted health. Far below us lie the forgotten terrors of the Black Death with its countless thousands, the gaol fever, taking its toll alike from judge and felon, and other hideous and fatal diseases born of want and neglect.

The work for our time is the passage of the torrent of zymotic disease, which, whilst we lag behind, annually claims its huge death-roll, and Worcestershire men, women, and children are daily swept away by its fatal current, and the health of many of those who survive is ruined for life, and the homes of those so visited wasted with poverty.

Our united efforts would surely hasten the day when we shall have done with preventable disease, when the damps of its chill breath will no longer be felt; when the last chasm passed, the fatal torrent crossed, the rocky barrier climbed, humanity under the guidance of sanitary science, will descend into that fair, and pleasant, and fruitful land, where each life may work out its purpose unlet by the dread, by the reality, by the regret of wasteful disease and untimely death.

Sir Douglas Galton, K.C.B., F.R.S. (London), said the Sanitary Institute had long had under its consideration to a certain extent the question of establishing affiliated Sanitary Societies. There had been a very definite proposal from The Manchester and Salford Sanitary Association with the view of forming a nucleus of Sanitary Associations for the whole of the country. The question involved a great many difficulties, and the Institute, having reconstituted itself so recently, had not yet been able to come to a decision on the subject.

But he confessed they would derive great advantage and strength if they could have affiliated societies to the Sanitary Institute in all the principal centres of population.

Dr. H. M. PAGE (Redditch) said he had had something to do with the vital statistics of a small area of the county of Worcester, and could enforce the view that those statistics, and certainly the zymotic and infant vital statistics, were nothing short of a disgrace to the county. He thought that now the County Council was able to consider its ways and means, one of the very first steps would be, as the writer of the paper suggested, to obtain and classify the county statistics for what they were worth. Fortunately there were in the county statisticians perfectly capable of sifting these figures, and he hoped they would be able to present to the Council a balance sheet of statistics, as it were, which might be of service to the Council in any steps it might take. No branch of vital statistics was more important than those of diseases which sanitary science had shown to be preventable. He thought the Councils ought to press the provision of hospitals where cases of infectious disease could be rapidly isolated. The adoption of the measure for the compulsory notification of infectious diseases was, unfortunately, in the provinces left permissible, not compulsory, but he hoped the Act would be brought into force throughout Worcestershire. He thought that with proper correction of statistics and the adoption of this Act, together with the formation of societies such as had been suggested, the Council would be able to nearly abolish preventable disease. He should be happy to furnish the Council with such statistics as he had.

Mr. G. J. SYMONS, F.R.S. (London), said, in regard to the remarks of Sir Douglas Galton, that a fearful amount of work had been entailed by the recent amalgamation. But as soon as the Congress was over they would find themselves in smoother water, and he would then be glad to support the line of action suggested by Sir Douglas Galton. There seemed to be an idea that the Sanitary Institute was a high and mighty and powerful body to which ordinary mortals could not expect to be attached. That was not the case. And they had also heard a great deal about ladies' associations, as if the Institute were entirely a masculine body. That was not so, for they had lady associates and lady members; there was no difficulty in gaining admission. If a few local people were to join the Institute, to receive the publications regularly and attend the meetings, they would act as a sort of nucleus round which a larger local body might be formed.

The MAYOR of WORCESTER said he would be very pleased to co-operate with Captain Howard in his very excellent work. They were all agreed as to the desirability of branch associations, and he thought they would be able to devise some measure without much difficulty for affiliating associations throughout the country with the Institute. He did not think that becoming a member or associate of

the Institute was the same thing as having a local branch, which exercises much greater force and influence. By a local branch they would have a direct local personal and collective interest, and they would have locally the full benefit of the work of the Institute. In addition to that it would be a valuable recruiting ground for the Institute. He hoped the Council would shortly be able to see their way to carry out the scheme promulgated by Mr. Howard.

Mr. H. HOWARD (Kidderminster), in reply, acknowledged the offers of co-operation which he had received. He entirely agreed with everything that had been said as to the absolute necessity of ladies taking an interest in the work of sanitation, and he was particularly struck by the remark of the Mayoress, that if sanitary science is to make general progress the beginning of it must in each case be made in the home of the individual. He was there to speak on behalf of the people who were unable to speak for themselves, who were not represented there in any way, to ask for the assistance of the Institute in obtaining an accurate account of those parts of Worcestershire which are in a disgraceful condition, because this will influence the mind of the Council and result in action. Such a report should be the first object of a branch association, and if it had a definite object like that there would be no want of interest in its meetings. If a branch were established, however, to talk about everything under the sun having reference to health, the interest would very soon slacken, and in the fatal third year of which Dr. Strange had spoken the end would come. He hoped something practical would be done as the result of this discussion, and he thanked them all for the interest they had shown.

On "Co-operative Cooking, by a 'Society for Supplying the Poor with Cheap and Wholesome Cooked Food,'" by WILLIAM STRANGE, M.D.

ABSTRACT.

THE *plan* now to be briefly described has been in operation in Worcester for the past three years, and has proved so far eminently satisfactory.

The object is to supply the working classes with a kind and quality of food with which they are to a great extent unacquainted, and which, in most cases, they are totally unable to provide for themselves.

The principle to be kept in view in carrying out this object is to avoid pauperising the poor. The food is to be paid for at a price which will be, on a large scale, self-supporting, and, on a smaller scale, at least pay the cost of materials and of cooking the same.

The food is of the most nutritious quality that can be had, consisting chiefly of pea soup (including some animal food); suet puddings, with treacle, jam, or raisins; Irish stew; and, where desirable, a lighter kind of soup for young children. Cooking for the sick might be added.

The operation of the plan is carried out by establishing cooking centres in several densely-populated parts of the town, where the food is sold at mid-day *to all comers*. Children's dinners are also provided and consumed on the cooking premises at ½d. and 1d. each.

The only charitable portion of the plan is carried out by the sale of tickets, 1d. each, to the clergy and others, to be distributed amongst the very destitute in severe weather.

The Mayor of Worcester said that it was necessary to supply the human body with food of the right character. Dr. Strange's paper had very ably illustrated the best class of food to be used for this kind of cookery. They knew Dr. Strange's zeal in this matter, his self-denying labours, and the very beneficial results which had ensued. The cheap dinners and the cheap breakfasts given in Board Schools had produced most sanitary results, inasmuch as the physique and tone of the school children had benefited considerably. He desired to add his testimony to the services Dr. Strange had rendered in this way in the city, and thanked him for bringing the subject forward.

Captain Locke (Worcester) said that from his long thirty-six years' experience as a sailor he believed the pea soup mentioned by Dr. Strange was the most nutritious and best fitted for use in that way. He might add that both passengers and crew always enjoyed the above three days in the week as part of their dinner. They always carried split peas, and used rain water if they were fortunate enough to catch any.

CONFERENCE OF MEDICAL OFFICERS OF HEALTH.

This Conference was jointly arranged by the Institute and the Society of Medical Officers of Health. A full report of the subjects discussed is given in "Public Health," October, 1889, pages 162—173.

SECTION II.

ENGINEERING AND ARCHITECTURE.

ADDRESS

By Henry John Marten, M.Inst.C.E.

PRESIDENT OF THE SECTION.

Introductory.

The subjects for consideration in this section — namely, Engineering and Architecture—although necessarily limited to their sanitary aspects only, cover a wide area, and present numerous and important features, each of which would be more than sufficient for the text of an address.

For instance, the works in connection with fen drainage, town and village sewerage, house drainage and domestic sanitation, water supplies and fittings, luminants in their sanitary aspects, building materials and methods of house construction, warming and ventilation, smoke abatement, and many other matters too numerous to mention, are all included within the limits assigned to this section, and you will probably have the opportunity of discussing some of them.

Although considering the extent of our information, and the light we now have with respect to sanitary matters, and the extent also of our opportunities, we have not much reason to boast of the progress we have made as a nation in practical sanitation, compared with what we might have made during the past 40 years; yet it may be permissible—in fact, it may be advantageous—to take a retrospect of some of the advances made during that period, and I invite you to do so with me for a short space of time.