LECTURE.

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Professor Corfield delivered the following lecture at the second evening meeting:—

Sanitary Science, properly so-called, is a branch of medicine, or perhaps I should rather say, a sister science to pathology, for it is the science which studies the causes of diseases, and its place among the sciences is between those of physiology—the science of life,—and pathology—the science of disease. We see, therefore, how it is that sanitary science, or hygiene, could only become a science in quite recent times, as it was impossible that it should be scientifically studied until physiology and pathology, upon which it is based, became scientific themselves. The more a branch of knowledge approaches to the character of a true science the more readily are fallacies detected, although even in the highest science, the most certain branch of human knowledge—mathematics,—in connection with which one would think no fallacies could exist, these are still to be found keeping their hold upon the minds of a certain class of investigators, as witness;—the supporters of the theory that the earth is flat and that the sun goes round it, the circle squarers, and the searchers after perpetual motion. If in the highest and most perfect science the power of fallacies does not cease to exist, can it be wondered at that in the youngest, which I will not, however, call the most imperfect, although fallacies which reigned triumphantly while it was yet only an art—the art of preserving the health—and before it became really worthy to be dignified by the name of a science, have been exposed, there are still many others which have a certain, and in some instances a most important influence upon the mind of large masses of the community?—An influence necessarily for evil. On the other hand, I must point out at once that what is necessary and inevitable in one generation, or at one period of time, may be a mischievous fallacy at a future period and in an advanced state of knowledge.

The history of Sanitary Fallacies is, of course, intimately bound up with the history of the art of preserving the health, and this is as intimately connected with the history of medicine, and indeed, with the history of the world. Among all ancient nations, as well as amongst savage tribes at the present day, we find that the offices of priest and medicine-man were united in the same individual. This was necessarily and inevitably the case, as the priests were in early times the most learned, nay, often the only learned among the people, and they found it expedient to enforce their spiritual rule by keeping secret the means they employed for the alleviation of disease, and not unfrequently by prostituting their knowledge to make the ignorant believe that they had the power of calling in supernatural agency. Among the Greeks in the earliest times Æsculapius, the priest-physician, was said to be so successful that he raised men to life. He was afterwards deified, and it is fitting that Hygeia, the Goddess of Health, should have been one of his daughters. The secrets of medicine, preventive and curative, remained with his descendants—a race of medical priests known as the Asclepeiades—until one of them, the seventeenth in descent from Æsculapius, Hippocrates, the father of medicine and the father of hygiene, gave them to the world in his most remarkable treatises. These works are as truly works of hygiene, or preventive medicine, as they are works of curative medicine, and indeed, it would be difficult to imagine a better or more comprehensive title for a work on public health than that of the celebrated treatise of Hippocrates on "Air, Water, and Places." Hippocrates may fairly be said to have been the founder of the rational method of studying the causes of disease—a method which we, 2300 years after the time when he flourished, have found out is the correct one.

But it was not so long before a great fallacy arose and divided the disciples of medicine into two rival parties. In the Alexandrian School, of which Herophilus (who divided medical science, or medical knowledge, into three branches: (1) Dietetics; (2) Medicine; (3) Surgery; thus assigning to dietetics, or as we should call them, "personal hygiene," the first rank among the medical subjects) and Erysistratus were the lights, there arose a set of thinkers, the Empirics, who struck at the root of the rational pursuit of medicine, by maintaining that the study of the body and its actions, and of the influence of medicines upon it in a state of health were either not possible, or if possible, were not necessary. This school of Empirics, founded in Alexandria in opposition to the teachings of Hippocrates, has existed ever since—exists at the

present day, and has to answer for a great deal of the distrust that exists in the public mind in connection with the rational study of medicine, and the rational teaching of sanitary science. The doctrines of Hippocrates were, however, promulgated in the Roman school by Celsus, and by Galen of Pergamos, who settled in Rome, and became physician to the Gymnasia in the 2nd century after Christ. Galen was a very learned man. He wrote much, and his doctrines held such sway over the medical world, that in the middle of the 16th century the College of Physicians of London insisted upon a recantation from one of its fellows, who had on certain points disputed the authority of Galen. Nothing can show more clearly than this how little was done in the promotion of the rational study of preventive medicine between the 2nd and 16th centuries after Christ. Indeed, after the treatises of Galen, and the works of a few great Arab teachers, there are few of any great importance until we come to modern times.

But before we pass to the Middle Ages, when fallacies reigned supreme, and when their results were most terrible, let us stop for a moment to consider whether there were not writings as old, nay, far older, than the works of Hippocrates, in which the rational practice of preventive medicine was laid down in a manner that could not be mistaken. In that country which was the cradle of the sciences, from which Europe derived the knowledge of numbers and of written characters, and the learned inhabitants of which were calculating and predicting eclipses, when our ancestors were hunting the wild boar and painting themselves with woad—in lower Egypt—a scheme of sanitary medicine had been devised, which must produce in all thoughtful persons who read it with care, a feeling of the greatest astonishment, and of profound admiration. These regulations we have handed down to us in the works of a man who was "learned in all the wisdom of the Egyptians," Moses the law-giver of the Jews, and only to mention one point in illustration of what I say, I will instance the sanitary treatment of a case of communicable disease as described in Leviticus, chap. xiii. and xiv. There isolation of the sick person is prescribed, and not only so, but the isolation of all doubtful cases is even insisted on. After recovery, the most careful cleansing of the person, including even the shaving of the head, the beard, and the eye-brows, and the purification of the clothing, is enjoined. He who comes into the house is unclean. He who lies in it, or eats in it, is to wash his clothes. Then disinfection of the house is provided for, and should the plague break out again in the house, it is to be destroyed. Garments which have

the plague on them are to be disinfected by the best disinfectant known at the time, the best disinfectant we know of now, and the best disinfectant that ever will be known—they are to be burnt. But in this instance, as is well known, the functions of medical officer of health and of priest were united in one person, and however necessary, or even advantageous this might be in an early state of civilization, a similar unnatural union produced most disastrous results in succeeding ages.

In the Middle Ages "when light and learning gave place to darkness and superstition, when truth and honesty were superseded by falsehood and imposture, when reason and experience succumbed to barbarism and bigotry," the priests and the monks were the physicians and the Sanitarians; and it can be hardly wondered at that the priestly functions threw the others into the background, and that, as Dr. Davies, whom I have just quoted says:—"Reason and experience were *wholly* discarded, the use of the ordinary means was *completely* eclipsed by the miraculous power of tombs and relics, of saints and martyrs, of holy water, charms and amulets; and that *each and every portion* of the human frame (however diseased or afflicted) was assigned to the guardianship of different Romish saints." During these ages learning was preserved and increased by the Nestorians and Arabs in their schools at Dschondisabour, Bagdad, Cordova, &c., for which the works of Hippocrates and Galen had been translated by Nestorians and Jews; while in Christian Europe, during these dark ages, the one single spot of light was the school of Salernum, where was published a remarkable work entitled "Regimen Sanitatis Salerni," a translation of which, described as "The most learned and judicious directorie or methodical instructions for the guide and governing the health of man," was dedicated to "The High and Mighty King of England, and published (by consent of Learned and Skilfull Physitions) for the benefite of all in generall," in the year 1617.

This grand fallacy, the mistaken union of theology and medicine, continued through mediæval times, and as late as the year 1511, Henry VIII ordered that physicians and surgeons should be examined by a bishop or vicar-general, with the assistance, it is true, of "such expert persons as they shall think desirable," while the power of granting the degree of Doctor of Medicine remained in the hands of certain high ecclesiastical dignitaries, to a much later period, even if it does not nominally exist now. Through all these dark ages, when the principles of preventive medicine laid down by Hippocrates, Galen and Celsus, were unknown to the multitude, and untaught and unpractised by those whose business it was to teach and practise them; when (more shame to them still) the regulations laid down in that Book of which they were the jealous guardians, to which they alone had access, and of which they proclaimed themselves the expounders and the teachers, were neglected as completely as if they had never been ordained; filth reigned supreme, the dirty houses were crowded together in narrow streets and courts; the rushes which formed a carpet for the floors were never removed, but piled layer on layer, forming a series of filthy strata often many years old; no attempt was made to check the spread of infectious diseases by the isolation of the sick, or by any of the other methods prescribed by Moses; and what was the result? In those ages, and the succeeding ones—the partakers too in the results brought about by this lamentable and gigantic fallacy—plagues held triumphant sway. In the 14th century, the Black Death, after travelling over the Eastern part of the Old World, reached Europe, and soon arrived in England. It spread over the whole country, and caused such a frightful mortality, that only a tenth of the inhabitants are believed to have remained alive, while "Europe is supposed to have lost an aggregate of 40,000,000" (Dr. Guy). As I have pointed out elsewhere, the only people whom this disease seemed to spare were those who, however imperfectly, followed the regulations prescribed by Moses, the Jews, whose immunity was so marked, that they were accused of spreading the disease by poisoning the water, and were burnt alive by thousands in various parts of Europe. The Black Death re-appeared as the Oriental Plague during the 16th and 17th centuries, and the last time that it appeared in England, in the year 1665, it killed between 70,000 and 80,000 persons in London alone.

But besides the Oriental Plague, a frightful prevalence of other diseases, some of which, as the "sweating sickness," are now unknown, while others, as typhus, scurvy, influenza, dysentery, cholera, and even smallpox, have lost much of their terror, must be included among the consequences of the fallacy which had overspread the world. This fallacy was removed by the gradual divorce of medicine and theology, and the 17th century which had seen the last of the Oriental Plague as far as England was concerned, saw anatomy raised to the position of a science, by the labours of Vesalius, of Eustachius, of Fallopius, of Malphighi, of Glisson, of Sylvius, of Willis, and of others, almost all of whose names are worthily preserved for ever in the names given to various

parts of the body, and saw physiology receive the grand impetus given to it by the discovery of the circulation of the blood by William Harvey, and scientific chemistry begin gradually to emerge from the Arabian Alchemy.

Thus began again the reign of rational medicine, and from that time to this, the study of methods for the prevention of diseases has been pursued, and in many instances with remarkable success. But although we have got again into the right path, there is, as may be expected, seeing the short time that we have been in it, a vast amount of ignorance prevailing in connection even with the rudimentary principles of Sanitary Science, and the ignorant multitude are too often led astray by specious fallacies, propounded with some show of reason and often with great bombast, by persons who have no right to speak with authority on such matters at all, and who are at best "blind leaders of the blind;" but this we may rest assured will always be the case, as is shown by the example of mathematical science that I have already instanced. All that we can do, therefore, is to point out such fallacies as they arise, and to warn those who are in danger of being misled by them.

Against all Sanitary improvements whatever, we find one argument continually brought—that things have gone on in the same way for many years and there is no reason why they should be changed, that our forefathers from generation to generation lived under unsanitary conditions, and why should we not do the same? that cholera, or enteric fever, or diphtheria has never broken out in a place, or in a particular house, and so it need not be expected! Such are the forms in which this argument meets us at every turn, but those who use it forget that our forefathers died in those places; they forget that in all places which have been made cleaner, from which refuse matters have been removed more speedily, where over-crowding has been abated, where more efficient drainage arrangements have been carried out, the general death-rate has been lowered. When they say that because such a disease as enteric fever has not appeared in a place, therefore it never will; they forget that when cholera or enteric fever is introduced into a place where the conditions are favourable for its spread, where the air is tainted and the water-supply rendered impure with excremental pollution—that in that place, although such diseases may have been absent for so long that their existence has been almost forgotten, they will spread like wildfire and decimate the population. They forget in fact that people who are

living in the midst of general unsanitary conditions are in a worse plight than people living in the crater of an extinct volcano, for not only may any one of the severest epidemic diseases break out among them at any time, but they are continually sacrificing unnecessary victims to the demon filth. I have mentioned some of the communicable fevers. Now what I believe to be an important fallacy still exists in connection with the poisons of these diseases.

It was formerly thought and was maintained by Trousseau that the poisons of these diseases might originate anywhere, at any time, under suitable conditions—the specious argument being that having arisen somewhere, at some time or another, there is no reason why they should not originate anywhere or at any time. Without entering into the vexed question of the nature of the poison of such diseases, I will merely point out that this belief is now almost universally scouted with regard to the majority of such diseases. How many persons are there who believe that smallpox or scarlet fever, measles or whooping-cough, arise independently of previous cases of these diseases, and yet we find not a few, supported by the weight of great authority, who believe in the spontaneous origination of the poisons of typhus and enteric fevers, of diphtheria and of cholera. The arguments brought forward to support this position are most of them fallacious in the extreme, and I am bound to say that the arguments advanced to prove the *de novo* origination of the poison of enteric fever, are of themselves sufficient to render it in the highest degree improbable. They are indeed so weak that no one really capable of judging the value of a scientific argument, could from them come to any other conclusion than that the position was untenable. But a practical and very serious mischief has arisen from the spread of these doctrines. We are told that enteric fever is not contagious, and we are told distinctly in so many words that it is rarely if ever communicated from person to person: we are told that in the great majority of instances the poison of this disease originates *de novo* in decomposing excremental filth; we are told that the intestinal discharges of patients suffering from this disease do not contain the poison of the disease, although they may be more prone to the special decomposition by which the poison is produced, and the result of all this is that a large number (I will not say the majority, for I hope it is not so) of the medical practitioners throughout the country, take no pains to destroy the poison of this disease at its source—the virus-laden discharges of the intestinal canal. It might be thought

that after people were told that living under bad conditions as regards the removal of filth, would engender enteric fever among them, they would be even more careful to prevent the possibility of its appearance, than if they were told that it would certainly spread if brought to them while living under such conditions, but this is not so, and for the simple reason that the people know well enough that enteric fever does not arise under these conditions: they may be deceived about the general death-rate, but they know perfectly well that a field may have the richest possible soil, may be well-manured and well-watered, but that no wheat will grow in it unless the seed is sown, that a place may be in the most unsanitary condition conceivable for many years, and that enteric fever will not spring up in it; and when they are told that it will, they do not recognize this as a fallacy, but jump to the conclusion that the whole of Sanitary Science is a philosophical fancy not worthy the attention of practical people.

But there is still a great fallacy abroad in connection with the question of the removal of refuse matters from the vicinity of habitations. People talk and write as if the water-carriage system and the conservancy systems stood upon the same footing—the principal of the one being the *immediate* removal of excretal matters from houses, and that of all the others being, as their name indicates, the keeping of such matters in and about the house for a certain time. The one is a correct principle, the other is a false one, and it is no argument at all to say that where the water-carriage system is badly carried out, the result may be worse than where the conservancy system is carefully managed. In Sanitary matters, as well as in everything else, we should follow correct principles. If we do not, but by arguments equally specious and fallacious try to persuade ourselves that "practically speaking" (according to the cant phraseology of the day) better results may be obtained by following false principles, nothing is more certain than that by an inexorable law of nature true principles will assert their position, and we shall be punished for our mistake by being landed in difficulties greater than we had to contend with at the outset. It is a very old and often-exposed fallacy to argue against the use of a thing from the abuse of it, and to argue against the water-carriage system because when surface drains have been called upon to do the duty of sewers, for which they were not intended, and of which they are not capable, or because the sewage has been turned into the water-courses, which have thus become unfit to supply water for domestic purposes, is an excellent example

of this kind of fallacy. I do not say that a well-managed conservancy system is not better than a badly-managed one, nor far better than no system at all, nor do I say that there are not places where the difficulty of carrying out a water-carriage system are not so great as to be almost, if not quite, insurmountable; but I do say that in towns where a water-carriage system is possible, there is no room for choice in the matter. The mischiefs that have been traced to the water-carriage system have occurred from the abuse of it, and not from the proper use of it. Sewer air, about which so much has been written, is injurious when it is collected in badly ventilated sewers and allowed to escape from them into the houses, but in an impervious sewer with a proper fall, sufficiently flushed and efficiently ventilated, the noxious ingredients of sewer air are scarcely formed at all, and the air of the sewer is hardly appreciably different from that in the street, while its foulness bears no comparison to that of the atmosphere of many inhabited rooms. The proper way to ventilate sewers is to have a sufficient number of openings leading into them from the surface of the roads, as has been demonstrated over and over again, but I see that the ridiculous practice of having, as far as possible, air-tight sewers, and connecting them with the flues of furnaces, notwithstanding that the fallacy of it was exposed by the Health of Towns Commissioners in 1843, and has been pointed out over and over again ever since, still has its advocates. The Commissioners pointed out that in the first place the action of the furnaces was at times so strong as to draw all the water out of the traps on the house drains, and at other times so ineffectual that the air from the sewers was drawn into the houses through the unsealed traps. They pointed out too that in a case where some of the sewers in Battersea had been connected with the furnace of some soap works, on one occasion coal-gas escaped from a main into the sewer (as has frequently happened since, and not so long ago in the neighbourhood of Great George Street, Westminster), and an explosion occurred which blew the works to pieces.

Another important matter in which we are liable to be led astray by false principles, is that of the supply of water for domestic purposes. A man deservedly eminent in his own branch of medicine, told the public not so long ago from a position that lent weight to his words, that Water-Analysts and Medical Officers of Health had all gone wrong about water: that the small quantities of organic matter that were discovered in water were matters of no

importance at all, that all water, however pure it was, was contaminated with organic matter as soon as it got into our mouths; that the greater part of our food consisted of organic matter, and that it was ridiculous to condemn a drinking water because it contained small quantities of organic matters. The obvious fallacy of such arguments must be patent to all who have thought upon the subject at all, but to the multitudes who allow others to think for them, such fallacies coming from the mouth of one whose words were entitled to be listened to with respect, were calculated to do a vast amount of mischief. There are organic matters *and* organic matters, and it is not because beef and mutton are good for food that putrefying filth, in however small a quantity, coming from sources likely to be tainted with the poisons of specific diseases, is to be tolerated in water for domestic use: and this leads me to speak of a still greater fallacy in connection with the water supply. We are told that it is not necessary to go to the purest sources for water; we are told that we may take a water that has been once polluted, filter it, and give it to the people to drink, that it is a "practically wholesome" water, that no harm can be shown to have resulted from it, and so forth; and we are given averages of its composition to prove that it is "reasonably pure" to be used: but it is not averages we want—we want to know the quality of the worst samples that are supplied. It is ridiculous to tell a man that the average quality of the water given him to drink is good, if on one day in the year he gets water that is "quite unfit for dietetic purposes." But the people are awakening to this matter. They will not be put off by such specious arguments and fallacious reasonings, but they will insist on the "practical" carrying into effect of the true principle as laid down by Mr. John Simon:—"It ought to be an absolute condition for a public water supply that it should be uncontaminated by drainage."

The fallacies connected with dietetics are very numerous, but as they are associated almost entirely with personal hygiene I shall leave the discussion of them for another place. I must mention, however, the curious fallacy about the nutritive power of gelatine, which owes its origin to the results of some incomplete experiments, and which completely upset for a considerable time the belief of scientific men, and of the public generally, although this was not only correct but backed by the experience of ages, that gelatine was an important article of diet. What really is the place of gelatine among foods I will not discuss now. It is sufficient for me to say that more complete experiments have shown beyond doubt

that the ancient experience was reliable, and it is to be hoped that the nonsense about invalids being starved upon jellies and port wine will disappear from our treatises.

The mention of port wine leads me to say a word about alcoholic liquors, but while the opinions of those who are best qualified to judge upon this matter are so divergent, while some of the greatest lights of the medical profession hold that all alcoholic liquors are baneful under all circumstances, and others hold that in moderation no ill effects can be shown to result from them, or even go so far as to say that under the circumstances under which we live, especially in large towns, they may be advantageous not only in disease but in health, it would ill become me to dogmatize upon the matter. There are those—and I think there always will be—who cannot believe that the exquisite *bouquet* of the wines of France, of Italy, and of Spain is only fit to be smelt, there may even be those who are wicked enough to insinuate that if people do not taste them they show a lamentable deficiency in the cultivation of an important sense. While upon this point let me read to you a few lines from the celebrated book on Dietetics that I have already mentioned—"The Regimen Sanitatis Salerni"—the book which has served as a pattern for all books on Dietetics for the last six centuries:—

"The better that the Wines in goodness be,
The better humours they beget in thee.
If Wine looke blacke, it makes thy body dull,
If it be cleare, old, subtile, ripe and full,
Well qualified, leaping, drunke discreetly:
Then with thy body it agrees most sweetly."

All, I know well, will not agree with this, nor with the following:—

"He that drinkes water when hee feede on meate,
Doth divers harmes unto himselfe beget.
It cooles the stomache with a crude infesting,
And voides the meate againe, without digesting."

But all will, I am sure, without exception, agree to the last quotation that I shall make from this remarkable book:—

"Of whatso'ere yee drinke, see no offence
Unto the stomache bee procured thence."

But let it not be thought that I underrate the mischief to be traced to the use of alcoholic liquors. There are serious facts about which there is no fallacy at all. When we find one of our most eminent judges saying—"There is scarcely a crime before me that is not directly or indirectly caused by strong drink:" another

—"I have no hesitation in stating that intemperance is directly or indirectly the cause of by far the largest proportion of the crimes that have come under my observation:" yet another—"If the enormities that have been committed in the last 20 years were divided into five parts, four of them would have been the issues and product of drinking at tavern or alehouse meetings," we have no right to hesitate, and indeed there can be no question in my mind that the drinking of alcoholic liquors does far more mischief than any other habit whatever. One fallacy in connection with this subject is worth pointing out. The man who drinks his glass of grog at night often defends himself upon the plea that the spirit is diluted, and that the mixture does not contain more alcohol than the few glasses of wine usually taken at meals; but the spirit and water thus taken is taken under circumstances which render it most potent for mischief; a highly diffusible liquid, it is taken into the stomach when digestion is over, and when the stomach is nearly or quite empty; it is absorbed directly, unaccompanied by any nutritious substances, into the blood, and is enabled to act in the most prejudicial manner, not only upon the liver, producing the gin-drinker's liver, which means death, but also degeneration of all the tissues of the body.

With regard to tobacco there is a curious fallacy abroad: although the excessive use of it, as of tea or of coffee, or of any substance that acts directly upon the nervous system, is injurious in various ways, there is no evidence that the moderate use of it is pernicious. Sir John Sinclair, who took pains to investigate this subject carefully, comes to the following conclusion in his admirable "Code of Health:"—"It does not appear that a temperate use of tobacco can be considered as an obstacle to longevity." On the contrary, the evidence is very distinct that among the old persons available for the investigations, the great majority were smokers, so it might indeed be argued with some show of reason that smoking was favourable to longevity. For instance, out of 40 persons above 80 years of age, and living in some of the Western Islands of Scotland, "no less a number than 30 (or three-fourths) are reported to have been addicted to the use of tobacco, and of the remaining 10 it is probable that some of them followed the same practice, though it was not adverted to at the time." He states that in Greenwich Hospital there were 96 men exceeding 80 years of age, of whom 13 were above 90 and one above 100—"and yet they almost all used tobacco." He mentions also that of the pensioners in a hospital in Ireland there were "31 above 80 years of age, all of whom, with

the exception of one, were in the habit of using tobacco, and many of them freely." If I am told that these old men might have lived to a greater age if they had not been smokers, I would rejoin, that they, at any rate, lived longer than the non-smokers, and that the argument reminds me of that used by the old lady who said of an inveterate smoker, 80 years of age, "Ah! but if he hadn't been a smoker he might have been 90 by this time!" The arguments derived from the composition of the tobacco leaf and its smoke are obviously fallacious, and cannot stand for a moment in comparison with the facts ascertained by Sir John Sinclair. I must, however, express my agreement with Dr. Parkes that smoking is an injurious and most undesirable habit for growing lads.

Let me pass now to a subject about which we are all much more likely to be agreed. I refer to the fallacies abroad in connection with smallpox and vaccination, and I must take especial notice of the style of fallacious argument employed by those who try to persuade the people that vaccination is not a preventive of smallpox. It is a style of argument well known of old, and very powerful of mischief. Take the following as an example:—"The decrease in the mortality from smallpox towards the latter part of the last century would have continued if vaccination had not been introduced, and would have been more marked than it has been." Here is a style of argument well calculated to throw even wary people off their guard. The false statement upon which the fallacy rests is not put forward as a statement of fact, but is assumed as something well known, and not to be disputed:—"The decrease in the mortality from smallpox towards the latter end of the last century!" This is the way in which it is put, and nine persons out of ten at the very least would not suspect that the statement assumed to be true is the falsest of falsehoods. As a matter of fact, the five most severe epidemics of the last century, each causing a mortality of more than 100 deaths from smallpox out of every 1000 deaths from all causes, occurred in the latter half of the century, and the most severe epidemic of the century, which caused no less than 184 deaths out of every 1000 from all causes, occurred in the year 1796! Take another argument of a similar stamp. "In Prussia everybody was vaccinated and re-vaccinated, yet Berlin was subject to severe smallpox epidemics like other places, and when smallpox was epidemic there lately the number of deaths in one week was three times as great as in London during the height of the epidemic here." This statement was made in 1871 in the House of Commons, and at the request of my friend, Mr. George

Ferguson of Cheltenham, who was then carrying on a controversy in a public paper with the chairman of the Anti-Vaccination League, I took pains to investigate the matter. I then found that up to March, 1874, there had been no compulsory vaccination laws at all for the civil population in Prussia, the law only *recommending* (!) vaccination; but that in March, 1874, the German Government was so impressed by the severity of the epidemics of smallpox in Prussia compared with those in parts of the German Empire where vaccination was compulsory, that a law was passed making the vaccination of infants and the re-vaccination of children of riper years compulsory throughout the whole of the German Empire. The Swedish statistics, which have always been pointed to as strongly in favour of vaccination, have been recently manipulated with view of proving the reverse. I have before me the statistics for 124 years. In the 61 years before the practice of vaccination, there was only one year in which the deaths in Sweden from smallpox were less than a thousand, and there were 9 years in which the deaths were over 10,000. In the 63 years during which vaccination was practised, there were 48 years in which the deaths from smallpox were under a thousand, and in no year did they reach 10,000 or even 3000.

There is another class of diseases, the prevention of which is to a certain extent dealt with by Acts of Parliament, and about these too it seems to me that a serious fallacy is widespread. Whatever many well-minded people may say to the contrary, I must, speaking not only from a sanitary but from a humanitarian point of view, maintain that it is not our prerogative to visit the sins of the fathers upon the children; and in answer to the common argument brought against attempts to prevent the spread of these diseases, I would re-echo the words of Dr. Farr:—"Morality, it may be hoped, will be inculcated by higher agencies than enthetic diseases."

Although I do not mean to enter into a statistical discussion, I will mention one or two serious statistical fallacies that are very prevalent, and out of which much capital is made. We are told that in spite of sanitary improvements the death-rate remains the same; now, considering that "the mortality of the City of London was at the rate of 80 per 1000 in the latter half of the 17th century, and 50 in the 18th, against 24 in the present day" (Farr), this statement seems rather audacious. We are also told that the death-rate of London is and has been for some time practically stationary, but since the density of the population is increasing, the death-rate

ought to be increasing, whereas it is actually diminishing. Dr. Farr shows that the death-rate of London (calculating from its density), ought to be 35·2 per 1000 per annum, whereas it is now under 23. Again, we are told that the death-rate from zymotic diseases is stationary; but surely the wonder is that it is not increasing rapidly.

Yet another statistical fallacy:—The death-rate of London is very low indeed; we are positively told that this is due to the influx of healthy lives from the country! whereas, as a matter of fact, they make an almost inappreciable difference in the death-rate. The annual influx of immigrants forms in time a permanent addition to the population, but as their death-rate (say that of persons over twenty years of age), differs but little from that of the community at large, or from that of persons under twenty years of age, they scarcely affect the general death-rate themselves at all; if we are required to debit London with the deaths of persons under twenty years of age, of whom the immigrants may be said to be the survivors, we must also credit the population of London with the additional population, under twenty years of age, which would result from an annual number of births equal to that of the immigrants, and of the persons under twenty whose deaths we have taken into account. Thus it can be easily shown that the death-rate is hardly affected at all by immigration.

Lastly, I would refer to one great fallacy of a totally different kind, that I see is likely to become dangerous. A house divided against itself cannot stand, and I look upon the existing jealousy between various sanitary organizations, I will not say with the greatest alarm, but with serious apprehensions. If we wish to make the public believe that we are in earnest about sanitary reforms we must be united among ourselves, and not go about wringing our hands, as some do, because others than themselves have a share in the good work.

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