AN ADDRESS

DELIVERED AT THE OPENING OF

THE SECTION OF PUBLIC MEDICINE.

*At the Annual Meeting of the British Medical Association,
held in Leeds, August, 1889.*

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MEDICAL OFFICERS OF HEALTH: THEIR TRAINING AND
THE CONDITIONS ON WHICH THEY SHOULD
HOLD OFFICE.

SINCE the last occasion on which it was my privilege to attend an annual meeting of this Association a very proper step with respect to the sectional meetings has been taken by the Council. They have relieved the Presidents of Sections from the duty or task of preparing and delivering an introductory address. To me, selected as your President this year, the step is a source of personal rejoicing, and I congratulate you, gentlemen, also, on having been protected from an infliction which would assuredly have put a strain upon your habitual courtesy. But, as things turned out, neither you nor I have come to be let off quite so easily as I anticipated; since, notwithstanding that a formal address has been dispensed with, I have been requested to introduce, by means of a written paper, the first subject on our agenda. The subject relates to "Medical Officers of Health: their Training, and the Conditions on which they should hold Office"—a subject which just now has been brought into prominence by a recent statute, and by the promise of further legislation in the same direction. It is not for me, holding the official position that I do, either to criticise past action of Parliament or to forecast the future, but it is clear that public interest has been aroused. It is equally clear that there is abundant room for the expression of both professional and non-professional opinion as to what should be further done, and what the relation should be between County and District Councils and their respective sanitary officers on the one hand, and between the latter and the central sanitary authority of the kingdom on the other hand. I mention this, not because I shall take any part in the discussion, but because I am sure that these relations have occupied your thoughts, and because it is not to be expected, in a meeting of Englishmen, that what is labouring in their minds will fail to be delivered in words. For myself, I may say that I have never posed as a medical reformer, nor taken any active part in medical politics. In respect of all such subjects I occupy, and intend to occupy, the stool of the learner.

For a good many years of my life, as most of you probably know, I filled the post of medical officer of health in one of the largest of the metropolitan districts, and for a good many years since have been in relation, official or otherwise, with gentlemen holding a similar post in all parts of the country, both in urban districts and in rural districts. In this way I have necessarily made a very considerable number of acquaintances, and formed, I am most happy to add, not a few personal friendships, among the medical officers of health of England; and, somehow, very many of these professional acquaintances and friends have been led, for some reason best known to themselves, to make me the recipient of their confidences, their anxieties, and their professional troubles. So, what with my own experience, and what with hearing the experience of others, I think I know something of what it is to be a medical officer of health. I shall make use of both these kinds of experience in what I am about to say. I will be as brief as possible in saying it, and I shall confine myself to one branch of the subject by endeavouring to reply to the question, What are the requisites for a good and efficient medical officer of health?

First, then, he must possess himself of due learning. What I

mean by this, of course, is that his mind must be specially stored with that kind of learning which shall fit him to deal with and to advise about disease, not as it affects the individual but as it affects the community. It goes without saying that, as communities are made up of individuals, a knowledge of disease as it affects individuals is the basis of the knowledge of disease as it affects communities, and this is the reason why an officer of health to be efficient must be a medical man. "Nihil humanum a me alienum puto" is the motto which every practitioner of the art of medicine appropriately adopts; "Nihil mundanum a me alienum puto" should be the motto of every medical officer of health. No knowledge—I was going to say in Heaven above—certainly on the earth beneath, comes amiss to him. He has to deal often with complex problems, to solve which his mind cannot be too well furnished, and furnished with information that the ordinary practitioner of the healing art has little or no call for. Let me instance such branches of knowledge as these: meteorology, geology, sewer and water engineering, the construction of houses, the ventilation of private and public buildings; or, to pass to living things, bacteriology, the subtle and often tortuous path of epidemic contagia, the physical and sometimes moral peculiarities of race; and even the pathology of animals lower than man in the scale of creation, but domesticated for his use. I need not prolong this list. When medical officers of health were first appointed in this country the necessity for special knowledge was scarcely recognised; but a considerable step was made when it was recognised that an officer of health should be medical. As I speak to-day the necessity for special knowledge has obtained recognition by Parliament; this is another great step in advance, and not only so, but in the great schools of medicine in England, Scotland, and Ireland provision has been made for giving requisite special instruction.

Secondly, to make a man an efficient health officer he requires to be trained. The requisite science he may be taught, but the art is only to be acquired by practising it and by watching others practise it. It is the same with preventive as with curative medicine. The physician does not learn his art in the lecture room, but in the hospital; so the health officer learns his either slowly and laboriously, with many mistakes and even some blundering in striving to carry on his duties, or he may take the shorter road of working practically for a season under the direction or supervision of another. It is the same with all professions; a good theologian would make but a sorry parish priest unless he had been well drilled in parish work. What is now needed to supplement the scientific instruction of the future health officer is the same sort of practical training under a medical officer of health that men entering other professions and the curative branch of the medical profession get before they are permitted to exercise them. Judging from some reported proceedings of the Medical Council, and some discussions that occurred during their last session, an opinion of this kind appears to have found expression there. I hope that at their next session some regulation pertaining to this subject will be formulated. It is a subject that requires to be dealt with, and no doubt will be dealt with thoughtfully and with discrimination.

Lastly, I may mention "tact"—an acquisition of rare value, but one the possession or lack of which may make all the difference between the successful and the inefficient medical officer of health. To such an officer, all his learning and all his training will avail him little unless, at the same time, he has learned the inestimable art of dealing patiently but firmly with men—with men who have not always the intellectual culture that he possesses, who see the same things that he sees but with differently coloured spectacles, and from altogether a different view-point. Deficiency in tact is a fault chiefly observable among the junior members of the confraternity. Anxious to serve their district, earnest and enthusiastic, they chafe at obstacles which they find impenetrable, and are ready to give up a strife which, over and over again, terminates in their discomfiture. It is men of this stamp (and they are not always—I say it with bated breath—young men) that I hear perpetually calling out for central interference. They mistake their position and functions, and are wanting in a very cardinal virtue. They forget that they are advisers, not administrators; that good and proper as their advice may be, there may be difficulties not apparent to them in at once pursuing it—trifling difficulties, possibly, in their eyes when they are pointed out, and unworthy of regard in view of the advantages to be gained by their disregard, but, nevertheless, serious difficulties in the eyes of other people. A medical officer of health

is not an autocrat; it was never intended that he should be one. Often and often it has happened that health officers, who have made this mistake, have sought my condolence with them in the tribulation they have thus brought upon themselves. They all get from me pretty much the same advice. It is this: Be patient, bear with the infirmities of your weaker and less instructed brethren. Keep your own conscience clear amidst all discouragement by carrying out your duties to the best of your ability, and leave other people to look after theirs. Recollect that the rope you are tethered with is public opinion—the public opinion locally prevalent; that if you want to be more free, to get more of your own way, you can only do it by educating public opinion; you must turn schoolmaster. You will do no good but much harm by scolding those who appear to be stupid. You must be patient; and in the end, by the tedious process of line upon line and precept upon precept, you will perhaps attain your object. And to assist yourselves to wait patiently for results, to save yourselves from the misery of grizzling over the opposition you encounter, divert your thoughts into scientific channels. Nature is never unkind to such as in the proper way seek to learn her secrets; she never disappoints, never vexes, never discourages. To the medical officer of health working in the baldest rural district, as well as to him who labours in the crowded town, she holds an open gate, and says: "Treasure is hidden here; my servants are contented and happy; come and dig."

Dr. G. E. J. GREENE (medical officer of health, Ferns, Ireland) thought that the chief reason why a medical officer to a dispensary district in Ireland, who was also a medical officer of health, was frequently found to perform his sanitary work in an imperfect manner was because it was often financially to his advantage to be "sanitarily amaurotic," especially when he who permitted a nuisance to exist was a well-to-do patient. Medical officers of health should possess a diploma in sanitary science, obtained by passing a Government examination in analytical chemistry, botany, geology, pathology, and sanitary engineering; should hold jurisdiction over a large area; be appointed by, and draw their pay from, Government, which pay should be sufficient to support them without their engaging in any other occupation; should not engage in private practice; and should have the option of promotion to a better district after some years' service. The Parliamentary Bills Committee of the British Medical Association might have a Bill, containing some of the most practical points in this paper, introduced next Session into Parliament.

Dr. GRIMSHAW (Registrar-General of Ireland) wrote saying that, had he been present, he had intended to advocate a system of organisation of public health officers on the Irish system. He was strongly in favour of combining in one person the offices of poor-law officer, public vaccinator, district medical officer of health, and registrar of births and deaths. Such a civil medical service was the foundation upon which the whole State medical system should rest, only there should be independent offices, say for counties and groups of unions. There should be inspectors, then superintendent officers for counties, and then again the really active officer who combined all the offices together. He thought a local officer should not require so high a qualification as the county officer or the combined union officer.

Dr. JOHN BROWN (Bacup) said the medical officer of health was a specialist of the highest order. His duties were the conservation of the health of the community and the prevention of disease. The medical officer of health for large districts whose time was entirely devoted to his work ought by age, experience, and high attainments in sanitary science to be held in high esteem, and to have the fullest confidence of his medical brethren. No one should be under 25 years of age, and probably 30 would be better for the more important positions for county councils. Cases of difficult diagnosis, where a mistake might involve the town in a serious epidemic, were of frequent occurrence. The medical officer of health should be able to command the confidence of his medical brethren, and be called in to assist in the diagnosis; therefore, it was desirable that he should have had considerable experience in general practice and special facilities by attending fever hospitals to assist in cases of doubtful or difficult diagnosis. He should have practical knowledge of the analysis of water and air, and how to detect the more common adulterations of food, although no one would expect him to be a thorough analytical chemist. He should be able to make a complete qualitative and quantitative analysis of water, so far as it regards the detection of those organic substances and salts which showed that the water had been pol-

luted with sewage or other organic matter. In some epidemics of enteric fever, unless the water was examined just after its pollution, by the time the circumstances were reported to the Health Committee, the water might be perfectly free from organic matter, as the following case proved. Some months since he (the speaker) analysed the water-supply of a hamlet where a serious epidemic of enteric fever had occurred. The circumstances, apart from analysis of the water, clearly proved that the water-supply was the source. The analysis which he made showed organic pollution of the water, the source of which was proven. The circumstances were reported. The Health Committee decided that a sample should be taken and forwarded to the county analyst. His analysis failed to detect organic pollution, and no action could be taken to close the supply. The consumers, however, acted on his advice, and no harm came of it. The further pollution was prevented. In cases like this the medical officer of health ought to be able to perform the analysis, and county councils ought to provide laboratories and all the necessary apparatus for water analysis. To be able to do this considerable experience in practical chemistry was absolutely necessary, and every medical officer of health should have at least a three months' course in a laboratory under a skilled analytical chemist. He should also be, trained in the practical duties of the office, so as to obtain fact-method, etc. There ought to be appointed by the Local Government Board a medical officer of health, holding a public appointment for a county council or large borough, who by his experience and scientific attainments was well qualified to train men in the practical duties of their onerous and responsible work. These officially appointed tutors should have facilities for giving practical instruction on the construction and uses of instruments used in meteorological observations; also for giving practical demonstrations on the various methods of ventilation, lighting, construction of sewers, various methods of treatment of sewage, disposal of towns' refuse, examination of meat, fish, etc. He should also be trained in bacteriology, and should attend a course of practical demonstrations on the use of the microscope in adulterations of food, examination of micro-organisms, parasites in meat, etc. As far as possible set lectures should be avoided, and everything should be taught by practical demonstrations. He should also understand geology, and ought to learn the special features of the geology of the district of which he might happen to be the medical officer of health. The conditions on which medical officers of health now held office were scandalously unsatisfactory. If faithful in the discharge of the duties they might have to resign, submit to reduction of salaries, increase of duties without extra pay, as in some cases in which the medical officer of health had been appointed surgeon to a fever hospital, which if he had not accepted he must have resigned, or been subjected to many petty annoyances because he had the ill-will of one or more of the Committee. The following conditions were necessary in order that the highest interests of the public might be served: 1. Fixity of tenure, so long as the medical officer of health was able to discharge his duties. 2. Salary in county councils and large populations should be such as to secure the very best men; £500 per annum should be the minimum. This could scarcely be considered a high salary when one remembered that the medical officer of health had spent considerable time and money in gaining the special knowledge required, and was debarred from private practice, and moreover had no claim for pension for long service, or any claim for permanent disablement by sickness, etc., acquired or contracted in the discharge of his duties. Besides, he exposed his life and health to special dangers which might prematurely cut short his career. 3. Salaries should be placed by the Local Government Board at a fixed minimum; for large districts (county councils) this might not be necessary in all cases; but in small towns and rural authorities the salary was absurd; only young men, newly qualified, would hold these appointments, and, as a rule, little or nothing was expected to be done. These remarks applied to many parts of England, and to nearly every place in Ireland. Also there should be a fixed minimum of increase for every five or seven years that the appointment had been held. This would be conducive to the best interests of the public. The medical officer of health would be more likely to remain and serve the public to the best of his ability, and the experience gained would not be lost. 4. The Local Government Board should be a court of appeal as to matters of dispute, so that it would be impossible to discharge the medical officer of health without their consent, or to reduce his salary, or impose any duties which were contrary to the principles of justice and honour.

Dr. CALDWELL SMITH (Glasgow) remarked that, as a teacher of hygiene, he would like to say something regarding the training of medical officers of health. It was now necessary that medical officers of health should possess a qualification in public health, but the General Medical Council had passed a resolution to the effect that such qualification would not be registrable unless after six months' analytical work in a laboratory, as well as six months' work under a medical officer of health for a large area. In regard to the former, he had to demur somewhat; he thought a better system would be for the Council to insist that all examining bodies should require attendance at lectures on hygiene before the entering for the examination. Such course of lectures should necessarily include analysis in all its bearings on public health. He did not think that a medical officer of health should be public analyst—although he ought to be able to perform and interpret analyses—as if he held such office it was apt to produce much friction with some classes of the community. In regard to tenure of office, he was glad to state that in Scotland they were in advance of their English brethren, as in the Local Government Bill for Scotland no medical officer of health under the county council could be dismissed from office without the consent of the central authority for Scotland, namely, the Board of Supervision for Scotland. He thought that this section of the Association should petition Government to pass a supplemental Bill to the English Local Government Bill to obtain such tenure of office. He might state that Dr. Wallace, of Greenock, was the only medical officer of health that he knew who could be deposed from office only with the consent of one of Her Majesty's Secretaries of State.—Dr. LITTLEJOHN (Edinburgh) referred to the admirable address to which they had listened, and he emphasised the importance of tact in the discharge of sanitary duties. He agreed with the last speaker, that the medical officer of health should not also hold the office of public analyst. The chemistry of adulteration was making such rapid advances, and the delicacy of chemical analysis was becoming so great as to render it impossible for an active medical officer to overtake in a satisfactory manner his ordinary official work and at the same time conduct analyses. As to tenure of office, thanks to the action of this powerful Association, coupled with the remonstrances of the profession in Scotland, Government had lately conceded the great act of justice in rendering it impossible for any local authority to dismiss the medical officer without the sanction of our Local Government Board. In large centres of population, this security was not so much required as there; a medical officer should, if at all capable, and gifted with common sense, so commend his work to the community as to render his position absolutely secure. It was in smaller areas with annual appointments that the injustice was chiefly felt. As to Dr. Grimshaw's suggestions, he regarded them as admirable, and he quite approved of the conjunction of various public offices, as this secured a more respectable salary. The rule should be the dissociation of public sanitary duties from private practice, and until this rule were made absolute, it would be impossible to prevent what was so much to be deprecated, namely, friction with our medical brethren, which already had done so much to hamper the efficient discharge of sanitary duties.—Mr. ALDERMAN EMSLEY did not agree with the speakers as to the expediency of a medical officer of health being also appointed registrar of births and deaths, public vaccinator, and medical officer for guardians. In Leeds it would be impossible to follow that suggestion. In the Borough of Leeds there were four Poor-law unions, and if a medical officer of health were appointed for each union, a proper salary would have to be paid: the officer ought not and could not attend to private practice in Leeds. Only last week it was proposed in the Leeds Corporation that a medical officer of health should be appointed for each union at a salary of £250 a year each. This resolution did not pass, as it would be impossible to obtain men at such a salary who could properly perform the duties. He objected to having the medical officer irremovable except with the consent of the Local Government Board. The Corporation were surely better able to decide as to the necessity of discharging the medical officer of health than an official sent down by the Local Government Board. In Leeds they had not found centralisation in many cases work well for the town. Leeds had a high death-rate; this no doubt was caused to a great extent by the congestion of cottage houses in old parts of the town, and also by the pollution of the River Aire, which passed through the town. If the chairman would give them any information regarding their powers for the removal of these nuisances they would not regret the visit of the Medical Association.—

Dr. ALLFREY gave the meeting his experience—derived from twenty-five years' experience in general practice, and as Poor-law medical officer and public vaccinator. He advocated the absolute independence of the medical officer of health from private practice, and spoke in favour of combining the offices of medical officer of health, union medical officer, and public vaccinator, in one person, as advocated by Dr. Grimshaw.—Dr. GEORGE DE'ATH (Medical Officer of Health for Buckingham) suggested that, though medical officers of health should of course be independent of private practice, it would be only making enemies of private practitioners to take their Poor-law medical work away and attach it to public health work. Their present experience of a satisfactory salary to a medical officer of health, who was only a medical officer of health, was not encouraging. Much could be done in time, but in the meanwhile the Local Government Board, which inspected the work of vaccination officers, might also periodically inspect the work of health officers and also their districts, using as fully and freely as possible their powers and influence to make both health officers and local authorities do their duty and use their powers.—Dr. B. A. WHITELEGGE said the medical officer of health was simply the adviser of the sanitary authority, and beyond that the responsibility for the actions of the latter did not rest upon him. He should have a competent knowledge of chemistry and of certain branches of law and engineering, but should always have the advantage of the co-operation of professed experts in those matters. The tenure of office should at least be equal in security to that of Poor-law medical officers, but the system of annual or even triennial election was far less secure than simple tenure subject to notice. Registration of births and deaths came legitimately within the sphere of the medical officer of health, and he had already to obtain and classify such returns; but there were other duties now grouped with this work of registration which would scarcely be congenial. He would view with great regret any relaxation of the present supervision of the Local Government Board, which was of the greatest possible service to local medical officers of health. The duties of the medical officers of the county councils were as yet undefined, but on a smaller scale the councils would in some measure supply the place of the Local Government Board, and their officers, being brought into intimate relations with the local medical officer of health, would have a wide field of useful work.—Mr. J. BRINDLEY JAMES said every medical officer of health should be apprenticed to a medical officer of health to gain the experience necessary for that office. He should not practise as a medical practitioner, but give the whole of his time to his office, and be well qualified in every branch of medical science and applied sciences; and receive proper salary to keep him above bribery and corruption.—Mr. W. HOLDER, speaking as a member of the profession and a member of a municipal corporation, said that in the training of medical officers of health the student should have acquired a fair knowledge of chemistry and applied science in his studies for matriculation examination. Then a year passed under a general practitioner, and afterwards a pupilage in the office of a medical officer of health, was essential that he might gain a knowledge of how to acquire and distribute statistical work, learn how to submit his opinions to governing committees, and submit with grace for a proper time to be repressed in his zeal on a question for which public opinion was not yet ripe. He could not but think that the position of medical officer of health was a comparatively new one, and that the growth of public opinion and municipal pay was not altogether unsatisfactory in towns, viewed in the light of its growing importance. In Hull, he would point out, the medical officer was greatly appreciated, had a reasonable salary, and was not subject to instant dismissal, but appointed for so long as he maintained good behaviour. His opinion was one highly valued, and he was treated with the highest respect. He instanced Hull in these matters because the reason why the position in Hull was so reasonably satisfactory was that the emotional feeling of the public had been guided into proper lines by a number of members of the profession, who had accepted their duty as civilians and sought positions on the councils of their corporations, where they had given to the corporation the advice which their technical training fitted them to give to non-professional councillors who, in his experience, were only too glad to do right when they were convinced and knew the importance and truth of the steps they were taking. In Hull, Sir H. Cooper, an old President of this Association, and Dr. Kelburn King had done great things in this corporation work, and their influence was great and

would be abiding, and he urged members of the profession to enter into this useful work as much for the benefit of the people as for that of the profession.—Surgeon-Major POOLE remarked that it seemed to him that the science of public health was becoming too much of a speciality, especially as they heard of one gentleman speaking of the necessity of a medical student intending to follow out the special calling of medical officer of health undergoing an apprenticeship to some such officer. The tendency of the present day was to specialise, and this tendency should be resisted, and appointments made from among the well-qualified general practitioners, provided they had, if possible, the diploma of public health.—Dr. OGILVIE GRANT wished to state that he attached great importance to and urged the necessity of medical officers of health first being for some time general practitioners, and by contact with all classes learning that tact so necessary for the discharge of their duties. Unlike the majority of medical officers of health he had been trained as a civil engineer, but he attached very little importance to this training in comparison with the experience he had acquired as a general practitioner.—Dr. MAJOR GREENWOOD said that the position of medical officers of health would be much improved if more members of the profession took an interest in local matters, and deigned to come forward as candidates for places on the sanitary boards of their districts; that in his own district, an important metropolitan one, with a population of over 150,000, on a board of 120 members, he was the only medical representative, and that far from getting any encouragement from neighbouring practitioners, he was rather rebuked for having anything to do with local matters; that often, when endeavouring to promote sanitary reform in his district, he sadly missed the presence of other medical men on his board, and that he felt sure that a greater leaven of members of the profession on the sanitary authorities throughout the country would make a world of difference in the position of medical officers of health, both as to their influence for the public good and in ensuring them a proper remuneration for their services.—Mr. J. S. LOE considered that all medical officers of health should possess special qualifications for the office; that no medical man should be appointed without this special sanitary knowledge; and, as in obtaining this knowledge many years' work might be required, it was, therefore, only fair that the appointment should be for life, and that he should not be subject to dismissal from any personal feeling that might arise during the discharge of his duties, but that, in the event of just cause of complaint, the matter should be referred to the Local Government Board, which alone should have the power of dismissal.—Dr. BALLARD, replying on the discussion, said it did not follow that because the Irish system was successful in Ireland it would suit England. In his experience he found that local authorities very often did not appreciate a man as a medical adviser, but simply as an inspector of nuisances, which was not the position of a medical officer at all. He was quite sure that that Section would not wish in any way to advise or suggest anything in the present condition of the medical affairs of Leeds. It was only general principles, he thought, on which they could say a word. One point raised by Alderman Emsley was that of cutting up a large town into small districts, and giving to the medical officer for each a small salary. That idea would never do either in Leeds or any other large district; unless a medical officer had time and opportunity to progress he was almost useless. The rivers pollution question, he thought, was dealt with under the new Act.

Resolution as to Tenure of Office of Medical Officers of Health.

—Dr. CALDWELL SMITH moved the following resolution:—

That in the English Local Government Bill a clause should be inserted providing that no medical officer of health shall be dismissed without the consent of the Local Government Board, and also that in regard to the appointment of medical officers the word "shall" should be substituted for "may" in the Local Government Bill.

Mr. LOE (Leeds) seconded, and the resolution was adopted. It was also agreed to thank the Parliamentary Committee for their efforts to secure the recognition of the principle embodied in the resolution when the Bill was before Parliament.

TYPHOID FEVER AT BASLE.—An epidemic of typhoid fever has been raging at Basle since the beginning of June. There have so far been 450 cases with 31 deaths. The water-supply has been tested chemically and bacteriologically without anything being found to account for the outbreak. The epidemic is now subsiding.

A DISCUSSION ON DISINFECTION AND ISOLATION: WITH SPECIAL REFERENCE TO THE CONTROL OF EPIDEMICS.

In the Section of Public Medicine at the Annual Meeting of the British Medical Association, held in Leeds, August, 1889.

I.—H. FRANKLIN PARSONS, M.D.,

Medical Inspector, Local Government Board.

THE invitation of my friend and colleague, the President of the Public Medicine Section, must be my excuse for submitting to the Section, as a text for discussion, the following remarks on disinfection with reference to the control of epidemics.

By disinfection I mean the destruction of infection—the destroying of the activity of that matter which, produced by a sick person and received into the system of a healthy one, has the power of causing in the latter a disease similar to that from which the former was suffering. In popular language the word disinfection is used to include the use of substances ("deodorants") which destroy offensive odours, and "antiseptics" which prevent or retard putrefaction, but I shall employ it in its strict etymological sense.

What, then, is the nature of this infective matter which in the interests of the public health we seek to destroy? It is known that it is organic matter, and particulate—that is, solid, not liquid or gaseous—matter, although the fine colourless particles of which it is composed may be freely suspended in both water and air. There is reason also to believe that it is in all cases living matter, and consists of microscopic vegetable organisms. The analogy between the life history of infectious fevers and that of the yeast plant in a saccharine solution long ago suggested to Liebig this view—a view embodied in the term "zymotic," often applied to such diseases. Modern research has shown that certain diseases in men and animals are undoubtedly caused by the presence in the system of micro-organisms, and are communicable by the inoculation of such organisms. Among these I may mention two acute febrile diseases, namely, anthrax and relapsing fever; acute suppuration and various forms of septicæmia; the chronic diseases, tuberculosis and leprosy; also fowl cholera and infectious pneumo-enteritis of the pig, "swine fever." The last-named disease has an interesting resemblance to the common human infectious disorders, in that the contagium may be transmitted through the air, and attaches itself to places in which the affected animals are kept. In other diseases, as Asiatic cholera, scarlatina, diphtheria, and enteric fever, certain micro-organisms have been found and have been looked upon with more or less probability as the cause of the disease; but the connection is not perhaps as yet completely established, mainly owing to the difficulty of testing it by the results of inoculation on animals. In other infectious diseases, again, as small-pox, measles, and whooping-cough, no such organism has, I believe, as yet been identified; but we may probably for our present purpose, without much risk of error, assume the *materies morbi* in these also to be a living organism. This assumption furnishes us with a practical means of testing the efficacy of the agents we employ to destroy infection. It is in most cases not practicable to test directly the effect of our disinfecting agents upon the contagia of the ordinary infectious diseases of mankind, for the reason that we cannot make the necessary experiments (including control experiments with undisinfected portions of material) upon human beings; and these diseases cannot, or cannot with certainty, be produced by inoculation in the lower animals. If, however, we choose the most refractory organism, pathogenic to animals, that we can find, and ascertain how it may be killed, we shall be tolerably safe in assuming that the same means will kill the contagia of the infectious diseases of mankind, with which as sanitarians we have to do. Now certain of the pathogenic micro-organisms, bacilli, have the property of forming spores, and these spores are found to be more resistant than the fully developed organism, just as a grain of wheat will survive treatment, such as drying and dipping in poisonous solutions, which would kill a growing wheat plant. Of the patho-