

**BRITISH MEDICAL ASSOCIATION.  
SUBSCRIPTIONS FOR 1893.**

SUBSCRIPTIONS to the Association for 1893 became due on January 1st. Members of Branches are requested to pay the same to their respective Secretaries. Members of the Association not belonging to Branches are requested to forward their remittances to the General Secretary, 429, Strand, London. Post-office orders should be made payable at the West Central District Office, High Holborn.

**British Medical Journal.**

SATURDAY, SEPTEMBER 16TH, 1893.

**DEATH CERTIFICATION.**

I.

THE report of the Select Committee on Death Certification, of which we published a summary last week (p. 596), is an important document, which will well repay careful study. It marks a distinct advance in public opinion, and has evidently been drawn up with the greatest care, and with that full knowledge of the subject which might be expected when it is remembered that the Committee was presided over by Sir Walter Foster, who has thus, while discharging his official duties as Parliamentary Secretary to the Local Government Board, been able to render an extremely valuable service to the public and to the profession of which he is a distinguished member. The report itself contains a very full analysis of the evidence of the thirty-two witnesses examined, and contains an able discussion of all the obvious as well as other possible objections to the present system of death registration and certification. No one reading the twenty-seven pages of this elaborate report can longer doubt, even if they doubted before, that the system needs reform in order to remove its more patent defects. Many of the Committee's recommendations, moreover, should they ever become legislative enactments, would manifestly constitute important improvements of the system.

The first of the principal recommendations is to the effect that no death should be registered without the production of a certificate of its cause, signed either by a registered medical practitioner or by a coroner. In order to provide for the certification of the causes of the above 15,000 deaths per annum in England and Wales, which under the present imperfect system are not so certified, it is suggested that in each sanitary district a "registered medical practitioner should be appointed as public medical certifier" of causes of death not otherwise certified. In the body of the report, it is proposed that "the medical officer of health for each district should discharge this duty," and that in certain cases this official should be permitted to delegate the duty to another registered medical practitioner as his deputy. While in principle this recommendation appears to be most excellent, it is obvious that certain difficulties stand in the way of its application in the present state of sanitary administration. One of these, which arises from the fact that it is only a comparatively small minority of medical officers of health who are not engaged in private practice, is referred to in the report which suggests that the medical man appointed to the offices of medical officer of health and medical

certifier, should be required to devote the whole of his time to the duties of these offices. But if this difficulty were overcome, the doubt must remain whether even medical officers of health debarred from private practice could undertake this new and onerous duty, especially in the 575 rural sanitary districts, where uncertified causes of death are most numerous, and where the area of the districts is almost invariably very large, thus necessitating much travelling for the "medical certifier."

According to the Census Report just issued, there were at the close of last year very nearly 1,600 sanitary districts in England and Wales, and it necessarily follows that, whether this duty of certification is performed by medical officers of health or by other registered medical practitioners specially appointed for the purpose, and whether these medical certifiers are paid by salary or by fees, with travelling allowances, the cost of this important work will constitute a very considerable addition to the present cost of the registration of deaths. We are inclined to the opinion that a more satisfactory, and in the end less costly, provision for the certification of the causes of death now registered as uncertified could be attained by appointing a skilled medical referee to each coroner, whose services might be also utilised to obviate the necessity for holding many inquests that would thus become unnecessary; the net cost of the medical certifier would thus be reduced.

The third and fourth recommendations are, from a professional point of view, of primary importance. They are (a) to the effect that "a medical practitioner in attendance should be required, before giving a certificate of death, to personally inspect the body;" and (b) that medical practitioners should be required to send these certificates direct to the registrar, instead of handing them to the representatives of the deceased.

In the body of the report it is suggested that, in consideration of the proposal that the duty of verifying the fact of death, and of transmitting the certificate to the registrar, should be imposed upon the medical practitioner, the precedent of the Infectious Diseases (Notification) Act, 1889, should be followed, and that a fee of 2s. 6d. should be payable to a medical practitioner out of the public funds for each death certificate issued by him. There can be no doubt as to the justice of the claim for some pecuniary recognition for the service rendered by medical practitioners to the State by furnishing these medical certificates.

On the other hand, it cannot be overlooked that this payment would signify an addition of about £70,000 per annum to the cost of registration. At present the medical practitioner is not bound to certify to the fact of death, which responsibility rests with the legal informant of the death, under penalty of fine or imprisonment in case of false information, and we are not fully persuaded that the suggestion to put this responsibility on the medical practitioner, on the proposed terms, is one that would be acceptable to the profession. Moreover, the suggestion that "if on the ground of distance, or for other sufficient reason," the practitioner is unable to verify the fact of death himself, he should "obtain" and attach to the certificate a statement of death signed by two neighbours of the deceased, although providing a means for evading this troublesome duty, leaves it very doubtful who would be responsible for obtaining and producing this signed statement, which is to be attached to the certificate in such cases.

In the interest both of registration and of the profession we much doubt the expediency of the proposal that medical certificates of the cause of death should be sent by the medical practitioner direct to the registrar instead of being handed to the representatives of the deceased. Such a course would not only be the source of troublesome responsibility to the medical practitioner, but would undoubtedly cause in many cases much public inconvenience by delaying registration and burial. It would, moreover, probably fail to secure the object of the provision—namely, that relatives of the deceased should not, in certain cases, be aware of the cause of death certified by the medical attendant. Any such attempt at secrecy in such a case must necessarily fail, because (a) a relative of the deceased is generally the legal informant of the death, and the cause of death would be entered in a column of the entry in the death register before the signature of the entry by the informant, whose duty it is to read through the entry before signing it; and (b) because a certified copy of the entry in the death register is almost invariably required by the relatives of a deceased person for legal purposes, and the assigned and registered cause of death would thus become known to them. It may also be pointed out that this mode of dealing with medical certificates of the cause of death has long been in practice in Scotland, and has been assigned as one of the main causes of the excessive proportion of uncertified deaths in that part of the United Kingdom.

The fifth recommendation, to the effect that the form of certificate of the cause of death should be legally scheduled, and that medical practitioners should be required to use such form, in view of the proposed payment for medical certificates, is one to which no reasonable objection could be made, and which would inevitably prove a distinct gain to the registration system. The report suggests, moreover, that the form now in use should be modified so as to include an expression of opinion that the death is due to disease and not to any form of violence or criminal neglect, which would materially add to the value of the certificate by facilitating the differentiation of those cases that should be referred to the coroner or the medical certifier.

We propose to defer to next week the consideration of the remaining recommendations of the Committee's report, which deal mainly with burial certificates and with the registration of stillbirths.

### CHOLERA VIBRIOS.

DR. D. D. CUNNINGHAM was the first observer who showed clearly that in choleraic stools several distinct kinds of comma bacilli or vibrios may be found, some of these being distinguished by such marked characters that they may be considered to be not mere variations or sports of the common type, but different species. Cunningham's work was severely criticised at the International Congress of Hygiene in London by Hueppe and others, who would not allow that the various forms shown by him were distinct species. No one who has seen Cunningham's preparations can question the fact that in cholera stools several more or less distinctive kinds of vibrios are found. It is quite possible that the majority of the ten or twelve forms shown by him were simply varieties of a common type, but many bacteriologists accept the opinion of Pettenkofer that Cunningham separated

at least two distinct species, and his researches demand the most serious consideration, since they were pursued in a locality where cholera is endemic, and where errors of diagnosis are improbable. Since the recent outbreak of cholera in Hamburg and Paris bacteriologists have paid special attention to the morphological and biological characters of the comma bacillus, and at present opinions are greatly divided in regard to the existence of various kinds or species of cholera vibrios. Thus Gruber and Wiener compared the vibrios obtained from Paris (1892), India, and Tonkin with Koch's vibrio, and found appreciable microscopic and biological differences. They came to the conclusion that possibly the term "cholera vibrio" might include various allied kinds of organisms, which are perhaps distinct species, a view before them expressed by Cunningham. The effect of intraperitoneal injections on guinea-pigs of these different varieties was identical. This, however, helps us but little, since many other bacteria injected in the same manner act similarly, as shown by Klein and Gruber and Wiener. Finkelnburg, on the other hand, made careful comparisons between the Hamburg and Paris vibrios, and found only slight differences, not sufficiently marked to warrant him to consider them to be species differing from our ordinary laboratory form, which is derived from Koch's original Indian cultures. He believes, however, that the cholera vibrio, through being grown in a laboratory, may lose some of its vital energy, and undergo a gradual attenuation. The latter opinion is, we believe, now generally accepted. It can, therefore, no longer be denied that various kinds of comma bacilli occur in the stools of cholera patients, forms allied to Koch's original vibrio, yet quite distinct. All these are distinguished easily enough from the vibrio of Finkler and Prior, or of Deneke, and the vibrio of Metschnikoff, and also from that recently described by B. Fischer, and obtained from a case of acute food poisoning with choleraic symptoms, originally diagnosed as cholera nostras.

The inexperienced observer might, no doubt, have difficulties in coming to a definite conclusion whether he is dealing with one of the true cholera vibrios or with one of the other forms which occasionally find an abode in the human intestinal tract. Matters might be easy enough for the skilled bacteriologist, if the vibrios occurred exclusively in the human body; but, unfortunately, various kinds or species have recently been found in water. These might easily be mistaken for true cholera bacilli, and a faulty diagnosis might obviously lead to the most serious consequences. Günther, while examining the Spree water supplied by the Stralau waterworks for cholera bacilli, found suspicious colonies, very similar to those of Koch's vibrio. A careful objective study, however, established differences important enough to convince him that he was dealing with a microbe essentially distinct from the true cholera vibrio. Weibel found another vibrio similar to that of cholera, but different from any hitherto described. Bujwid, again, discovered bacteria in the water of the Vistula, which microscopically could not be distinguished from Koch's comma bacillus. The culture method, however, cleared up all doubt. Orłowski also found an organism in the water of a well at Lublin of still greater resemblance to the true cholera vibrio. Fokker likewise described a comma bacillus which he cultivated from water, and which was very similar

to the genuine Koch's comma, but on careful comparative examination was quite distinct. He considers both his and Günther's vibrios to be degenerate cholera bacilli, altered on account of a change of soil and surroundings. How great the influence of these conditions may be appears from the fact that it is possible to alter the true cholera vibrio in such a manner that it permanently loses its power of liquefying gelatine. Finally, Gärtner also separated from water a vibrio closely resembling Koch's bacillus.

The moral to be drawn from these facts is that in any doubtful case the bacterioscopic examination should be performed by skilled and patient workers. The microscopic appearances alone are utterly inadequate. We must make ourselves familiar with the various kinds of vibrios known, make careful and painstaking comparisons as to growth in various media, liquefaction of gelatine, fermentation of milk, etc. All possible care is necessary, and the bacterioscopic investigation of any suspected matter should be conducted with a keen appreciation of the great responsibility incurred, and of the consequences to which an error might lead. We cannot accept Fokker's opinion that the various water vibrios described are simply degeneration forms of the comma bacillus. The same logic would lead us to the belief that the vibrio Metschnikovi is merely a modification of Koch's comma.

A point of much practical importance raised by these recent researches is the diagnostic value of the comma vibrio in suspected cases of cholera, which has been seriously questioned by Professor Liebreich. We shall not attempt to answer or discuss the latter's objections here, since they are academic rather than actual and real, and leave them for future consideration.

## THE GRIEVANCES OF ARMY MEDICAL OFFICERS.

### II.

ACCORDING to our contemporary, the *Army and Navy Gazette*, with whom we agree, the reply of the Secretary of State for War to the suggested alterations and reforms in the Army Medical Service is especially regrettable in the entire want of conciliatory tone. There is nothing to smooth the harshness of total refusal, which makes it all the more necessary to examine the grounds upon which such an extreme and uncompromising stand is made. We regret to say the more the arguments or, rather, statements are looked into the more merely negative and the less conclusive do they appear. The very form of the reply but too plainly indicates that it was framed, not merely as a present refusal, but also as a ready weapon against anticipated prospective demands. It was doubtless felt by the military advisers that the controversy was becoming uncomfortably narrowed to plain issues; therefore, it was desirable to closure further awkward importunities. So long as this might be temporarily done, it mattered little how. And so, this long, laborious, and weary controversy has for a time culminated—probably with some sense of relief and rest to the less ardent spirits. But, unless we are wholly belied by the past, the lull will not be long, for hitherto apparent quiescence in the department has proved but a prelude to the renewal of insidious attacks and consequent rousing to defence. If we are mistaken in this forecast it will come to us as a new revelation. After all that has been said and done by the

Parliamentary Bills Committee, the medical schools, and by individual representatives in this contest, it is, of course, not possible to let the reply remain unchallenged; and, therefore, we propose to traverse it rapidly in detail, so that, when the certain revival of the controversy comes about, we may know where we are, and have some ready arguments at hand.

The first and most fundamental of the matters in dispute is the formation of a consolidated medical corps. The suggestion that such would bring much solidarity, efficiency, and contentment to the medical service is characterised in the reply as a "subverting of the existing status of the Medical Staff," probably on the old untenable ground of the difference between staff and regimental allowances. But as no more money is asked or required, the adjustment of allowances is a mere accountant's bogey. We challenge any army administrator to say whether the existing status or conditions of the medical service, as a whole, would for a moment be contemplated or followed if it were necessary to create a medical corps *de novo*. The existing relations between officers and men of the Army Medical Service are wholly anomalous, because they had their origin in adventitious and almost fortuitous circumstances. The Medical Staff, as we find it, is simply the result of unification between the old regimental and unattached medical officers; the present Medical Staff Corps is a body of which the Medical Staff were not even the original officers, but others, called lieutenants and captains of orderlies. But the administrative absurdity of these intermediary officers led to their abolition, and brought the Medical Staff and the Medical Staff Corps into direct but, at the same time, very anomalous contact, and so they still remain.

But if it follows, which we wholly deny as in any degree necessary, that organic union between the corps and the officers would subvert the status of the latter, then what is the status of the officers in the organic unit called the Volunteer Medical Staff Corps? Will it be denied that the organic union in that corps better fits it for service in war? The truth is that the auxiliary medical service is ahead of the regular in everything pertaining to corps organisation and field efficiency. We altogether deny, on the best of testimony, that in the present haphazard and scratch arrangements between the Medical Staff and the Medical Staff Corps for field service "the standard of efficiency is adequately maintained," as the reply asserts. The officers and men have no proper bond of union, not to mention opportunities of drilling together as bearer company and field hospital units; until a closer corps organisation is brought about we look for no improvement in this absolutely serious state of field efficiency in the medical department. Instead of subverting, a proper corps organisation would raise and define the army status of medical officers; but this, we fear, is just what is not wanted by a powerful section of the army, whatever the risks and costs towards efficiency. We venture to think the subject of corps organisation in the medical service will soon force itself on the authorities.

The question of foreign service was one in which concessions were confidently expected from the very nature of the case, so that a cold and hard refusal of any modification whatever must prove profoundly discouraging. We know the exacting nature of foreign service is already, on wary

advice, deterring capable candidates from competing for commissions in the medical service; and this will increase in the absence of any amelioration. The determination to apply the screw in India at any risk will speedily react on the popularity of the service. It may be argued, surely, if the conditions of service in European hospitals in India are such as to break down and cause a "maximum" of invaliding after four years, can it be a paying policy to take six out of the survivors?

We can imagine a man in his fourth year, even if in weakly health, struggling on for one more, who could not possibly face a sixth; is it unlikely then, that not a few are unwillingly driven in their fourth year to take refuge in the unpopular mercies of a medical board? The broad accuracy has never been impugned of our statistics concerning the unhappy fate of the first batch of twenty-nine young medical officers sent to India under the new six years rule. More than half succumbed, one way and another, to the conditions of service, and yet that seems twisted into an argument for extracting the last possible pound of flesh from the survivors. We do not, of course, have data before us to afford positive actuarial deductions, but are morally certain that when the cost by death, invaliding, sickness, and ultimate non-effectiveness are duly summed up the sixth year in India will be proved a financial mistake. On this ground alone, and on no higher, for it never had a higher, notwithstanding the vague talk of increasing home service, do we think it will be abandoned. Meanwhile it is persisted in, and a very valuable and deliberate recommendation of the Camperdown Commission thereby ignored. The other points in the reply must be held over for future remark.

#### THE CONDEMNATION OF UNSOUND FOOD.

THOUGH somewhat similar difficulties have arisen before, the spectacle recently witnessed outside Southwark Police Court is surely without parallel. The sanitary inspector of St. George-the-Martyr had applied to Mr. Slade for an order to destroy certain herrings seized at a fishcurer's in the Borough. The officer said there were eighty-five barrels of the fish in a putrid state, and he thought the better course would be for his Worship to visit the premises where the stuff was stored and inspect it there, as, if brought through the streets, it would endanger the public health. However, Mr. Coates, the clerk to the magistrate, said: "All the herrings must be brought here." Accordingly, the same afternoon, five large mud carts belonging to the vestry were loaded with the fish, and brought through the Borough up to the court, when the magistrate promptly inspected the lot, and made an order for its destruction.

Can the ruling of the magistrate's clerk in this case be good law? It is certainly not common sense, and we are glad to notice that the Home Secretary has frankly acknowledged that, if the interpretation of the law is good, the law is bad and must be amended. The statutory powers as regards the seizure and condemnation of unsound food for the metropolis are contained in Section 47 of the Public Health (London) Act, 1891. The sanitary inspector is empowered to seize the "animal or article" intended for food of man, etc., which appears to him "to be diseased, or unsound, or unwholesome, or unfit for the food of man," and he may carry it away himself or by an assistant in order to have it dealt with by a justice.

Then follows what is required of the magistrate: "If it appears to a justice that any animal or article which has been seized, or is liable to be seized, under this section, is diseased, or unsound, or unwholesome, or unfit for the food of man, he shall condemn the same and order it to be destroyed or so disposed of as to prevent it from being exposed for sale or used for the food of man."

It seems to us that the words which we have printed in italics were inserted to enable magistrates to deal with applications similar to that lately made at Southwark. The words do not occur in the "unsound meat" sections—Sections 116 to 119—of the Public Health Act, 1875, on which Section 47 of the Public Health (London) Act is modelled. If an inspector finds a quantity of unsound meat or fish (intended for food of man, exposed for sale, or deposited for the purpose of sale, or of preparation for sale), "he may seize and carry away the same," but if his doing so would endanger the public health, and amount to an offence under the Public Health Act, obviously he has the option of doing something else. He can leave the stuff (getting an assistant to watch it if he thinks this necessary), and make an application at the court, as the inspector of St. George-the-Martyr did. On such an application being made, what is the duty of the magistrate? Are he and his clerk to insist on an intolerable effluvia- nuisance being created to the annoyance of the whole neighbourhood? Certainly not. If it appear to the magistrate on the sworn evidence submitted that the food seized, or liable to be seized, is diseased or unsound, etc., he shall condemn the same and order it to be destroyed.

But it may be said there is no Section in the Public Health Act which compels a magistrate to visit the premises where the seizure is made or to be made, and most magistrates would be unwilling to condemn a large quantity of food without seeing it. This is so, but there does not appear to be anything in the Act to prevent a magistrate from going to inspect noxious food when there are excellent reasons why it should not be brought to him.

#### BIOLOGY IN GREAT BRITAIN.

THE word "biology" has become so familiar and is so convenient that it is only on reflection that we realise that in the nature of things it could only have come into use within comparatively recent times, and Professor Burdon Sanderson did well to recall in his address to the British Association this week the circumstances under which it was introduced. For Treviranus, who first introduced it, it was equivalent to "the philosophy of living Nature." Professor Sanderson's address was an interesting exposition of the phases through which the study of biology has passed during the present century, and it is significant that in dealing with the proper subject of the philosophy of living Nature he had to draw his illustration almost entirely from modern researches. It is the fact that only in recent years, during a period which certainly does not antedate the publication of Darwin's epoch-making work, have we had presented to us any large generalisation in biology, or has any effectual effort been made to study the higher problems of the nature of life. Not that the middle portion of the century was barren of great achievements in the field of biology, but the field was so wide and so untilled that the workers

saw that all theories of wide scope must have an insufficient basis until a much larger accumulation of facts had been made. The physiologists of the middle of the century have been accused of taking a mechanistic view of the phenomena of life, but, as Professor Sanderson showed, the fact rather was that they abandoned theory and speculation for experiment and the accumulation of facts. "Physiologists ceased to theorise because they found something better to do." At the present day biologists have taken heart of grace to attack the problem which Treviranus formulated, though it must be admitted with no immediate prospect of finding a complete solution.

Professor Sanderson insisted that there is one principle—that of adaptation—which separates biology from the exact sciences, and that the end we have to keep in view is not merely to investigate the relation between a phenomenon and the antecedent and concomitant conditions on which it depends, but to gain this knowledge in constant reference to its effect on "the interests of the organism." The idea of organism is the central idea of biology; and Professor Sanderson pointed out that it must never be overlooked that specific activity is of the essence of organism—"that if, on the one hand, protoplasm is the basis of life, on the other, life is the basis of protoplasm."

The address was directed to the discussion not only of the origins and present tendencies of biological thought, but also of the relations which subsist between biology and other branches of natural science, and the speaker made an appeal, which we may hope will meet with a generous response, to workers in all branches of science to combine to support, with all the strength of their united influence, the demands made by the various branches for a larger measure of public support and official recognition. In particular we may hope that his appeal on behalf of the British Institute of Preventive Medicine will not fall upon deaf ears. If it be true that, as regards administrative efficiency in matters relating to public health, this country still maintains a position of superiority, it is lamentably true also that as regards the scientific study of the causes and mode of prevention of infectious diseases we are content to borrow from our neighbours, and to send our students to Berlin, to Munich, to Breslau, or to Paris, to obtain the instruction and to find the laboratories which ought to have been provided in this country long ago. We reproduce in another place the greater part of Professor Sanderson's admirable address, which will be read with interest by many to whom the technicalities of modern physiology are distasteful. How closely medicine is linked to other branches of biological study is apparent in every line, and no better illustration of the light which may be thrown upon the obscurer problems of mammalian physiology by the study of unicellular organisms could have been found than in the section of the address which deals with phototaxis and chemiotaxis.

SIR MORTIMER DURAND, who is leaving Simla on September 15th on a mission to the Ameer of Affghanistan, will be accompanied by Surgeon-Major Fenn, A.M.S., Surgeon to the Viceroy of India. We understand that during Surgeon-Major Fenn's absence his duties will be discharged by Surgeon-Colonel Harvey, I.M.S.

DR. WILLIAM CALWELL has been appointed registrar to the staff of the Royal Hospital, Belfast, by a unanimous vote of the staff, with whom the appointment rests.

#### TEACHING OF HYGIENE IN GERMANY.

THE prospectus of the German University Extension Courses in Hygiene has now been published. The courses, which are designed for the use of officials, will be given in connection with the Hygienic Institutes of Breslau, Königsberg, Berlin, and Marburg. Each course will last a fortnight. The general prospectus for the courses divides the subject into the following eight heads: 1. General hygiene, vital statistics, etiology, pathogenic parasites. 2. Soil and water, water supply, filtration, springs, domestic filters. 3. Sanitation of houses, air, ventilation, heating, local and central heating apparatus, schools, hospitals, cottages, workmen's dwellings, prisons. 4. Disposal of refuse, drainage, storm water, scavenging. 5. Dietary, cost in public institutions, alcoholism, adulteration, inspection of abattoirs, market police. 6. Trade hygiene. 7. Burial. 8. The prevention of infectious diseases.

#### DUBLIN WATER SUPPLY.

THE Corporation of Dublin has given notice that in the absence of a copious rainfall the Vartry supply will be cut off from the south-western area of the city on September 18th. This has become necessary owing to the fall of the water in the reservoirs to 22 feet below normal level. The greatest previous fall was to 17 feet in 1887. The area for which the Vartry was originally intended has been greatly exceeded, and the added townships have made great demands upon the supply during the present summer. The Corporation propose to use the water from the Grand Canal at a point some miles from the city. A reassuring note is published as to its quality, but it is recommended that the water should be boiled before using. The new arrangement will cause much inconvenience if not risk, because the pressure will be inadequate to raise the supply to the tops of the highest houses. The question will now arise whether an additional reservoir should not be provided, or whether some of the townships should not be left to obtain an independent supply for themselves.

#### PROSECUTION OF A CHEMIST.

THE Pharmaceutical Society of Ireland have prosecuted Mr. Francis Leonard for retailing a poison, within the meaning of the Act, to wit, Kay's compound essence, he not being a qualified person. Professor Tichborne deposed that in one bottle he found one-eighth of a grain of morphine to the drachm, and in a second one-third of a grain to the ounce. Dr. Auchinleck said a spoonful would kill a child. For the defence, Mr. John Shaw, the manager of Kay's works, said the small bottle contained 10 drachms, and the quantity of morphine would be  $\frac{1}{2}$  of a grain. There was  $1\frac{1}{4}$  drop of sulphuric ether. The quantity of chloroform was  $11\frac{1}{4}$  drops. Spirits of wine were used to combine the chloroform and sulphuric ether. The other elements in the compound would act as emetics. If, then, by any chance a child happened to swallow the entire bottle, there would not be the slightest fear of any fatal result, as the dangerous element would be got rid of. Mr. Foy and Sir Charles Cameron were examined for the defence, and the magistrate reserved judgment until October 12th.

#### THE THIRD AND FOURTH GENERATION.

M. G. LAGNEAU communicated to the Académie de Médecine recently the concluding part of an interesting statistical paper on the Population of Paris, in which he proved that the extinction of families of Parisians proceeds with extraordinary rapidity. A little over 60,000 children are born annually in Paris, and the expectation of life at birth is 28.05

years. The population of Paris at the last census was 2,424,703, and M. Lagneau calculates that if not recruited from the country the population, at the end of one generation, would be reduced to 1,698,679, a diminution of more than a third; at the end of the second it would have fallen to 1,190,100, at the end of the third to 833,720, and so on until at the end of the eighth generation *la ville lumiere* would contain only 140,700. Probably the real figures would be even less favourable, for as a matter of fact it is almost impossible to find a Parisian whose ancestors for three generations have been Parisians. The same, or very much the same, holds good in London. Some ten years ago Mr. James Cantlie, in a lecture which he gave for the National Health Society, challenged anyone to produce a Londoner of the fourth generation, a challenge which was not, we believe, taken up. The causes of this dying out of town populations are, no doubt, complex, but M. Lagneau points out two which, in Paris at least, are the most important—the enormous mortality during the first year of life and the very high death-rate from tuberculous diseases. This death-rate appears to be twice as great in Paris as in London, and M. Lagneau appears to attribute a part of this difference at least to the less density of population on the surface in London. The Londoner has 84 square metres, whereas the Parisian has only 39.

#### THE SANITARY STATE OF THE CAVALRY BARRACKS AT WINDSOR.

SINCE we last commented on this case questions have been asked in the House of Lords and also in the Commons on this subject, and it is worthy of remark that responsible Ministers have in both places fenced with the inquirers. In the Lords the opinion of the medical authorities was quietly omitted, while in the Commons Mr. Campbell-Bannerman said it was not usual to submit Departmental reports. It has, however, been made quite clear that the general sanitary state of the barracks is about as bad as it can be, and the arguments of the Secretary of State for War to the effect that the state of these barracks was no worse than that of many others in the country, and that because there has been no outbreak of disease or unusual sickness, that therefore there is no urgency, is certainly unworthy of a responsible Minister of the Crown. We hope that some independent member will insist on the House being made acquainted with the opinion of the medical authorities, as they should certainly be made public in the interests of the troops.

#### "HIS EXCELLENCY THE GOVERNOR."

DR. DONOVAN'S Report on the Lepers' Home at Spanish Town, Jamaica, contains the extraordinary allegation that "In November, 1891, in compliance with instructions, received through the superintending medical officer, from His Excellency the Governor [Sir Henry Blake, K.C.M.G.], the medical officer appears to have been constrained to subject a number of his patients to the 'Mattei treatment!'" It seems that nineteen patients were so treated for a considerable time—in some cases the treatment being persisted in for from nine to twelve months—with the natural result that "no amelioration has taken place in a single instance and that in a few the disease appeared to have been aggravated during the treatment." We have reason to believe that the medical officer was at first properly averse to having anything to do with a treatment which, on the face of it, is nonsensical, and that he was actually coerced, against his better judgment, by the fear of dire consequences from the Government of the colony. Another surprising feature in the affair is that the "superintending medical officer," a man of high position in the medical profession, allowed himself to be the medium through which the Governor's ideas and instructions as to the medical treatment of the inmates of the asylum were conveyed to the medical officer in charge. It should be

made clear whether such interference in questions of pure therapeutics is a proper function of a lay governor, who is necessarily ignorant of such matters, and who may readily become the dupe of irresponsible faddists and vendors of quack remedies.

#### AN ASYLUM ATTENDANT CONTRACTING LEPROSY.

IN the report of Dr. Donovan, of the Lepers' Home at Spanish Town, Jamaica, for the year ending March 31st, 1893, recently published in the *Jamaica Gazette*, there is a history especially worthy of comment. It is well known that clear and authenticated instances of attendants in leper asylums developing leprosy are extremely rare, and it is obvious that positive facts bearing upon alleged cases are of extreme importance. Among the administrative changes recorded in the home during the year, we learn that the cook, who had been employed in the institution for seventeen years, had developed symptoms of leprosy, and had been invalided and granted a compassionate allowance. Dr. Donovan gives the following brief history of the case:

Patient has been for seventeen years working in the institution; during the greater portion of the time has been acting as cook, a couple of male inmates of the asylum assisting in the kitchen peeling yams and other work. He is the eldest of five children, all alive and healthy. Father died of dropsy, mother of fever. First manifested the prodromal symptoms of the disease about 1891, lassitude, want of tone, loss of sexual power, and increasing anæsthesia of the left hand and forearm, which was soon followed by the development of tubercles about the left ankle and on the forearm; the nose subsequently became enlarged and the lobes of the ears somewhat pendulous; the left hand presents well marked features of anæsthetic leprosy. Has no knowledge that any member of his family or relative, however distant, has ever been affected. He is married but has no children.

The diagnosis, it is clear, cannot be doubted, nor the fact that the man has developed the disease after many years' service among the inmates of the asylum, and that heredity may be left out of the question. But by what channel or channels—the skin, alimentary canal, or what not—the poison has entered his system is a problem as yet unsolved.

#### THE INFLUENCE OF ISOLATION HOSPITALS ON THE SPREAD OF SCARLET FEVER.

IN ordinary times the metropolis possesses in the admirable organisation of the Asylums Board a reasonable amount of facility for the isolation of scarlet fever; and it is a nice and almost insoluble problem how much scarlet fever is by these means prevented. Some light is, however, thrown upon this by a recent report of Mr. Wynter Blyth on the isolation of fever in Marylebone. Owing the insufficiency of accommodation at the Asylums Board throughout the whole of the metropolis, with the exception of St. Marylebone, a certain proportion of cases, which in times of less stress would be received in the Asylums hospitals, have to be treated at home, while in St. Marylebone a temporary scarlet fever hospital isolates all cases the Asylums Board refuse. It is, therefore, perfectly clear that a careful statistical inquiry as to the spread of scarlet fever in the one district in which all cases, or nearly all, are isolated in hospital, as compared with other districts in which only a certain small percentage is thus isolated, should reveal a proportionate less amount of fever, presuming that rapid removal from the places in which fever occurs does any good at all. Mr. Wynter Blyth has, by the aid of the printed list of notification issued by the Asylums Board, worked out the rate of scarlet-fever cases per annum and per mille of the population in every London district for two periods, the one of four weeks the other of five weeks. During the first (the four-week period), St. Marylebone was in the same position as the rest of the metropolis, but during the second (the five-week period) it possessed superior facilities for isolation. During the first of these periods the rate of scarlet-fever sickness in St. Marylebone was 10 per 1,000 per annum, and out of thirty nine parishes it stood in order

sixteenth on the list, that is to say that there were twenty-three districts in which a similar or greater prevalence of scarlet fever was indicated. In the second or "isolation" period St. Marylebone rose to the tenth place, the fever having remained in proportion to its population stationary. Moreover, with the exception of four districts, an increase in the prevalence of fever was shown in every London district. In many cases the increase was serious; in one district, for example, the increase was from 12 to 28 per mille. It may be reasonably objected that the periods are too short to be entirely trustworthy as a basis, but it must be remembered that very similar facts were brought out with regard to St. Marylebone when that local authority established a temporary hospital in 1892, and probably enough a longer period will only accentuate the differences as regards the prevalence of fever in districts in which, perforce, there is imperfect isolation and a district in which there is as perfect isolation as the law allows. In the same report Mr. Wynter Blyth makes some remarks as to isolation of scarlet fever cases in private houses, expressing his belief that in many there is fairly good isolation practised during the acute stage of the malady, when the patient is in bed, but that during the convalescent stage parents make very bad gaolers, and children feeling perfectly well, although dangerously infectious, are not kept within four walls, but sent into the parks to get air and sunlight, to their own great advantage, but to the disadvantage of the public. He believes that it is absolutely necessary to establish ample accommodation for those classes who are willing to pay for it, and, once that is done, then to alter the law and make it compulsory for every person, irrespective of wealth or social position, suffering from infectious fevers to be segregated from the community in the special hospitals established for that purpose.

#### UNQUALIFIED MEDICAL MISSIONARIES.

CHARITY, no doubt, covers a multitude of sins, and while we readily admit that in many cases half a loaf is better than none, the giver should surely call it by its proper name. Is it not time that some definition were arrived at of the term "medical missionary?" By what right do people who, to a smattering of theology, have by book-learning added a smattering of medical terms, arrogate to themselves the title? Truth will no doubt prevail among intelligent races, and the unqualified medical missionary on the male side will die out. On the female side, however, there is a greater danger. Lady doctors have not yet become so firmly established in the land that they can afford to allow, without protest, the intrusion in their midst, and the acceptance by leaders in society of a mass of unqualified female practitioners, even though the goodness of their aim may cast a halo of respectability over the badness of their method. A large and increasing number of women are now every year entering the medical profession, to a great extent picked women, who have put aside the ordinary ambitions of their sex in the hope of thereby doing greater good. They have gone through the full curriculum, have passed qualifying examinations on a level with their male competitors, have spent five of their best years in obtaining knowledge, and are legally qualified to practise their profession. Is it right then that when a certain standard of education has been imposed by Act of Parliament on all who wish to practise medicine in this country, and when women have bravely faced the difficulty and passed the standard, that others with the merest smattering of knowledge should be palmed off on our fellow subjects by religious societies as proper and fit persons to undertake the most responsible duties of the profession? It must be understood that the training through which these female medical missionaries have gone, except in regard to a little midwifery, is of an absolutely theoretical nature. That they are not even qualified as nurses, nor would they be accepted as such by the best institutes, and that, even as regards midwifery, the chances of

their ever having seen a difficult case are very small; yet they are to be sent to India to positions in which they will be absolutely isolated from all assistance or possibility of consultation, and left to face as best they may all the difficulties and possibilities of a style of practice in which they must take everything as it comes. It is a system which is injurious to the good name of medical science, which must injure the position of our medical women, and which casts an unpleasant shadow on the doing of associations and societies which ought at least to teach men to do as they would be done by.

#### THE SENSATION OF PLEASURE.

It will be remembered that the philosopher physician of Weinsberg anatomises the inner man as a triplicate, *Seele*, *Nervengeist*, and *Geist*, thus adding a member to the older twofold division of *Nous* or *Phren* and *Psyche*. Contrariwise, it has been the aim of modern psychology to obliterate the classic division of the soul as twofold, and explain even the very subtlest of man's powers and finest of his emotions as, in ultimate analysis, pure affections of the *Psyche* or animal half, as used to be thought, of that entity. Thus we have seen the analytic method applied to the reduction of the will itself to a system of sensations, and now we have Dr. Bourdon<sup>1</sup> exhibiting *Psyche* as the parthenogenetic mother of Pleasure without any co-operation whatever on the part of the celestial Eros—her divine spouse according to the delightful old Greek fable. This denial of a loftier birth—claim and "bringing down of pleasure from a height between heaven and earth," as Dr. Bourdon phrases it, and "tying her up to a merely sensorial origin" will be, as he contends, a new gain, should the case be thought proven, for physiological psychology, whatever loss may ensue to the poet and the moralist; but thorough inquiry into the nature of this phenomenon appertains to the province of psychology, which need not too greatly concern itself with the moralist's teaching,—a dictum to which no one certainly will deny the merit of candour. At the same time it should be said that this remark is made in another connection. While no one, says Dr. Bourdon, has ever claimed for this phenomenon (of pleasure) the character of an innate conception, the propriety, on the other hand, of ranking it among our sensations has seldom been mooted. Yet that the pleasurable sense rests on a physical basis is implied in the very expression. But what that organic substratum may precisely be is a question hitherto not solved unless it is now solved satisfactorily in the essay before us. And the solution he gives—not finding any either in Wundt's theory or in the observations of Bravis, Mantegazza, and others cited—is that it is a special sense having its organs in the skin, and is of the same nature as the sensation of tickling (*chatouillement*). No doubt a pleasurable feeling is the normal concomitant of every function of the organism in a good state of health—a state less common, by the way, than many suppose. But this pleasurable feeling or sense of the agreeable Dr. Bourdon is careful to distinguish from that special pleasure sense, which he has in view and seeks to locate anatomically, just as what is disagreeable seems distinct from what is painful. For this distinction he instances bitterness, and remarks that the gustative sensation evoked by this quality is disagreeable, but not painful like that caused by mustard essence or acetic acid. He suggests, or rather affirms, that the general tendency to identify the disagreeable with the painful and the agreeable with the pleasurable is due to the fact that in one case there arises desire for bodily approximation, for taking close to oneself, and in the other of avoidance and repulsion of contact. He shows from anatomical and physiological considerations the various pleasures arising from the action of the special senses, and so, too, that created by mental emotion, are each and all accompanied by a gentle diffuse cutaneous excitation analogous to that produced by tickling (*chatouillement*). Taking the auditory sense, for example, he

<sup>1</sup> *Revue Philosophique*, September, 1893.

remarks that all the sounds we utter are accompanied by mechanical excitation, not merely in the buccal region, but often also in a considerable portion of the entire body. And, in fact, do we not know that no fewer than forty-six muscles are concerned in every pulmonic effort? Our bodies vibrate to all sounds, and it is, in part, though the perception of these vibrations that deaf mutes learn in our day to speak. Simple experiments are suggested to show this, so that "one may boldly affirm," says Dr. Bourdon, that the hypothesis which would make the sense of pleasure in audition really due to gentle cutaneous excitation explains extremely well the depth and extent of the emotions which sounds are apt to cause us to experience. As an instance of the mode in which a mere emotion unconnected with sense may arouse the pleasurable feeling we may take that of joy. Joy and pleasure, he remarks, are often taken as synonymous. Now one of the characteristic phenomena of joy, set well in relief by Lange, is the dilatation of the capillary vessels, and consequently the afflux of the blood to the whole periphery of the body. But this afflux sets up a gentle excitation of the skin like that produced by tickling. Joy, too, as Lange shows, induces also muscular excitation, but even in default of this the result would not fail. Dr. Bourdon affirms that there would be no difficulty in showing that what are metaphorically termed elevated pleasures are no less susceptible of the application of his hypothesis, which, in short, proposes to substitute for the theory that the pleasurable sense is a common element in all sensation, or may be so, the idea that it is a special sensation having special structures as an organ, and that this sensation is a diffuse tickling of the cutaneous envelope (*chatouillement*) of very moderate intensity. Thus the last phenomenon and only one which the new psychology has not made its own would, like the rest, be henceforth included with them in the domain of the senses. That Dr. Bourdon has succeeded in his demonstration we would hesitate to affirm, but he has written an interesting article.

#### TRADE INTERESTS AND SANITARY NEEDS.

IN 1890 Parliament, in the Public Health Acts Amendment Act, gave to sanitary authorities the opportunity of strengthening for local purposes some of the many weak points of the Public Health Act of 1875, by the adoption of Part III. of the Amendment Act of that year. Among the powers thus offered are much-needed means of control over food supplies, slaughterhouses, closet accommodation, drainage, building sites, scavenging, etc., together with extended powers of making by-laws. While many towns and minor urban districts have lost no time in taking advantage of the new order of things, others have preferred inaction, for reasons which are more obvious than creditable to the authorities responsible for the sanitary government of the towns in question. Derby affords a recent and instructive example in point. The sanitary committee brought before the Town Council a report indicating the advantages to be gained by adopting Part III., and advising that that course should be followed. They were met by a vigorous opposition on the part of the manufacturers of the town, whose supposed interests seem to be singularly well represented on the council. It was not denied that the powers sought were important, and some of them necessary, but it was demanded that these should be sacrificed because one effect would be to place some restrictions upon trade effluents being passed into public sewers, if by their temperature or composition they would cause nuisance or interfere with the flow of sewage. This was represented as entailing of necessity the ruin of the important manufacturers of the town, and of course the usual irrelevant protests were made against the invasion of trade premises for the purpose of inspection, and the multiplication of inspectors, and what obstructionists in the way of sanitary progress delight to call "officialism." It is needless to say that the 1890 Act is silent as to the appointment

of additional inspectors, and gives no new powers of entry or inspection. It assumes that each town already has an efficient sanitary staff, but apparently in the opinion of a section of the Town Council such is not the case at Derby. In the end the opposition proved successful by a large majority, and for the present Derby must remain content to lag behind its neighbours in divers matters materially concerning the public health and safety, including the control of food supplies, with the unpleasant reflection that the commercial prosperity of the town is in such a precarious state that it depends upon manufacturers being left at liberty to turn hot or offensive effluents in a crude state into the sewers. It will be interesting to watch the fate of other and larger communities, Nottingham for example, which have adopted a different course.

#### INDIAN SANITATION.

IN THE BRITISH MEDICAL JOURNAL of July 15th we placed on record a strong opinion that to procure sanitary reform in India, more particularly in the small towns and villages and hamlets, the work must be done by those municipal and local bodies to which the care of commercial interests and affairs has been entrusted. A correspondent, to whose opinion we attach high value, has written to point out that a sanitary organisation, rather than a municipal organisation, is necessary to accomplish sanitary work in India. Our observation expressly indicated the need of skilled sanitary agencies, to advise and execute; but we held, and still hold, that these agencies must be placed in responsible and effective relation to the bodies which have been entrusted by the Government of the country with the power and the purse. Sanitary laws and by-laws have been enacted throughout India, to guide and govern these bodies: but something more is required—pressure from above to insist on these laws being observed, and an agency to procure and direct their application. The local bodies have been largely entrusted with measures of medical relief—why not with measures of medical prevention also? Medical men, educated in our schools and taught the principles of hygiene, are scattered throughout the country. Local bodies should utilise the knowledge possessed by these men for public health purposes, as the services of practitioners have been used in England for like objects, and as in India the services of civil surgeons have already, with the best results, been devoted to sanitary improvements. By all means let the central local governments have their departments to advise, to report, to inspect; but, for the sanitation of towns, villages, and hamlets in the interior a "department" is not the cheapest or best means of devising or executing measures necessary for improving the health of the people.

#### AN APPARATUS FOR STERILISING WATER BY BOILING.

THE apparatus for boiling water of Werner von Siemens is described at some length by Professor Rubner and Dr. Davids in the *Berliner klinische Wochenschrift* for September 4th. The principle of the apparatus consists in the passage of the water to be heated through a coil of tube which is bathed and surrounded by the outflowing stream, and in this way the ingoing water abstracts heat from the outgoing, and the latter is cooled, while the temperature of the former is already appreciably raised before it enters the vessel in which boiling takes place. An early form of the apparatus was experimented with last autumn, and it was found that 25 litres of water which was practically sterile could be obtained per hour, by means of the burning of 309 litres of gas. In the course of the present summer an improvement was devised, whereby the flow of fresh water into the apparatus was automatically regulated in such a way that the temperature to which it was subjected should always be maintained at boiling point. Moreover, the improved form of apparatus yielded 30 litres per hour, and

for every litre of water heated 11.35 litres of gas were expended. The cost of 1 cubic metre of gas being 16 pfennigs, it is calculated that 1,000 litres of water can be sterilised for 1.89 marks. Experiments were made, not only with ordinary dirty water, but with water highly polluted with the bacilli of cholera and of typhoid fever. The results as regards the sterilisation of the water were in every way satisfactory. Experiments in which the temperature instead of being raised to boiling point only attained 60, 70, and 80 degrees centigrade respectively were also conducted. For raising a litre of water to 80° centigrade 9 litres of gas were found to be necessary, and 1,000 litres of water could thus be heated to the extent specified at a cost of 1.44 marks. The results as far as the destruction of the bacilli of typhoid and cholera were concerned were practically identical with those obtained when the water was raised to boiling point.

#### EVICCTIONS FROM INSANITARY HOUSES.

It is, perhaps, a matter of legitimate curiosity to inquire where and how the people of this country would be lodged if all insanitary dwellings and houses with defective water supply were at once to be shut up. The question is suggested by what is going on in the village of Auchintibber, in Lanarkshire. For some months past this place has been infested with enteric fever, and at the present moment ten of the villagers are accommodated in the district hospitals. After careful investigation the outbreak has been traced to the water supply connected with Clyde Rows. The owner of these houses, however, says he has done all he can to provide pure water, and that, as the district pays the general water rate, the county ought to make good the supply pending the completion of the Glengavel water scheme—probably some three years hence. The result is that last week eighteen tenants were to be evicted. They are nearly all miners; they have nowhere to go to, and, the condition of affairs having got abroad, the factors are refusing any tenants from Auchintibber unless furnished with a medical certificate that their houses were not amongst the fever-stricken. The tenants not unnaturally declined to leave their houses, asking that the wells should be closed, and expressing willingness to carry water from other parts if only they be left undisturbed. This is but another chapter of the lesson that sanitary progress should be steady, gradual, and continuous. Jerky sanitation—sanitation which comes only when led by epidemics—is sure always to be attended with hardship, of which these Lanarkshire evictions are but a type.

## INDIA AND THE COLONIES.

### INDIA.

**RESIDENCY SURGEONS AND NATIVE COURTS.**—In reference to the paragraph in the BRITISH MEDICAL JOURNAL of September 9th respecting residency surgeons at native courts, it should be mentioned that the arrangements regarding Surgeon-Lieutenant-Colonel Hendley, C.I.E., and Dr. Adams are, so far, only temporary. It is well known that Surgeon-Lieutenant-Colonel Hendley has rendered certain services—political, social, and professional—to the Jeypore Durbar, which renders his removal from Jeypore a more difficult question than Government generally has to deal with in medical appointments in the Rajputana. Surgeon-Lieutenant-Colonel Hendley has been something like twenty-four years in Jeypore. Dr. Adams has proceeded to take over the Abu appointment as a purely temporary measure, pending, it is believed, certain decisions relating to the appointment by Government. The personal allowance of 500 rupees allowed Dr. Adams by the Maharajah of Jodhpore necessarily follows him while he is still virtually the permanent medical officer of the State. Personal allowance is not usually granted to any medical officer until he has been some considerable time in the service of the State. It is purely optional to give it on the part of the State, though before it is given it has to be sanctioned by the Government. Many men never obtain personal allowance, so that it is unlikely that anyone will suffer by Dr. Adams continuing to draw it while acting in a temporary appointment. Of course, if Dr. Adams continues in his new appointment he will lose his allowance.

**PRESENTATION.**—Mr. Herbert Jones, L.R.C.S.I., D.P.H. Camb., has been presented with a gold watch and a cheque by some of his patients and friends in Shipley upon his election to the post of Medical Officer of Health to the Borough of Crewe.

# THE CHOLERA.

## SPORADIC OUTBREAKS IN ENGLAND.

[BY OUR SPECIAL COMMISSIONER.]

### THE PROBLEMS OF THE ENGLISH OUTBREAKS.

FROM the reports which we continue to receive from various parts it seems evident that the cholera has broken through the outworks we have set up against it, and has invaded the inner line of our defences. We can but congratulate ourselves that this event has been so long delayed, and that the cooler season has come upon us before the cholera has made itself seriously felt.

Whatever else may be in doubt regarding the etiology and dissemination of this disease, it is abundantly clear that the multiplication of the contagium outside the body is largely influenced by temperature, and that an amount of infection of, say, a water supply, which in hot weather would inevitably lead to an epidemic, may in a cooler season have its development so restrained as to pass harmlessly away; but there are many other influences at work of which we know but little, and these are those which require investigation, and on which it is earnestly to be hoped some light will be thrown by careful inquiry into the habits and surroundings of the sufferers from those isolated outbreaks which are almost sure to crop up here and there during the next month, and again next spring.

We know well enough that cholera is, in 99 epidemics out of 100, disseminated by means of water; what we want to know is, How else? Where whole populations are simultaneously affected, water is almost certainly the vehicle. As happened at Hamburg, as happens every day in India, and almost every year at Mecca, the drinking of water directly poisoned by choleraic excreta produces cholera again in turn. It is thus truly described as a waterborne disease. In no other way than by means of water is any widespread epidemic likely to arise, for in no other way can widespread excremental poisoning take place.

Plumbism may be, and often is, a waterborne disease. We should, however, have an incomplete conception of lead as a cause of illness if we contented ourselves with the consideration of this aspect of the question.

And so in cholera; while accepting to the full that cholera is a filth disease and waterborne, and while recognising the still further limitation that the infection must go in at the mouth, it must be admitted that water, though its ordinary, is not its only, vehicle. The provision of a pure water supply is an elementary necessity for protection against cholera, still it will not do everything. Without pure water, the extinction of cholera in India is hopeless, yet even with it that consummation cannot be reached until the very habits of the people, the outcome of centuries of water starvation, have been altered.

For this purpose every possible chance of faecal befouling of both food and drink must be prevented. A pure municipal water supply is an essential and the chief means to this end. But it will not serve as a complete protection if other elementary hygienic provisions are neglected. Grimsby, for example, has a water supply which is said to be pure, is derived from deep wells, is pumped into the town and delivered at high pressure, the service being on the constant system; the ordinary fittings do not include cisterns, except for baths, and the taps are connected directly with the rising main; and yet Grimsby has furnished a considerable cholera mortality.

What, then, are the other means besides water carriage by which the cholera poison can gain access to the system? or, putting the question another way, what are the means other than wholesale water infection, by which the poison can be conveyed, retail, so to say, to foods and drinks in such a manner as to produce cholera in those who consume them?

The careful elucidation of the surroundings of each individual case is the direction which English investigation ought now to take. Where cases occur in crowds, as in great epidemics, when infection is so widespread that it is more difficult to eliminate than to prove exposure to it, this