paid special attention to, and a recurrence of which they hope to avert.

Recognising the difficulty of dealing with such a purely technical and abstruse subject as electricity, Sir Matthew White Ridley wisely added to the Departmental Committee for this special inquiry Mr. Charles Vernon Boys, F.R.S., whose assistance to and influence upon the Committee are distinctly observable in the recommendations which are made. While the report, generally speaking, is preventive rather than remedial, attention is drawn to the fact that the dangers from electric shock in the generation and distribution of high-pressure currents can never be entirely obviated. After alluding to the various pressures "low," "high," and "extra high" under which electricity is distributed to consumers, the processes of generation, the uses, and the dangers of working electricity are detailed. This part of the report, although more or less technical, can be readily understood by anyone. To the ordinary reader it conveys information of considerable value. Death from electric shock is generally so sudden that direct personal contact of an individual, particularly if his skin is moist, with a piece of highly charged metal, may be immediately fatal. Too great caution, therefore, cannot be exercised in regard to the proper insulation of the dangerous portions of machinery and cables. In the twenty-two recommendations which the Committee make there is nothing that is too drastic or elaborate. It must be a matter of considerable difficulty to a Committee, such as that appointed to inquire into the operation of certain trades that are known to be dangerous, to draw out rules that will cover the whole ground of the inquiry, or which can be readily and easily given effect to where there is the variety of expensive plant met with in electrical generating works. Special rules never give universal satisfaction, but so long as the main object of the investigation undertaken by the Committee is kept well in view, and the recommendations made are such that if carried out they will not only minimise the danger to life and limb among the employed, but not press unduly hard upon the industry in question, it may be said that the purpose sought has been realised. While the recommendations apply equally to existing generating stations, it is in the erection of new buildings and the laying down of improved machinery that their influence will be most felt. The generation and distribution of electrical energy is, comparatively speaking, a modern industry, and as the public demand for it has been urgent, it is only thus the fact can be explained that in certain stations the work is carried on in too confined spaces. Therein lies a great danger. The recommendation of the Committee that in future there shall be, for example, space of at least four feet behind the switchboards receives our heartiest support; also the requirement that only skilled workmen shall be employed, and the wearing of india-rubber gloves. Having described in detail the sources of danger to those engaged in electrical generating stations, and the means to be adopted to prevent accidents, the report proceeds to discuss other points, among which may be mentioned the probable cause of death in electric shock, and the methods to be put in force for the resuscitation of those apparently killed by electricity. The cause of death under these circumstances is, it would seem, still *sub judice*. As the result of a number of experiments carried out by Dr. Oliver, of Newcastle-upon-Tyne, who is the medical expert upon the Committee, it would appear that while in most of the animals death arose from sudden failure of the heart's action rather than from arrest of the respiration, yet that gentleman succeeded in restoring animals apparently killed by electricity by means of artificial respiration, in one instance as long as thirteen minutes after the heart had ceased beating and the breathing had been entirely suspended.

The report concludes by recommending that all work-people employed in electrical generating stations should be made thoroughly aware of the dangers incidental to their calling, and that they should receive practical instruction in the application of methods for the resuscitation of individuals who are supposed to have received a fatal shock. The methods recommended are the same as those used for the restoration of people who have been drowned. In the appendix of the report is described Sylvester's method of

carrying out artificial respiration, and for the present we may regard this as the best means of inducing recovery. Apart from the necessity which obliged the Departmental Committee to carry out this inquiry, the report which it has issued contains information valuable alike to the public and the medical profession.

BRITISH MEDICAL JOURNAL REPORTS

SPECIAL REPORT ON THE CONDITION OF THE RIVER BRENT.

By E. BAILEY DENTON, M.Inst.C.E.

IN compliance with the desire of the Editor of the BRITISH MEDICAL JOURNAL that I should report to him upon the condition of the Brent, a small river which, as is well known, rises on the high ground to the north of London, and ultimately joins the Thames at Brentford, flowing through a residential district specially favoured by Nature, but which has, unfortunately, recently occupied a notoriously unenviable reputation owing to the comments made both in the public press and in the House of Commons upon the foul state of the stream, I have carefully gone up the valley during four of the hottest days of the present month (August), when the evils consequent on river pollution would necessarily be very apparent. I propose to treat the question in five sections, and to refrain as far as possible from the use of technical language, so that all readers of the JOURNAL may readily appreciate the condition of this unfortunate valley. The sections relate:

1. To the condition of the lowest or canalised portion of the river from its junction with the Thames at Brentford upwards to a point by Hanwell Asylum, where the stream proper separates from the Grand Junction Canal.

2. To its condition between Hanwell Asylum and the culvert under the main line of the London and North-Western Railway, situated at a distance of about a mile and a half north-west of Willesden Junction.

3. To its condition between this culvert and the Welsh Harp reservoir.

4. To the condition of the Welsh Harp Reservoir and of the two feeders which flow into it at its northern and north-eastern extremities; the first from East Finchley, Hornsey, and Dollis; and the second from Collindale and Edgware.

5. To some remedial measures, which are necessary to restore the river to something like its original purity; and health and happiness to the people living on its banks.

1. At the Brentford Lock there was nothing unsightly in the appearance of the river, and it in no way differs from any ordinary canal; neither was there any smell, the only evidence of pollution being that after the passing of barges gases rose to the surface from the bottom—not an uncommon occurrence along our inland waterways.

There is evidence, however, that the pollution of the water is considerable—though perhaps not visible to the eye—because, whereas in days gone by fishermen were accustomed to assemble in considerable numbers, and even to pay for the privilege of pursuing their favourite amusement, and a good day's sport was the rule and not the exception, now I am informed that there are no fish whatever in this length of river, all of them—even the eels—having been poisoned by its foulness.

This condition of things prevails up to King's Lock, where there is a backwater; here the first stench was noticeable, and the water was discoloured. On the left bank at this point is situated the Southall-Norwood Sewage Farm; these sewage-disposal works consist of about 18 acres of land, 11 of which are irrigated, the remainder being occupied by engine house, precipitating tanks, filter beds, etc., chemical treatment being adopted in addition to, or as an alternative to, natural filtration through soil. By the courtesy of the manager, Mr. Selbidge, I was permitted to go over the works. The sewage was being applied to the irrigation land without the addition of chemicals, and the effluent as discharged into the river was clear to the eye and without smell. Having carefully inspected everything, I am of opinion that if the same care and attention was bestowed at all the other sewage-

disposal works along the valley as here, the Brent would not be in its present foul condition. With an increasing population, however, permanently satisfactory results are endangered both with regard to irrigation and chemical treatment because of the limited area of land which the authority have purchased, but at the present time I do not consider that the public have cause of complaint against the Southall-Norwood Urban District Council.

Here also, but on the other side of the river, are situated the Hanwell Sewage Farm and Disposal Works, where a very different state of things prevailed on the day of my inspection. The land over which the sewage, after partial treatment by chemicals, was being applied was in a very objectionable condition, the liquid lying in pools on its surface and giving off offensive effluvia. I likewise examined the so-called effluent which discharges into the backwater previously referred to. At the point of outlet its character did not differ from ordinary town's sewage previous to any treatment whatever; and the backwater was in consequence nothing more nor less than a cesspool giving off a disgusting smell. Further comment on the Hanwell Works is superfluous.

2. From the point near the asylum where the river leaves the canal there is no real change for the worse in its appearance until it passes under the main London Road to the west of the town. It is here that the first great alteration takes place in the main stream, and from this bridge upwards it becomes merely an open sewer.

I was informed that not only had all the fish between Hanwell and Ealing long since been killed, but that even the water rats had fallen victims to the foulness of the water. There appears to be but little pollution from the small village of Greenford, and there is nothing worthy of record until the sewage works of Ealing are reached, which are situated on the south bank a little below Perivale. They consist of twenty-one acres of land upon which the sewage of a portion of the town is purified by filtration through the soil after deposition in tanks and chemical treatment. Being clean and tidy, they present an agreeable appearance. The effluent was clear to the eye and without smell. In a word, their management is satisfactory.

Above the bridge by Perivale Church the stench was awful, and men under the orders of the Ealing Urban District Council were at work adding lime to the water.

The next point of interest is the Wembley District Sewage Works, which are situated on the north side of the stream, about a mile above Perivale Bridge; these works are, in my opinion, unsatisfactory. The effluent was discoloured, and the smell of the brook at the various outlets most nauseating. Moreover, they are too small in area to efficiently perform the duties which will be required of them when the Brent Valley has again come into public favour, and the popularity of Wembley Park has become established. If allowed to remain for a time without extension, they must be most carefully managed and frequently inspected in order to minimise, if not prevent, the probability of the sewage delivered to them being discharged directly into the river at times when it is inconvenient to adopt any treatment. If this is not done nuisance will continue, and the value of the remedial works now being carried out, or about to be commenced by other authorities, will be much reduced.

Above the Wembley Works up to the North-Western Railway the flow of the river becomes less, pools of foul sewage alternating with heaps of dirty shingle. In close proximity to the cottages near the Alperton Road servants of the Willesden Urban District Council were busy cleaning out the bed of the stream, and creating the most filthy stench possible. I cannot help thinking that it must be very unwise to continue this cleaning process during the present hot weather, for it certainly must be provocative of illness.

3. Immediately above the culvert under the London and North-Western Railway the flow was very trifling owing to the dam, the sluices of which were closed, placed across the stream by the Willesden Urban District Council. Above these sluices the river continues in the garb of a cesspool, emitting a most disgusting smell as far up as the high road to Harrow-on-the-Hill. Here a backwater, which was full of foul sewage and effluent from the neighbouring works of the Willesden Urban District Council, diverges from the

main stream. On ascending further, with the farm on its eastern bank, I came across two other dams, at both of which the council's men were in a rough and ready manner mixing lime with the river water. These dams, by holding back the water, provide a sufficient quantity behind them, which, when let go after lime has been added to it, flush out, and, to a certain extent, deodorise the reach below.

I forbear to criticise in any way what the Willesden authority are now doing, because they are spending a very large sum of money in permanent improvements. It must, however, be conceded by all that they have caused gigantic nuisance in the past.

Above Willesden the river presented a much improved appearance, for water lilies and green vegetation abound, with no black deposit in its bed, at the several places which I examined, and without any smell, thus clearly proving no recent contamination of importance.

Pursuing my course upwards I next came to the branch from Kenton, which flows into the main stream in proximity to the Metropolitan Railway. I followed this rivulet up for a short distance and found that, although the small quantity of water flowing down it was slightly discoloured, there was nothing in its condition to justify public protest.

To the north of the Metropolitan Railway there were evident signs of pollution in the stagnant pools of which the river bed consists, though nothing like the serious condition of things prevails as below the Willesden Farm outlets.

Between the Neasden Road and the Welsh Harp Reservoir there may truthfully be said to be no Brent at all, the sluices of the reservoir being closed, as is usually the case during the summer months, and not a gallon of water passing through them. The result is, I am informed, that for about seven months out of twelve the natural flow of the river is absolutely stopped, the feeder of the Grand Junction Canal, which follows a course somewhat parallel to the river bed but at a higher level than it, taking all the outflow from the reservoir. As far as I know, this state of things, although sanctioned by Parliament, is without parallel in this country, and the most serious consequences must inevitably result if an alteration is not soon effected.

4. As regards the reservoir I need not say much as most Londoners are well acquainted with it, but I feel sure that if its contents were drawn off or if a chemist were to analyse and report on the quality of the water upon which during winter so many of us skate, and on the banks of which during summer so many of us spend holiday afternoons, great astonishment would be universally expressed at no ill-effects having resulted before now. I must add, however, before passing onwards, that the tenant of the Old Welsh Harp Hotel informed me that twice during the last two years large quantities of fish have been killed owing to the polluted condition of the water, and that it was a matter of great moment to him that this destruction should not occur again.

Following up the East Finchley, Hornsey, and Dollis branch I found it in a most offensive condition, the smell being such as to make my companion and myself ill. Black lumps of sewage were floating down the stream and on all sides gases were bubbling up from its bed. I was not long before I traced this pollution to the effluent from the Hendon sewage works, which I can say, without any fear of contradiction, was the most filthy and impure effluent that I have ever seen; indeed, in my opinion the Hendon Urban District Council are incurring the gravest responsibilities if they allow this dangerous condition of things to continue for a single day longer than is absolutely necessary.

Above the junction of the effluent with the brook a great improvement is immediately noticeable; and though in all probability the water is to some extent polluted, still the pollution is, comparatively speaking, trifling, and no nuisance is caused to the passer by. The Edgware branch, which joins the reservoir at its northern extremity, is badly polluted as far up its course as Schweppe's manufactory of mineral waters, and the several sources of pollution are clearly visible to the eye. Above this point the brook calls for no further comment, as its contamination is not serious.

5. On the assumption that the local authorities of Southall-Norwood and Ealing are satisfactorily doing their duty, and that the remedial works now in course of construction at

Willesden will, when completed, produce permanently good results, it is necessary that Hanwell, Wembley, and Hendon should be immediately compelled to take steps to stop the pollution which they are now causing, because unless this is done, the efforts of those authorities who are conscientiously doing their best will be to a great extent wasted. When the County Council are satisfied that the effluents from all the sewage works along the valley conform to the requisite standard of purity, the river bed should be cleaned out from Hanwell to the Welsh Harp Reservoir, not omitting all the small tributaries and backwaters from Brentford upwards, whilst above the reservoirs the north-eastern feeder to above the Hendon Sewage Works and the northern feeder to above Scheppe's manufactory should be treated in a similar manner.

As the course of the Brent is very tortuous, it might be advisable to straighten it in certain places so as to secure a more rapid flow; but in all probability this proposal would be opposed by some riparian owners, whilst many might say that the alteration is not essential.

It has been suggested that a special conduit should be laid from the Thames alongside the river to receive the effluents from the sewage works along its course, and so to free it entirely from this means of defilement. Such a scheme would be very costly, and an equally satisfactory result would, in my opinion, be obtained if the Canal Company were compelled to daily send down the Brent in perpetuity from their reservoir at the Welsh Harp a quantity of water equivalent to the combined effluents of all the local authorities below, which, roughly speaking, according to Mr. Jones, engineer to the District Council of Ealing, represents about 1,000,000 gallons per diem. I am quite aware that it may be a matter of considerable expense and difficulty to store more water than is now done at the Welsh Harp Reservoir, and that it may be even advisable to construct an additional reservoir higher up the valley; but questions of expense and difficulty sink into insignificance when the health and lives of thousands are at stake, and this is now literally the case in the unfortunate Valley of the Brent.

THE SERUM DIAGNOSIS OF TYPHOID FEVER.

DISCUSSION AT THE MEETING OF THE AMERICAN MEDICAL ASSOCIATION.

At the meeting of the American Medical Association recently held in Philadelphia an important discussion took place on the Serum Diagnosis of Typhoid Fever. A Committee, consisting of Drs. W. H. Welch, Wyatt Johnston, J. H. Musser, R. C. Cabot, S. S. Kneass, A. C. Abbott, J. M. Swan, E. B. Block, H. M. Biggs, N. S. Davis, jun., M. W. Richardson, J. B. Herrick, A. R. Guerard, and A. P. Ohlmacher, was appointed by the President of the Section on Practice of Medicine to draw up a summary of the views expressed on the subject in the discussion. The following report, a copy of which we owe to the courtesy of the Committee, was drawn up by these gentlemen. It is pointed out, however, that while expressing the general consensus of opinion brought out in the course of the discussion, the report does not claim to represent exactly the individual views of any one of those who took part in it.

REPORT OF THE COMMITTEE.

1. In selecting the material used in making the test the choice between (a) serum, (b) dried blood, (c) fluid blood, and (d) blister fluid will depend largely upon whether the object be scientific research, clinical diagnosis in hospital or private practice, or public laboratory diagnosis where the samples have to be sent some distance.

2. In spite of considerable variation in technique, there has been a remarkable uniformity in the results obtained by those taking part in the discussion, and their average of about 95 per cent. of successes agrees with the general average of the cases, nearly 4,000, thus far recorded in medical literature.

3. Each of several methods of technique advocated may thus give good results in the hands of those thoroughly familiar with the details found necessary in each case and the sources of error to be avoided, success depending rather on being perfectly familiar with one method than on the particular one selected.

4. For routine diagnostic work even the very simplest methods may give good practical results, but for recording scientific observations these methods which are accurately quantitative should be selected. This is especially necessary in reporting exceptional cases at variance with the general results recorded, or where the observations are made the basis of generalisations.

5. A complete reaction should comprise both characteristic clumping and total arrest of motion occurring within a definite time limit. For practical diagnostic work a dilution of 1 to 10, with a fifteen minute time limit, is convenient. In any doubtful case the dilution should be carried as far as 1 to 50, or perhaps 1 to 60, and a reaction not obtainable at that point should not be regarded as perfectly conclusive. For these higher dilutions the time limit should be extended to two hours.

6. Intensity of reaction in a given serum should be estimated by determining the degree to which it may be diluted without losing its power of giving a decided reaction, both as to agglutination and loss of motion.

7. The intensity of reaction shown by the same serum is influenced by the age, condition and virulence of the test culture and by the composition and reaction of the culture medium. For purposes of comparison the sensitiveness of the test culture should be taken into consideration.

8. The evidence so far recorded establishes that the reaction may be delayed or occasionally may not be obtained in cases of genuine typhoid infection; and also that it may be exceptionally present in non-typhoid cases, though not in an intense degree.

9. In investigating exceptional and contradictory results the following circumstances have to be considered: (a) The uncertainty of clinical diagnosis; (b) the absence of bacteriological or other confirmatory methods of diagnosis during life, giving decisive negative results; (c) the possibility of overlooking typhoid infection, even *post mortem*, in the absence of characteristic intestinal lesions where a very thorough bacteriological examination has not been carried out.

10. The modifying influences mentioned above suffice to explain the divergencies existing in the reports of different observers. Without being absolutely infallible the typhoid reaction appears to afford as accurate diagnostic results as can be obtained by any of the bacteriological methods at our disposal for the diagnosis of other diseases. It must certainly be regarded as the most constant and reliable sign of typhoid fever, if not an absolute test.

UNITED KINGDOM POLICE SURGEONS' ASSOCIATION.

The annual meeting of this Association was held at Exeter Hall on July 28th, when the report of Council was received and adopted, and 200 copies ordered to be printed and distributed to police surgeons.

A resolution congratulating the retiring President (Sir H. J. Littlejohn) on his appointment as Professor of Forensic Medicine in the University of Edinburgh was unanimously adopted, and Dr. Edmund King Houchin, Metropolitan Police Surgeon and Deputy Coroner for East London, was elected as his successor.

A form for recording *post-mortem* notes, which had received the sanction of the Coroner for Central Middlesex, was considered and adopted, and copies ordered to be sent to members of the Association.

A letter was read from Dr. J. F. Craig, of Birmingham, urging that coroners should be communicated with as to the desirability of police surgeons being selected to make necropsies and give evidence in cases where no medical man had been called in during life, and it was resolved that this should be done.

The following officers and Council were elected for 1897-98:—*President*: Dr. E. K. Houchin. *Vice-Presidents*: T. Holmes, F.R.C.S.; T. Bond, F.R.C.S.; Sir H. J. Littlejohn, M.D.; H. Barnes, M.D. *Treasurer*: H. Nelson Hardy, F.R.C.S.Ed. *Honorary Secretaries*: F. W. Lowndes, M.R.C.S. (Liverpool); H. C. Hopkins, M.R.C.S. (Bath). *Council*: J. R. Baumgartner, M.R.C.S. (Newcastle); J. F. Craig, M.D. (Birmingham); C. Eastwick-Field, M.R.C.S. (Midhurst); G. H. Heald, M.R.C.S. (Leeds); W. J. Heslop, F.R.C.S.Ed.