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Dr. Thorne Thorne's Report to the Local Government Board on a Prevalence of Diphtheria in the Urban Sanitary District of Denbigh, and on the General Sanitary Circumstances prevailing there.

GEORGE BUCHANAN,
Assistant Medical Officer.
January 25, 1878.

Denbigh is a municipal borough and a county town in North Wales. The borough includes the parish of Denbigh and a portion of each of the parishes of Henllan and Llanrhaidr-in-Kinmerch; it occupies an area of 8,987 acres, and in 1871 had a population of 6,323. By far the greater portion of this population is in Denbigh town. The remainder, now probably reaching some 600 or 700 inhabitants, is distributed over the large rural area included within the borough limits. The most populous place in this area is the village of Henllan, which has about 500 inhabitants.

In this Report I propose in the first instance to deal with the town of Denbigh, and subsequently to make such reference to the outlying portions of the borough as may be necessary.

A. DENBIGH TOWN.

I. Description.—The town of Denbigh is mainly built on the slopes of a steep hill situated on the western side of the Vale of Clywd, its rugged summit being occupied by the ruins of Denbigh Castle, into the precincts of which the town extends. It consists principally of one main street, which commencing in the Vale rises in a westerly direction to the market square at the foot of the castle, and then falls again towards the Vale on the north-east. In various portions of the course of this street, and especially in the vicinity of the market square, are side streets and some irregular groups of dwellings and yards. Many of the houses are very old, in some parts they are somewhat thickly crowded together, and as regards those occupied by the poorer classes, it is evident that though very constant efforts are made to keep them clean inside, these are to a great extent frustrated by the conditions of filth outside. To the east the town lies on the Triassic Lower Mottled Sandstone, a pervious deposit which, partly covered by drift, occupies the bottom of the Vale and overlies impermeable Silurian rocks. Both the bluff, on which the high-lying portion of the town stands, and the low-lying district to the north-west are carboniferous limestone, which here and there may be seen coming close to the surface of the ground. The surface soil in and around the town is a clay retentive of moisture.

II. Water-Supply.—The water-supply for the town is derived from several sources. 1. By far the greatest supply is from the works of a private company; the water flowing from a gathering-ground about two miles south-west of Denbigh, where springs issuing from the shale overlying the carboniferous system are conveyed through an open conduit into a service reservoir. From this reservoir a service, formerly intermitting during dry weather, but now constant, is supplied to the town by gravitation, the water being twice strained through gravel before delivery. There is every reason for considering this water to be a wholesome one; the supply is also stated by the Company to be abundantly sufficient for the "present" requirements of the town; but the gathering-ground is not a large one, and doubts are entertained whether under certain emergencies, such as the establishment of a water-closet system throughout the town, the amount which can be procured and stored would at all seasons suffice. In some of the poorer parts of the town, including the neighbourhood close to the castle, and which is above the level to which the water rises, the supply is delivered by means of stand pipes, but these are in certain localities so far apart that the inhabitants rather than resort to them prefer, for various domestic purposes, to procure nearer but obviously foul supplies. 2. Denbigh also contains a certain number of wells, most of which are sunk to a considerable depth in the limestone rock. These wells must almost without exception be, from the nature of their position and surroundings, subject to constant risk of soakage of filth. Some which are known to be so fouled are, it is stated, not used for household purposes, but others, such as Charnel's well, to which reference will again be made, and the contents of which can hardly escape exposure to pollution, are regularly so used by a considerable population; and one well to which a board has been

affixed by the Sanitary Authority, declaring its contents to be unfit for domestic purposes, is well known to be largely resorted to for such purposes. 3. In at least one part of the town water is collected for so-called "cleaning" purposes from a brook which besides being fouled by ordinary liquid sewage, receives the contents of common privies.

III. *Means of Sewerage and Drainage.*—The means of sewerage and drainage in Denbigh are so notoriously faulty and deficient that it will only be necessary to refer to them with a view of indicating how great a source of danger to the health of the inhabitants they constitute. With the exception of one short length of glazed pipe sewer, which is ventilated by man-holes opening on the street level, and a few other lengths of the same construction, but less efficiently ventilated, the public sewers are defective in the extreme. They are mainly old stone "rubble drains," which have evidently been so constructed as to favour stagnation of contents and leakage into the surrounding soil. Many, if not most of the private drains, are equally a source of nuisance and of danger to health, and from the conditions observed it is quite obvious that in their construction no proper supervision has been exercised by the Sanitary Authority. There is also reason to believe that even where new sewers have been made, the house connections with the old ones have been allowed to remain. And it is certain that some old and apparently disused drains are a source of great nuisance. Many parts of the town are however without any artificial means of drainage; hence here and there slops are thrown into the streets; there is soakage of liquid filth into the fissures of the limestone rock; pools of slops and stinking liquid refuse may be seen in close proximity to dwellings; and drainage from yards and piggeries finds its way at times even to cottage door-sills. The existing sewers pour their contents into a brook which ultimately reaches the river Clwyd.

IV. *Means for the Disposal of Excrement and Refuse.*—About one-fifth of the houses in Denbigh are believed to be supplied with water-closets. Throughout the remainder of the town the common-privy prevails, and as a rule it is associated with conditions of more than ordinary filthiness. The privies themselves are often dilapidated and at times doorless. The pits, some of which are mere holes dug in the ground, are open to rainfall; they often receive the drainage from the privy roofs; and they are very frequently made the receptacle for slop-water and liquid house-refuse generally. Hence they are as a rule sloppy, thus favouring soakage into the surrounding soil and rapid decomposition of contents. They are almost invariably of very great dimensions, and being very commonly in close proximity to dwellings, and at times owing to the rapidly sloping surface of the ground, on a level with the first-floor windows, the nuisance arising from them must be all but intolerable. There is no public system of privy scavenging, and as a natural consequence enormous accumulations of excrement and other filth are stored up. So also, the expense at times incurred in getting the pits emptied, together with the aggravated nuisance which results when they are emptied from the exposure of surfaces which have for years been saturated with excremental filth, tends to increase the amount of privy contents stored up in the town. Indeed, from one end of Denbigh to the other, excepting only some parts occupied by the well-to-do, there must be many acres of such filth on the surface of the ground. And when these filthy accumulations are removed, they often have to be carried through dwelling-houses. It also seems a common habit to make the process of removal needlessly revolting, by depositing it in the first instance in the street and on the foot pavement, from which it is carted at convenience, often not until the next day. In one locality the privies are constructed over a brook. The scarcity of closet accommodation of any description is also very great, as many as from three to twelve houses being met with having only one common-privy between them. Street scavenging is carried out, but the refuse which includes the sweepings from the cattle market, held in the streets, is deposited on the road-side in the town. This naturally gives rise to complaint, not only on account of the offensiveness occasioned each time the deposit is disturbed, because its more liquid contents trickle down towards the houses in the vicinity.

V. *Piggeries.*—The nuisance from the keeping of pigs in Denbigh has assumed most unusual proportions. The piggeries are often situated in narrow confined yards, at times against houses immediately under windows; they are as a rule undrained, their liquid contents frequently flowing about the yards and soaking into the surrounding soil, or being washed hither and thither by rainfall, and near them is often situated a heap of pig dung. Indeed, the little space left behind some houses is all but completely occupied with these and excremental nuisances.

VI. *Slaughter-houses.*—A number of slaughter-houses were visited during the course of my inspection. None of them are licensed or registered; some are in yards close to

privy-pits and heaps of decomposing refuse, and a number of them are even without any supply of water. Some of them indeed are, besides being utterly unfit places for the slaughtering of human food, a source of considerable nuisance.

B.—OUTLYING PORTIONS OF THE BOROUGH.

In most of the outlying portions of the borough which were visited the sanitary circumstances were found in the main to resemble those in Denbigh town, although the resulting nuisances were as a rule diminished by the larger amount of open space about the houses. The *water-supply* is in many parts most defective. In Henllan village the only available supplies, namely, two springs and a brook, are so far removed from the most populous parts of the place that it is next to impossible to procure a sufficient supply to ensure cleanliness, especially during dry weather when no rain-water can be collected. So again in a district known as The Green, resort is had to pits, to road-side ditches, and to the water from a few land-springs. It is also in some localities taken from sewage polluted streams. There is nowhere anything like a system of *sewerage and drainage* except in Henllan village, where some use is made of drains constructed to receive road-water only. Here as elsewhere in the borough the sewage finds its way into neighbouring water-courses. The means of *excrement and refuse disposal* is the common privy-with-pit, and in some localities, as in parts of Henllan village, it is as grave a source of nuisance as in Denbigh town.

Mortality and prevalence of Infectious Diseases in the Borough.

Owing to the borough not being coterminous with any registration area no continuous statistics are procurable, showing the general annual mortality prevailing in the borough prior to 1875. Neither can any very definite information with regard to the past sanitary history of the borough be obtained beyond the facts, that from 1851-60 the mean annual mortality from all causes exceeded 23 per 1000 living; that in 1831-32 cholera was very fatally prevalent; that in 1853-54 "there was a severe epidemic of typhoid fever, which proved fatal to about 80 people;" that "there was another outbreak of about 20 cases" in December 1871 and January 1872 "entirely confined to a locality where the inhabitants drank the water of Charnel's well" then ascertained to receive sewage from a sewer brook which leaked into it and which still flows close to it; and that "slow autumnal fevers" were formerly very prevalent, but have greatly diminished since the introduction into the town of the company's water about 10 years ago.

After making the corrections rendered necessary by increase of population and the existence within the borough of several public establishments, such as the County Lunatic Asylum, &c., it appears that the death-rate from all causes was unnecessarily high in 1875 and 1876 when it reached 22.3 and 23.1 per 1000. The total deaths in 1875 were 130, including 4 from "fever," 2 from diarrhoea, and 2 from erysipelas. In 1876 the number were 139, and it included respectively 2 from enteric fever, 1 from scarlet fever, 1 from diphtheria, and 1 from small pox.

Prevalence of Diphtheria.—During the past autumn there has also been an extensive prevalence of *diphtheria*, which apparently commenced about the 10th of August, and had, by the middle of November, attacked at least 25 persons and caused 6 deaths. Several circumstances have however tended to prevent any proper history of this epidemic being obtained. The Medical Officer of Health for the borough not only receives no information as to the prevalence of infectious diseases from private practitioners, but such information even when specially sought is, in one important instance invariably refused, on the ground that to supply it would injuriously affect the practice of the medical practitioner in question. So also in several, if not in many, instances there has been no medical treatment, and the patients have only been found out accidentally. That these comparatively mild attacks were due to genuine diphtheria can, I think, admit of no doubt; not only were the histories obtained as to the symptoms typical of the disease, but in two of these cases I found that the patients were suffering from those forms of limited paralyses, in these instances affecting deglutition and vision, so characteristic of the effects of the diphtheritic poison. And further, diphtheria was, as I have elsewhere reported, prevalent during the same period in the adjoining sanitary district of the Ruthin Union.

The physical conditions of the Vale of Clwyd and of Denbigh are such that in and after wet weather there is a considerable amount of moisture in the air. The rainfall about Denbigh in August last was between 5 and 6 inches, or nearly 3 inches in excess of that for the same month during the preceding five years, and the temperature was, at least during the first half of the month, exceptionally low. Similar conditions have elsewhere been noted in connection with the spread, if not the origin, of this disease.

General Sanitary Administration of the Borough.

In view of the circumstances which came under observation during the inspection on which this Report is founded, some enquiry was made into the general administration of the borough. Up to the middle of 1873 there was no Medical Officer of Health for Denbigh, but since that date the post has been held by J. Lloyd Roberts, M.B., who holds a similar appointment for several adjoining sanitary districts. At every monthly meeting of the Town Council, as Urban Sanitary Authority, a report has been presented by this officer, and a perusal of these documents suffices to show, not only that he has made himself fully acquainted with the sanitary conditions prevailing in his district, but that he has brought them, and in some instances repeatedly, before the notice of the Authority, together with recommendations as to the best means of remedying them. One of these recommendations dealt in a special and detailed manner with the various measures which might be adopted to do away with the grave nuisance arising from the existing means of excrement and refuse disposal. Another made in 1874 advocated the making of a house-to-house inspection of the borough. With the assistance of the returns furnished him by the Registrar of Deaths, he has also compiled a complete record as to deaths in the borough during the past two years, and when, either by means of such returns or in any other way, the existence of cases of infectious diseases has been heard of, advice has been given, both verbally and by means of a notice printed both in English and Welsh, as to the best means of preventing the recurrence of such diseases, and of staying the spread of infection. But in the absence of more complete information in this respect, and of the provision by the Sanitary Authority of any means either of isolation or of disinfection, such advice is, as might have been anticipated, not considered to have had any material effect upon the prevalence of infectious diseases in the borough.

The Inspector of Nuisances, whose salary of 15*l.* per annum is quite insufficient to command services such are required in this borough, cannot have devoted much time to the duties of his office. Examination of his Report Book, however, showed that certain of the grosser nuisances had from time to time been brought under the notice of the Authority, but that some even of these remained unremedied, notwithstanding the Authority had gone so far as to threaten legal compulsion. I was also assured that a large number of unrecorded nuisances had been abated, but since evidence of such action is all but entirely wanting, it is clear that it must have been mainly limited to that class of nuisance which, in the absence of the adoption of some permanent remedial measures, must necessarily and rapidly recur. No house-to-house inspection has ever been made throughout the borough, and, although I found that something of this sort had just commenced, owing to the recent prevalence of diphtheria, no record even of it was being kept. Thus the Sanitary Authority has all along been without any detailed record of the conditions under which people are living in their district.

During the course of the present year, however, a series of byelaws has been adopted, a scheme of sewerage and sewage disposal for the town has been submitted for the approval of the Local Government Board, to whom the Authority have applied for sanction to a loan for carrying out the works, and a proposal has been made for the erection of a cattle-market outside the town limits. But with these exceptions it is quite evident, as the result of my inspection, that little or nothing has hitherto been done for the permanent improvement of the sanitary condition of the borough. It is true that some of the action required has, in all probability, been delayed until the proposed scheme of sewerage had been finally decided upon; but this alone cannot possibly account for a condition of things which is evidently the result of neglect spread over a long series of years, neither can it be deemed to account for the conditions prevailing in the outlying portions of the borough.

R. THORNE THORNE.

Local Government Board, Whitehall, S.W.

January 1878.

RECOMMENDATIONS.

I. The Sanitary Authority should see that their district is throughout provided with a proper supply of water. In the town the present requirements of the population can easily be provided for, but the stand-pipes should be much more numerous than they now are. In the outlying districts skilled advice should, if necessary, be sought as to the best means of carrying out this recommendation.

II. All polluted water-supplies should forthwith be dealt with in accordance with the provisions of Section 70 of the Public Health Act, 1875.

III. No unnecessary delay should be allowed to take place in carrying out an efficient system of sewerage and drainage in the town. All house drains connected with old disused sewers should be taken up. Steps should also be taken to deal with the liquid refuse in the outlying portions of the borough, especially in the village of Henllan.

IV. The Sanitary Authority should take into consideration the best means for dealing with the excrement and refuse of the population. Before any conclusion is arrived at as to the adoption of the water-closet system for the town generally, information should be obtained as to how far the Water Company will be able to provide such a supply of water as will ensure to each closet ample means of flushing. If any other system should be determined on, whether for any portions of the town or elsewhere, it will be requisite that the Authority should, either by themselves or by arrangement with others, procure the regular removal and the proper disposal of the closet contents. Furthermore, all privies that cause nuisance should without delay be efficiently dealt with; and byelaws should be made to secure the proper construction of all closets and privies attached to new houses. Under any circumstances, the Authority should at once undertake the removal of all house refuse, and they should secure a suitable plot of land outside the town where both it and the road sweepings can be temporarily stored. Further information relating to this subject may be obtained from the Office Report of the Local Government Board on Certain Means of Preventing Excrement Nuisances in Towns and Villages.

V. Steps should be taken to do away with the grave nuisance now arising from the keeping of pigs. In effecting this the Sanitary Authority would find it advantageous to modify their present byelaw relating to this subject, so that it should comply with that contained in the Model Byelaws (No. II., Byelaw 10) recently issued by the Local Government Board, in assigning a distance from dwelling-houses, within which no swine or deposit of swine's dung shall be kept.

VI. All existing slaughter-houses should be registered, and then strictly subjected to the byelaws relating to them. Any which are then found to constitute a nuisance should be dealt with as such. Any new slaughter-houses should be duly licensed, and no new slaughter-houses should be sanctioned within the limits of the town proper.

VII. In the present state of the borough it is doubtful whether any Inspector of Nuisances can properly perform the duties attaching to that office unless he gives his whole time to them, and such services should be adequately remunerated. The Inspector should be required, under the supervision of the Medical Officer of Health, to make a house-to-house inspection of his entire district, and he should duly record the results of this inspection in a book to be kept for that purpose.

VIII. It is important that, with a view to prevent the spread of infectious diseases in their district, the Sanitary Authority should have in readiness, 1st., some means for the immediate isolation of persons found to be suffering from infectious diseases, and who cannot be properly lodged and accommodated in their own homes; 2nd., some apparatus for the efficient disinfection of infected bedding, clothing, &c.; and 3rd., a proper mortuary.

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II. All polluted water should be forthwith dealt with in accordance with the provisions of Section 70 of the Public Health Act, 1875.

III. No unnecessary delay should be allowed in taking place in carrying out an efficient system of sewers and drains in the town. All house drains connected with old drains now in use should be taken up. Steps should also be taken to deal with the liquid refuse in the outlying portions of the borough, especially in the village of Haulham.

IV. The Sanitary Authority should take into consideration the best means for dealing with the excrement and refuse of the population. Before any conclusion is arrived at as to the adoption of the water-borne system for the town generally, information should be obtained as to how far the Water Company will be able to provide such a supply of water as will enable to each class of means of flushing. If any other system should be determined on, whether for any portions of the town or elsewhere, it will be requisite that the Authority should either by themselves or by arrangement with others, prepare the regular removal and the proper disposal of the close contents. Furthermore, all private cess-pipes should be without delay be efficiently dealt with; and hydrants should be made to secure the proper construction of all closets and privies attached to new houses. Under any circumstances the Authority should at once undertake the removal of all house refuse, and they should secure a suitable plot of land outside the town where both it and the road sweepings can be temporarily stored. Further information as to this subject may be obtained from the Office Report of the

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V. Steps should be taken to secure that the Sanitary Authority would find it advantageous to modify their present bye-law relating to this subject, so that it should comply with that contained in the Model Bye-law (No. 11, By-law 10) recently issued by the Local Government Board in connection with a bye-law from dwelling-houses, within which no swine or deposit of refuse shall be kept.

VI. All existing slaughter-houses should be registered, and then strictly adapted to the bye-law relating to them. Any which are then found to constitute a nuisance should be dealt with as such. Any new slaughter-house should be duly licensed, and no new slaughter-house should be sanctioned within the limits of the town proper.

VII. In the present state of the borough it is doubtful whether any Inspector of Nuisances can properly perform the duties attaching to that office unless he gives his whole time to them, and such service should be adequately remunerated. The Inspector should be required to exercise the supervision of the Medical Officer of Health, to make a house-to-house inspection of his entire district, and he should daily record the results of this inspection in a book to be kept for that purpose.

VIII. It is important that with a view to prevent the spread of infectious diseases in their district the Sanitary Authority should have in readiness, for some means for the immediate isolation of persons labouring under infectious diseases, and who cannot be properly looked after and recommended in their own houses; and, some apparatus for the efficient disinfection of infected bedding, clothing, &c.; and also a proper mortuary.