Dr. Thorne Thorne's report to the local government board on the general sanitary circumstances and administration of the rural sanitary district of Dartford, and on an outbreak of diphtheria in the parish of Swanscombe.

Dr. Thorne Thorne's Report to the Local Government Board on the General Sanitary Circumstances and Administration of the Rural Sanitary District of Dartford, and on an Outbreak of Diphtheria in the parish of Swanscombe.

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I.—General Description.

The rural sanitary district of Dartford includes 20 of the 22 parishes which are comprised in the Union of Dartford, the remaining two, namely, the parishes of Dartford and Erith, having been constituted urban districts. It is situated in the northern portion of the county of Kent, and stretches from the River Thames to within about 6 or 7 miles of Sevenoaks. By far the greater portion of the district lies upon the Chalk, but to the north-east and to a lesser extent in several scattered parts of the district this formation is covered to a varying depth by Thanet Sand and the Woolwich and Oldhaven Beds forming the Lower London Tertiaries, and by patches of London Clay. Entering the rural sanitary district at the south-west is the River Darent, which, curving in an easterly direction, reaches the centre of the district, and then continuing its course northwards flows through the urban district of Dartford and empties itself into the Thames through the Dartford Marshes. On the north-west the River Cray also enters the district. Flowing northward it receives one of its principal tributaries, and then taking a more easterly direction it joins the Darent about a mile and a half above the mouth of that river. The basins of these two rivers form the natural drainage areas for a very considerable proportion of the rural sanitary district.

II.—General Sanitary Circumstances and Administration.

1st. *Dwelling Accommodation.*—Many of the parishes in this district contain localities which are rapidly becoming populous, others are, and probably will for a considerable time remain, sparsely populated. Where a rapid increase of population is taking place it is generally due to the establishment of some trade giving employment to a large number of hands, and as a consequence the houses which are being built are to a great extent of the class required by the artizan and labouring man. Thus cement works, paper mills, powder mills, cartridge factories, and silk and linen printing establishments have in various parts of the district led to the conversion of hamlets into populous villages, some of which in turn bid fair soon to become small towns. On the other hand there are also instances, as, for example, at Bexley, where a large increase in the number of inhabitants has been due to the construction of first class villas and other residences mainly for persons having business engagements in London. But whether the houses are of the former or of the latter class they very generally exhibit conditions which must necessarily subject their inhabitants to risk of nuisance and of danger to health. Thus houses are built on sites which, in their present state, are, from wetness, quite unfit for human habitations. Indeed water may be seen flowing rapidly from beneath door steps which are only a few inches above the ground level, and wells close to the houses may be seen with the water standing in them to within about three inches of the surface, the ground floors being only separated by a few inches of space from this surface. The suitability of the materials of which the houses are constructed appears also at times a matter of complete indifference to the person erecting the dwelling. Thus in one instance I found the inside wall of a dwelling house being lined with broken pieces of brick which were thickly coated with manure and other black offensive matter. It is also a common practice to provide new houses with a well and cesspool in dangerous contiguity. Both of these are as a rule sunk to a considerable depth in the chalk or other formation, the well being almost invariably the deeper of the two, and the contents of the cesspool, over which the privy or watercloset is built, are known to soak away. It is true that the chalk in most parts of this district is very hard and that it is more than usually free from fissures, and so long as the houses were sparsely scattered over a somewhat wide area the cesspools and wells were in consequence not often in dangerous relationship to each other. But now that cottages are being run up in long rows, and in yards behind main streets and roads, the circumstances are entirely different, and before long this practice must be productive of very serious consequences. The limited space on which the houses are built has also led to the cesspools being constructed so near to the dwellings as to cause grave nuisance.

Nuisances of almost incredible magnitude were also found to arise from the negligent manner in which the house drains had been constructed. They are at times so laid as to leak under the houses; and, as a very general rule, they act as a direct means of communication between the interior of cesspools or closets on the one hand, and the interior of the houses on the other.

The position of the closets and privies with regard to houses is often precisely that which is certain to produce grave nuisance; indeed, under existing arrangements, the passage of an excrementally tainted air direct from privy and cesspit into the dwellings is very frequently quite unavoidable, and in some localities the gravity of the nuisance arising from this cause is far greater in the recently constructed houses than in the older ones.

2. *Water Supply.*—The greater portion of this rural district is within the area over which the Kent Water Company have Parliamentary powers. The parishes of Bexley, Crayford, and East Wickham were included in the Company's Act of 1864, and in 1877 their powers were extended to the parishes of Darent, Eynsford, Farningham, Stone, Sutton-at-Hone, Swanscombe, and Wilmington. The Company's mains now extend more or less into all these parishes, the exceptions being Darent, Eynsford, and Farningham. But in all the parishes having this supply wells are still resorted to, and these are often sunk in near proximity to cesspools, which need emptying so rarely that it is obvious their more liquid contents must soak away.

As a rule an effort is made to keep the cesspool and well some considerable distance apart, but where new houses are built for the labouring classes, the space allotted to each house is often so limited that the well cannot long escape the risk of soakage; and even if care can be exercised to prevent, as far as possible, such a risk arising from any source of danger on the same premises, there is no certainty that a far greater risk of danger does not lie close at hand on some adjoining premises. When complaint is made as to water being unfit for human consumption, a chemical analysis is ordered by the Authority, and if it be unfavourable, an order is, as a rule, made to lay on the Kent Company's water where this is available; but if this supply is not near at hand, a new well has either to be sunk or some such measure as the cleaning out of the existing well is ordered. Where there has been soakage of filth into a well from the surrounding soil this latter step is necessarily very unsatisfactory and cannot be relied on as ensuring any permanent improvement in the supply, the more so as the gardens which often surround these wells are made the depository of the cesspool contents, all the dry house refuse, and at times of all the slops and liquid refuse. The instances too in which complaint is voluntarily made, were found by no means to include all cases in which the present supply from wells is obviously unfit for domestic purposes, even in districts where a supply from the Kent Company's mains could be procured. In Greenhithe some of the wells are subject to another source of contamination owing to their proximity to the Thames. After high tides the water they contain is stated to remain "brackish" for two or three months at a time, and during that period a supply has to be obtained from elsewhere by favour or by stealth.

Excepting only in a few special localities, the water service of the Kent Company in this district is an intermittent one, but it is anticipated that the area having a constant service will gradually be extended, and that, apart from any special local circumstances, all new extensions of this supply will afford a constant high pressure service.

3. *Sewerage and Drainage.*—The cesspool drainage, of which mention has already been made, is all but universal throughout the district. In some localities the greater part of the liquid contents of the cesspools is known to soak away, but where the cesspools are sunk in clay, and but little soakage from them takes place into the surrounding soil, it has at times been found necessary to construct cesspool after cesspool, until, as I was informed, the ground round about houses is "honeycombed" with them. Quite apart also from the danger resulting from the soakage of cesspool filth into the water-bearing strata, the cesspools give rise to conditions of the most dangerous character. Some houses are all but built over cesspools, and the foul effluvia rising up from them, especially when the houses are closed at night, thoroughly contaminate the air which the inmates have to breathe. It is also an almost invariable custom to connect the interior of the houses directly with the cesspools by means of pipes from kitchen sinks, a practice by which the passage of foul air into houses is further ensured. Many complaints were made to me as to the offensive condition of houses owing to this latter cause, which obtains more frequently in dwellings of recent than in those of older date. Some cesspools are "ventilated," but these bear only a small proportion to the total number; and even then the so-called ventilation consists merely of the provision of a pipe, which allows of the escape above the roof of the house of such foul air as is forced out under pressure.

Nowhere did I find any true ventilation of drains, such as can only be ensured by providing in the course of the drain two openings, one of which shall serve for the entrance of fresh air, as is contemplated in the Model Byelaws, Series IV., § 65, issued by the Local Government Board.

Two extensive schemes for sewerage, however, affect this rural district. The first is the West Kent system of sewerage. The principal main sewer in connexion with this scheme passes through the parish of Bexley from west to east, and is, in its course through the parish, joined by the Cray Valley branch sewer. The main sewer subsequently enters Crayford parish to the south, and, after traversing the northern part of the urban district of Dartford, its contents will, after being dealt with at certain purifying works, be delivered into the Thames. This system of sewerage is now approaching completion; but in view of the fact that some of the most serious conditions as to drainage which have been noted in this Report prevail in the populous parts of Bexley and of Crayford, it is to be regretted that, so far as these parishes are concerned, no arrangements have as yet been made either to utilise the sewers referred to or to provide some other efficient means of drainage. Both are now populous parishes, Bexley having an estimated population of 8,550, and Crayford probably containing at least 5,000 inhabitants. As regards Bexley, however, it is quite possible that the question of its proper sewerage and drainage has, amongst other things, led to a recent application that the parish should be constituted an urban district.

The main sewer of the Darenth Valley Sewerage Works, which are now in process of construction, will also pass through the district. Entering it to the south, it will pass successively through the parishes of Lullingstone, Eynesford, Farningham, Horton-Kirby, Sutton-at-Hone, and Wilmington, and then reaching the Dartford Urban District, it will, by means of a main sewer which the Dartford Urban Authority are required to complete in 1880, discharge into the West Kent outfall sewer. In addition, moreover, to the above-named places the greater portion of the parish of Darenth, which, with a few other more rural places, is within the drainage area of this sewer, is deemed a contributory place for the purposes of the main sewer works under a Provisional Order of the Local Government Board.

When these two schemes of sewerage are completed, nearly all the more populous localities in the Dartford Rural District will be brought within their drainage areas, and thus means will be afforded for their efficient drainage. Swanscombe Parish, however, which, in addition to Greenhithe, includes a steadily increasing population in and near Swanscombe Village and Galley Hill, will, however, need sewers independent of either of these main works.

4. *Disposal of Excrement and Refuse.*—The means adopted in this district with regard to the disposal of excrement and refuse are, as a rule, faulty in the extreme. Perhaps the most frequent plan is to erect a common privy which is placed either directly over a large cesspool or communicating with it by means of a sloping passage excavated in the chalk or other soil, and at times lined with brickwork. Before the localities in which these closets are found became populous, the structures in question were placed at some considerable distance from the houses and the wells, and the evils resulting from them were comparatively inconsiderable. But of recent years the value of land for building purposes has increased and hence the area allotted to each house has become restricted. The labouring classes also, apparently ignorant of the resulting consequences, and hence indifferent to all considerations except their own personal convenience, have shown a decided preference for houses having closets in close proximity to them. It might have been anticipated that this circumstance would have given rise to the absolute abandonment of this form of closet, but the difficulties associated with scavenging, so long as it is not undertaken by a Sanitary Authority, have doubtless hindered the adoption of anything in the shape of a dry-closet, and the result is that closets of the class I have described may now be found in close proximity to dwellings, the door of the closet often facing the door or window of the dwelling-room, so that a thoroughly tainted air can freely make its way into the houses. The extent of the evil is also greatly enhanced by the circumstance that the cesspools almost invariably receive the slops and liquid refuse; their contents are therefore wet, and as a consequence they are constantly in an advanced state of decomposition.

In some parts of the district, however, pan closets provided with a "siphon-trap" have been provided, the contents passing into cesspools, from which they require more or less frequent removal. Rarely, however, are these closets provided with proper means of flushing, and as a natural consequence, many were found quite as offensive as closets of the sort previously described. Indeed, the practice of conveying into the closet-pan a sink-pipe from the interior of the dwelling, and so of affording means by which foul air

is often conveyed direct into a dwelling room, leads, even where traps are fitted over the sink inlet, to a nuisance, perhaps even of a graver character than that resulting from the common privy. Some of these pan-closets too, were found in a most dilapidated state.

In some few instances, I found that an effort had been made by certain individuals to deal with the difficulty as to excrement disposal by providing closets, the contents of which it was intended should be regularly mingled with ashes and dry refuse. But in the absence of any local information as to the sanitary principles to be attended to in the construction of such closets, the method adopted has been faulty and the object aimed at has not been attained. Thus, in one locality, the privy pit, instead of being limited to a space situated entirely beneath the closet seat, and having its floor above the level of the surrounding soil, was found to consist of a cemented tank sunk below the ground level, and placed behind the closet, the two communicating by means of a shelving slide, from which the tenant has found it necessary to swill down the excrement. In this way the tank has simply become a cesspool half full of liquid and rapidly decomposing contents.

The remaining closets in the district are ordinary waterclosets, also emptying into cesspools. In some instances the soil-pipe was found to be continued about the roof of the house, but always by means of a pipe of a less diameter than the soil-pipe, and often having a number of right angles or curves in its course, thus hindering the free exit of foul air.

5. *The Sanitary Authority and its Officers.*—The Guardians of the Dartford Union constitute the Sanitary Authority, but they have delegated their powers, under Section 201 of the Public Health Act, 1875, to a Committee consisting of eight elected and four ex-officio Guardians. This Committee meets on the same day as that on which they meet as Guardians, and at a later hour than the meeting for poor-law purposes. The sanitary work of this Committee is done at irregular intervals. On an average there appear to be eleven meetings in the year. Once during the last two years the Committee met on two consecutive weeks, but so long an interval as seven weeks has elapsed without any meeting. Four out of five of the poor law medical officers of the union have been appointed to be Medical Officers of Health, and there are two Inspectors of Nuisances. *The Medical Officers of Health* receive regular returns of death from the registrars, and when a death from infectious disease occurs they take steps, in conjunction with the Inspector of Nuisances, for the disinfection of the premises, unless they have reason to believe that proper advice in this matter has been given by the medical practitioner in attendance on the case. It is also an understanding that, as occasion occurs, they are to aid the Inspectors of Nuisances by advising them on such points having a medical bearing, as may be brought before them. They keep a record of the principal action they take in the sanitary administration of their districts, and in certain instances they also communicate in writing with the Sanitary Authority as to any special action which they deem necessary. But, being engaged in somewhat extensive private and poor-law practices, they are not asked to attend the meetings of the Sanitary Authority, and thus they have no ready means of advising them as to any action which the Authority may be proposing or may have under consideration. The *Inspectors of Nuisances* do not give their whole time to their duties under the Sanitary Acts. They both exhibited considerable knowledge as to the sanitary circumstances of their districts, but it became evident during the course of my inquiry that many conditions needing the active intervention of the Sanitary Authority remained undetected in the course of the ordinary inspections made by Inspectors of Nuisances, whose duties cannot be efficiently performed unless they are required periodically to make detailed inspections, and to record the result of these inspections in a book which should be regularly submitted to the Authority. At present even their ordinary report books, in which are entered up the cases in which they have found it necessary to take some action, are not necessarily submitted to the Authority, only those instances in which their instructions have not been complied with, or those in which some special action is deemed necessary being brought under the notice of the Authority in separate communications. Owing to this, work is often done under the direction of an Inspector of Nuisances which, had it in the first instance been submitted to the Authority, could hardly have been sanctioned, except after some skilled advice had been procured as to its propriety. Thus instances came under my notice in which after the prevalence in a house of some infectious disease, such as enteric fever, measures involving some considerable expense have been adopted which leave matters, if not worse, at least quite as bad as before. Faulty drains, for example, have been replaced by other means of drainage, so constructed as to place the interior

of a house in direct communication with the interior of a cesspool until, as alleged, the house has, since the alterations, become almost unbearable from the excremental emanations finding their way into it. The Inspectors of Nuisances have, however, no instructions as to the method in which structural alterations of this sort should be made, and they have in these matters acted to the best of their ability. A large amount of nuisance removal has doubtless been carried out, and the emptying of cesspools is a prominent portion of this work, but in the absence throughout this district of proper means of drainage, the real nuisance caused by cesspools cannot be generally dealt with; thus where a house, for example, is built on soil either saturated with cesspool soakage or loaded with cesspool emanations, the emptying of the cesspool only deals with the smallest part of a dangerous nuisance, which must necessarily soon recur, and all the while the real danger to health remains. Where the Kent Waterworks Company's mains have been laid, all complaints as to polluted water have as already stated received attention, and in many instances the Company's water has replaced that from wells subjected to pollution. Numerous instances, however, came under my notice where no measures had been adopted to secure a proper supply even where the public mains were close at hand, merely because, in the absence of a formal complaint to one of the officers of the Authority, they remain unknown.

III.—Diphtheria in Swanscombe.

During the third quarter of the present year Swanscombe parish was visited by a severe epidemic of diphtheria. The parish had in 1871 a population of 3,105, but owing to the establishment of some extensive cement works there, it has since then considerably increased, and it is now believed to contain about 4,500 inhabitants. It consists of several somewhat detached parts; to the extreme north-west lies Greenhithe; to the east is Galley Hill, a modern place occupied almost exclusively by cement workers; near the centre of the parish is Craylands, also to some extent of modern growth; and lastly there is the old village of Swanscombe.

A large portion of the parish, including Galley Hill, lies immediately on the Chalk, and at a considerable elevation above the Thames which bounds the parish to the north. In the neighbourhood of the river much of the chalk is covered by alluvial deposit, and to the south it is capped by the Lower London Tertiaries and by London Clay.

With the exception of a small portion to the west of the district to which the Kent Company's supply has been laid on, the water supply for the parish is derived from wells sunk in the Chalk to a depth varying from about 50 feet to 90 feet, and into the same stratum are dug either huge cesspools to contain both the closet contents and all liquid refuse, or, where the slops are thrown in the garden, smaller cesspits for privy contents only. None of the cesspits are made water-tight.

The outbreak of diphtheria was, owing to an accidental omission at once to report it on the part of the Medical Officer of Health for the parish of Swanscombe, not brought under the notice of the Local Government Board until towards the middle of September, and then by means of a communication from the Registrar-General. And although the inquiry with regard to it was instituted with the least possible delay, the epidemic was found to be at an end before the enquiry could be commenced. The sick had also been attended by at least five different medical practitioners, several of whom had not preserved any accurate record either as to the dates when the patients first came under treatment or as to when they had first been attacked with the disease. These, amongst other circumstances, were found materially to hinder the objects of the inquiry, and greatly to lessen its value so far as the probable cause and the early history of the diphtheria were concerned.

So far however as could be ascertained, two cases of diphtheria appeared almost simultaneously in two different houses on or about July the 26th or 27th last. One of the houses is a small four-roomed dwelling situated at Craylands. Two of the rooms, a sitting-room measuring only 10 ft. × 9 ft. × 7 ft. and a scullery, are almost entirely embedded in the surrounding chalk, and they are evidently very damp. The sitting-room opens into the scullery, and by means of a sink in the latter the interior of the house is placed in unbroken communication with a drain. Upstairs are two other small rooms. At the time of the outbreak under discussion a family named I——, consisting of parents and five children between the ages of 4 years and 14 years, had lived there for some time. In this damp, overcrowded, and otherwise unhealthy house, which the family have since then left, a child named Sarah I——, aged eight years, was visited by a medical practitioner on August 1st. She was then found to be suffering from well marked diphtheria, her illness having apparently commenced on July 26th. The glands below

the jaw were greatly enlarged, the fauces were covered with a characteristic membrane, and the child died within about 24 hours of the visit referred to. Another member of the family, George I——, aged 6 years, was taken ill with diphtheria on August 1st, and he died on August 5th, having doubtless contracted the disease from his sister. Repeated inquiries have entirely failed to show that Sarah I—— had, prior to her attack, come into contact with any other person suffering from sore throat in any form. The child, in common with most of the children in this district, attended a school at Galley Hill, but no throat sickness is known to have prevailed amongst the scholars. The water-supply to the house did not appear to be subject to pollution, and the only milk used in the house was "condensed milk." So-called "common sore throat" had however, previously prevailed in the family, one member of which had so severe an attack of "ulcerated throat" in 1878 as to need medical attendance. Enteric fever also prevailed in the house about 15 months prior to the outbreak of diphtheria.

The second house referred to is at Galley Hill, about half a mile from where the family I—— lived; and in July last it was occupied by a family named E——, and consisting of the two parents and of five children all between the ages of 3 years and 14 years. The house is a new one, and its sanitary arrangements, though not faultless, were far superior to those of the majority of houses in Swanscombe, and afforded no clue whatever to the illness which followed. On the 29th of July a medical practitioner was called to the house to see Rosina E——, a girl of 10 years of age. She was found to be suffering from well-marked diphtheria, characterised by some enlargement of the glands below the jaw, and the presence of membrane on the fauces. Her illness was ascertained to have commenced either on July 26th or 27th. She died on August the 27th from pneumonia which supervened during convalescence. Three other children in this house sickened of the same disease, viz., Kate E——, aged 5 years, on July 29th; Alfred E——, aged 14 years, apparently, on July 30th; and Harry E——, aged 6 years, on July 31st. The boy named Alfred died on August 29th.

With the exception of the first case in this house all the others were probably due to direct infection, and as regards the first attack, the only history which could be obtained bearing upon the disease was, that although the child Rosina, had, owing to severe headache, to which she had long been subject, not been to school for about eight days before she sickened, yet there was a considerable intimacy between her family and that of the I—— family, the children belonging to each being frequently together. Indeed there can be little doubt but that Rosina had opportunities of meeting Sarah I——, whose attack has already been considered, and who is admitted to have been walking about during the early stages of her illness. With a disease like diphtheria, having probably at times a period of incubation which may be limited to hours, and with the uncertainty which exists as to the precise date when the first symptoms commenced in the two children Sarah I—— and Rosina E——, it seems quite possible that the latter child may have had opportunity of contracting the disease from the former, and in this connexion it should be stated that the medical practitioner who attended both the children had from the first a strong conviction that the first symptoms which had been recognised in the case of Sarah I—— were quite one day in advance of those of Rosina E——.

Thus far we have dealt with six cases occurring in two families. Another attack deserves attention in connexion with the early history of the outbreak. It is that of an infant between 2 years and 3 years of age, named Jessie I——d, who was attacked with diphtheria on August 2nd. The attack in this case appeared slight at first, but, a relapse occurring, it died on August 22nd. The house in which this child lived is also a new one, and its sanitary arrangements could not be found, apart from one point to be hereafter mentioned, to have had any bearing upon the disease. In point of situation it is not far from that where the family E—— lived, yet, owing to the child's tender years, there does not seem much probability that it had come into contact with the sick of either of the families previously referred to. Under these circumstances inquiry was made as to any previous throat illness in the same house. The family consisted, at the date of the outbreak, of the parents and three children, the other two children being respectively 10 years and 6 years of age. At first all previous sore throat was denied; but on being pressed, the mother, Mrs. I——d, who had previously not thought the matter worth mentioning, informed me that, owing to the subsoil water getting in to the house the basement became flooded and she had on July 26th or 27th baled the water out. She suffered at the time from "a chill," which was followed, as far as can be recollected, on the next day, by a sore throat, which lasted until August the 2nd, when her child sickened. If this woman's "sore throat" was the infecting cause of her child's diphtheria, then it must also be considered in connexion with the

attack in the family E——, for she admits having held free communication with that family, although it is uncertain how far her more recent visits had preceded the attack of Rosina E——. That they followed it is certain, and this leaves it further open to doubt whether Mrs. I——d, without herself having any infectious sore-throat, could have been the means of conveying infection from the E——s to her own child. The other two children in the house escaped.

The circumstances narrated will suffice to show that at the period when this inquiry was commenced, the only available information had not that precise and accurate character which is essential to the elucidation of the causes of an epidemic. Especially did it fall short, so far as concerns the dates of the earliest recognised attacks, of the data necessary for the formation of an opinion as to the immediate origin of a disease, the etiology of which is at present involved in so much obscurity. It is, however, certain, that the houses first attacked had nothing in common as regards water supply, drainage, or milk supply. The influence of school attendance was inquired into, both with regard to the early history and the spread of the disease. As regards its early history, it was found that only one of the children who were first attacked in the three families above referred to was at the time attending school, and although as regards some of the later attacks, attendance at school may doubtless have favoured the spread of the disease by means of direct infection, yet even this influence was limited, because about a week after the disease commenced the school was closed. Notwithstanding this, however, there was subsequently such free communication between children coming both from infected houses, and from houses as yet healthy, as to render useless any attempt to ascertain whether any other influence beyond direct infection from person to person was at work as regards the cases that followed.

But with regard to the first attacks, the occurrence in several families attacked with diphtheria of previous attacks of "sore throat" led to an inquiry whether the disease had not, either as sporadic diphtheria, or in an unrecognized, and perhaps in a modified form, been prevalent either in Swanscombe or the neighbourhood before the commencement of the epidemic. Any general prevalence of "sore throat" was not ascertained to have existed, and had it prevailed such, I am informed, is the reluctance of many of the inhabitants to seek medical attendance, even in cases of grave sickness, that it is not likely it would have come under medical observation. In the first week of July, however, a child aged 3 years residing at Galley Hill, was attacked with a disease which, in the absence of any suspicion as to the prevalence of diphtheria, was considered to be "croup," and the child dying, it was so registered. The medical practitioner in attendance did not observe any deposit on the fauces or any glandular enlargement, but the attack appears to have been associated with distinct febrile disturbance. No communication is, however, known to have taken place between any member of this family and either of the families in which diphtheria subsequently occurred.

Again, in February last a death from diphtheria in a child 5 years of age was registered as having occurred at Galley Hill, and another took place in the same locality in September 1878. Besides which, in the first quarter of the present year, diphtheria was prevalent in the adjoining parish of Northfleet, four deaths being registered as due to this cause. Between Northfleet and Swanscombe there is admittedly very free communication, many people from the latter place going regularly to Northfleet to do their shopping.

In short, there is very little doubt that cases of genuine diphtheria had been prevalent in and about Swanscombe prior to July last. And further, there are strong grounds for believing that the cases which were believed to have constituted the commencement of the epidemic had, at varying intervals, been preceded by other cases of "sore-throat."

The incidence of the disease on one more house is noteworthy, both on account of the sanitary circumstances with which it was found to be associated, and which it may be useful to record for the purposes of the sanitary administration of the district, and because it was found in common with several other cases to have been preceded by so-called "sore-throat" attacks in the same house.

The case in question occurred in one of a modern row of houses erected for the working classes, and having a somewhat attractive exterior. The child Phœbe S——, aged 3 years, was attacked on August 20th, and her case terminated fatally. She lived with her parents and an infant 10 months old on the first floor of the house in question, another family, Sp——, occupying the basement and the upper story. The house has an open space at the back in which are situated a well and a cesspool. The well is sunk into the chalk to a depth of about 80 feet, the cesspool is also dug out in the chalk and is believed to be about 40 feet deep, the two being about 40 feet or 50 feet apart. Owing to the child's extreme youth the mother was able to express herself as confident

that it had not come into contact with any children from other houses, and hence inquiry was made as to any previous case of "sore throat" in this house. As the result, I found that a young married woman, a member of the family occupying the basement room as a sitting room, had frequently suffered from such an affection since she had resided in the house in question, and that about three or four weeks before Phœbe S——'s fatal attack she had a severe "ulcerated throat." Her tonsils also exhibited extensive loss of tissue. Within two feet of this living room was a privy, which opened towards and all but faced the door of the living room. This privy communicated with the cesspool which has been referred to, the foul odours from which could easily make their way into the house. The interior of this room was also placed in direct communication with the interior of the cesspool by means of a sink pipe, up which foul air was known to be forced whenever large quantities of liquid were poured into the cesspool from other houses which also use it.

But the rooms on the first floor belonging to the family where the case of well-marked diphtheria occurred were also found to have been brought into dangerous connexion with this cesspool by means of a shaft carried up from the space beneath the privy seat to a point below the bedroom window. The bed-room and the sitting-room belonging to this family opened into each other, and the cesspool emanations making their way into the former from the shaft in question were found to have been particularly offensive during the summer months.

In all, 32 cases of throat affection, most of them being cases of genuine diphtheria, occurred in Swanscombe during the months of July, August, and September last, and including the case of "croup" above referred to, 14 of them terminated fatally.

Directly the disease was recognised as diphtheria the Medical Officer of Health visited all the cases he could then hear of, and the Inspector of Nuisances, under his directions, provided the inhabitants with certain disinfectants and also gave advice as to their use. The school was closed before the usual time for the holidays, and it remained closed for a period of six weeks.

V.—Summary.

To sum up the results of this inquiry in the Dartford Rural Sanitary District, I would observe:—

1. That conditions, which are a source of danger to health, obtain widely throughout the district. These conditions have already, in certain instances, been associated with the prevalence of preventable disease, and being rapidly on the increase are likely before long to become a far graver source of danger.
2. That numerous localities in the district either have already become, or are rapidly becoming, so populous as to stand in urgent need of more complete sanitary appliances. Especially do they need efficient means of drainage, proper water supply, and means of excrement disposal which shall be free from nuisance and from danger to health.

R. THORNE THORNE.

RECOMMENDATIONS.

1. The Sanitary Authority should without delay take the necessary steps for providing a proper water-supply for all portions of their district not having such a supply. With this object in view detailed inquiry should, in the first instance, be made as to the existing supplies, and, where necessary, remedial measures should be adopted, by action under section 70 of the Public Health Act, 1875, and under section 3 of the Public Health (Water) Act, 1878. In localities through which the mains of the Kent Water Company already pass, the Authority should avail themselves of the exceptional facilities which the district possesses for dealing with this matter.

2. The question of the efficient sewerage and drainage of those portions of the rural district standing in need of such provision should receive the early and serious consideration of the Sanitary Authority. With regard to the more populous portions of those parishes which are within the drainage areas of either the West Kent or the Darenth Valley system of sewerage, the Sanitary Authority should come to a decision as to the use of those systems for the purposes of their district. And as to places for which the Sanitary Authority either cannot, or do not propose to, utilize these systems, skilled advice should be sought as to the best means of making the provision required. The various portions of Swanscombe parish especially call for early action in this matter.

3. Steps should be taken to do away with all sources of nuisance or of injury to health arising from the present condition of house drains, whether these are due to the proximity of cesspools to houses or to the direct communication existing between the interior of houses and cesspools, drains, or closets, or to other causes.

4. The Authority should without delay take into consideration the necessity of making such provision for dealing with the excrement and refuse of the population as shall be free from nuisance and the risk of danger to health. If waterclosets are constructed they should in every case be provided with adequate means of flushing. In the case of dry-ash-closets, the pit, which should be constructed at a level of six inches above the surrounding soil, should be limited to the space beneath the seat, and facilities should be afforded, as by the provision of a seat rising on hinges, for the frequent and effectual application of the ashes to the excreta. Both with regard to these and other forms of closets more complete information may be obtained from the Report of the Local Government Board on " Certain Means of Preventing Excrement Nuisances in Towns and Villages."

In the more populous parts of the district the Authority should itself undertake the removal of all house refuse, and except where waterclosets may be in use, of all closet contents.

5. It is important that the Authority should, with a view to the efficient adoption of the preceding recommendations, make application to the Local Government Board for such urban powers as will enable them to make byelaws, for the more populous parts of the rural sanitary district, relating to matters dealt with under sections 44, 157, & 158 of the Public Health Act, 1875.

6. The Inspectors of Nuisances should be required to make, under the supervision of the Medical Officers of Health, a house-to-house inspection of their respective districts. This would necessarily be a work of some considerable length, but if it is carefully carried out, and the recorded results regularly brought under the notice of the Sanitary Authority, it will afford them such detailed knowledge of the sanitary circumstances of the district as will materially facilitate their action in dealing with its numerous sanitary defects.

7. It would doubtless materially contribute to the sanitary administration of the district if the meetings of the Sanitary Authority were held at stated and more frequent intervals, and if the advice of the Medical Officers of Health could be regularly procured as to the action which the Authority propose to take in matters concerning health.

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