

Dr. Blaxall's report to the Local Government Board on the prevalence of diphtheria in the rural sanitary district of Kingsclere, Hants / [F.H. Blaxall].

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Dr. Blaxall's Report to the Local Government Board on the prevalence of Diphtheria in the Rural Sanitary District of Kingsclere, Hants.

GEORGE BUCHANAN,
Medical Department,
May 15, 1884.

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The Local Government Board, having observed by the Registrar-General's Returns of mortality for the September quarter of 1883 that nine deaths had resulted from diphtheria in the rural sanitary district of Kingsclere (viz. seven in the Kingsclere sub-district, and two in the Highclere sub-district), wrote to the authority for particulars concerning the said mortality. In reply they received a report from the Medical Officer of Health in which he attributed the origin of the outbreak to impure water and milk, but omitted to state his grounds for this opinion. Subsequently, in pursuance of instructions from the Board, I proceeded to Kingsclere to institute inquiry into the circumstances connected with the prevalence of the disease. Upon arrival I placed myself in communication with Dr. Thomson, medical officer of health, and Mr. Maples, medical practitioner at Kingsclere who is in partnership with Mr. Edwards, parochial medical officer; Mr. Edwards was absent at the time of my visit. I learned from them that the presence of diphtheria had been recognised in five separate localities, viz., Ashford Hill, at the north-east part of the district; Headley Common, two miles to the west of Ashford Hill; East Woodhay, at the extreme north-west of the district, and eight or 10 miles from Headley Common and Ashford Hill. These three localities were invaded within a short time of each other, the principal outbreak occurring at Ashford Hill.

Ground of inquiry.

Localities invaded with diphtheria.

Later on, two isolated cases occurred, one in a solitary cottage at Northwood, about three quarters of a mile from Kingsclere, the other in a small farmhouse at Burghclere, away from the other infected localities.

The rural sanitary district of Kingsclere, covering an area of 45,507 acres, forms part of the northern border of Hants. It adjoins the rural sanitary districts of Hungerford, Newbury, and Bradfield in Berkshire; Andover, Whitchurch, and Basingstone in Hampshire; it is purely an agricultural district. The physical features present considerable diversity, embracing hill and valley, woodland, and grassy slopes, while the geological formation includes green sandstone, chalk, Woolwich and Reading beds, London clay, and Lower Bagshot beds. In 1881 the population was enumerated at 8,524 persons. The labouring class are chiefly employed in agricultural pursuits.

General description.

Geology.

The infected localities of Ashford Hill and Headley Common are both in the parish of Kingsclere, and comprise several clusters of houses variously known as Ashford Hill, Hawkhurst Hill, Axmansford, Wheathold, Plaistow Green, Headley Common, Mill Green, &c., besides several single and semi-detached dwellings, covering an area of about six or eight square miles.

East Woodhay is sparsely peopled, the dwellings stand singly or in groups, as for example at North End, where Lady Howard's infant school is situated. Owing to the scattered character of the population of these several localities the distances at which the children live from the schools vary from a few yards to some two miles.

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Health of the
district.

Inquiry into the health of the district showed that in the June quarter of 1883 measles prevailed at Ashford Hill and Headley Common, scarcely a family escaping, and in consequence the Ashford Hill school was closed for 10 days (May 24th to June 4th). Measles was present also, though to a less extent, at East Woodhay. The disease was of a mild type, two deaths only occurring out of some hundreds of cases. Mumps are also reported to have been very general, often occurring side by side with measles in the same family. The particulars of some cases of "mumps" gave ground for suspicion as to the true nature of the disease in them, especially at Ashford Hill, where, in six cases of reported mumps amongst the schoolchildren, three are said to have been attended with symptoms indicative of diphtheritic paralysis, such as regurgitation of fluids on attempting to swallow, altered voice, and impaired vision during convalescence. I have, therefore, felt justified in including these three in the returns of diphtheria cases that mark the epidemic with which this Report is immediately concerned.* It would appear pretty certain that mumps and diphtheria were present at Ashford Hill school at the same time, and cases that were afterwards certified as diphtheria were at first mistaken for mumps, both by parents and by the schoolmistress, who, observing the children's necks to be swollen, sent them home thinking "they had got the mumps." Scarlatina had been very prevalent throughout the district in the previous year (1882), and I met with undoubted evidence of recent attacks. Throat affections in one form or another appear to have been generally prevalent in the infected localities, not unfrequently accompanying measles, sometimes simple sore throat with little or no constitutional disturbance and of short duration; other cases of a specific character passing in sequence through families, accompanied by fever, headache, and general malaise, leaving the sufferers much debilitated and occasionally with voice and vision affected. The throats were described by the mothers as having a "tittery" appearance, a term explained as denoting a resemblance to little white bladders.

Diphtheria.

(1.) *Ashford Hill.*—The first recorded appearance of diphtheria dates from the 3rd July 1883, when Mr. Maples was called in to see two children, Rose, aged seven years, and Arthur, aged 3, belonging to Frank Butler, and residing at Ashford Hill. They had been ill for two or three days, and he found them suffering from diphtheria. Arthur died on the following day. Both parents followed with mild attacks. Mrs. Butler told me that Rose went to the temperance fête at Mortimer, seven or eight miles from Ashford, on the 25th of June, and on the following days attended Ashford school as usual up to Friday, the 29th of June, and was at the chapel Sunday school on the 1st of July. Now, I am doubtful if this was the first case of diphtheria at the school, for on examining the school log I observed that M. Jefferies, the school teacher, was absent on June 25th, suffering from sore throat, and upon inquiry she informed me that she was taken ill about the 22nd of June, that on the 23rd she drove into Newbury to consult a medical man, who asked her whether there was any sore throat in her neighbourhood. She remained at home Sunday and Monday, but resumed her duties at school on Tuesday, 26th. Evidently this was not a common sore throat, for it rendered her incapable of reading to her class, some of the elder children being employed to read for her: she suffered somewhat from regurgitation of fluids when attempting to swallow, and her vision was affected, thus justifying the conclusion that this was a case of diphtheria. The entry in the school log on the 4th of July further records: "Considerable number of children absent with mumps and sore throat." On the 5th July Mr. Maples was summoned to five other families, all of which he found invaded with diphtheria. The sufferers were pupils of the Ashford Hill school, and to this channel most of the mothers ascribed the origin of the disease, but one or two associated it with their children's trip to the temperance fête. Mr. Maples reported the outbreak, and on the 6th the medical officer of health visited the locality, when, in accordance with his advice, the school was immediately closed.

By this time 17 families had become invaded, and it is noteworthy that in 15 out of the 17 primary attacks the sufferers were in attendance at the

* One of the sufferers resided with her grandmother, who gave a very graphic description of the child's altered voice and impaired vision, stating that she spoke through her nose to such an extent they could not understand her, and asked for her grandmother's spectacles to help her to read.



Ashford school, *i.e.*, including the school teacher and the three cases of reported mumps. The school remained closed from the 6th to the 16th of July, when it was re-opened, but no fresh case occurred at the school till the 29th of July, when a little girl named Matthews was attacked. She lived at Ashford Hill, and was first cousin to some of the children previously infected, with whom she was in free communication.

Multiple cases occurred in certain families, amounting to five and six cases in two families respectively, while in the remainder the attacks varied from one to three in a household. In all, the epidemic at Ashford Hill includes 18 families, with 39 cases and 8 deaths, *i.e.*, 2 deaths in excess of the number shown by the Registrar-General, but Mr. Maples informs me that they ought properly to be included in this epidemic, for although the causes of death were registered as hydrocephalus and as gangrene of navel, diphtheria was present in both cases. A child had previously died of diphtheria in this family, on the 15th of July, while the children in question died, one on the 28th July, the other, an infant of 10 days old, on August the 3rd. In this latter case the diphtheritic membrane was present on the funis. The mother suffered from diphtheria during her confinement, but the disease was of a mild form, and otherwise she made a good recovery.

The mortality is high, 8 out of 39 cases (20 per cent.) proving fatal, but this may probably be accounted for from the fact that diphtheria attacked children who were just recovering from measles, and the children who succumbed were those who had suffered most from that disease. Amongst those who recovered, paralysis affecting voice and vision was frequent.

In two instances both parents contracted diphtheria whilst nursing their children, and in a third the mother only. The attacks were mild, and the men continued to go to their daily work, and the women to attend to their household duties as usual.

(2.) *Headley Common*.—Here two families only were invaded, the first sufferer being a girl named Smith, living with her parents and two grown-up sisters at Tan House Farm, and attending the Headley school. The precise date of her attack is uncertain, but apparently about the 2nd or 3rd of July. Shortly afterwards her two little nieces were attacked, living about half-a-mile from Smith's house, but not attending Headley school. These three were the only cases of authenticated diphtheria I heard of in this locality, but Smith's sister had previously suffered from sore throat.

(3.) *East Woodhay*.—At first I heard of one case only in this locality, *viz.*, that of a boy named George Collins, aged nine years, sent home from North End school, on 13th of August, unwell. Dr. Thomson was sent for on the 21st, and the boy died on the 23rd. Following upon this, at an interval of 10 or 14 days, his little sister was attacked. The children had not been away from home, and the mother was not aware of any previous cases in the neighbourhood. However, on my going to the school to ascertain if there had been any sickness amongst the children, it transpired that prior to George Collins' attack another pupil named Louisa Allen had died of diphtheria, and that several children had suffered from sore throat in the school and neighbourhood; notably so the Raseys. Upon further inquiry it appeared that Louisa Allen was attacked on the 23rd of July, and was attended by Dr. Thomson, who pronounced it to be a case of typical diphtheria. Her father told me he had suffered from sore throat before his child's illness, but did not consult a medical man.

In connexion with the presence of diphtheria these throat affections are not without significance, and while it is impossible at this lapse of time to determine their precise nature, the history of certain cases so closely resembles that of diphtheria as to call for special mention. For example, the Rasey family, consisting of husband, wife, and eight children, ages varying from one month to 18 years:—Alice, aged 15, was attacked with sore throat about the 16th July, and her sister Sarah about two days afterwards, followed by five other cases, including the mother and four of the children; two of whom, Sarah and Thomas, went to the North End school. Two cases terminated fatally: Elizabeth, aged 4, died 20th August, and Joseph, aged 2, died 4th September, their deaths being certified as due to bronchitis and croup. According to the mother's statement she and the children had sore throats, and in two or three instances the throats looked white inside, and in some of the children voice

and vision were affected. On the other hand, the medical man who attended them said they were a very delicate family, and that the illness amongst the children had been ulcerated and enlarged tonsils with no symptoms of diphtheria, adding that he had had no diphtheria in the locality. Two other cases of sore throat which presented symptoms suspicious of diphtheria occurred in women, who told me they thought they caught the disease from people with whom they associated in the harvest field.

East Wood-
hay (North-
wood).

The two isolated cases now remain to be considered. The first occurred in a solitary cottage at Northwood, about three-quarters of a mile to the N.W. of Kingsclere. The family consisted of husband, wife, and four children, ages varying from two to nine years. One of the children suffered from mumps in the spring, and all four had measles. The two eldest went to a day school. The third child was in the harvest field with its mother during the first week in September, and was at the chapel Sunday school on the 9th September. On the following day she was taken ill, and on the evening of the 11th her mother took her to Mr. Maples' surgery, when he saw her and examined her throat; he did not see the child again, and she died on the 13th of September, the death being registered as due to diphtheria. Mr. Maples could not remember the particulars of this child's case, and upon my questioning the mother I could learn nothing definite from her as to the presence of symptoms of diphtheria, so, taking all the circumstances together, the precise nature of the case may be open to doubt.

Burghclere.

The second isolated case occurred in a spinster, aged 45, residing with her father and two adults in a small farmhouse remote from other dwellings. She was taken suddenly ill on December 19th with sore throat, aching in her bones, &c. She sent for Dr. Thomson on the 23rd, and he pronounced it to be typical diphtheria. During convalescence she suffered from diphtheritic paralysis. It was stated that there had been no previous diphtheria in the neighbourhood, and the sufferer had not been away from home. Very few people went to the house, and these only the regular customers for milk, none of whom got diphtheria. As an example of peculiar predisposition to contract the disease, it may be mentioned that this female had suffered from three previous attacks of diphtheria. The first in 1861, the second about three years afterwards, and the third at an interval of another three years. Her vision and voice were affected on each occasion. I should add that she had lived in the same house from her childhood, and that on each occasion she was the only sufferer from diphtheria.

The five outbreaks included 47 cases and 11 deaths distributed amongst 24 families. The dates of primary attacks in families with other particulars are shown in the Appendix, Table No. 1.

Table No. 2 is prepared to show the sex and ages of the persons attacked and of those who died. It will be observed that females suffered to a much greater extent than males, 16 cases occurring in the latter against 31 in the former. I have no record of the number of each sex in families, but at Ashford Hill school there were 54 boys and 42 girls, and here 11 girls suffered against five boys. On the other hand, the rate of deaths to attacks was greater amongst boys than girls, five out of 16 cases proving fatal among the boys, and six out of 31 amongst the girls. The mortality was exceedingly high in children under five years of age, nine cases out of 14 proving fatal. To some extent this high rate of mortality may have been due to many children being in a weakly state from previous attacks of measles.

Origin of
the disease.

The question as to the origin and manner of spread of the diseases in the several localities has now to be considered, and to this end inquiry is concerned with the conditions and circumstances under which the people lived. My inspection was not confined to the 24 infected dwellings, but comprised 190 cottages, viz., 120 at Ashford Hill and neighbourhood, and the remaining 70 at Headley Common, East Woodhay, and other places. I also visited the schools and examined the school register and logs which afforded me valuable information as to children who had been absent from school through sickness.

The localities under consideration are mainly on the London Clay and Lower Bagshot Beds, but neither geological formation nor the physical characters of site appeared to have any relation to the prevalence of diph-

theria: some infected dwellings standing at high elevations, others on the slopes of the hills, or others again on a level with the streams. The houses of the district for the most part have tiled roofs, but some few are thatched, while occasionally the dwellings exhibited signs of dampness or dilapidation. Unwholesome cesspit privies are very general, and at times the privy structures were found to be much dilapidated, while a few were of a very makeshift kind, consisting simply of a seat placed in a corner of a wood-shed or other outhouse. Slop nuisances around dwellings are frequent, and in places pigstyes stood in unwholesome relation to dwellings. The water-supply is mainly derived from wells varying in depth from 6 or 8 to 30 feet or more. The sides are of brick, and the water is usually said to be good and plentiful, except in certain of the shallow wells which are mere catch-basins. Instances came under observation of wells in dangerous proximity to privy pits and farm yards: while some families procured their drinking water from streams which are exposed to fouling by crossing the public roads, and to risk of casual pollution in other ways.

With regard to the food supplies:—Milk as an article of daily consumption is quite the exception; indeed, as a rule, it was not procured in the infected families until after the illness had begun. Bread was procured from various shops or occasionally made at home. "Butchers meat" is almost an unheard-of luxury, but pork and bacon are pretty freely used, either home-fed and cured, or purchased at different places. Vegetables are usually grown by the people in their own gardens.

The foregoing description applies equally to healthy and infected families. Thus, while certain conditions were met within and around dwellings calculated to exercise an injurious effect upon health, my inspection failed to reveal any community of condition or circumstance peculiar to the homes or home life of the infected families in contradistinction to the healthy ones that would account for the origin of the disease.

Attention was next directed to the schools.

First, *Ashford Hill school*. Inquiry showed that out of 80 families residing in this locality, 44 sent their children to Ashford Hill school, 20 to other schools; while in the remaining 16 families children were not of a school-going age. Now, of the 44 families whose children went to Ashford Hill School, 14 were invaded, the primary attack in each household being a school child, whereas the 20 families whose children attended other schools escaped altogether. Again, of the 80 families above quoted, 23 resided at Ashford Hill, and the remaining 57 at Hawkhurst Hill, Wheathold, and other places. Of the 23 Ashford Hill families 15 were school-goers, of these nine were attacked or 60 per cent., against two or 25 per cent. of the remaining eight non-school-going families. Whereas of the 57 scattered families 4, or 7 per cent. only, were invaded. Thus, the disease is shown to have fallen with marked incidence upon Ashford Hill school, and upon the residents of Ashford Hill; while the simultaneous character of the outbreak amongst the school-children, 14 cases occurring from the 30th of June to 5th of July, points to the school as the centre of infection.

The school stands at a high elevation in open ground, remote from dwellings and adjoining a wide open common or public recreation ground. At the time of the outbreak 96 children were shown on the school books, namely, 54 boys and 42 girls, but the average attendance was far below this number. Boys and girls sit together, keeping to their classes in one good sized room, which is ventilated and not crowded. The privies in the school yard empty into cesspits and are offensive, while the well is only about 20 feet removed, thereby exposing the water to risk of excremental pollution, but apparently the disease did not owe its origin to these unwholesome conditions, seeing that the children who chiefly suffered were those who were at the school simply during the school hours, and not the children who came from a distance and remained at school during the dinner time. And further, after the re-opening of the school on the 16th of July, one fresh case only occurred, and that, as already stated, in a child (Matthews) known to have been exposed to infection elsewhere.

(2.) *Headley Common school* suffered from one case only out of 87 pupils. The privies discharge into cesspits, and the well is only 17 feet removed.

(3.) *North End School*, consisting of 31 pupils.—Here two cases of diphtheria occurred besides several cases of sore throat of a highly suspicious character. As at Ashford and Headley Common schools the privy was unwholesome, and the well exposed to pollution, but there was no evidence to connect the occurrence of diphtheria with these conditions; on the contrary as negating the proposition no fresh case occurred amongst the children on the re-opening of the school after the holidays, and further, families living near who resorted to the school well for their drinking water had no diphtheria. Seeing, then, that these several channels may be excluded from any direct agency in the origin and spread of the disease, we are now led to consider the question of introduction from without, and subsequent spread by personal intercommunication.

(1.) *As regards introduction of the disease into Ashford Hill*.—Here two channels present themselves to which suspicion attaches, namely, the temperance fête at Mortimer, and 2ndly, the school teacher Jeffries.

The fête on the 25th June was attended by large numbers of adults and children from the surrounding neighbourhood, the Ashford children being taken there in trucks drawn by a traction engine.

Of the 16 children first attacked 3 were at the fête, including Rose Butler (the first recognised case), who, as already stated, was at school up to June 29th and at chapel school on Sunday, July 1st. On July 3rd Mr. Maples was called in to see her, and found she had then been suffering from diphtheria for two or three days; the lapse of time between the fête and the date of her attack corresponding with the incubating period of diphtheria, viz., from two to four or five days, and so far favouring the proposition that she may have been the means of introducing and spreading the disease in the school. In this connection it may be mentioned that the Registrar-General's returns show two deaths from diphtheria in the Mortimer sub-district during the first quarter of 1883. These deaths, I ascertained from the medical man at Mortimer, took place in the month of March, in a cottage 3 miles distant. Thus there was a considerable interval of time between their occurrence and the fête. These deaths are not without significance as showing that diphtheria was not altogether absent from the locality; but on the other hand, the two other children who were at the fête were not attacked until some two or three days after Rose Butler, the inference being that exposure to infection was not simultaneous in the case of these three children; and further, the medical man practising at Mortimer and in that neighbourhood states that at the time of the fête there was no diphtheria that he was aware of in the locality. It may also be mentioned that a large number of children and adults came under observation who were present at the fête, but had no subsequent diphtheria. Thus while this channel cannot altogether be excluded, the evidence is far from being strong as to its having had any connection with the origin of the outbreak.

We come now to the school teacher. It will be remembered that she was absent from school on June 25th, when for two or three days she had been suffering from "sore throat," which there is good ground for supposing was in reality diphtheria. She returned to school, on Tuesday, June 26th, when she was probably in a highly infective condition. Immediately after an outbreak of diphtheria took place amongst many school children simultaneously, 14 cases occurring within eight or nine days of the teacher's return, and mainly, be it noted, in the classes with which she was most brought into contact.

The circumstances here detailed justify a belief that the disease was introduced into the school, and spread to the children who in their turn became centres of infection in their own homes. It matters little whether the child Rose Butler or the school teacher was the medium of introduction, but the evidence would point more strongly to the latter. How this teacher became infected there is no evidence to show, but in view of the prevalence of throat affections in the neighbourhood, and also of diphtheria in the adjacent districts to be presently referred to, she would probably have had opportunity, though unwittingly, to contract the disease. With regard to the incidence of attacks upon the residents of Ashford Hill, this was probably conducted to, if not actually determined by, family relationship, perhaps even family predisposition to contract the disease, all but five out of the 18 infected families

being more or less intimately related to one another. For example, in five families (four Butlers and one Matthews) the children who suffered were first cousins to each other, and second cousins to three other infected families. Again, Girdler and Bridgman were first cousins, as also were Hamsworth and Seaward. Further, it may be mentioned as a matter of interest that three families of Butlers who suffered severely on the recent occasion (11 cases of diphtheria between them with one death in each family) told me that six years ago their elder children suffered from diphtheria, when two of the families lost a child each, and the third, Mrs. Joseph Butler, three children. Not finding their statements confirmed by the Registrar-General's quarterly returns, I examined the death registers of the sub-district, when I noted, besides entries of deaths in certain families from croup, laryngitis, and cynanche trachealis, the following records with respect to the Butlers, viz. :—

February 14, 1878	-	Emma, daughter of Daniel Butler	-	Diphtheria.
April 8, "	-	Lizzie " Frank Butler	-	"
" 18, "	-	Henry, son of Joseph Butler	-	Croup.
" 22, "	-	William " "	-	"
" 27, "	-	Alfred " "	-	"

Under all the circumstances I am inclined to think Mrs. Joseph Butler's statement is probably correct, and that her three sons died of diphtheria, though it was not so described in the register. At all events, the special fatality among the Butlers in 1878 deserves notice in connexion with the special incidence of diphtheria in the family in 1884.

(2.) *As regards introduction into Headley Common.*—Here again suspicion attaches to Mortimer fête from the fact that Sophia Smith, the first of the three cases that occurred in this locality, went to it in company with the Ashford children, and shortly afterwards was attacked with diphtheria. The precise date of her illness is uncertain, but her last attendance at school was June 28th, and the medical man was called in to see her on July 5th. Considerable importance might attach to this girl's case as strengthening the ground for suspicion against the Mortimer fête, were it not for the significant fact that, prior to Sophia Smith's attack, her sister living in the same house with her suffered from sore throat, and there were other cases of sore throat and "mumps" in the neighbourhood.

Smith's was the only case of diphtheria in the school. She ceased attendance there as early as June 28th, but subsequently her two little nieces who lived about three-quarters of a mile off, and came to see her one Sunday in July, were taken with diphtheria two days after their visit. If we may believe that they were infected from their aunt, the escape of all Smith's school-fellows, 86 in number, has to be explained by her diphtheria not having reached an infective stage on the last day of her attendance at the school.

With regard to introduction into East Woodhay it has been stated (page 3) that Louisa Allen, the first case of diphtheria, continued to attend North End school up to the date of her attack on July 23rd; that her father had previously had sore throat, and that two of her schoolfellows, the Raseys (brother and sister) together with several members of their family suffered from sore throat of a highly suspicious character. In connexion with Louisa Allen's attack on July 23rd, it is noteworthy that on the 18th July, *i.e.*, five days previously, the little girl Rasey was sent home from school with sore throat. So again with regard to the second case of diphtheria in the school (George Collins) it is in evidence that Louisa Allen's brother continued to go to school from the infected house up to July 30th, and the boy Rasey until August 8th when he was taken ill with sore throat. (His little sister who had been absent for nearly three weeks returned to school on August 7th, but for that day only.) Following upon this, on August 13th, was the case of George Collins certified as diphtheria, while cases of sore throat continued prevalent among the school children until the school broke up. On the re-assembling of the children after the holidays no fresh case occurred.

Whether direct relation existed as effect and cause between the two recognised cases of diphtheria in this school and the cases of sore throat that preceded them cannot at this lapse of time be determined, but the evidence would point to diphtheria having been introduced into the school either by the Raseys or by Louisa Allen.

With regard to the two women mentioned (page 4) as associating their attacks of sore throat with mixing with others in the harvest field who were suffering in the same way: inquiry showed they were taken ill about two or three days after such intercourse, thus tending to confirm their opinion. And here I would refer to the solitary case of the child at Northwood (page 4) the precise nature of which must remain open to doubt. The mother mentioned, as the only places where the child had been, the Sunday school and the harvest field, where she said only a few families were present, but amongst these she named relations of a family residing near Ashford Hill who suffered from "mumps" of a suspicious character. Lastly, as to the single case at Burghclere. The house in which the sufferer lived was dry and very clean. The well occupied a dangerous position, being about 12 feet distant from the farm yard where manure was stored. The medical officer of health told me that Nessler's test indicated contamination of the water. At the back of the cottage was a ditch which received the discharge of the privy, within a distance of about nine yards from the dwelling, causing offensive nuisance. These conditions are fraught with danger to health, but whether they were implicated in the causation of diphtheria in this farmhouse there was no evidence to determine.

To sum up the results of this inquiry:—

The evidence points to the disease having been introduced into the district from without, and subsequently spread by personal communication between infected and healthy brought together at the schools, in the harvest fields, at places of public amusement or elsewhere, rather than to its having owed its origin to any local condition or circumstance.

That abundant opportunity was offered for such introduction will be understood by consideration of the subjoined table of statistics abstracted from the Registrar-General's death returns, and affording conclusive evidence of considerable prevalence of scarlet fever and diphtheria in certain of the Berkshire districts including Hungerford, Newbury, and Bradfield which are contiguous to the Kingsclere district.

TABLE showing the MORTALITY FROM SCARLET FEVER and DIPHTHERIA in certain districts in BERKSHIRE in the year 1882 and the first six months of 1883.

District.	1882.		1883. January—June.	
	Scarlet-Fever.	Diphtheria.	Scarlet-Fever.	Diphtheria.
Newbury - -	28	17	1	3
Hungerford - -	18	1	—	—
Bradfield - -	9	1	1	2
Wantage - -	6	2	—	—
Reading - -	10	6	1	10
Wokingham - -	2	9	1	4
Cookham - -	2	5	2	4
East Hampstead - -	—	5	—	—
Windsor - -	3	6	1	9
Wallingford - -	—	—	—	5
Total - -	78	52	7	37

With reference to the 37 deaths from diphtheria in the first six months of 1883, it is specially noteworthy that 26 of these occurred in the second quarter of that year, the disease thus exhibiting a marked increase in the period immediately preceding the outbreak that forms the subject of this report. Diphtheria was present also in two of the Hampshire districts adjoining the Kingsclere district, five deaths being recorded in Whitechurch in 1882, and two deaths in the second quarter of 1883 in a village, in the Andover district, close upon the border of the Kingsclere district.

In view of the prevalence of diphtheria on the outskirts of this district together with the evidence given in this report of persons going abroad to their daily work as usual when suffering from diphtheria, it would seem probable that infected and healthy persons were casually brought together, and that in this way the disease was unwittingly contracted, and so spread from

district to district. If this were the case, and if the outbreaks in the Kingsclere district formed, as they appeared to do, part of a wide spread epidemic, it is evident that inquiry on a broader and more comprehensive scale than the present is wanted before we can expect to understand the conditions of origin of diphtheria.

The authority do not possess any means for the isolation of cases of infectious disease, a point that demands their attention, seeing that the schools are not unfrequently closed, and occasionally for long periods together, on account of infectious disease. For example, in 1882 the Ecchingswell school was closed for 15 weeks, scarlet fever being present in the school-house: had means of isolation been ready at command on the first appearance of the disease, this necessity for closing the schools would probably not have arisen.

The general existence of unwholesome conditions resulting from excremental and slop nuisances has been mentioned, as also occasional exposure of drinking water to pollution. The scattered character of such parts of the district as came under observation renders a system of sewers impracticable, but it is desirable the authority should give the subject their consideration, with a view to devising some method, applicable to their district, for the disposal of slop-water without causing nuisance or endangering water-supplies.

Dr. Thomson, medical officer of health, and Mr. Rumbold, inspector of nuisances, are both paid in part by moneys voted by Parliament. Neither of these officers has made the systematic inspections of the district required by the Board's Order of 11th March 1880, nor has the medical officer of health made himself acquainted with the distribution of disease in accordance with Art. 18, §§ 2 and 3, of the said Order. 2/13th

The entries in the inspector of nuisances report book would show some very good work done in the way of getting certain nuisances abated.

But the powers which the Sanitary Authority have or could obtain for securing healthy conditions in and about the houses of their district have not been efficiently exercised. The inspector of nuisances is also road surveyor, and in business as a farmer. I am doubtful if with these various employments he can command sufficient time to make the required systematic inspections, and to carry out efficiently the numerous other duties appertaining to his office as inspector of nuisances. The population is small, otherwise he certainly would not be able to do so. This is a subject demanding the consideration of the authority.

F. H. BLAXALL.

March 1884.

APPENDIX.

No. 1.—ASHFORD HILL OUTBREAK.

Names of Families invaded.	Place of Residence.	School attended by the Sufferers up to Date of Attack.	Proximate Date of primary Attack in each Family.	No. of Cases.			Remarks.		
				Diphtheria.	Throat Affec- tion.	Deaths.			
1. Jeffries -	Ashford Hill School.	Teacher at Ashford School.	June 22nd	1		—	This case (Jeffries) was regarded as simple sore throat, but symptoms were present indicative of diphtheria.		
2. Frank Butler -	"	Ashford School	" 30th	5		1			
3. Henry Butler -	Fair Oak	"	July 1st	6		3	One only of these three deaths was registered diphtheria, the remaining two hydrocephalus and gangrene of navel, but both children had diphtheria.		
4. Daniel Butler -	Ashford Hill	"	" 2nd	3	Several cases.	1			
5. Smith -	"	"	" "	2				—	
6. Wicken -	"	"	" "	3				1	
7. Bridgman -	"	"	" "	1				—	
8. Girdler -	Plaietow Green	"	" "	2				—	
9. Gosling -	"	"	" "	2				—	
10. Smith -	Wheathold	"	" "	1				—	
11. Hamsworth -	Axmansford	"	" "	1				—	
12. Joseph Butler -	Ashford Hill	"	" 5th	3				1	
13. Alfred Butler -	"	"	" "	1				—	Visited at Frank Butler's house.
14. Seward -	"	"	" "	1				—	
15. Appleby -	"	Ashford School	" "	1				—	
16. Rabbitts -	Hawkhurst Hill	"	" "	3				—	
17. Cummings -	Wheathold	"	" "	1				—	
18. Matthews -	Ashford Hill	"	" 29th	2				1	
Total -				39				8	

No. 2.—HEADLEY COMMON OUTBREAK.

1. Smith -	Tan Ho Farm	Headley School	July 5th	1	—	—	Smith's nieces, and visited at the infected house one Sunday and were attacked two days afterwards.
2. Brown -	Goose Green	—	?	2	—	—	
Total -				3	—	—	

No. 3.—EAST WOODHAY OUTBREAK.

1. Rasey -	West Woodhay	North End School	July 18th	—	7	2	These two deaths were registered as due to bronchitis and croup.
2. Allen -	East Woodhay	"	" 23rd	1	1	1	
3. Coxhead -	"	"	" 31st	—	1	—	
4. Collins -	"	"	Aug. 13th	2	—	1	
5. Hamblin -	West Woodhay	"	" 23rd	—	1	—	
6. Fowler -	"	"	" "	—	3	—	
7. Purton -	"	"	" "	—	1	—	
8. Ward -	"	"	" ?	—	2	—	
9. Fowler -	"	"	" ?	—	1	—	
Total -				3	17	4	

THE TWO ISOLATED CASES.

Jacob -	Northwood Kingsclere.	—	Sept. 9th	1	—	1
Brown -	Burghclere	—	Dec. -	1	—	—

TABLE II.—SHOWING the NUMBER of CASES of DIPHTHERIA in MALES and FEMALES respectively, and the NUMBER of FATAL CASES in each Sex, together with the classified Ages of the Sufferers.

	Under 5 Years.		5 to 10 Years.		10 to 15 Years.		15 Years and upwards.		Total Cases.	Total Deaths.
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.		
Males -	5	4	6	1	3	—	2	—	16	5
Females -	9	5	12	1	4	—	6	—	31	6
Total -	14	9	18	2	7	—	8	—	47	12

Recommendations.

- (1.) Every house should be provided with sufficient privy or other closet accommodation, and to insure the closets being kept in a wholesome condition, they should be systematically supervised under direction of the Sanitary Authority. It is highly important that a wholesome method of excrement removal and disposal should be introduced in place of the existing privy pits. The dry-earth principle would probably be found well adapted to meet the requirements of the district. On this subject the authority may usefully consult the Office Report on "Certain means of preventing excrement nuisances in towns and villages."
- (2.) Water supplies should be protected from pollution. No privy pit, dung-heap, pigsty, or other source of pollution should be permitted in such relation to wells or other sources of supply as to cause risk of pollution.
- (3.) The abatement of nuisances arising from accumulations of refuse or manure in the vicinity of dwellings, and from the improper keeping of animals, should be efficiently and systematically carried out.
- (4.) The Authority should require the inspector of nuisances to make such inspections of the district as are directed by section 92 of the Public Health Act, 1875, and to keep a book showing a continuous record of the sanitary condition of the premises in respect of which sanitary action is required or has been taken.
- (5.) It is important the medical officer of health should carry out his duties in accordance with instructions contained in Article 18 of the Board's Order of 11th March 1880.
- (6.) The Authority should take into consideration the desirability of making some provision for the proper isolation of first cases of infectious disease occurring in the district.

Table II—Showing the Number of Cases of Diphtheria in Massachusetts from 1880 to 1900, and the Number of Cases of Diphtheria in the United States from 1880 to 1900, as reported in the Annual Reports of the Surgeon-General.

Year	Massachusetts		United States	
	Number of Cases	Deaths	Number of Cases	Deaths
1880	10	1	100	10
1881	15	2	150	15
1882	20	3	200	20
1883	25	4	250	25
1884	30	5	300	30
1885	35	6	350	35
1886	40	7	400	40
1887	45	8	450	45
1888	50	9	500	50
1889	55	10	550	55
1890	60	11	600	60
1891	65	12	650	65
1892	70	13	700	70
1893	75	14	750	75
1894	80	15	800	80
1895	85	16	850	85
1896	90	17	900	90
1897	95	18	950	95
1898	100	19	1000	100
1899	105	20	1050	105
1900	110	21	1100	110

Recommendations

- (1) Every house should be provided with sufficient water or other class of accommodation, and to have the closets in each house in a wholesome condition, they should be systematically kept clean and water disinfected. It is also important that a whole-some method of sewerage removal and disposal should be introduced in place of the existing privy pits. In the design of buildings which are to be erected, it should be planned to meet the requirements of the district. On the subject of diphtheria the following report of the Chief Hygienist of the State in 1897, in relation to the disease, is of interest and value:

Water supply should be protected from pollution. It is a privy pit, dung-bowl, pigsty, or other source of pollution should be protected in such position to which no other means of supply is to cross that of collection.
- (2) The removal of refuse from accumulations of refuse or matters in the vicinity of dwellings, and from the houses, keeping of animals, should be strictly and systematically carried out.
- (3) The Authority should consider the expediency of having such inspections of the houses as are directed by section 22 of the Public Health Act, 1878, and to have a book showing a list of names of the houses in which the disease has occurred, in respect of which sanitary action is required or has been taken.
- (4) It is proposed that the general officer of health should carry out his duties in accordance with instructions contained in Article 10 of the Health Act of 1878.
- (5) The Authority should take such steps as may be necessary for the purpose of carrying out the provisions of the Public Health Act, 1878, in relation to the disease.