

Dr. Airy's report to the Local Government Board on an outbreak of diphtheria at Great Dunmow / [Hubert Airy].

Contributors

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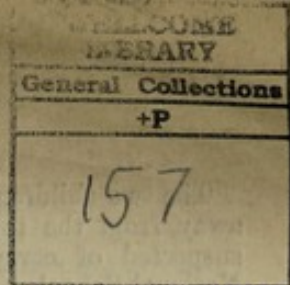
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Dr. Airy's Report to the Local Government Board on an Outbreak of Diphtheria at Great Dunmow.

GEORGE BUCHANAN,
Medical Department,
August 20, 1883.

In consequence of a public statement in the "Essex Herald" of May 7th, 1883, that diphtheria was alarmingly prevalent in Dunmow and the neighbourhood, supported by private representations as to the unsanitary state of the town, the Board, on May 14th, ordered the matter to be inquired into by one of their medical inspectors. I was instructed accordingly on May 15, and I visited Dunmow on May 18th and following days, and now beg to report the result of my inquiries.

Up to the time of my visit there had been, as far as was known, since the beginning of the year, about 36 cases of diphtheria in the Dunmow Rural Sanitary District, of which no fewer than 20 proved fatal, including three which were registered as "malignant sore throat." [Two additional cases have since arisen in a family already infected.] Twenty-three of the 36 cases had occurred in the parish of Great Dunmow (population 3,005); the remaining 13 in neighbouring parishes. Of these 13 outlying cases the greater number showed no connexion with those in Great Dunmow. One group in particular, in the parish of Hatfield Broad Oak, comprising six cases, five of them ending fatally, will claim special attention in this respect.

The first appearance of undoubted diphtheria in this outbreak took place at Great Dunmow in January of the present year. It had been noticed, however, for two or three months previously that some of the children were suffering with sore throats. In one of these children, who had been ill about Christmas, there was some appearance of loss of tissue from one tonsil, and there was a suspicion of nasal intonation in his voice, suggestive of the characteristic effects of an attack of diphtheria.

I was told by Mr. W. B. Clapham, who has long been in practice at Dunmow, that in the autumn he habitually meets with cases of sore throat characterised by diphtheritic patches. Fatal diphtheria, however, appears to have been very rare in the town, for the death register of the Dunmow sub-district, which includes the town, records only two deaths registered under that name in the last 10 years. The last was in 1878. Since that year there have been only five deaths registered from diphtheria in the Dunmow Union, all five being in the Stebbing sub-district, four in 1879 and one in the third quarter of 1882.

Appended to this report is a list of the families attacked by diphtheria in this epidemic. The family A., in which the disease was first clearly recognised, is that of a cooper working at a brewery in the town. The family were otherwise healthy and well off, and their dwelling generally wholesome and comfortable. In the back kitchen, under the sink, was a moveable bell-trap, and close to the back door was a defective drain-trap, whence a drain smell was occasionally perceived when the wind lay in a certain quarter. The drain ran for about 14 yards down the yard and joined a drain from neighbouring premises in a small brick catch-pit, which on examination at my visit was found fairly clean and free from smell. The further course of the drain ends in a filthy open sewer ditch which saps the back wall of an adjoining cottage, and, passing through gardens and meadows and under a public pathway, discharges into the River Chelmer. There is no reason, however, to think that the state of this drain or of the house-traps was exceptionally bad last January previous to the outbreak of diphtheria.

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The two children in this family (A.), who were first attacked, had not recently been away from the town, nor had the family been visited by any friend who might be suspected of carrying diphtheritic infection. They both attended the Dunmow National School, and it is just possible, though there is no evidence of it, that they may have caught their illness from some unnoticed previous case of sore throat at the school. The subsequent spread of the infection took place, in a large measure, among the scholars of the National School, and the attention of the Sanitary Authority was directed especially to the surroundings of this school in seeking for the origin of the outbreak. The school buildings stand on gravel on the upper side of one of the main streets, with plenty of open space about them. On the same side of the street, and opposite to the windows of the girls' and infants' schoolrooms, at a distance of 30 or 40 yards, is a large pond, about 100 yards long and 50 wide, with shallow water over a great depth of filthy mud, receiving some sewage at the upper end, and having an overflow under the roadway and under a brewery yard on the lower side of the road, into a ditch which joins the River Chelmer. This pond often stinks, especially in hot weather, and it was suggested that it might be the cause of the diphtheria, especially as some of the children who stayed at the school through the dinner hour were in the habit of sitting by the side of the pond. This, however, would not be the case in January, when the epidemic arose, nor was it among that class of children that the disease first appeared or chiefly spread. Still it may be noticed that the family (A.) first attacked resided not far from the pond in question.

The closets (plain siphon waterclosets) belonging to the National School are arranged in a row, three for each sex, at the back of the school buildings, from which they are separated by a narrow yard. In the middle closet on the boys' side there was on the day of my visit an unmistakable smell of sewer air, and on close examination it was found that the earthenware siphon was broken through about two inches below the level of the trap-roof, so that the water sank below that level, the trap was unsealed, and there was free way for the sewer air to escape. Assuming the sewer air to contain that which causes diphtheria, this would be sufficient to account for diphtheria attacking a child who had used that closet. The boy who was first attacked was questioned as to this point, but his recollection pointed to another closet of the three as having been more frequently used. Even so, assuming the sewer air to have been capable of causing diphtheria, I cannot doubt that there was enough of it mixed with the confined air in the yard and in the adjoining closets to infect a susceptible subject. This assumption seems to me to receive support from the habitual autumnal occurrence of diphtheritic sore throat in Dunmow. The drain from the school closets joins a public sewer in the street, which passes under the premises of a brewery already mentioned, receiving brewery refuse on its way, and afterwards, partly as an open ditch and partly in culvert, finds its way to the River Chelmer.

I was not able to learn how long the siphon trap had been in the defective state in which it was found at my visit. The fracture had every appearance of being an old one, but I did not hear that any one had noticed the peculiar odour of sewer air in that closet before.

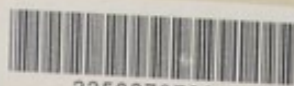
Spread of
diphtheria.

In the subsequent spread of the disease, out of ten families in Great Dunmow that were invaded by it, in eight the first person attacked was a child attending the National School; in one of the remaining two (G.) the first attacked was an adult, who almost certainly caught the infection by drinking from the same vessel with a fellow workman who had a sore throat after his children had diphtheria; in the other (R.) the child attended another school, the "British," on week days and the National School on Sundays. This case occurred nearly at the end of the outbreak.

With this last exception the "British" School was entirely free from infection.

The British School stands within a stone's throw of the National School, but it is further away from the filthy pond above mentioned, and stands on higher ground, and its drainage does not communicate with the sewer.

The National School had, in 1882, 352 names on the school register, and the average number in attendance was 194. The British School had 207 names on the register, and the average attendance was 140. Thus there was no such disparity in the number of scholars as would account for the disparity in the incidence of the infection. It seems clear at once that the spread of infection must have been due either to some local cause at the National School or to personal contagion among the scholars, or possibly to both causes combined. The National School has not been closed, because of the near approach of the annual examination.



Referring, again, to the list of cases appended to this Report, it is noteworthy that in seven of the ten invaded families in Great Dunmow the first person attacked was a boy attending the National School. One of them, however, was in the infants' class. In only two (H. and R.) the first attacked was a girl, and one of these two (H.) was a girl who was every day employed in sweeping the floors of the schoolrooms (the boys' room as well as the girls'), in which duty she would be liable to inhale some of the dust her sweeping would raise. This may justifiably be called an exception confirmatory of the rule which connects the spread of the infection with something appertaining to the boys' schoolroom. In the other case (R.) I did not find any such exceptional circumstances, but it was a case that occurred near the end of the outbreak when the possible sources of infection were numerous.

Again, out of the seven boys four were in the fourth class, one in the second, one in the first, and one in the infants' class. The fourth class is numerically the largest, with 35 boys, the third class has 23, the second class has 23, the first class has 24.

The boys' classes, 1 to 4, are arranged in that order, from east to west, in the boys' schoolroom. Class 4 is at the west end of the room, nearest to a large window which overlooks the back yard containing the boys' waterclosets. Probably but little importance is to be attached to this relation, for it can hardly be supposed that the air which entered by that window could be retained by the nearest group of children. It would circulate through the room in various currents and eddies, and probably, in the first instance, pass clear over the heads of those just under the window. None of the boys in the next class (3) were attacked.

I would rather attach importance to the fact that the boy in whom the disease first appeared on January 22 (in family A.) was a member of the fourth class, and regard it as most probable that the infection spread to other boys of the same class by personal communication. In this way probably the disease was caught by No. 4 (attacked February 4), and by Nos. 11 and 12 (attacked February 17 and 18), though here the clue is complicated by the fact that the mother of Nos. 11 and 12 had recently (February 3) helped at the house of B., laying out the dead body of No. 3. (No. 3 was in the second class, but may have been in contact with No. 1 out of school hours, or may have been poisoned by sewer air in the closets.)

The next case in class 4 was No. 31 (family P.), who was taken ill on April 27. Thus for more than two months that class was free from the infection. But in the meantime it had been smouldering on in the families C. and G., passing from one family to the other, probably in the act of drinking from the same mug, till it appeared (April 16) in the family K., in the person of a boy who was in the first class at the National School. Whether he had been in contact with a previous case or owed his infection to the closets is uncertain. The disease spread to three other children in this family. Possibly one or another of these gave it to a little boy in the infants' class (No. 27, family O.), who was taken ill on April 24. The infection rapidly spread to his brothers and sisters. The elder brother (No. 28) was in the fourth class, and was attacked on May 1; but four days earlier another boy in this class (No. 31, family P. above mentioned), who, it was afterwards remembered, had complained of a bad smell from the breath of No. 27, was taken ill. From him the disease spread to his two sisters (who attended a private school), and then to the father and trained nurse. The three children died. The father was removed to an infectious hospital at the union workhouse, where he was nursed by the mother and the trained nurse. The mother has since been attacked. This apparently ends the outbreak in Great Dunmow, which, I think, gives plain indication of having been caused by sewer air escaping in the boys' closets, and of having been spread chiefly by close personal contact, especially among scholars in class 4, and among children of the same family.

Besides the chain of infection in Great Dunmow there were, as has been mentioned above, cases in some of the neighbouring parishes. In Little Dunmow, to the east, the disease appeared early in February in a family (D.) residing about half a mile from B. and C. on the same road. There is a probability that there had been communication between the families B. and D., though the children of the latter went to another school.

About the same time, at Great Canfield, to the south-west of Dunmow, a boy (No. 10) was attacked with diphtheria and died on February 12. This case could not be shown to have any connexion with the outbreak in Dunmow.

Two deaths occurred (Nos. 16 and 38) on April 9 and May 12, both registered as diphtheria in Felstead parish, about four miles to the east of Dunmow, among children attending one of the Felstead and Rayne board schools. From what I could learn of the symptoms presented by these children, it seems by no means certain that their

Diphtheria
in parishes
around
Great Dun-
mow.

illness was true diphtheria. In the latter case the mother said her child had very little sore throat, but had a rash on the body, and was continually vomiting. There was scarlet fever about in the parish, and among the children attending another school under the same board, but nearer to the village of Rayne, two sudden deaths were ascribed to röteln.

Dr. Downes, Medical Officer of Health for the Chelmsford Rural District, informed me of some cases occurring at Good Easter, eight miles south of Dunmow, at the end of April and beginning of May, which appeared to partake of the characters of both scarlet fever and diphtheria. From the medical attendant, Mr. C. Hartley, of Dunmow, I learned that one of these cases was pronounced diphtheria. There was no history of communication with Dunmow.

Scarlet
fever and
diphtheria at
Taverner's
Green.

Lastly, we come to a curious group of cases, presenting a similar concurrence or confusion of scarlet fever and diphtheria, which occurred in the latter part of April at an isolated farmhouse, which has been turned into two labourers' dwellings, at Taverner's Green, in the parish of Hatfield Broad Oak, about six miles south-west of Dunmow. A large ditch full of stagnant filth from a farmyard lies near the house. Drinking water was obtained from a neighbouring pond. To one of these dwellings (L.), the eldest daughter, who had been in service at Beckenham, and had there caught scarlet fever, for which she was treated at the Islington Fever Hospital for seven weeks, came home convalescent on April 14. All care appears to have been taken to disinfect her clothes and person before sending her home. Eight days after her arrival at Taverner's Green one of her sisters, aged 14, was taken ill on April 22nd, and died on the 24th of "malignant sore throat," certified by the medical attendant, Mr. C. G. Firman, of Hatfield Broad Oak. Next day three more of the family, aged 12, 9, and 3 years, were seized with the same complaint. One died on the 25th and another on the 26th. The youngest lived a week longer, and appeared to be recovering, but relapsed and died on May 4. In this case in the relapse there was an appearance of petechial blotches on the skin. This death was certified from "diphtheria," and Mr. Firman considers that the earlier deaths also were from the same disease. A child (No. 26) in the adjoining dwelling, under the same roof, was taken ill with sore throat on April 24, and developed the rash of scarlet fever about the 30th, followed by desquamation on chest, legs, and arms. Four other children in the same family escaped. A woman (No. 30), residing a quarter of a mile away, who came to help in nursing the sick children and laying out the dead bodies, was attacked with diphtheria on April 29, and died, while sitting in her chair, on May 2.

On the one hand, it is difficult to disconnect this string of events from the recent arrival of the convalescent scarlatina patient from the Islington Hospital; and, on the other hand, one is tempted to ask whether the diphtheritic character which the infection exhibited could have been due to the simultaneous prevalence of true diphtheria at Dunmow. Dunmow lies to the north-east, and it is remembered by the parents of this family (L.) that the wind lay in that quarter at the time in question. The Greenwich meteorological records, published by the Registrar-General, show that at Greenwich the wind was N. and N.N.E. on the afternoon of April 20, and north-easterly through the next four days. We may ask—though we cannot answer the question—did the north-east wind on April 21 convey to Taverner's Green the infectious matter of diphtheria, and did that infectious matter reinforce and modify the character of the scarlatinal infection supposed to have been brought by the eldest daughter? Evidence is accumulating to show the frequent concurrence (perhaps affinity) of these two infections, as in recent reports of Dr. Parsons relating to their prevalence in the Sutton-in-Ashfield Urban Sanitary District.

Great Dun-
mow.
Sanitary
condition.
Sewerage.

The sanitary condition of Great Dunmow is far from satisfactory. Sewers have been laid at various times to drain different small sections of the town. They have a comparatively short course, and discharge at convenience into the nearest ditches, among the gardens and outlying cottages on the lower side of the main street. The ditches communicate with the River Chelmer, which is visibly polluted thereby. The sewers are not ventilated. Other parts of the town cannot be said to have any sewerage at all, each property being drained into the nearest ditch, causing offensive nuisances. One of these ditches discharges, by culvert, into the large pond near the National School. At Church End, an outlying suburb to the north, there is, close at the back of some cottages on the other side of the river, a very filthy and offensive sewer ditch, discharging directly into the river.

Water
supply.

Water for all purposes is obtained chiefly from wells of various depth, sunk in the bed of gravel on which the town stands. Where the situation is at a distance from privies, &c. the water is said to be of good quality; but many of the wells are evidently

in danger of pollution from soakage of filth through the porous soil. The family (A.) first affected with diphtheria were supplied with good water from an artesian well at the brewery where the father was employed. At Church End there is a spout of good water, which rises in the hill side above.

Many of the better houses have waterclosets, which in some cases are connected with the sewers, in others with cesspools on the premises. The cottages generally have common privies. The contents of the pits are removed from time to time for use on the gardens or are taken by farmers.

Excrement disposal.

At the time of my visit the Dunmow Rural Sanitary District was without a Medical Officer of Health, Mr. Baldwin (a local practitioner) having left, and a successor having not yet been appointed. The office was formerly very efficiently held by Dr. W. Armistead, of Cambridge, at a salary of 120*l.*, of which half was repaid by the Board. In 1881 the Sanitary Authority declined to re-appoint Dr. Armistead, and appointed Mr. F. M. Williams, assistant to Mr. Clapham, at a salary of 65*l.*, the Board allowing no repayment. Mr. Williams was succeeded in 1882 by Mr. T. A. Baldwin, also assistant to Mr. Clapham, at the same salary. In the present year the salary has been reduced to 50*l.*, and a proposal to appoint to the post one of the district medical officers, residing near the northern border of the district, is at present under consideration.

Administration.

The duties of Inspector of Nuisances are intelligently and efficiently performed by Mr. J. Hamilton, of Great Dunmow. His salary also has been reduced.

2nd July 1883.

HUBERT AIRY.

RECOMMENDATIONS.

1. The Sanitary Authority should take skilled engineering advice as to the best way of dealing with the sewage of the town, so as to abate the nuisances at present existing in connexion therewith.

2. The nuisance caused by the large pond near the National School should be abated.

APPENDIX.

LIST OF CASES OF DIPHTHERIA IN DUNMOW RURAL SANITARY DISTRICT.

Families attacked.	Cases.	Age.	Sex.	Residence.	School and Class.	Date of Attack.	Date of Death.	Remarks.
1883.								
A.	1	9	m.	Great Dunmow	N. 4	Jan. 22.	—	An infant in this family had a very slight attack.
	2	7	f.	Do.	N. 3	Later.	—	
B.	3	8	m.	Do.	N. 2	Jan. 29.	Feb. 3.	Lived next door to B. at Dunmow Ford.
	4	8	m.	Do.	N. 4	Feb. 4.	—	
C.	5	9	m.	Do.	—	Later.	—	Probably in personal communication with No. 3.
	6	5	m.	Do.	—	Later.	—	
D.	7	Adult	m.	Little Dunmow	L. D.	Feb. 6.	Feb. 9.	Other cases of sore throat in this family. Mother had helped at B. when No. 3 died.
	8	6	f.	Great Canfield	G. C.	Feb. 12.	—	
E.	9	6	m.	Great Canfield	G. C.	Feb. 17.	—	Worked with No. 7, and drank from same mug.
	10	6	m.	Great Dunmow	N. 4	Feb. 18.	Feb. 22.	
F.	11	9	m.	Do.	—	Mar. 29.	—	Swept floor at National School. Doubt as to nature of disease.
	12	7	m.	Do.	—	Mar. 29.	—	
G.	13	Adult	m.	Do.	—	Mar. 29.	Apr. 4.	Doubt as to nature of disease.
	14	3	f.	Do.	N. 1	Mar. 25.	Mar. 29.	
H.	15	13	f.	Felstead	F.	Apr. 2.	Apr. 9.	Removed to ward at workhouse.
	16	6	f.	Do.	N. 1	Apr. 16.	Apr. 23.	
I.	17	10	m.	Great Dunmow	N. 4	Apr. 19.	Apr. 30.	Elder sister came home from London convalescent from scarlet fever on April 14.
	18	7	m.	Do.	—	Apr. 27.	—	
K.	19	2½	m.	Do.	—	May 17.	—	Helped nurse L. family. Lived next door to L. developed scarlet fever rash and desquamation.
	20	6	f.	Do.	—	—	—	
L.	21	14	f.	Taverner's Green, Hatfield Broad Oak.	H.	Apr. 22.	Apr. 24.	Removed to ward at workhouse.
	22	12	f.	Do.	H.	Apr. 23.	Apr. 25.	
M.	23	9	m.	Do.	H.	Apr. 23.	Apr. 26.	Nursed P. At British School on week days and National School on Sundays. Doubt as to nature of disease.
	24	3	f.	Do.	—	Apr. 23.	May 2.	
N.	25	Adult	f.	Do.	—	Apr. 29.	—	Removed to ward at workhouse.
	26	12	f.	Do.	H.	Apr. 24.	—	
O.	27	6	m.	Great Dunmow	N. Inf.	Apr. 24.	Apr. 26.	Removed to ward at workhouse.
	28	9	m.	Do.	N. 4	May 1.	—	
P.	29	3	f.	Do.	—	May 5.	—	Nursed P. At British School on week days and National School on Sundays. Doubt as to nature of disease.
	30	1	m.	Do.	—	May 6.	May 10.	
	31	8	m.	Do.	N. 4	Apr. 27.	May 1.	Removed to ward at workhouse.
	32	13	f.	Do.	Private	May 1.	May 16.	
	33	11	f.	Do.	Private	May 12.	May 19.	Removed to ward at workhouse.
	34	Adult	m.	Do.	—	May 22.	—	
Q.	35	Do.	f.	Do.	—	—	—	Removed to ward at workhouse.
	36	Do.	f.	Do.	—	—	—	
R.	37	11	f.	Do.	B. and N.	Apr. 10.	—	Removed to ward at workhouse.
	38	6	m.	Felstead	F.	May 10.	May 12.	

