

Dr. F. St. George Mivart's report to the Local Government Board on the general sanitary circumstances and administration of Biggleswade rural district, and on the prevalence of diphtheria and enteric fever therein / [F. St. George Mivart].

Contributors

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Dr. F. St. George Mivart's Report to the Local Government Board on the General Sanitary Circumstances and Administration of the Biggleswade Rural District, and on the prevalence of Diphtheria and Enteric Fever therein.

RICHD. THORNE THORNE,
Medical Officer,
November 28th, 1899.

A succession of local complaints has lately drawn, in a special manner, the attention of the Board to the Biggleswade Rural District, in certain parts of which diphtheria has for some years past been from time to time unduly prevalent. During the first quarter of the present year the local Medical Officer of Health has had to furnish no less than three special reports upon outbreaks of illness in various parts of his district, viz., upon diphtheria at Sandy, upon the same disease at Langford, and upon enteric fever at Old Warden. In addition to the various reports thus furnished, the Bedfordshire County Council, in consequence of representations made to them by certain residents of the village of Sandy, instructed their own Medical Officer of Health to prepare for them a further report on the outbreak of diphtheria in that locality. As a result of the state of things thus, and in other ways, brought to light, the Board instructed me to enquire into the general sanitary circumstances and administration of the whole of the Biggleswade Rural District. I accordingly visited the District at the close of the month of May and on many subsequent occasions.

The Biggleswade Rural District occupies the extreme south-east of the County of Bedfordshire. Until 1892 the town of Biggleswade—since then included in a separate urban district—formed part of the rural district. The Biggleswade Urban and Rural Districts are coterminous in area with the Biggleswade Registration District and with the Biggleswade Union. For registration purposes the rural district is divided between the Registration Sub-Districts of Pottton and Biggleswade.

The area of the Rural District is 53,628 acres ; its population at the census of 1891 was 21,864 ; its rateable value is stated as £114,288.

It is bounded on the north-east and east by the Caxton and Royston Unions respectively ; on the south-east and south by the Hitchin Union ; on the south-west by the Ampthill Union ; on the west and north-west by the Bedford Union ; and on the north by the St. Neot's Union. In Table I, I have recorded the facts as to area, population, and rateable value of each of the parishes forming the district, and in the last column I have indicated the precise page of the report whereon each locality finds mention.

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TABLE I.

Contributory Place (Township or Parish).	Registration Sub-District.	Area (in Acres).	Rate- able Value.	Census, 1891.		Census, 1881.		Page of Report whereon the Parish finds mention.
				Popula- tion.	Inhab- ited Houses.	Popula- tion.	Inhab- ited Houses.	
Arlesey	Biggleswade ...	2,344	9,750	2,108	428	1,908	400	17
Astwick	"	665	697	54	13	49	12	19
Blunham	Potton	1,205	3,089	606	144	620	146	4
Campton	Biggleswade ...	969	1,435	448	108	555	126	18
Chicksands	"	1,439	1,418	64	9	43	7	19
Clifton	"	1,422	3,404	1,374	332	1,458	328	14
Cockayne Hatley	Potton	1,175	1,021	104	20	103	22	18
Dunton	"	2,650	2,057	434	99	477	106	15
Edworth	Biggleswade ...	1,122	896	100	18	112	21	19
Everton	Potton	1,361	2,298	219	52	216	50	16
Eyeworth	"	1,254	1,049	140	30	170	29	14
Henlow	Biggleswade ...	2,377	3,764	879	194	932	187	10
Langford	"	2,070	11,155	1,183	259	1,242	260	9
Meppershall	"	1,965	2,597	650	149	778	163	18
Moggerhanger	Potton	1,815	3,047	430	95	404	94	5
Northill	"	4,140	6,317	1,419	304	1,400	305	5
Potton	"	2,676	5,650	1,907	409	2,006	410	15
Sandy	"	4,276	20,536	2,755	638	2,674	598	10
Shefford	Biggleswade ...	144	2,077	990	212	1,070	216	13
Shefford Hardwick	"	360	387	65	17	53	14	19
Southill	"	5,734	5,979	1,143	266	1,227	274	7
Stondon Upper	"	428	445	47	13	72	15	19
Stotfold	"	2,398	8,978	*3,004	394	2,892	396	19
Sutton	Potton	2,234	2,261	283	60	295	66	19
Tempsford	"	2,341	9,033	492	119	535	120	4
Warden	Biggleswade ...	3,364	3,410	440	103	498	111	8
Wrestlingworth	Potton	1,700	1,538	533	138	642	143	14

* Including 1,147 in the Asylum.

The district is in the main exceedingly flat, the only hilly ground being on the East and West. Through the centre of the district flows the river Ivel, in a direction roughly parallel to the main line of the Great Northern Railway. Into that stream pass various small water-courses, and it is thus the recipient of the drainage of the district. For short distances, at the north and south-east of the district respectively, the rivers Ouse and Rhee form its boundaries.

The geological formation is extremely varied. The southern portion of the district rests upon Chalk, the greater part of Arlesey being upon a stretch of Chalk overlain in places by river Gravels and Boulder Clay. Further Northward the Gault comes to the surface, though in parts much overlain by river Gravels and Boulder Clay. Further North the Greensand is met with, overlain by river Gravel and Boulder Clay, save a small patch East of Biggleswade where the Greensand comes to the surface. West of Biggleswade the Oxford Clay is encountered overlain by river Gravels and in places by deposits of Brick Earth. North of Biggleswade the Lower Greensand is at the surface, but beyond Sandy the Oxford Clay outcrops, overlain in places by Boulder Clay.

The main industry of the district is Market Gardening. The cultivation of vegetables for various markets is carried on very extensively, and entire families are engaged in field labour, the amount of wages earned in the aggregate being often considerable. As many as 150-200 women may at times be seen engaged in weeding onions which are grown in great quantities and supplied, under contract, to pickle manufacturers. The great centres of this industry



are Sandy and Biggleswade. Of late a new industry has sprung up at Arlesey adjacent to the Three Counties Railway Station, in the shape of Portland Cement and Lime Works, which are now becoming very extensive. Brick and Tile making is also carried on here.

GENERAL SANITARY CIRCUMSTANCES OF THE DISTRICT AS A WHOLE.

Dwelling accommodation.—Very few instances of crowding of dwellings upon area were met with, but in certain small villages were found dwellings grouped closely together with very little curtilage. The prevalent style of cottage building is poor—the construction known as “Stud and Mud” being largely resorted to. In some cases this kind of building has been “faced” with brickwork, half a brick in thickness. In certain places houses were seen which appeared unfit for occupation by reason of general dilapidation, dampness, defective ventilation, absence of proper water supply, want of suitable means of excrement disposal, or several of these defects combined. The general absence of paving around dwellings was conspicuous.

Water Supply.—Speaking generally the water supply must be said to be of a very unsatisfactory kind. In every part of the district the inhabitants are dependent upon wells—which are either fitted with bucket and chain or with a pump. Some wells indeed are so shallow that water may be taken from them by “dipping” with a pole and pail. In almost every instance the wells were found to be dry stoned, and being sunk in garden ground or in ill-kept curtilages, often indeed in the vicinity of piggeries, chicken runs, foldyards, and the like, the contamination of the contained water by the direct passage of filth or by the soakage of foul liquid from the superficial layers of the soil may be looked upon, in the majority of cases, as in the highest degree probable.

Sewerage and Drainage.—With the exception of the little town of Potton no centre of population in the district has any clearly defined system of sewerage—although here and there lengths of glazed and socketted pipes may have been laid down. For the most part the road drains have been made use of to convey the slop liquids and, now and again, sewage from water closets, which latter have increased in number of late years. These matters are, generally speaking, discharged into ditches which communicate with some larger water-course. In certain villages some specially offensive ditches receiving foul smelling liquids have been culverted, but the nuisance still persists. It must be admitted that the flatness of the country often presents great difficulty in the laying of sewers, the need of which in certain localities has become urgent.

Excrement and refuse disposal.—Save in the large houses where water closets are found, the usual method of excrement disposal is by means of cesspit privies, the contents of which are at irregular intervals removed and applied to agricultural or garden land. The disposal of house refuse is even less satisfactory. The total provision of ashpits in the district is small, while very few are provided with covers. An ordinary method of bestowal of refuse is in a “soak hole” in garden ground or curtilage, often close to the door of the dwelling. Into this soak hole slops are likewise frequently cast, with the result that masses of fermenting and offensive matter were frequently met with, and in some localities inhabited by the poorest class the ground in the vicinity of these “soak holes” was obviously saturated with foul liquid, forming small quagmires.

In only one locality, viz., Sandy, have the Rural District Council undertaken public scavenging. This system, however, was only put in force during the course of my inspection.

In one place, viz., Arlesey, the Rural District Council have adopted a system of cesspool emptying by means of hand pumps and iron tank carts.

Slaughter-Houses.—The Rural District Council have byelaws for the regulation of slaughter-houses. Such slaughter-houses as I visited were, generally

speaking, not well kept; some of them, moreover, as regards proximity to dwellings, were badly situated, and in some cases the drainage arrangements were defective and occasioned nuisance.

Dairies, Cowsheds, and Milkshops.—The cowsheds and dairies visited by me were, with two or three exceptions, found to be not cleanly kept; in several instances lighting and ventilation were found defective and water supplies were generally of a suspicious character. In some instances milk was found stored in basement premises.

I heard of no *common lodging houses* in the district.

DETAILED RESULTS OF INSPECTION OF VARIOUS CONTRIBUTORY PLACES.

Tempsford (area, 2,341 acres; population, 492).—This is a rural parish containing only one centre of population, viz., the straggling village of Tempsford lying along the road, skirting two sides of the demesne of Tempsford Hall. The north and south ends of the village are detached one from another—the latter being known as “Church End.” The village consists mostly of cottage dwellings. A large number of them are built of wattle laid over wood, a method of building locally known as Stud and Mud, and many have roofs of thatch. They seem cleanly and tidily kept, and garden space is for the most part sufficient. There is no public water supply. The private wells, two or three of which are said to yield a short supply in dry summers, are shallow and generally dry steined, the steining being not unfrequently defective. They are generally of the “dip” kind; others are fitted with windlass and chain. The edges of most of the wells were found to be flush with the surface of the ground, a wooden collar being generally furnished, to which a more or less ill-fitting or broken cover is fixed. The situations of many of the wells are of a very doubtful character. I found one placed in the centre of an extensive chicken run, while another was reported to be contaminated from a similar source. Another placed in a kitchen garden was obviously contaminated from the surrounding ground surface.

There is no system of sewerage—but in a few cases, here and there, especially at Church End, slop drains are provided, such drains communicating with surface water-drains discharging into ditches or into “dumb wells.” Where no slop drains exist, the refuse liquids are thrown upon garden ground or upon rubbish heaps. Excrement disposal is usually by means of cesspits which are emptied occasionally upon garden ground; in a few cases privy pails are provided.

Blunham (area, 1,205 acres; population, 606). The village of Blunham is the only centre of population in the parish of the same name. The greater part of the village stands upon a belt of river gravel, overlying and adjoining Oxford Clay. The village contains some recently built red-brick cottages and other dwellings of a more or less substantial character. But it also contains other small dwellings of a less satisfactory kind. Some of them are built of wattle or cement over wood or rough brickwork, and are huddled together, in certain instances without any garden space, and with insufficient curtilage; the thatch roofs are defective, the ventilation insufficient, while the absence of damp courses, and paving adjacent, renders them damp. In some cases no slop drains were to be found; tenants throw refuse liquids upon the ground near the houses or upon rubbish heaps and holes. In a small yard serving as open space or curtilage for several dwellings, was found a shed in which was a privy, in a foul condition, and beside it was an open pit in which was lying a mass of offensive matter, including, as I was informed, the cleanings of pigs' entrails. This spot is close to a shallow dry steined pump well, from which the inhabitants of these houses obtain a supply of drinking water, which is admittedly “not very first-rate at times,” and which is also said to be deficient in quantity in dry weather. There is no public water supply whatever in Blunham.

I inspected a number of private wells, and found them in all cases to be shallow and dry steined. In some cases, percolation through the sides seemed to be going on actively. Though I was unable to obtain the exact details, there appears to be some sort of primitive sewerage. I found that all the slop liquids of the south and south-west portion of the village find their way by means of pipes (presumably for the most part, field pipes laid end to end), to a large brick catch pit, measuring about 9' x 4', sunk in a strip of road-side grassplot near the schools. This pit is closed by means of a loosely fitting wooden cover, and was seen to contain a mass of semi-solid filth. The over-flow from this pit passes through earthenware pipes into a ditch, running for a distance of upwards of 200 yards beside the road in the northern part of the village, where it reaches a pond. The ditch was nearly full of filthy liquid, apparently stagnant, and the pond also was in a foul condition. This ditch is occasionally cleaned out by the agency of the Rural District Council, but, I am informed that when this cleaning is performed, the filth taken out is merely deposited along the sides of the ditch. Strong representations were made to me of the nuisance caused by this ditch, and of the stench given off by it at times.

Privies in Blunham appear to be generally of the cesspit kind; the contents of them are from time to time applied to agricultural land. But from what I saw, I derived an impression that many of the privies are rarely attended to, and that refuse liquids soak away to pollute the surrounding porous soil. Proper means of refuse disposal are generally wanting.

Moggerhanger (area, 1,815 ; population, 430).—This rural parish contains two centres of population, viz., the little village of Moggerhanger and the tiny hamlet of Chalton, which are situated close together, about $1\frac{1}{2}$ miles from Blunham Station. The locality was visited in January, 1897, by Dr. Buchanan, in consequence of the occurrence of 48 cases of enteric fever in this parish between February and September, 1896. He thus reports upon the wells of Moggerhanger, which he states amount to about a dozen, and to be of old construction :—"They are dry-steined; and their steining consists of brickwork which is frequently faulty. Water is drawn from them usually by bucket and windlass, sometimes by a pump. Some are 20 ft. or more in depth; others are about 15 ft. These wells are fed by surface water, which percolates to them through the layers of glacial drift which overlie the Oxford clay. They have apparently been given their depth partly with the object of traversing the whole thickness of these superficial layers, and so obtaining the greatest amount of water that the drift will yield; partly also they have been sunk more deeply than is common in the case of wells fed merely with surface water in order to allow for storage in periods of drought. . . . Some houses in Chalton obtain water from one or two wells which in depth and construction correspond with those of Moggerhanger, and thus obtain water from a pond beside the road from Blunham to Moggerhanger." Dr. Buchanan's report further gives the results of certain analyses of these waters, which show them to be contaminated. In so far as I was able to ascertain, the water supply of the villages of Chalton and Moggerhanger is in the same condition as it was when these places were visited by Dr. Buchanan, save that in certain instances the number of factors of contamination have been reduced, inasmuch as certain cesspits have been abolished, and privy pails have been substituted. But in many cases the cesspit privies are apparently used under the same conditions as formerly, and the contents of the privy pails appear to be deposited in the vicinity of the shallow wells whose steining "consists of brickwork which is frequently faulty."

I saw very little provision for the reception of house refuse, which is still thrown upon the surface or into holes in the ground. Such ash-pits as I saw were for the most part uncovered.

Northill (area, 4,140 acres ; population, 1,419).—This is a rather extensive parish, and contains, in addition to the village of Northill, the hamlets of Ickwell Green, Hatch, and Upper and Lower Caldecote.

Northill: The soil is Oxford clay. The village is small. Some of the houses are fairly substantial and have sufficient garden space. But in one portion of the village they are packed together much more closely than is generally found to be the case in rural villages; only narrow alleys separate the rows of houses, which themselves are inadequately ventilated, having in some cases only a small back window. The walls are occasionally of wattle, and some appeared to be damp. The almost entire absence of any paving around dwellings tends greatly to increase this dampness. There appear to be three public pump wells, but as to the depth of these I could get no certain information. It was stated that one of them was 60 ft. deep, and that they are all three dry-steined. The water from one of these wells is said occasionally to smell unpleasantly in summer, and it appears to be considered generally unwholesome. The locality of another public well appeared unsatisfactory, owing to its proximity to a foul pond and a farmyard. Save for these three sources, water is obtained from private wells, or from wells that may be termed semi-public, inasmuch as the inhabitants of groups of cottages make use of wells which are so placed as to be accessible to all. With few exceptions these private wells are placed in situations that favour their contamination by soakage into them of foul matter from the surface. I was unable to ascertain the exact depth of the well at Northill National Schools, where at the time of my visit 133 children were on the books. It is said to be dry-steined and it is not more than 60 ft. from the cemetery, the land sloping to the well. The slop drains of these schools, which pass close to the well, have just been re-laid. From certain pieces of broken pipe seen lying about, and from information given me, I believe that these drains consist of common field pipes laid end to end. It appears that there is some sewerage of a primitive kind in the village, but I could get no exact information about it, nor did I succeed in ascertaining the nature of the pipes or the manner in which they were laid. There are, it is said, two outfalls, the northern being into a ditch or watercourse, and the southern into a small brook which ultimately reaches the river Ivel. The southern outfall did not appear to be discharging very foul matter, though I was assured that at times nuisance was caused by it. Great complaints were made to me of stench arising here and there in the village from slop drains. Excrement disposal is either by means of privy pails, or, much more generally, by cesspits, the contents of which are applied to land. Refuse disposal is unsatisfactory. Such ash-pits as exist are without covers, and they not unfrequently adjoin or are placed against the walls of dwellings. In one such instance I found the ash-pit filled to overflowing with foul-smelling refuse. In the house against which it abutted five cases of diphtheria had been notified on the day previous to my visit. In many instances refuse along with slop water is thrown into holes in the ground.

Ickwell Green.—This picturesque hamlet consists of cottages built of brick and wattle, or of wood. They are placed around the village green, and adjoin the park of "Ickwell Bury." The western portion of the hamlet seems to rest upon the Oxford clay, while the eastern portion stands upon a deposit of brick earth. As regards water supply, I was informed that, in the aggregate, the quantity is perhaps sufficient, but the quality is curiously unequal. Within a few yards of one another wells yield water said in some cases to be good, and in others to be very bad. The inhabitants informed me that they "borrowed water from one another," and that thus they "contrived to make shift," but some persons undoubtedly suffer hardship in dry weather. Most of the wells are of the "dip" kind, shallow and dry-steined, the steining being generally defective. There is no sewerage of any kind. Excrement disposal is generally by means of pit privies, some of which are placed in undesirable situations, and were now and again seen to be over full. The nearly stagnant brook bounding the west side of the green is a source of nuisance, owing to the passage into it of slop water from houses on that side of the green.

Upper Caldecote.—This is a considerable hamlet, consisting of dwellings of a more urban and, in some cases, apparently more substantial character than Ickwell Green. At the school house, where at the time of my visit 128 children were on the books, the well, from which water is obtained when required for the

children, is not more than 40 ft. from the burial ground. Drinking water is obtained from private wells. In some cases tenants were doubtful as to the quality of the water, and in others (as at Harvey's Trust Cottages) I was assured that it was good. A group of 16 houses were found to be supplied with water from a dry-bricked dip-well, 12 ft. deep, the water in which appeared thick. The garden space for these houses is small and common to all. The slop drains pass to an adjacent ditch. There is no paving around these houses.

At Caldecote Green 21 houses depend, it was stated, for their supply of drinking water upon one pump-well in a back yard. Hereabouts was a ditch receiving slop drainage. The occasional cleansing of this ditch is said to be carried out by the agency of the Rural District Council, the owner paying the cost.

Lower Caldecote (or Nether Caldecote).—A rather closely-built hamlet, standing in the midst of an expanse of market garden ground. The houses are of a squalid and dilapidated kind, and are unprovided with yard paving. There appear to be only about five shallow dip-wells, sunk in evidently foul ground, for the supply of the whole hamlet.

Hatch.—This little hamlet possesses no public water supply. Water is obtained from private wells of the usual defective character; moreover, the quantity is insufficient, and at certain outlying cottages, the tenants informed me that there was no supply at all. Privy pits were found generally over full and defective. Beside the road there is a water course (dry at the time of my visit), which was formerly cleaned out annually by the agency of the District Council, and will, in future, be attended to by the County Council's workmen.

At Thorncliffe Green, a little distance only from Hatch, is a collection of some 13 houses. On the Green is a pump well, which is resorted to by cottagers from a considerable distance. The edge of the well is flush with the ground, and is loosely covered with boards. The water is only about 3 ft. 6 ins. from the surface.

Southill (area, 5,734 acres; population, 1,143).—This is the most extensive parish in the whole of the Rural District. It contains the village of Southill, and the hamlets of Broom and Stanford. The straggling village of Southill contains cottage dwellings of a substantial character grouped along the high road, in the immediate vicinity of Southill Park. There seems to be some doubt as to the geological formation underlying the village, but Mr. Hawkins, of the Geological Survey, believes it to be brick earth. At the time of my visit there was some slight prevalence of diphtheria, which had evidently been propagated by personal contact. The sanitary circumstances of the village of Southill appear for the most part to be of a satisfactory kind. Many of its dwellings are of modern construction, most of them bearing upon their fronts the date of their erection, and the garden ground provided is generally sufficient. But some of the wells are not of a desirable kind, and in two cases the water yielded was admittedly considered unwholesome. Many of the wells are of the "dip" kind. In an outlying locality some nuisance seems to be caused by defective drainage leading to the discharge of filth over the surface of the ground into a pond beside the road.

The hamlet of Stanford is a straggling aggregation of cottages, for the most part of an extremely squalid character, placed in rows or in small irregular groups. The soil is said to be a bed of river gravel. Garden ground is scanty; in many instances it is absent. The houses are more or less dilapidated; indeed, in some cases they seemed unfit for habitation. Curtilages are narrow, for the most part unpaved, and ill-kept, and in many instances common to numerous families. Some of the houses appear damp, and in some cases smell unpleasantly. The water supply, which is entirely from private shallow dry stoned wells of the "dip" kind, is extremely unsatisfactory, as the wells are almost without exception sunk in such positions that the contained water can hardly fail to be contaminated by foul soakage or the direct passage

of filth from the surface. I may instance one group of about fifteen squalid cottages, all of which have to obtain drinking water from a shallow dry steined well, the edge of which is flush with the level of an ill-kept curtilage surrounded by dwellings, sheds, privies, etc. The well appeared to contain only about 1 ft. of water, and the steining of the sides was dilapidated; other wells are equally ill-situated. The cesspit privies are generally dilapidated, and in a filthy condition. Nuisance occurs from the keeping of animals in proximity to ill-ventilated dwellings.

Broom.—The village of Broom has been the subject of numerous complaints to the Local Government Board. On the 10th of April last Dr. Prior furnished to the Board, by their directions, a special report upon the sanitary condition of Broom, which stands upon an almost entirely level bed of river gravel. He drew attention, in particular, to an almost stagnant ditch, which is a source of considerable nuisance at times. This ditch receives the slop drainage of a good many houses, and at the time of my visit much nuisance was being caused by the accumulation of stagnant filth. This ditch is the subject of a dispute as to ownership, between the owner of Broom Hall and the Rural District Council. The village possesses no public water supply, nor was I able to hear of any system of sewerage. Many of the cottage dwellings are of an extremely unsatisfactory character; indeed, some of them appeared to be absolutely unfit for habitation owing to their dilapidated condition combined with want of ventilation, to their dampness, to their want of adequate water supply and means of excrement refuse disposal. Some of these cottages are built of wood, and are of a very slight construction, the wood, moreover, being rotten. The roofs are frequently defective. The narrow curtilages possess no paving. The private wells are very defective. In one case I found that 14 small and crowded cottages depended upon one dip well, the steining of which was much dilapidated. It was found to be $9\frac{1}{2}$ feet deep, and to contain only 18 inches of water. The water was turbid, and contained slugs and larvæ. The privies in connection with these cottages were inadequate in number and ill-kept. Ashpits were represented by holes in the ground, full of filth fermenting by reason of liquids cast upon it. The inhabitants of another group of three cottages obtain drinking water from a shallow well sunk at the edge of an extensive "pig run." Numerous other instances of ill-situated wells were found. Many cottagers complained of offensive emanations from the brook already mentioned, or from gullies apparently leading to it. On the other hand, the sanitary circumstances of a group of modern red brick cottages at the south-east extremity of the village appear good.

Warden (area, 3,364 acres; population, 440).—This parish is sparsely populated, the only centre of population being the picturesque village of Old Warden, which is much visited by tourists owing to the beauty of its situation, in a rather large and shallow valley bounded by extensive woods. The village belongs entirely to Major Shuttleworth, of Old Warden Park, who has evidently expended considerable sums in adding to the natural beauty of this property. The geological formation is the Lower Greensand.

From September, 1898, to February, 1899, fourteen cases of enteric fever occurred among inhabitants of this village.

The first appearance of the village is eminently attractive. The cottages seem neat and well kept; there is a considerable amount of garden ground surrounding them or adjacent to them, and the public pump wells, of which there are about four, appear to have been carefully attended to. A closer inspection, however, shows that certain sanitary defects have existed, and still exist in certain instances. The cottages are undoubtedly of a substantial kind, but there is an almost complete absence of yard paving. Owing to the highly porous soil there can be no doubt that moisture sinks very quickly into the ground, and must soon reach the foundations of the houses. Although the wells seem well cared for externally, the porous nature of the soil makes it advisable that great care should be taken in guarding against soakage into them of foul matters.

Nevertheless, in such private and public wells as I was able to inspect, I found that the brick lining was so loosely set that the percolation

of liquid from the surface could be thought of as probable, although no absolute evidence of it was obtained. Previously to my visit it would seem that considerable nuisance was caused by a foul and defective drain—apparently almost the only drain in the village; and offensive odours were stated to have arisen from a small pond which received the overflow of the closet drainage from a considerable household. A certain number of open privy middens also existed, and are said to have been very offensive. But, however these matters may have been, there can be no doubt that great improvements have been effected. Privy pails or boxes have replaced the middens and cesspits, though ashpits are still devoid of covers.

At the Warden Schools where, at the time of my visit, about 91 children were on the books, I found no supply of drinking water existed, although a rain water tank had been provided; and a pump, drawing from it, had been placed in the boys' cloak-room. The closets, which are behind the school-house, were dark and insufficiently ventilated.

Langford (area, 2,070 acres; population, 1,183).—The only centre of population in this parish is the village of Langford, which lies about two miles south of the town of Biggleswade, and extends for a considerable distance along the road to Hitchin, which here runs north and south parallel to the Great Northern Railway. The soil is a bed of River Gravel. The inhabitants of this village are almost exclusively agricultural labourers and the village is a very unattractive one. House property is, I am informed, generally in the hands of small owners, and is very often mortgaged. The houses are of a mean and squalid character, set for the most part in little rows, or sometimes in small irregular groups, with little or no garden ground, and with unpaved and ill-kept back yards which are used in common. The houses themselves are of poor construction, the walls, even where built of brick, being only about six inches in thickness. Frequently they are of a mixed construction, parts of them being apparently of brick, and parts of wattle or of rough cast; they are often in a dilapidated condition.

There is no public water supply in Langford. The private wells from which drinking water is obtained are generally shallow, often not exceeding 8 to 10 ft. in depth. All those seen are dry-steined, and their steining is frequently out of repair and dilapidated. Many of the so-called "wells" are unworthy of the name, and are little more than mere holes in the ground into which surface water percolates. I saw no wells in Langford which could be regarded as otherwise than contaminated, owing to their having been sunk in dirty back yards, the surface filth from which obtains entrance to them. Certain wells have been sunk within a few feet of chicken runs or pig-styes. In one case, at least, the well is actually by the side of an old dilapidated gully drain.

In addition to the so-called wells for the supply of drinking water there are also certain dipping places, whence water is obtained for household purposes only. Some of these dip basins seem to contain little more than liquid sewage. It was found that upwards of thirty families obtain their principal supply of drinking water from one pump well, an annual charge of 6d. being made by the tenant owner.

There is no system of sewerage in Langford. I was informed that all slop liquids are drained to a ditch running through the centre of the village; owing to the stench exhaled by it, the ditch has now to a large extent been covered in. The ditch discharges into the Ivel. A portion of the ditch was found to be in a very foul condition, and the stench from it was described as being "something awful" on calm evenings.

Privy accommodation in Langford is insufficient and of an unsatisfactory kind. Owing to the scarcity of garden ground the contents of privy pits are frequently deposited in dangerous proximity to drinking water supplies. Properly covered ashpits are very few. For the most part refuse is thrown on the surface, or into holes in the ground, in proximity to back doors; and upon these accumulations slop liquids are also cast. There is a

great deal of refuse lying about in the village, and filth nuisances of all kinds abound.

Owing to the recent prevalence of diphtheria, in which the school children were the principal sufferers, I deemed it advisable to carefully examine the school buildings. At the mixed schools, the cloakrooms seem fairly airy, though that of the girls has no cross ventilation. The classrooms are airy and clean, and were not crowded. The water-closets, which are of the long hopper type, are said to be hand flushed daily. They drain to a catchpit and cesspit, both of which are believed to be dry-steined, and which are at a distance of about 21 feet only from the shallow dry-steined pump well, from which water is obtained for the children, and which is at about the same distance from the churchyard. As during the summer of 1898 the supply of water entirely failed, this well had to be somewhat deepened in the autumn of the same year. At the infant schools there are closets fitted with a trough, and said to be flushed daily by a pump at one end; the contents are washed out to a cesspool.

Henlow (area, 2,377 acres; population, 879).—This is an agricultural parish, containing one village of the same name situated about half a mile from Arlesey Station, on the Great Northern Railway. It consists of one single street formed by the main road from Hitchin to Biggleswade. Some of the houses are poorly constructed, but on the whole they seem to be of a fairly substantial character. Henlow has only one public water supply, viz., a pump well placed on a piece of waste ground which borders the road towards the north end of the village. This water supply was paid for by public subscription on the occasion of the jubilee of Her Majesty the Queen. The well is about 25 to 30 feet deep, and is dry-steined. The water in it has not been analysed, but is considered good. With this exception, the supply of drinking water is from private wells, which in the northern part of the village are of an average depth of 25 to 30 feet, and in the southern part of a greater depth. There appears to be reason to suspect contamination of some of these wells by soakage from leaking slop drains. Others of them are exposed to risk of soakage from filth on the surface of the ground. There is no system of sewerage; but the road drains, of which no plan is extant, have been utilised for the disposal of slop drainage, and, it is believed, the sewage of at least one water-closet. These drains, believed to consist of field pipes, carry the sewage to a ditch known as the "Parish Brook," which discharges into the Ivel. Nuisance exists at times owing to the stagnation of sewage matter in this conduit, which is cleaned out twice a year by the agency of the Rural District Council.

"New Town" is a group of 21 houses, of a poor class, to the north of the main village. There is only one well for the supply of drinking water to these houses, and nuisances caused by the keeping of fowls and animals in or adjacent to the small and unpaved common back-yard required abatement.

Sandy (area, 4,276 acres; population, 2,755).—Although not the most extensive parish in the district, this is decidedly the most populous. It contains four centres of population, viz., the small town of Sandy, the closely adjoining village of Girtford, the hamlet of Beeston, and the group of cottages known as Seddington. All four lie to the extreme west of the parish, which hereabouts is flat and occasionally marshy, and through which flows the river Ivel to join the river Ouse near Tempsford. East of the railway sand hills rise rather abruptly. The land—geological formation for the most part Lower Green sand overlying Oxford clay—is almost entirely laid out in market gardens, which are very highly cultivated and remunerative, producing large crops, especially of onions, carrots, Brussels-sprouts, vegetable marrows, &c. The locality enjoys exceptional facilities for the transport of produce, as by means of the main line of the Great Northern Railway, which passes the town of Sandy, communication is obtained with London and with the North; while by means of the Bedford to Cambridge branch of the London and North Western Railway, which also passes the town, direct communication is obtained with the East and West of England. Probably in consequence of these advantages the town has of late considerably extended, and it would seem that Girtford will soon extend right on to Sandy.

In consequence of the market gardening thus very extensively carried on, there is a large traffic in manure, which is brought from London and neighbourhood by the Great Northern Railway to Sandy Station, whence it is distributed over a large portion of Biggleswade Rural District. At certain periods of the year this traffic assumes very large proportions, and several trains freighted entirely with this product may be seen waiting to be unloaded in the sidings. Although the manure thus brought appears to be mainly stable dung, much of it is very foul smelling. It is kept in large stacks in the various market gardens, ready to be spread, when required, on the land, and the smell from these stacks is occasionally almost overpowering to persons unaccustomed to it. The field workers, however, are quite unaffected by the odour, and frequently resort to the shelter of these stacks for their meals. It was found to be quite impossible to ascertain from what precise localities this manure is derived; it is sent down by a great number of different contractors for the dung from large London stables. The roads in the immediate vicinity of the railway station were seen to be in a very foul condition, being thickly strewn with manure dropped from the carts.

The town of Sandy consists largely of small houses and cottages, some of which are built of brick; others are of the combination known as "stud and mud," which in some cases seemed to have been faced with brick. Some of the dwellings, indeed, are of a miserable kind, and were apparently not originally intended for human habitation, the walls being of boards and the roofs of thatch, both alike much decayed. At Beeston especially, and in the outlying parts of Girtford and Sandy, cottages in an extreme stage of dilapidation were seen. In addition to these structural defects, houses are generally wanting in ventilation, owing to bedrooms being unprovided with fireplaces, or with any window or opening at the back. Of whatever material, walls appeared generally to be thin, and many complaints were made of coldness and dampness of interiors. Existing down-pipes are largely utilized to convey rain water to butts upon or tanks in the ground, a supply of soft water being valued. These ground tanks were frequently found to be offensive—in one instance, at least, seriously so—owing to leakage into them of matter from house drains. Houses are almost without exception arranged in little groups or rows, in such a manner that the small back yard is common to all the inhabitants of the group or row of dwellings, which are also approached by a common alley way or passage at the back. These back yards or curtilages are not only unpaved, but so rough and irregular of surface that collections of liquid are formed in wet weather. In most instances, beyond these curtilages are a row of buildings, locally known as "barns," used as wash-houses, wood-houses, and the like. Commonly, too, a privy is found in these barns. Beyond the barns is generally found the garden, where such exists, which is usually shared in unfenced strips by the tenants of the adjacent dwellings. Garden ground is generally scantily provided; often, indeed, there is next to none at all, and many complaints were made to me of the great difficulty of finding space whereon to dispose of the contents of privy pails or to bury house refuse. The above description may be taken to represent the back-yard and garden arrangements at Sandy; such differences as obtain in one and another part of the place usually depending upon the greater or less amount of space, or the degree of foulness resulting from the deposit of refuse.

There is no public water supply at Sandy. Drinking water is obtained from private wells, which are generally dry-steined, and of an average depth of 25 to 30 ft. I inspected a very large number of these, and found that owing to their construction, position, and surroundings, the water contained in them can hardly fail to be polluted. Indeed, speaking generally, it would appear doubtful if uniformly wholesome water can be found in any well at present existing in Sandy, Girtford, or Beeston. Suspicion of this sort is confirmed by the perusal of the results of analyses of seven samples of water taken from seven separate wells in various parts of these places. Not one of these analyses yielded favourable results, the description "a suspicious water" being the least unfavourable verdict given in respect of any of the samples examined. Indeed, it would be surprising were it otherwise, having regard to

the fact that these wells are sunk in highly porous soil, contaminated by the continual soakage into it of sewage matter of various kinds from privy pits and drains, and of filth from chicken runs, piggeries, ill-kept farmyards and the like. The objectionable practice, too, prevails of lowering into wells pails, the previous uses and contents of which are often suspicious.

There is no regular system of sewerage in Sandy or the other places in this parish. The road drains have been utilized as sewers; and these though they formerly received little but slops, or, at worst, fluid excreta, have since the introduction of water closets in Sandy, caused great nuisance by reason of the foul emanations given off from the road gulleys. Several formal complaints in this regard were made to me, and certain road gulleys immediately adjacent to the National Schools were strongly objected to. The road drains thus doing duty as sewers, consist in the majority of cases of rough earthenware pipes which leak freely at the joints. They run in various directions, owing to their having been laid piece-meal on different occasions. Some discharge into the River Ivel, others into ditches communicating directly or indirectly with that river; but nuisance of a serious kind is undoubtedly caused by them, and the pollution of the soil must be of an extensive character. In fact, having regard to this incessant contamination of the soil in the town, and of that outside the town by the continual introduction of manure, which is often dug into the ground in very great quantities, the water in the Lower Greensand hereabouts can hardly fail to be considerably polluted.

For the disposal of liquid filth and slops gulleys are commonly provided, these being generally situated in back yards, and often adjacent to back entrances. But I was assured that these slop drains are of but little service. They communicate in some instances with "dumb wells," which are generally so full that the drains are often blocked. The pouring of slops into them must, therefore, be done very slowly, and little by little. In the result the cottagers find it easier to throw slops on the ground at any convenient spot.

Water-closets, properly so-called, exist only in houses of the better class; in other cases the hand-flushed "long hopper" is the only type of water-closet met with. But much more common are pit-privies, or privies provided with pails. Both these two last named are not uncommonly placed in "barns." Several instances were met with of the deposit of privy filth and excreta upon house refuse, cast into open holes in the ground in the immediate vicinity of houses. At Girtford were seen privies foul and dark, provided with pails, which were freely overflowing upon the ground, and upon the back walls of the houses against which the privy structure had been placed.

For house refuse disposal there is little accommodation. Certain large bricked and cemented ashpits were met with, but they were unprovided with covers, and I found that cottagers generally decline to make use of them owing to the difficulty in getting them emptied. House refuse was in nearly every instance found deposited either upon the ground or in a hole therein, and owing to the subsequent throwing of liquid filth upon it, a very offensive condition is often produced.

For some little time past the Rural District Council have been maturing a scheme of public scavenging for Sandy and its neighbourhood. Having advertised for tenders, they have now entered into a contract for the removal and disposal not only of house refuse and the like, but also of the contents of privies, cesspits, and privy pails. For the purpose of the work the parish has been divided into two districts, called Nos. 1 and 2, and respectively on the west and east sides of the River Ivel. Each of these districts is to be perambulated by the contractor's cart accompanied by two workmen, on three days in each week, for the removal of house refuse. Privy filth is to be removed in the same systematic order, between the hours of 10 p.m. and 6 a.m. This scheme, as already stated, came into force during my inspection.

Such dairies as I inspected were not well kept, and the milk is sometimes stored in ill-ventilated underground premises, reached by a staircase descending from the interior of the dwelling-house.

Two slaughter-houses in central positions were visited, and found to be dirty and ill-kept. In both cases a quantity of foul bones and scraps were lying about, and in one case quantities of manure were being kept adjacent to the slaughter-house.

Having regard to the recent prevalence of diphtheria, the National Schools at Sandy were visited by me. From the master I learnt that the average attendance for the year has never exceeded the accommodation limit fixed by the Education Department, though the occasional attendance has at times considerably exceeded that limit. At the time of my visit 205 infants were in the infant department of the school, the accommodation being for 186; on the other hand, the attendances in the boys' and girls' departments respectively were below the accommodation limit. There is no lavatory in the boys' or the girls' schools, though the infants are provided with water and basins for ablution. The waste pipe from the basin leads to an adjacent "dumb well." The class rooms are airy and bright, but the division of the boys' and girls' class-rooms by curtains appears, in view of the prevalence of diphtheria, an undesirable arrangement. This system of curtains has, it was stated, existed for two years. The cloak-rooms were clean and well ventilated and free from unpleasant smell. There are three privies for boys and three for girls; the pits, which are built of brick not rendered interiorly in cement, are opened from the back, and are said to be emptied about once a month. The pits at the time of my visit were as clean as such pits can be. The privy pails provided in the infants department needed emptying. Complaints were made as to the school playground which is said to be liable to flooding, and in wet weather, owing to its low level, water collects here and there in pools. In the playground there is a gulley leading to one of the offensive street drains already referred to.

Owing to the presence of diphtheria among the children the schools had been closed from the 18th October to the 5th December, 1898, and again from the 18th January to the 20th February, 1899. During both these periods the schools were thoroughly cleansed, and during the latter, disinfection by means of sulphur fumigation was carried out.

I inquired as to the cleansing of school slates and was informed that in the infants' department sponges are provided, and that spitting upon or licking the slates is forbidden. I was further informed that in the case of children looking ill careful inquiry was always made, and children belonging to infected families were excluded from school. But there has been no attempt at school systematically to examine the children's throats.

Shefford (area, 144 acres; population, 990).—This is the smallest parish in the district, is almost entirely occupied by the little market town of Shefford lying in the valley of a feeder of the River Ivel, is situated near the south-western boundary of Biggleswade Rural District, and is about midway between Hitchin and Bedford. The geological formation is said to be gravel. The streets are wide and appear cleanly; they are swept and watered by the agency of the administrators of the "Feofees" endowment, who are also responsible for the lighting of the town by gas. There is, however, no public scavenging in the place. The houses seem generally fairly substantial. The only public water supply is afforded by three public pumps—viz., one in North Bridge Street, one in High Street, and one in New Street. I was unable to obtain definite information as to these sources of supply, but it was said that the well in North Bridge Street is dry stined, and that it had been recently cleaned out; the pump in New Street was stated to draw from a tank which is filled from a spring. Generally speaking, water is obtained from private wells, which are not numerous. Those examined were all dry stined, shallow, and by reason of their situation and surroundings—such as unpaved ground in the close vicinity of dwellings, the proximity of refuse heaps, and the like—exposed to contamination.

At the Shefford Board Schools the boys' and girls' departments are each provided with pumps drawing from separate wells. On the day of my visit the boys, I was informed, had complained of the water obtained from their pump as containing insects and such like. The well in question is situated

on a slope below the pit privies and urinals, and it appears possible that contamination may take place from the urinal drain which passes close by. On the girls' side the pump well is in the yard of the mistress's house, close beside the ashpit, which was seen to be full of refuse, and immediately adjoining the pit privy. As regards sewerage, there are various lengths of drain pipe of various kinds down the principal streets, and they all in one way or another discharge into a ditch beside the commencement of the Ivel Canal. This ditch passes ultimately, by means of a culvert, beneath the Ivel Canal, and after a circuitous course appears to discharge into this canal at a lower point near Clifton.

Clifton (area, 1,422 acres; population, 1,374).—An agricultural parish with an extensive village of the same name, on the road from Shefford to Baldock. The detached western portion of the village, extending nearly to Shefford, is known as Clifton Fields. The only public water supply is obtained from a pump-well close beside the road, near the centre of the village. This well is said to be 32 feet deep, and to be dry steined. The water is said to be good, but I heard of no analysis having been made. The pump and the covering structure are of an ornamental kind. With this exception, the village depends entirely upon private wells, which are insufficient in number. Speaking generally, water may be said to be very scarce in Clifton village in dry weather; in fact, it appeared to me that the inhabitants of the whole of the south and east of the village resort to one private pump well, the water of which is considered good. The owner permits all comers to obtain their supply upon his premises. A good many private wells were inspected and found to be shallow, dry steined, sunk in garden ground or curtilages, or to be imperfectly covered over. The water from many of these wells is not used for drinking, the tenants stating, in reply to questions, that it was considered to be unwholesome, and that it was only used for household purposes.

As regards sewerage, it was stated that 9" agricultural pipes have been laid through the village, partly in the site of a former open ditch, and that this sewer discharges into a ditch at some distance from the village. The liquids thus got rid of ultimately reach the Ivel, but it does not appear that there is any nuisance at the outfall. The sewer pipes are stated to be only clay jointed. There is no provision for flushing, but I was assured that this was efficiently done now and again by storm water.

Eyeworth (area, 1,254 acres; population, 140).—A small agricultural parish with a hamlet of the same name, standing upon rather high ground, near the border of Cambridgeshire.

The water supply is deficient. There is one public pump-well in a small enclosure beside the road. I was unable to obtain particulars as to the construction of the well save that it is said to be about 80 feet deep. To this well the inhabitants of cottages at a distance of nearly a quarter of a mile are compelled to resort. Five new houses of substantial construction, erected in the year 1898, are without any water supply at all other than that obtained from the above-mentioned well upwards of 200 yards distant. One private well seen was found to be shallow, dry steined, and its sides to be heavily moss grown. The water was said to be of doubtful quality, and the supply to fail altogether in summer; at such times those dependent upon it are compelled to resort to the public pump above referred to.

I could hear of no sewerage in the hamlet. Apparently in some instances road drains are utilized for the conveyance of slop liquids to ditches. In other and more frequent instances slops are thrown upon garden ground, of which there is but a moderate provision. In one locality I found night soil from a privy pit in an open hole close to a dwelling.

Wrestlingworth (area, 1,700; population, 533).—An agricultural parish with a straggling village lying, to a large extent, in a hollow. Through the centre of the village flows a wide and shallow brook, which is the recipient of most of the drainage of the place, including foul liquids, and even blood from

an ill-kept slaughterhouse close beside it. At the time of my visit this brook was in an extremely foul condition, and was being cleaned out by the agency of the Rural District Council.

At the northern extremity of the village is a considerable aggregation of cottages of a squalid character, some of them being among the worst seen in the whole district, and unfit for habitation. The only garden ground provided for many of them is a common strip in the front, sloping down to the side of the brook already referred to, and which hereabout was in a very foul condition, the stench from it being perceptible at a considerable distance. The ground contiguous to these dwellings is irregular, unpaved, and much refuse was seen lying about.

There is no public water supply in Wrestlingworth, and the supply drawn from private wells seems to be both scanty and precarious. Two large groups of cottages depend for their supply upon three shallow dry-steined wells provided with windlass and chain, by which the cottagers lower their own pails. The sides of all these wells were heavily moss grown, and they are sunk in such situations that the contained water can hardly fail to be contaminated. In one instance the well was found close to a hole in the ground which served as a midden.

At the Wrestlingworth schools it was stated that the water supply was drawn from a well behind the master's house, but that this well "runs dry in summer." At such times a well down in the village, at some distance away, is resorted to. Inasmuch as a large proportion of the smaller shallow wells are said to run dry in summer, it appears that, speaking generally, the whole village of Wrestlingworth depends upon three or four private wells, from which water is drawn by permission of the owners. I could hear of no sewerage other than occasional lengths of agricultural pipe leading to the foul ditch above mentioned. Complaints were made to me by some of the inhabitants as to the want of water, and the hardship caused by the absence of slop drainage and means of disposal of house refuse.

Dunton (area, 2,650 acres ; population, 434).—An agricultural parish with a small village of the same name, standing upon rising ground near the border of Hertfordshire.

The cottages generally are poor as to construction and repair, though they seem cleanly kept. Curtilages are unpaved, and frequently very uneven. Garden ground is, on the whole, fairly sufficient for the disposal of privy contents and house refuse. The village possesses one public pump drawing from a well sunk on the green, at the roadside, and apparently not more than 40 feet from the churchyard, which is at a higher level. I was informed that the well is dry steined, but I was unable to ascertain its depth. Such private wells as I saw in the village were shallow and dry steined. As a rule they are sunk in situations where soakage of foul moisture into them was probable ; and into several the direct passage of contaminating matter from the surface was likely by reason of the imperfectly adjusted covers fitted to them. In many of the wells slugs and snails were observed, in some instances in considerable number. At one spot a ditch was found in a foul condition owing to the discharge of slop drainage into it. I was unable to hear of any sewerage. Cesspit privies are in general use.

At the National School the only supply of drinking water for teacher and scholars is from a well situated apparently beneath the passage between the school building and the teacher's house. The water yielded by this well is said to smell disagreeably at times, and did so at the time of my visit. The boys' urinals are very close to the school, as also is the cesspit privy. I found house refuse deposited in an open hole in the ground close to the school building, outside the playground.

Potton (area, 2,676 acres ; population, 1,907).—An agricultural parish on the north-eastern boundary of the district, having a small market town of the same name. This place was visited by Dr. Parsons in November, 1882, in

respect of an outbreak of scarlet fever there. He thus describes the town:— "It stands in a dry and open situation on a plateau of the Lower Greensand. Besides the usual avocations of an agricultural place, the digging, washing, and sorting of coprolites furnish employment to many of the inhabitants. The town is somewhat compact in plan, the Market Square forming a centre from which streets radiate in different directions; but there is no noteworthy crowding together of houses on the ground. It has been well sewered in recent years by the Sanitary Authority; most of the privies have been converted into hopper closets, and drained into the sewers; the water supply is obtained from wells about 40 feet in depth, and is considered to be of good quality—so that altogether the sanitary condition of the town may be regarded as satisfactory." This description is, on the whole, applicable at the present time, though at the north-eastern extremity of the town I found certain cottages of very poor construction which have been permitted to get seriously out of repair. Certain curtilages were also seen to be unprovided with paving, and to be in a foul condition owing to the keeping of pigs and fowls, and the presence of overflowing open ashpits.

There is still no public water supply in Potton; and it was stated that in some localities the wells yield a water of unsatisfactory quality, and that the quantity is deficient in dry seasons.

The sewage disposal at Potton is by broad irrigation, the land thus treated being between two and three acres in extent, situated on the high road from Biggleswade to Potton. The sewage is conducted to the settling tanks by 12" glazed and socketted pipes. The effluent from the land is discharged into a brook communicating with the Ivel. A large portion of the area referred to is laid out for cultivation, and has been cultivated until this year, but the land is now thoroughly "sewage sick," and at the time of my visit seemed little more than a foul swamp. The sludge is disposed of with difficulty, as farmers can not be induced to take it. At present the "Sutton" system is going to be tried. The payment for the necessary works will be made out of the rates. There are now being constructed four tanks, each 24' x 30'. In two of these filtration will be carried on through burnt ballast, and in two others the final filtration will be through coke. The sewage will flow into the old settling tanks as before, in the first instance, and will afterwards be pumped up to the filter beds. The work is being carried out under the supervision of Mr. Owen-Jones, the Inspector of Nuisances for Biggleswade Rural District.

Everton (area, 1,361 acres; population, 219).—A small parish, with a village of the same name placed on the highest ground in the district, and close to the border of Huntingdonshire. A small part of the village is situated in the St. Neot's Rural District. Though this village is in a picturesque and airy situation, and is to outward seeming cleanly, yet upon inspection its sanitary circumstances were found to be unsatisfactory in many instances. Certain of the cottages are of poor construction, and have little or no back ventilation, nor are the bedrooms always provided with chimneys. Curtilages are unpaved, and their surfaces are uneven and in holes. In one instance cottages are grouped rather closely together with little open ground. There is no public water supply, the inhabitants being dependent entirely upon private wells, which seem to average from 25 to 35 feet in depth. In some instances I was informed that the water is not very good, though it rarely fails altogether. Many of the wells that I saw are of brick or stone set in mortar. Of several the sides are covered with moss and vegetable growth, and some are sunk in situations where the water yielded by them is likely to become not only contaminated by soakage, but also by the direct passage of filth into the water owing to the coping of the well being flush with the surrounding garden ground or owing to the insufficient protection afforded by defective wooden covers.

As regards sewerage it was stated that some three years ago an existing drain had been deepened at a cost of £50, the work being carried out at the expense of the Trustees of the village property owner. This sewer now runs from the

upper part of the village from a spot near a residence referred to as the "Big House," and after passing through the more populous portions of the place, receiving in its course slop drainage and the excreta from at least one water closet, turns down a hill to the north and discharges into a ditch beside the road. Certain privies were found to have only bare earth floors, from which the excreta are raked away as required. House refuse is disposed of by throwing it upon the ground or into holes therein. Such rare ashpits as were seen were found to be uncovered.

Arlesey (area, 2,344 acres; population, 2,108).—The village of Arlesey, now rapidly attaining the proportions of a small town at the extreme south of the Biggleswade Rural District, straggles for about two miles along a road on the east side of and parallel to the main line of the Great Northern Railway. It is served by two railway stations, viz.: "Arlesey" and "Three Counties"; the former placed at the northern extremity of the place, known as "Church End," and the latter at the southern extremity, and within a short distance of the large lunatic asylum, for the passenger and goods traffic of which it provides. The population of Arlesey has increased considerably of recent years owing to the influx of the working class in connection with the various industries that have sprung up hereabout. The geological formation appears to be Chalk and Gault. The general sanitary condition of the place is known to be very unsatisfactory, and the Rural District Council have been for some time past endeavouring to effect an improvement.

There are undoubtedly many dwellings in Arlesey which by reason of their dilapidated state or of the filthy condition in which they are permitted to remain, or of their want of ventilation, or of any proper means of excrement or refuse disposal, are at present unfit for habitation. The houses are generally built in little irregular groups, and are often provided with little or no garden ground; even when curtilages are small the scanty space is still further diminished by chicken runs, pigstyes, and the like, while much refuse and filth are suffered to accumulate about dwellings. Certain of the houses in Arlesey are among the worst examples of the style of building locally known as "stud and mud."

The water supply is obtained entirely from wells. Of these nine are public pump wells, and all are situated either on the footpaths or on rough ground close beside the road; one, indeed, is placed just outside the churchyard. I could obtain no information as to the depth or character of these wells. As regards the private wells, I saw but few that were not manifestly exposed to contamination by soakage from polluted soil, or even by the direct entrance of filth from the surface of the surrounding ground.

The drainage of Arlesey is at present effected by means of the road drains. I was unable to find that these had been laid on any clear and definite plan; they would seem to have been taken up and relaid from time to time, catchpits being added here and there. The drains appear to discharge by several outfalls into the River Hiz. There can be no doubt that the "fall" provided for these drains is quite inadequate. The complaint that the "drains do not run well" was a repeated one, and stench is said to be exhaled from some of them. After much discussion the Biggleswade Rural District Council selected some land for sewage disposal and treatment, and on the 18th March, 1897, Mr. Willcocks, one of the Board's Engineering Inspectors, held an enquiry with respect to an application by the Rural District Council for a Provisional Order to empower them to acquire the land in question compulsorily. The application was not sanctioned. The Rural District Council then decided to adopt what they term the "Gravesend system" of emptying cesspools into tank carts, and applied for the Board's sanction to the scheme. But though the Board refused their sanction, the Rural District Council have resolved to give their scheme a trial. To this end they have provided themselves with two iron tank carts, made by Gates, of Gravesend, each holding between 900 and 1,000 gallons. They are fitted with suction valves and used with a small hand pump. The foul air outlet is covered with a wire basket full of

cotton waste, saturated with disinfectant. No charge is made by the Rural District Council for the operation of emptying cesspools. These carts are kept in a disused cartshed adjoining the high road through the village. The cesspool contents are said to be discharged from the tank carts upon land at various points. As recently as the 14th June, 1899, the Board wrote to the Rural District Council pointing out that by failing to provide a proper scheme of sewerage for Arlesey the Council would incur a serious responsibility.

Not only are solid excreta stored in leaky cesspools but also in open middens. In the vicinity of poor dwellings, huddled together upon small area, I met with uncovered ashpits into which night soil had been cast. The present condition of the village of Arlesey is a serious danger to the public health, and should at once receive the attention of the Rural District Council.

Campton (area, 969 acres ; population, 448).—A rural parish with small village of the same name, about one mile south-west of the Shefford Station on the Bedford and Hitchin section of the Midland Railway.

The water supply of Campton is deficient. There is no public water supply at all. There are two private dry-steined wells at the north-west end, one adjoining a small farmyard. I met with three open dip wells, of large bore, with raised brickwork sides, but the sides of the well below the ground level are dry-steined only. The water was noticed in one instance to smell unpleasantly ; snails and frogs were also seen in two of the wells, while traces of percolation through the sides were noticed.

Meppershall (area, 1,965 acres ; population, 650).—A parish and small village two miles south from Shefford Station.

Certain cottages here were seen to be much out of repair, and their "stad and mud" walls were cracked, and, in some cases, faulty and leaning. The ground around the cottages is unpaved. On the other hand it appears that garden ground is, on the whole, sufficient. Water appears to be rather scarce. All the cottages near the church derive their supply of drinking water from one well upon private premises. There is also one public shallow dry-steined dip well beside the high road, but the water yielded by it is said not to be good.

Cockayne Hatley (area, 1,175 acres ; population, 104).—An agricultural parish, with a hamlet of the same name, on the borders of Cambridgeshire.

The village was visited in October, 1896, by my colleague, Dr. Buchanan, in respect of an outbreak of diphtheria there, upon which he subsequently reported. He thus speaks of the place : " Situated 200 feet above Ordnance Datum, an elevation higher than that of other villages in the neighbourhood, it lies on the southern slope of a tableland that hereabouts separates the valley of the Ivel on the west, from the watershed of the river Rhee, a tributary of the Cam, on the south and east. This tableland is of the Gault formation, capped with ' Boulder Clay.' . . . The whole parish of Hatley Cockayne contains only 20 inhabited houses."

Dr. Buchanan goes on to describe the houses as poorly constructed—noticeably damp in most cases, and ill-provided with ventilation. Excrement and refuse are disposed of upon the garden ground, upon which slop liquids are also cast. He also speaks of the village as ill-found in respect of water supply. Speaking generally, it may be said that the sanitary circumstances of the village proved at the time of my visit to be just as they were found by Dr. Buchanan. In spite of the occurrence of 23 cases of diphtheria nothing appears to have been done to improve the condition of the dwellings, to provide a sufficient water supply, or to remedy the unsatisfactory methods of excrement and refuse disposal. At the time of visit I could hear of only one dry-steined, bucket and chain well, upon which all the inhabitants appeared to depend for their water supply.

Chicksands (area, 1,439 acres ; population, 64).

Edworth (area, 1,122 acres ; population, 100).

Shefford Hardwicke (area, 360 acres ; population, 65).

Upper Stondon (area, 428 acres ; population, 47).

Sutton (area, 2,234 acres ; population, 283).

Astwick (area, 665 acres ; population, 54).

These are rural and very sparsely populated parishes, calling for no special remark. The parish of Shefford Hardwicke is almost entirely comprised in a single farm. Water supplies, generally speaking, need attention.

Stotfold (area, 2,398 acres ; population, 3,004).—An agricultural parish, with an extremely straggling village of the same name, on the road from Bedford to Baldock, and on the Hertfordshire border of the county of Bedfordshire. The river Rhee flows through part of the parish.

The north end of the village is commonly known as "Fen End." The houses are dotted about irregularly ; sometimes isolated, sometimes in little groups or rows. Much of the place is said to be on gravel, but Chalk is also stated to come to the surface here and there. A good many dilapidated cottage dwellings were seen. For the most part garden ground may be said to be sufficient in extent though not always conveniently placed.

There were six cases of diphtheria in Stotfold parish during last March, with two deaths. The first case was found to be associated with serious filth nuisances which have now been abolished. As regards the other cases, it appeared from the information given to me that the infection had been conveyed by personal contact.

I could hear of no public water supply in the village. Drinking water is obtained from private wells, the steining of which is frequently defective ; all those seen by me were shallow. In one instance part of the dry-steining had apparently fallen in, and been removed by the cottagers. Other instances were encountered of wells insufficiently protected against the passage into them of filth from the surface. In one case, indeed, there appeared to be every probability that slop water found occasional entry into the well. It was stated that water does not run short in the village.

I could obtain no information of any sewerage in the village other than the road drains, which seem to be made use of as sewers here and there. A ditch—receiving much liquid filth—runs through the place, and is alleged to be cleaned out once a year by the agency of the District Council. Numerous instances of accumulations of foul refuse were seen, as well as a pool of liquid filth into which night soil had been thrown.

RECENT OUTBREAKS OF INFECTIOUS DISEASE.

A.—DIPHTHERIA AT SANDY.

That diphtheria has been long established in the parish of Sandy is evident from Table II., on which has been set out, parish by parish, the number of cases of diphtheria, and of enteric fever that have come to the knowledge of the Medical Officer of Health of the district since the adoption of the Infectious Disease (Notification) Act, which Act came into force in the district in February, 1890. Since that time, in not one year have less than six cases of diphtheria been notified in Sandy, while during several years the disease prevailed to a large extent. The total number of cases of diphtheria in Sandy, notified to the Medical Officer of Health from February, 1890, to the close of the year 1898, has been 285.

TABLE II.

SHOWING PARISH BY PARISH THE NUMBER OF CASES OF DIPHTHERIA AND ENTERIC FEVER NOTIFIED IN BIGGLESWADE RURAL DISTRICT IN EACH YEAR FROM FEBRUARY, 1890, TO 31ST DECEMBER, 1898.

	Year 1890.		Year 1891.		Year 1892.		Year 1893.		Year 1894.		Year 1895.		Year 1896.		Year 1897.		Year 1898.		REMARKS.
	Cases of Diphtheria.	Cases of Enteric Fever.	Cases of Diphtheria.	Cases of Enteric Fever.	Cases of Diphtheria.	Cases of Enteric Fever.	Cases of Diphtheria.	Cases of Enteric Fever.	Cases of Diphtheria.	Cases of Enteric Fever.	Cases of Diphtheria.	Cases of Enteric Fever.	Cases of Diphtheria.	Cases of Enteric Fever.	Cases of Diphtheria.	Cases of Enteric Fever.	Cases of Diphtheria.	Cases of Enteric Fever.	
Arlesey	—	2	1	4	5	18	7	1	9	—	3	2	9	1	—	4	1	2	
Astwick	—	—	—	—	1	—	7	—	7	—	2	—	2	—	—	—	3	—	
Blunham	—	—	—	—	—	—	—	—	4	—	—	—	—	—	—	—	—	—	
Campton	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Chicksands	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Clifton	—	—	—	—	—	—	—	—	—	—	—	—	10	—	—	—	—	—	
Cockayne Hatley	—	—	—	—	7	1	6	—	3	—	—	—	—	—	—	—	1	—	
Dunton	—	—	—	—	—	—	4	—	—	—	—	—	—	1	—	—	7	2	
Edworth	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Everton	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	
Eyeworth	—	—	—	—	—	—	—	—	9	—	—	1	—	2	—	—	—	1	
Henlow	—	6	—	—	3	—	4	—	5	—	6	1	1	—	3	—	43	—	
Langford	14	—	6	1	—	—	1	—	—	2	—	1	—	—	—	—	—	—	
Meppershall	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	
Moggerhanger	1	—	—	—	—	—	4	—	2	—	—	—	—	48	—	—	1	—	
Northill	1	1	—	—	5	—	5	—	2	—	—	—	3	1	—	—	9	1	
Potton	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	
Sandy	26	2	8	—	6	1	27	3	36	2	13	2	21	1	5	137	2	—	
Shefford	—	—	—	—	—	2	—	1	—	—	1	—	—	—	4	—	—	—	
Shefford Hardwicke	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Southill	—	—	—	—	4	1	2	—	1	1	6	—	—	—	—	—	—	—	
Standon, Upper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	
Stoifold	1	—	3	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	
Sutton	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Tempsford	—	—	—	—	1	1	1	—	1	—	—	—	—	—	—	—	—	—	
Warden	—	—	—	—	2	—	—	—	2	—	—	—	—	—	—	—	—	13	
Wrestlingworth	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Totals in each year	43	11	26	6	37	24	68	6	81	5	31	6	47	56	37	16	202	24	

During the first three-quarters of the year 1898, only sixteen cases of diphtheria were notified in Sandy. Then occurred an outburst of the disease with the result that between the 26th October, 1898, and the 31st January, 1899, no less than 122 cases were brought to light. The following table, prepared for me by the Inspector of Nuisances, Mr. J. Owen-Jones, sets forth the incidence of the disease, upon the age groups, so far as regards these 122 cases :—

Age Group.						Number of persons in Sandy attacked by diphtheria between Oct. 26, 1898, and Jan. 31, 1899.
Under 5 years	...	...	...	...	...	30
5—10 years	...	...	...	...	...	34
10—15 years	...	...	...	...	...	26
15—25 years	...	...	...	...	...	22
25—35 years	...	...	...	...	...	5
35 years and upwards	...	...	...	...	...	5

It will thus be apparent that the incidence upon children was overwhelmingly greater than upon adults, of whom very few were infected. All such adults were either persons whose children had previously been attacked by the disease or who had been associated more or less closely with such children.

I made inquiry with respect to any unusual prevalence of affections of the throat and air-passages during the few weeks immediately preceding the outbreak of the disease upon a large scale. As a result one local practitioner expressed the opinion that there had been such unusual prevalence, whereas another, who had had twenty years' experience of practice at Sandy, emphatically negatived any such idea. He goes, indeed, so far as to state that the parish has been remarkably free from throat affections of all kinds, other than diphtheria; that he has not seen a score of cases of Follicular Tonsillitis since he has resided at Sandy. This latter statement is not in accordance with the experience of the practitioner first referred to, or, indeed with that of the three practitioners in Biggleswade, all of whom concurred in the view that in the Biggleswade Rural District, as a whole, and in that portion of it in which Sandy lies in particular, throat affections are of frequent occurrence.

Since the end of January of the present year 1899 diphtheria has gradually decreased in Sandy, as will be seen from the following table :—

RETURN OF CASES OF DIPHTHERIA AND ENTERIC FEVER IN BIGGLESWADE RURAL DISTRICT NOTIFIED FROM 1st JANUARY TO 31st MAY, 1899.

Parishes.	January.		February.		March.		April.		May.	
	Diphth.	Enteric Fever.	Diphth.	Enteric Fever.	Diphth.	Enteric Fever.	Diphth.	Enteric Fever.	Diphth.	Enteric Fever.
Blunham ...	—	—	—	—	—	—	3	—	—	—
Everton ...	6	—	—	—	—	—	—	1	—	—
Langford ...	1	—	1	—	6	1	—	—	—	—
Sandy ...	30	—	11	—	5	—	—	—	—	—
Stotfold ...	—	—	1	—	2	—	2	—	2	—
Southill ...	—	—	—	—	—	—	—	—	5	—
Warden ...	—	1	—	—	—	—	—	—	—	—
Total ...	37	1	13	—	13	1	5	1	7	—

On the 5th June, during the course of my inspection, three notifications were received in respect of a single family residing in the village, and though all the three children in question were removed to the Isolation Hospital, fatal results supervened in each instance. The youngest child of the same family, aged 18 months, had died from "convulsions" a few days previously to the occurrence of the first well-marked attack of diphtheria in this house. The medical practitioner who attended the family now informs me of his belief that the death of this infant resulted from diphtheria; that the malady remained undetected in this case for the reason that as he was not called in until shortly before the child's death, when no special throat symptoms were apparent.

In addition to the fact of the great incidence upon children, it was evident that the disease was entirely confined to the families of the working class.

As regards localities in Sandy affected by the diphtheria it is apparent, from the report made by the Inspector of Nuisances after his house-to-house inspection of the premises in which occurred the 122 cases above referred to, that the disease was scattered broadcast over the whole parish. All the localities affected were visited by me and found to present examples of the conspicuous sanitary defects enumerated in that section of my report wherein I have set forth the detailed results of my inspection of the parish of Sandy.

Two facts need especially to be dwelt upon. First, that all the cases occurred among the inhabitants of houses having back yards or small gardens used in common with those of other dwellings, and that in this manner the facilities for personal communication were necessarily greatly increased. And, secondly, that all the cases occurred among children attending the only elementary schools at Sandy, or among persons who had been associated with such children to a greater or less extent.

As regards the meteorological conditions that prevailed previously to the outbreak of 1898, I have been unable to get other than very general information; but there can be no doubt that the summer of 1898 was a very hot and dry one, and that the drought, which continued until the beginning of October, was severely felt. About this period heavy rains occurred, and the remainder of the autumn and early winter was wet.

As regards the epidemic itself, the type of disease, generally speaking, has been mild. I could only hear of two cases that were followed by paralysis.

CAUSES OF THE OUTBREAK.

In considering very briefly the various conditions which may be thought of as having been concerned in one way or another in either causing or fostering the spread of diphtheria in Sandy, it must be premised that having regard to the fact that diphtheria has been present to a greater or less extent in the neighbourhood for the last ten years, it would be futile to endeavour to discuss the origin of the present outbreak, or even to trace the sequence of the cases.

The fact that the whole of the cases occurred among the children of the labouring class, children, that is, associated together at the elementary schools, and having out of school often very close personal communication by means of the back yards, gardens, alleys, and passages, all used in common, makes it evident that the spread of the disease from person to person must be thought of as having been a considerable factor in its distribution. As regards possible infection through milk, the Inspector of Nuisances, Mr. Owen-Jones, found no less than seven milk dealers concerned in the sale of milk among the families in which diphtheria had occurred, and in such proportion that no suspicion can be entertained that any of the local milk supplies were concerned in the spread of the disease.

Drain Emanations.—During the course of my inspection complaints were from time to time made to me as to the stench exhaled from road drain openings and from gulleys on house drains connected with these road drains,

which have to do duty for sewers in Sandy. But careful inquiry failed to establish any definite connection between foully smelling drains and the occurrence of diphtheria, or to discover any special groupings of cases around the localities referred to. It must, moreover, be borne in mind that this particular form of nuisance is no novelty in Sandy; that it has been a subject of complaint for years past. So common are drain nuisances that it is a frequent practice to place a folded cloth, a brick, or a tile, or such like object over a gulley opening in order to check the foul smell issuing therefrom. Indeed, the inhabitants of Sandy may be, perhaps, considered to be in some degree inured to objectionable smells, having regard to the fact that an enormous quantity of manure is continually being brought into the locality and stored there, and that the stench of it is found almost overpowering by visitors unaccustomed to these very strong odours. In view of the abundance of drain nuisances it is in no way surprising that in the majority of instances in which I made inquiries concerning occurrence of diphtheria, I found that more or less foul emanations were complained of as issuing from gulleys situated in the rear of houses and used for slop drainage. But inasmuch as in the present state of our knowledge we are, notwithstanding much investigation in this sense, without any direct evidence of the communication of diphtheria by drain emanations, these and similar highly insanitary conditions in so far as they cause a constantly foul state of the atmosphere in the neighbourhood of houses, must be thought of rather as producing conditions eminently favourable to the propagation of the disease than as directly causing it.

Manure.—To anyone visiting Sandy and its neighbourhood for the first time it cannot fail to be evident that the nuisance arising from the importation, storage, and distribution of the enormous quantities of manure required for the market gardens of the locality is very great. Probably no section of the inhabitants of the district are greater sufferers in this sense than those dwelling in the immediate vicinity of Sandy station. In the sidings attached to this station there are rarely to be seen less than 40–50 open trucks of manure waiting to be unloaded, and the stench is at times offensive in the extreme. Nevertheless there was a notable absence of diphtheria in the houses nearest to the station, and the Inspector of Nuisances, Mr. Owen-Jones, who made careful enquiry upon the subject, found that no cases of diphtheria had occurred among the men engaged in unloading the manure, and that there was an absence of any evidence directly implicating this product in any way.

It will be apparent from the above remarks that the difficulty of accurately assigning to any one possible factor a principal agency in the dissemination of diphtheria in Sandy is insuperable. It would rather seem that a number of unfavourable conditions may be thought of as operating in concert, and in now briefly summarising these it is not intended to suggest them as the actual causes of the outbreak but merely as tending to encourage the spread of it.

It has to be borne in mind that for many years past diphtheria has never been absent from the parish; that it has frequently prevailed therein to such an extent that it may almost be regarded as endemic in the neighbourhood. The crowded condition of the Infant School during the last quarter of the year cannot be overlooked as a possible help to spread of the disease; the occurrence among the children of one or two undetected cases of diphtheria under such circumstances cannot be considered as otherwise than dangerous in a very high degree. To these conditions of school life must be added a condition of home life which at Sandy, in a more special manner than elsewhere, facilitates personal communication, viz., the fact that almost all the inhabitants dwell in little groups of houses whose back-yards are used in common. Certain of the general sanitary circumstances, too, of these houses must be thought of as likely at any rate to induce in the children of the inhabitants a condition of special receptivity to infection. Foremost among these conditions must be placed the absence of any paving around houses and the general fouling of the soil in their neighbourhood by reason not only of leaking cesspools and the almost universal custom of depositing house refuse in holes in the ground, but also of the keeping of fowls and pigs in contiguity to dwellings, and the casting of slops upon the ground or upon "soak holes" therein. To the fouling of the earth must be

added the constant fouling of the air by the emanations from the drains in direct communication with "dumb wells" or with road drains doing duty as sewers.

B.—DIPHTHERIA AT LANGFORD.

From perusal of Table II. it will be seen that since the Infectious Disease (Notification) Act came into force in February, 1890, in no year has diphtheria been absent from the parish of Langford.

During the year 1898, 42 cases of diphtheria and one case of membranous croup were recorded in the Notification Register of this parish. Owing to the length of time that had elapsed since the outbreak, it was found impossible to ascertain the precise locality in which the outbreak commenced. Evidence was not wanting to connect the outbreak of diphtheria in Langford with a prevalence of the same disease in the urban district of Biggleswade, which extends to within a short distance of Langford village. But however this may be there can be no doubt that the outbreak in Langford was established in September, 1898, and that the place was not free from diphtheria until April, 1899.

There were eight deaths from the disease in 1898, viz., six in Langford itself and two at the Isolation Hospital. But as regards attacks the result of my inspection has been a conviction that a number of cases escaped detection; nor is this surprising, having regard to the fact that the population of Langford is almost entirely composed of persons of the labouring class, and moreover that at the time the outbreak began, the then Inspector of Nuisances was almost entirely incapacitated by illness. Later on, when this officer's duties were undertaken by Mr. Owen-Jones, who has since been appointed Inspector of Nuisances for the district, the great pressure of work resulting from simultaneous outbreaks of diphtheria at Sandy, and of enteric fever at Warden, rendered special search for unreported diphtheria cases impracticable. A perusal of the log of the Mixed Department of Langford Board School tends to confirm the view that in these circumstances cases escaped detection. On October 21st a note was made that "several scholars are absent with common sore throat"; and again on November the 18th, that the "attendance has been very bad owing to several fresh cases of diphtheria and bad colds and coughs among the scholars."

On the 14th February, 1899, Mr. Owen-Jones presented to the Rural District Council a special report concerning 22 cases of diphtheria in respect of which he had made visitation of the invaded houses. In every one of these investigations serious sanitary defects came to light. In every instance the water supply was from a shallow well, and in one case this was near to the dung heap. In many instances fowls and pigs were kept in proximity to the well from which drinking water is obtained, and under such conditions that the water is likely to have been polluted not merely by soakage through the soil, but even by the direct passage of filth from the surface. In the great majority of cases slop liquids were cast into open ashpits, which are generally holes in the ground. Close to the "Wrestlers' Inn and Wrestlers' Cottages, at which a number of cases of diphtheria occurred, there existed at that time an open semi-stagnant watercourse, which was the recipient of nearly all the drainage of the place. I heard a rumour of the appearance of cases of "gapes" among poultry in one locality where several cases of diphtheria had occurred in succession, but I was unable to obtain any precise information, or in any way to connect this illness of poultry with the diphtheria which appeared subsequently in the locality.

Throughout this period of diphtheria prevalence in Langford the schools were not closed on account of that disease, though earlier in the year they had been closed for more than a month on account of an epidemic of measles. All children from diphtheria infected families were excluded. On two occasions—viz., on two Friday evenings—it is stated that the schools were disinfected by means of fumigation by burning sulphur, and the premises were also thoroughly washed and cleansed.

C.—ENTERIC FEVER AT OLD WARDEN.

A limited outbreak of Enteric fever occurred in this village in the autumn of the past year, 1898. Fourteen cases in all were notified to the Medical Officer of Health, and of these four terminated fatally; one case occurred in the person of a woman, aged 66, and nine were of a slight character. The first definitely known case, notified September 18th, 1898, was that of a middle-aged woman who had been occupied in preparing food for and attending upon some workmen sent from London to carry out certain decorative work at a mansion in the locality. One of these workmen appears undoubtedly to have suffered from illness, as to which I am unable to obtain precise information, but I learnt that there had been some difference of opinion among local medical men as to whether the case was really one of enteric fever or not. The patient after recovery had returned to London. The second case of enteric fever in the course of the outbreak was notified on October 4th. It occurred in the person of a woman residing at a cottage adjoining the first notified case, and who is said to have been frequently in attendance upon her. The third case likewise occurred in the person of a woman residing in a cottage of a similar character on the opposite side of the village street, while the fourth case was the husband of the woman first of all affected. A later case was that of a trained nurse from Bedford, who had come over to take charge of some of the patients.

The conditions of spread of infection in this outbreak have been the subject of much discussion. The local Medical Officer of Health in a special report, dated March 18th, 1899, which was called for by the Board, expressed strongly his opinion that the disease had been spread by communication from person to person. However this may be, it appears from the report of a house to house visitation of all the infected houses, carried out by the Inspector of Nuisances, Mr. Owen-Jones, that with three exceptions, all the persons attacked had derived their supply of drinking water from a certain pump-well known as the "Workhouse pump."* I found, moreover, that popular opinion regarded this well with suspicion, and that a chemical analysis of a sample of the water had shown that such suspicion was reasonable. The well which thus came under suspicion is situated at the roadside at the foot of a rather steep slope, on which stand at some little distance several cottages, whose inhabitants have been for many years in the habit of emptying the contents of their box or pail closets upon the garden ground intervening between their cottages and the well. I had the stone which covers the top of the well removed and examined the interior, which I found to be dry stained only within a few feet of the surface; moreover, the stones thus set had become slightly separated on that side of the well towards the manured kitchen garden just referred to. I was unable to see any distinct signs of percolation into the well then going on or having recently occurred, but there was some withered vegetable growth hanging from the stonework. I ascertained that the month of August, 1898, had been on the whole dry, but that on the 6th of that month there had been a heavy rain-storm which had given a fall of 1·41 in. of rain in that locality.

It is satisfactory to be able to report that in consequence of the suspicion thus cast upon the water yielded from the "Workhouse Pump," and misgiving lest other dry-stained wells in the village might be at present or hereafter become contaminated, Major Shuttleworth, the owner of the cottages in the village, has decided to obtain an entirely new supply of drinking water for the inhabitants, and to lay on this water by pipes to the various dwellings. Mr. Munckton, the agent for the Warden Estate, informs me that the boring of a fresh well in the Green Sand at some little distance from the village has already been begun, and, if the results are satisfactory, it may be hoped that in the future there will be no danger that in the village the infection of enteric fever will be conveyed by the drinking water.

* NOTE.—The well is so called because it was formerly the source of water supply for the Old Workhouse building.

SPECIAL SANITARY MEASURES TAKEN WITH REFERENCE TO INFECTIOUS DISEASE.

Briefly summarized, the following are the special measures taken by the Rural District Council with a view to arrest the spread of infectious disease, especially diphtheria.

Bedding and clothing from infected houses are spread out in the sun as much as possible. The district does not possess proper means of disinfecting these articles. With regard to disinfection of premises, which is carried out by means of sulphur fumigation, the Inspector of Nuisances informs me that in the majority of cases he now himself conveys the sulphur candles to the house to be disinfected, and personally sees the work commenced. At times, when he is unable to do this, the caretaker of the hospital undertakes the work. On the whole, it would appear that lime washing and re-papering of infected premises are now fairly well attended to. When accommodation is available, the removal of patients to the Infectious Disease Hospital is always urged, and is now much more frequently assented to, as prejudice against that institution appears to be breaking down. When removal to hospital is declined isolation is enjoined, and careful instructions are given for the carrying this out. At the first visit of the Inspector of Nuisances to an infected dwelling a survey of this and of neighbouring premises is made, and all nuisances are rectified as far as possible. Disinfectants are also supplied for scattering about and for mixing with excreta.

I gathered that during the latter part of the term of office of the late Inspector of Nuisances these and similar matters had not been carefully attended to.

As regards the exclusion from the schools of children from infected families, I am informed that the Inspector of Nuisances gives warning to schoolmasters in order that this may be done.

GENERAL SANITARY ADMINISTRATION.

The Biggleswade Rural District Council are the successors of the former Biggleswade Rural Sanitary Authority in whose administrative area was included the town of Biggleswade which has since been formed into a separate urban district. The Rural District Council consist of 34 members whose meetings are held fortnightly at the workhouse of the Biggleswade Union. Since April, 1899, sanitary matters are dealt with at each meeting, instead of at alternate meetings as formerly. There are a number of Committees dealing with various separate sanitary questions, viz., the "Potton Sewerage" Committee, and the "Arlesey Drainage" Committee, to which are referred all questions in connection with those special matters. There is also the "Plans Committee" to which are referred the plans for new buildings; and there is the "Sandy Scavenging Committee" under whose recommendation the new scheme for the public scavenging of the parish of Sandy has been formulated. Finally the "Hospital Committee" deal with all matters connected with the Infectious Disease Hospital.

The meetings of the Biggleswade Rural and Urban District Councils, and of the Guardians of the Biggleswade Union are all held upon the same day.

The Inspector of Nuisances attends each meeting of the Rural District Council, and he submits a report once a month. The Medical Officer of Health does not attend the meetings unless instructed to do so.

There are Byelaws for the Biggleswade Rural District allowed by the Local Government Board in September, 1880, for the Biggleswade Rural Sanitary Authority, in respect of the following matters:—

Common Lodging Houses.
New Streets and Buildings.
Slaughter Houses.

The Byelaws in respect of Slaughter Houses have not been duly enforced for some considerable time past.

In pursuance of the Dairies, Cowsheds, and Milkshops Order, of 1885, the Biggleswade Sanitary Authority adopted a set of Regulations in this matter on the 14th March, 1888. But registration of these places does not appear to have been required under the regulations, and I was unable to find that any of the regulations have been enforced. A new set of model regulations in respect of Dairies, Cowsheds, and Milkshops is, I am informed, now in preparation.

The Infectious Disease (Notification) Act, 1889, was adopted in the District from the 1st January, 1890.

The Infectious Disease (Prevention) Act, 1890, was adopted in the District and came into operation on the 28th February, 1891.

Part 3 of the Public Health Acts Amendment Act, 1890, was adopted in 1896. No byelaws have thus far been framed under this Act. I could hear of no action that had been taken under the Housing of the Working Classes Act, 1890.

The Rural District Council obtained urban powers on the 1st September, 1897, for the contributory place of Potton, in respect of such provisions of section 42 of the Public Health Act, 1875, as relate to the proper watering of streets.

As already stated, a scheme for the public scavenging of the parish of Sandy has recently been adopted. The parish has for this purpose been divided into two districts.

The Medical Officer of Health is Dr. C. E. Prior, who resides at Bedford. His is a permanent appointment, and in respect of it he receives a salary of £100. In addition to the post of Medical Officer of Health for Biggleswade Rural District, Dr. Prior holds the following other public offices:—Medical Officer of Health for Biggleswade Urban District, for Bedford Rural District, for the Borough of Bedford, for Woburn Rural District, Medical Officer to Bedford Workhouse, Coroner for Bedford, and Deputy Coroner for Bedfordshire. It will thus be seen that the area of Dr. Prior's sanitary administrations is considerable; he informed me that he is Medical Officer of Health for about two-thirds of the County of Bedford, an area amounting to upwards of 180,000 acres.

Dr. Prior submits his report book to the Council of the Rural District every month. The book does not usually contain mention of the action taken by the Council in respect of matters thus brought to their notice, nor of the result of such action. As already stated, he does not attend the meetings of the Council unless requested to do so. Dr. Prior informed me that as a general rule he goes over to Biggleswade once a week in order to confer with the Inspector of Nuisances. In addition to his annual reports, which are now always printed, he has, under instructions from the Board, prepared, on various occasions, a number of special reports dealing with outbreaks of infectious disease in the district, and special reports also on the sanitary condition of particular localities.

The Inspector of Nuisances is Mr. J. Owen-Jones, appointed in February, 1899. He was formerly Surveyor and Inspector of Nuisances at Pwllheli, Carnarvonshire. He receives a salary of £150—a moiety of which is repayable from county funds. He also holds the offices of Sanitary Surveyor and Road Surveyor. For the former he receives an annual salary of £10, his duty being to examine the plans of new buildings, and for the latter he receives an annual salary of £40. I am informed that there are only some ten miles of road over which his duties extend. As Inspector of Nuisances he keeps a report-book, which is submitted to the Council at each meeting. He has not hitherto kept a "journal" as he informs me that owing to the very heavy work thrown upon him he has not had time to do so, but he is now about to set up such a book. He has, however, written up a special register of cases of infectious disease, noting in it the sanitary circumstances of houses in

which they occur. He keeps a special register of the inspections made by him at Arlesey, and enters therein a detailed record of the same. He has a special set of notices for use in the Arlesey parish in connection with privy nuisances, and he has issued a good many. He informs me that, thus far, he has not issued any formal notices in respect of nuisances elsewhere, as he has found that, when verbal notice were insufficient, a letter has always had the desired effect.

Although Mr. Owen-Jones has held office for a short time, there would appear to be every probability, judging by the character of the work already done, that he will prove an efficient officer. On succeeding to the post he found that the work had been neglected for a long time past. There can be no doubt that though antecedently a good officer, the late Inspector of Nuisances, Mr. Miller, during the last years of his life gave little attention to his duties, while during the last few months he appears to have suffered from some cerebral disease, which entirely incapacitated him. His acceptance of the post of School Attendance Officer, at a time when he was already overpressed by sanitary work, still further hampered him in the performance of his sanitary duties. The Biggleswade Rural District especially demands on the part of the Inspector of Nuisances steady, persevering, and methodical work, and Mr. Owen-Jones came into office at a time when diphtheria was extensively prevalent in two portions of the district, while a small outbreak of enteric fever in another portion was occasioning considerable anxiety. He has produced a good report on Sandy, having in connection with the diphtheria there made a house to house visitation in respect of 122 cases. He has also made house to house visitations in connection with the outbreak of diphtheria at Langford, and with that of enteric fever at Warden.

With this amount of extra work, and that too of an urgent kind thrown upon him, it is not surprising that so far he has not been able to give needful attention to the suppression of the nuisances which I have shown to be rife in the district. His activity in the future is likely to be much hampered unless the Rural District Council quickly bestir themselves and obtain urban powers in respect of certain localities to enable them to make byelaws in respect of nuisances.

There is an Isolation Hospital, erected in 1878, on land situated about a mile in a north-easterly direction from the town of Biggleswade, and close to the road between that place and Potten. The construction of the hospital is in the main good, but it is undoubtedly too small for the demand the district now appears likely to make upon its accommodation. It comprises two wards each $24' \times 24' \times 13'$. In each at the time of my visit were eight beds and two cots, a totally insufficient amount of cubic space per bed. The accommodation for the increased nursing staff required is inadequate, and the water supply for the hospital is so insufficient that inconvenience, I am assured, at times arises from this cause. The hospital is the property of the Rural District, but the Biggleswade Urban District has the privilege of sending patients to it by paying a proportion of the expenses.

There is no doubt that in the past there has been a widespread feeling of dislike to the Isolation Hospital. On examining the Notification Register in respect of the prevalence of diphtheria at Sandy, I observed that out of 92 cases recorded 62 had against them the entry "hospital refused." This antipathy, which is alleged to be chiefly due to certain known defects of the management of the hospital in the past, appears to be dying out, and the Inspector of Nuisances informs me that there is certainly less difficulty than formerly in inducing parents to send their children to that Institution. But the need of increased accommodation is undoubted. During the prevalence of diphtheria at Sandy, the hospital quickly became full, and there is evidence that extension of the disease was in part caused through the necessity of retaining infected children in crowded dwellings.

An old brougham is kept at the hospital, and is used as an ambulance. A new and efficient ambulance is now being procured. The ambulance house

which is now being built will be attached to the present administrative block. In a chamber forming part of the laundry block there is a small apparatus by Nelson, of Leeds, for disinfecting the clothing, &c., of patients by means of dry heat. A more efficient "disinfector" which will be available also for the clothing and bedding, &c., of patients outside the hospital is urgently needed.

From the perusal of the foregoing remarks it will be apparent that a vast amount of sanitary work is in many directions demanding the attention of the Biggleswade Rural District Council. Many of the sanitary defects noted by me do not appear to have been hitherto brought to their notice: and I do not assert that they have been altogether unmindful of their duties in supplying the wants of their district. Their first attention should, in my view, be given to the large number of overgrown villages, many of which need a scheme of sewerage as well as a proper public water supply.

In conclusion, I have to express my thanks to a large number of persons resident in Biggleswade Rural District for help afforded me at various stages of my inquiry, and more particularly to Mr. T. J. Hooper, the Clerk to the District Council, as well as to Mr. Wagg, the acting Clerk, and to Dr. Prior, the Medical Officer of Health. I am indebted to Mr. H. Heath Mills, Mr. R. C. Cater, and Miss S. C. Hayter, teachers respectively at Sandy and Langford Schools, for information collected and access to the school logs. I have also to thank a number of gentlemen resident in certain of the localities visited, who accompanied me in some of my inspections. Lastly, I have to express my indebtedness to Mr. J. Owen-Jones, the Inspector of Nuisances, for much assistance, and for the way in which he has met the demands upon his time which the necessities of so prolonged an inspection compelled me to make.

F. ST. GEORGE MIVART.

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