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**Dr. Ballard's Report to the Local Government Board on
an Epidemic of Enteric Fever at Newlyn, in the Rural
Sanitary District of St. Columb, Cornwall.**

GEORGE BUCHANAN,
Medical Department,
December 22nd, 1880.

Newlyn, otherwise known as Newlyn (East), is an irregularly built mining village of about 150 houses, nearly all of the cottage class, and about 650 inhabitants, formerly prosperous, but now poor on account of the closure of mines in the vicinity. It is situated on the summit of a hill, and the older part of the village surrounds the churchyard which is overfull. In this older part many of the cottages are mud built and grievously dilapidated, some being quite unfit for the habitation of human beings. On the road called Metha Lane there is a steep descent from the village for about 100 yards to a hollow, in which is situated the "town well," to be presently more fully described. The only drain in the whole village is a badly arranged and badly constructed road drain, which, having openings or inlets in convenient spots, commences at an isolated cottage to the east of the church, passes round the south side of the church, and then down into the hollow above mentioned, where it empties itself near the town well into a field ditch. (This course is indicated by a red interrupted line in the plan appended to this report.) It receives not only road drainage, but house-slops and overflows from cottage cesspools, &c., along its course. Otherwise the village is altogether without drainage; slops and liquid filth of all kinds are thrown into the roadway to run off or soak in, or into open trenches or surface depressions about the cottages, where these matters stagnate. Complaints are made of frequent stinks arising from the inlets of the village drain. A large proportion of the cottages, (I cannot tell the exact proportion, but apparently about half of them,) have no privy accommodation; the men, they say, go into the fields, and the excrement of the women and children is thrown out upon the gardens or upon some midden-heap near the houses. Where there are privies these places are open cesspits or hollows dug in the ground, over part of which the privy is erected, and are often close to the houses. The wretched appearance of such a village, especially on a wet day, with its pools of surface and slop water lying about everywhere close to the cottages, and sodden excrement visible anywhere at the rear or sides, can be better imagined than described. I have seen nothing worse in the most neglected mining villages in Staffordshire.

There are three public wells, the "town well," the "new well," and the "western well," and one spring or spout known as "Butt's spring," for the public supply of water. The "town well" and the "western well" are covered, and furnished each with a pump; the "new well" is open. Up to the time of the closure of the "town well," to be presently mentioned, only a few of the inhabitants of the village were permitted to use Butt's spring; but since that time the inhabitants of the village generally have been permitted to use it. But practically for some few years past the only public source available has been the "town well," the "new well" having rarely had much water in it, and the water of the "western well" tasting of iron so much as to deter the villagers from its use. Of the five or six private wells in the village, only one (that at the Commercial Inn) is in use, the use of the others having been given up on account of obvious pollution and unwholesomeness. Hence for a long time past all the villagers (except those few who used Butt's spring and a few living at the outskirts, who sometimes got drinking water from other private springs or spouts outside the village, and a few who occasionally used rain water collected from the roofs of their cottages) have had to carry water in pitchers to their houses from the town

pump. From some parts of the village this source is about a quarter of a mile distant, and naturally the villagers (especially those residing at a distance) have been very sparing in the use of water. Mr. Vigurs, the Poor Law Medical Officer, who resides in the village, says that for a long time past he has been convinced that the water of the town pump was grossly polluted, and that he has consequently not permitted any of it to be brought into his house. It is a well sunk at the roadside to a depth of about five or six feet into the fissured slaty rock (killas) of the district. The public drain in its course from the opposite side of the road to the ditch into which it discharges itself, runs past the well at a distance from it of about three or four yards, and at about a foot or a foot and a half lower level than a former overflow of the well. Some inhabitants told me that, since the drain was put in, the water had sunk in the well so that it had ceased to overflow at any time. On causing the drain and the well to be opened up, I found that the level of the water in the well was that of the drain, that the pipes of which the drain was made were not cemented together, and that both near the well and on the opposite side of the road the sewage leaked out of it into the loose rocky earth in which it was laid. In fact it was abundantly obvious that for a long time past there had been a free interchange of contents between the well and the drain; and an examination of the wall of the well showed actual filthy matter oozing into the well from one of the fissures of the rock on the side next the roadway. In dry weather, when the water sank in the well, the flow into it from the neighbouring drain must have been plentiful.

What is known as "Butt's spring" is situated in a hollow at the far corner of a meadow. The water flows from a spout made of an earthen land drainage pipe. The surroundings were such as to inspire simple disgust, since the surface of the field and the ditch close to the spring were defiled with human excrement deposited there by the women and children when they came to fetch water. They probably had no privy at home. It was necessary to walk circumspectly to avoid treading in this filth.

The "new well" and the "western well," about 30 and 60 feet deep respectively, are situated in the higher parts of the village close to houses which have been invaded by fever, the slops from which houses flow close to the top of the well. Both wells are from their surroundings liable to dangerous pollution.

In these circumstances of drainage and water supply, and of excremental filth, it would appear that there has been abundant opportunity for the spread of fever in the village if the material of the fever became accidentally introduced. Such an epidemic spread has occurred more than once before, namely, about 1848, and again in 1874. On the latter occasion, Mr. Vigurs tells me the epidemic was very severe and extensive.

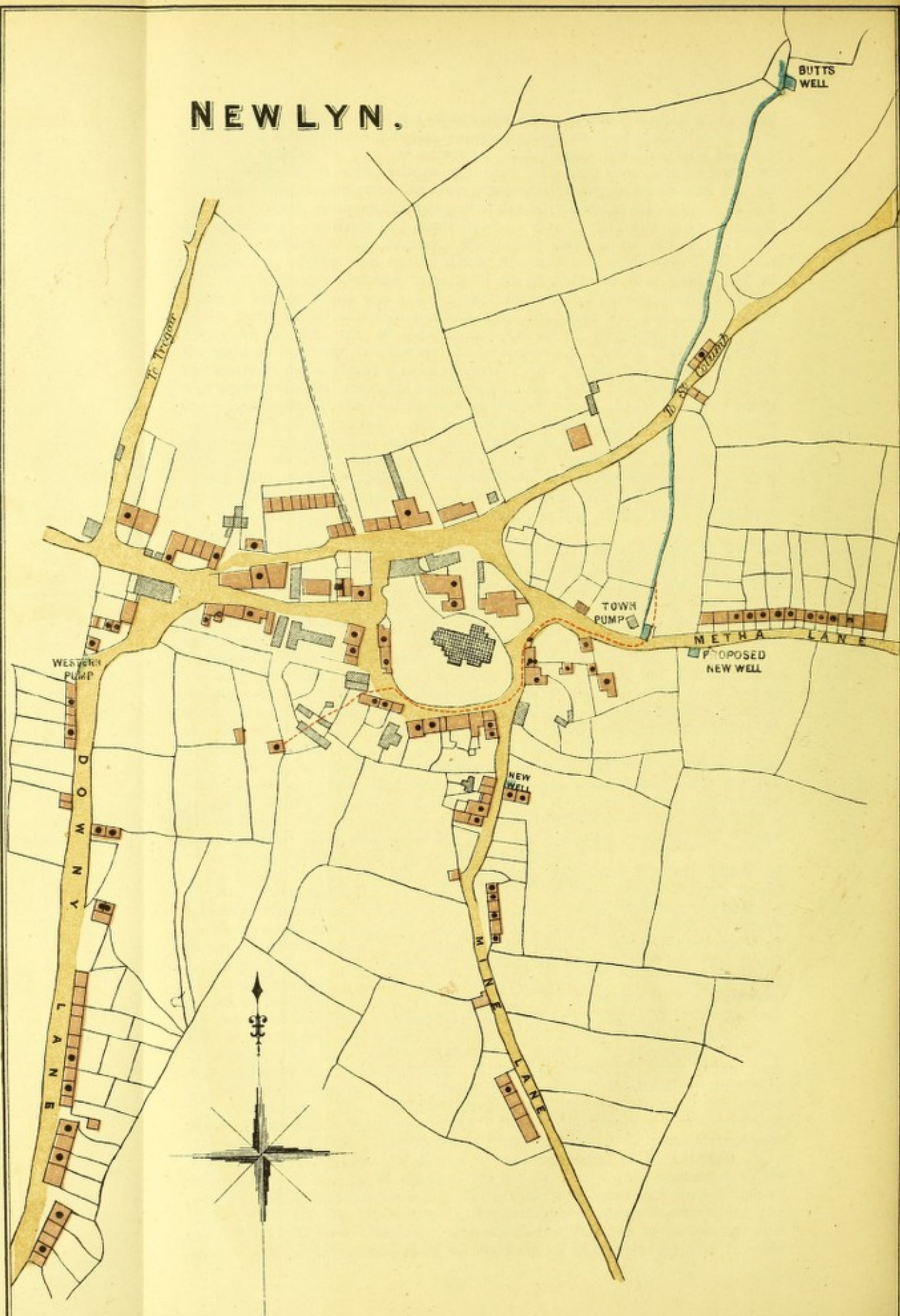
On September 24 Dr. Mackay, the newly appointed Medical Officer of Health, when making a primary visitation of his district, became unexpectedly aware of the fact that a serious epidemic of enteric fever was existent at Newlyn, at once inquired into it, visited several of the sick to satisfy himself of the nature of the disease, and the next day reported the results of his inquiry to the Guardians of St. Columb Major, who are the Rural Sanitary Authority. Continuing his inquiries specially into the causes of the epidemic, he reported again on October 21. By a minute of the Authority he was prohibited from obeying the Board's Order of March 12 last, requiring him to transmit a copy of each of these special reports for the information of the Board. By the courtesy of the clerk, however, in complying with my request for copies, I obtained copies of these reports, and forward them with this report. I append to this report the minute of the Sanitary Authority just referred to. The first intimation of the outbreak which the Board received was from a paragraph in the "Times" newspaper of October 19, and it was in view of that paragraph that I was instructed to make an inquiry. I commenced it on October 23, and it was terminated on November 1. Up to November 1 the list of cases given me by Mr. Vigurs amounted to 99 persons; probably there were in addition other mild cases not on the list, so that I shall not be far wrong in estimating that about one-sixth of the population had been attacked. The number of families or houses invaded was 62 (more than one-third of all the families in the place); and in some



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NEW LYN.



instances I saw from two to four persons in a house sick with enteric fever in various stages and of various grades of severity. The number of deaths up to November 1st had been nine (one of these questionably due to fever).

At my first visit I found that the Authority had closed the town well on October 1, since the Medical Officer of Health had attributed the spread of the fever to its use, and that Mr. Vigurs had been supplied with disinfectants for use in the houses of the sick. Private efforts had just commenced to be made to supply drinking water by means of a small watercart, but the majority of the population were obtaining water from Butt's spring. The Authority were erecting a windlass over and deepening the "new well" so as to obtain water from it; and removing from the "western well" the old pump, the iron pipe of which was believed by its corrosion to have rendered the water distasteful. They were also negotiating for a site for a new well at the roadside not far from the town pump. The Authority were thus carrying out in the best way that occurred to them the recommendations of their medical adviser.

Accurately determining the dates of the first definite symptoms in the earlier cases of fever, I found that the first three cases of which I could obtain any information commenced respectively on the 16th, 17th, and 18th of September; that the next seven cases commenced on September 19th, and the next 13 cases between the 20th and 23rd. Altogether at least 23 cases occurred during the first eight days of the outbreak. The first of the above cases (taken ill on September 16), was that of a young girl who had not been out of the village for a long time prior to her seizure, and who resided in a wretched dilapidated cottage without any privy, behind the church, and the slops from whose residence flowed into the town drain.* The second case (taken ill on September 17), was a little boy residing at one of the houses at the outskirts of the village in Downey Lane, and the third (taken ill on the 18th) resided in the part of the village near the church. Of the seven cases which commenced on the 19th all resided in the part of the village near the church. After these, the cases occurred in all parts of the village.

The accompanying rough plan of the village indicates by black dots the houses invaded up to November 1. On looking at this map one cannot fail to be struck by the fact that the greater proportion of the families invaded resided in the part of the village nearest to the "town pump," and most conveniently situated for obtaining their water supply from this pump, and who therefore may be fairly presumed to have used the water in greatest quantity and the most freely for all purposes. As a matter of fact, all the persons taken ill early in the outbreak, and of whom I made inquiry, did use habitually for drinking purposes the water of this well. It had a high repute generally in the village. Indeed, on September 25th, Dr. Mackay was probably perfectly correct in attributing the epidemic, as he did in his report of that date, to the use of this particular well-water. There was nothing else in common to all these families besides the use of this well-water; especially there was nothing else in common to the two first families invaded on consecutive days whose residences were about a quarter of a mile apart. That this well-water was very greatly and principally concerned in the spread of the epidemic may be gathered also from this, namely, that at the date when the town-pump water ceased to be an influence [the pump was closed on October 1, and its influence would be manifested up to October 15, but not longer], the average daily number of fresh attacks fell from 2.7 to 1.0; 57 cases occurred in the days September 24 to October 15 inclusive; 19 in the days from October 16 to November 1, when I left Newlyn.

But it is clear that the use of this well-water was not the sole cause of the spread of the disease, or the last 19 or 20 cases would not have occurred. Three other causes at least were operative. One of these was the sale and distribution of milk throughout the epidemic from houses and families which at the time had cases of fever in them, or where infected "town" well-water was used for the cleansing of the vessels in which the milk was contained. Another cause was most unquestionably the use of infected

* On November 15, during a slight gale of wind, this cottage actually fell, a woman who was ill with fever being in bed there at the time.

privies by several families in common, and exposure to the emanations from these and from their overflows running sometimes under houses in their course to the town drain; and generally, exposure to accidental infection by infected excrement lying about the surface of the village and about the Butt's spring. A third probable cause has been the scarcity of water in infected families, which forbade the observance of that personal cleanliness essential to the prevention of the spread of the disease in infected families. These three additional facilities for the spread of the fever have been operative all through the epidemic period.

Judging from the date of the earliest attacks, and allowing from 10 to 14 days for incubation of the disease, the town well probably became infected specifically with the contagium of enteric fever through the medium of the town drain, somewhere about the 5th or 6th of September. At this time the water in the well must have been low, and the well must have been deriving part of its supply by infiltration through the ground from the town drain. According to the rain register kept by Mr. Tredidgo, of Newquay, a few miles from Newlyn, the rainfall of June was 2·23 inches, and that of July 3·23 inches. Throughout the month of August rain only fell on two days, and then only to the total amount of ·14 inch, and from August 10 to September 9 no rain whatever had fallen. The most careful inquiries, however, that I have been able to institute have failed to discover by what means the specific contagium of enteric fever obtained access to the town drain. But various more or less probable agencies are conceivable; such, for instance, as the disturbance of some filthy and anciently infected material in the course of the drains; or the introduction of the disease by some person from elsewhere, the specific character of whose ailment failed to be recognised, or who passing through the village in an early, perhaps incubative, stage of his illness, had deposited excrement where it would reach the town drain, or whose soiled linen had been washed in the village. Enteric fever had been prevalent in various parts of Cornwall and Devon. Newlyn is not many miles from Truro, where fever, I understand, had also been prevalent, and there is frequent communication between the two places.

Such facts, while they add to the probability that Newlyn itself may have received its specific contagium from a distance, teach also how mischievously a neglected village may affect other communities.

On October 21 I had an interview with the Rural Authority, and after explaining the main points mentioned in this report, I gave them in substance the following advice:—1. That a parochial committee should be appointed as early as possible to superintend and carry out, under the advice of the Medical Officer of Health, the necessary measures for arresting the epidemic. 2. That drinking-water from a demonstrably wholesome source outside the village should be daily supplied by a water-cart to the inhabitants until a permanent wholesome village supply can be provided. 3. That printed placards, to be drawn up by the Medical Officer of Health, should be affixed in various parts of the village, calling attention to the temporary water-supply, and warning against the use of the local wells. 4. That immediate steps should be taken by the Authority itself to disinfect thoroughly all accumulations of filth of every kind and all the privies in the village, under the direction of the Medical Officer of Health; and that proper disinfectants should be provided for domestic use, with printed directions how to use them. 5. That in the absence of any public means of disinfection of soiled bed clothes, linen, &c., the Authority should temporarily establish a public laundry where such soiled articles could be disinfected and washed free of cost. 6. That a temporary hospital should be at once established for the reception of cases from newly-invaded families, and, so far as practicable, from other families not having proper lodgment. I left with the Authority a written memorandum embodying this advice.

EDWARD BALLARD.

November 5, 1880.

POSTSCRIPT.—The following statement, derived from the Medical Officer of Health, shows the progress of the epidemic subsequently to November 1 and up to December 7 :—

—	New cases.	Families newly invaded.	Deaths.
Nov. 2 to Nov. 14 -	11	4	3
Nov. 15 to Dec. 7 -	6	1	3

Dr. Vigurs states that the last case that came under his observation in the village was on November 25.

The total number of cases, then, treated during the epidemic up to December 7, had been 116, the number of families invaded 67, and the number of deaths 14 or 15.

December 8, 1880.

Recommendations.

The object of these recommendations is to place the village in a wholesome condition generally, and to prevent the recurrence of epidemic disease.

1. Proper sewers should as speedily as possible be provided, and on their provision all private premises for which they are available should be duly drained into them, care being also taken that both sewers and house drains should be properly ventilated. The old village drain should then be broken up and destroyed. The sewage should be so dealt with as not to become a nuisance.
2. The liability of the water in local wells to be scanty in the summer time, and at all times to become polluted by infiltration of filthy and dangerous matter, makes it necessary that the Sanitary Authority should at once proceed to carry out the duty imposed upon them by the Public Health Act, 1875, by providing a public supply of wholesome water from some safe source outside the limits of the village. A village water supply having been provided, the Authority should cause it to be laid on to all houses in the village, by the exercise of their powers under section 62 of the Public Health Act.
3. The Sanitary Authority should at once cause to be made a thorough inspection of the village, with a view to ascertaining what houses are unprovided with privy accommodation. The owners of such houses should be required to provide such accommodation immediately. Existing privies which are a nuisance or dangerous to health should be so dealt with under sections 94 to 96 of the Public Health Act as not only to cause abatement of present nuisance, but also to prevent its recurrence. Probably the best mode of effecting this object would be the abolition of cesspit privies, and the establishment throughout the village of one of the dry methods of dealing with excrement, the Sanitary Authority undertaking by their own officers the removal of excrement periodically from private premises. In carrying out this recommendation the Sanitary Authority may with advantage consult the Departmental Report upon Excrement Nuisances. Obvious nuisances, such as accumulations of filth, &c., should be actively looked after and abated.
4. Houses unfit for human habitation, or in such a state as to be injurious to health, should be dealt with under section 91 *et seq.* of the Public Health Act.
5. The Sanitary Authority should provide under section 131 of the Public Health Act a hospital for the reception and isolation of cases of dangerous spreading diseases. Such provision, permitting immediate isolation of any case of such disease that may occur, would be calculated to prevent the epidemic spread of the disease through the village and to other places beyond its limits. Public means of

disinfection of infected articles of bedding, clothing, &c. should be also permanently provided.

6. A parochial committee should be constituted to watch over the sanitary condition of the village; it should be empowered to deal with nuisances by speedy action under the provisions of the Public Health Act, and be instructed so to do, and to carry out strictly those sections of the Act, sections 120 to 129, which relate to the prevention of the spread of infectious diseases. The appointment of such committee, desirable for rapidity of local action, will not relieve the Guardians, as a body, of their obligation to see to the sanitary welfare of the village.
7. The Guardians (who are also the Rural Sanitary Authority) should request their District Medical Officers, on any case of dangerous disease liable to spread coming to their knowledge, without delay to acquaint the Medical Officer of Health with the fact, in order that it may be speedily dealt with. The Guardians should also make arrangements with the local registrars to furnish the Medical Officer of Health with *immediate* information of any death registered from fever or other dangerous infectious disease, as well as to supply him with periodical returns of mortality. All such information and returns should give particulars of name and residence.

APPENDIX.

EXTRACT from MINUTES of the RURAL SANITARY AUTHORITY of ST. COLUMB,
October 14th, 1880.

"Dr. Mackay, having asked the Board whether he is expected to send reports to the Local Government Board, according to Article 15, of the Medical Officers of Health's duties.

"Dr. Richard Cardell proposes and Mr. Thomas C. Lobb seconds, that he be directed not to send such reports, as the Local Government Board refuse to pay any part of his salary.

"Mr. John Rowse proposes and Mr. William H. Roberts seconds, that Dr. Mackay do send such reports.

"Original proposition carried."
