

Dr. G.S. Buchanan's report to the Local Government Board upon an outbreak of enteric fever at Wadebridge, in the rural district of St. Columb Major, upon the sanitary condition of the place and upon administration by the St. Columb Major Rural District Council / [G.S. Buchanan].

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**Dr. G. S. Buchanan's Report to the Local Government Board
upon an Outbreak of Enteric Fever at Wadebridge, in the
Rural District of St. Columb Major; upon the Sanitary
condition of the place; and upon Administration by the
St. Columb Major Rural District Council.**

RICHARD T. THORNE,

Medical Officer,

December 7th, 1897.

In the latter part of August, 1897, the Board were informed by Dr. E. C. Edwards, in his capacity as deputy to Dr. Mackay, Medical Officer of Health of the St. Columb Major Rural District, that an outbreak of enteric fever had occurred in Wadebridge, a small town situated in St. Breock, one of the parishes of that Rural District.

On receipt of this information, the Board, having in view the unsatisfactory nature of the water supply and other sanitary shortcomings of Wadebridge, which had again and again been commented on in the annual reports of the Medical Officer of Health, inquired what action this Rural District Council proposed to take to provide wholesome water and to carry out other sanitary measures necessary for the place. Later, complaints having come to the Board from the Parish Council of St. Breock and from certain inhabitants of Wadebridge as to prevalence of insanitary conditions and as to increase of the fever, and no reply having meanwhile been received to the Board's letter, local inquiry was ordered. Accordingly I visited Wadebridge on September 28th, and following days.

**PART I.—WADEBRIDGE; ITS SANITARY CONDITION AND
ADMINISTRATION.**

The town of Wadebridge is situated on the western bank of the River Camel, some six miles above Padstow, on the north coast of Cornwall. All parts of the town are on Devonian rock, covered in places by a few feet of surface soil. Its western portion, between "White Rock" and the western end of Molesworth Street, stands from 50 to 100 feet above Ordnance Datum. From the higher ground hereabouts the land on which the town is built falls, to north-east by a gradual slope to the Camel, to south-west steeply to Polmorla Brook, which joins the Camel at Wadebridge.

Immediately opposite Wadebridge, and reached by a 15th century stone bridge, is a long street of houses called "Egloshayle Road," leading to the village of Egloshayle, some $\frac{3}{4}$ mile up the Camel on its eastern bank. This street and village are in the Bodmin Rural District, which is here separated from the St. Columb Major Rural District by the Camel River. For practical purposes, however, they may be considered as forming part of Wadebridge.

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The number of inhabited houses in Wadebridge proper is approximately 280. The present population of the town is computed as between 1,200 and 1,300. In this computation no account is taken of a considerable number of persons whose daily occupation is in Wadebridge, but whose place of dwelling is across the bridge in Egloshayle Road or in Egloshayle. The two latter are estimated to contain about 240 houses, and to have a population of some 900 persons.

Wadebridge is a commercial centre for the agricultural population of a wide area on either side of the Camel. The principal street of the town, Molesworth Street, contains hotels and shops of good class. There are also a few warehouses, a small iron foundry, and a tannery. Wadebridge is now served by an extension of the South-Western Railway, as well as by a branch of the Great Western from Bodmin. There are quays on the Camel below the Egloshayle bridge, to which coasting vessels come up on the spring tides. These vessels carry away china clay and stone, brought by the railways from various parts of Cornwall. The town is frequently made a starting point by tourists, but is not otherwise frequented by holiday visitors. On the whole, Wadebridge may be said to be a little town commercially well to do, and promising to grow in the future owing to increased facilities of railway communication.

Sanitary Condition.

The *dwellings* are for the most part substantially built of the stone of the country, in many cases faced with plaster or cement, or in the case of poorer dwellings, having an outside coating of limewash. All but a few newly-built houses are without damp-proof course, and many are damp in consequence. Dampness of walls in some of the cottages is aggravated by the absence of eave-gutters. In the higher part of the town the dwellings are mostly separate, and many are provided with garden ground; but towards the river houses and shops, some of better class among the number, are crowded together and at best have small (usually paved) yards. The poorer class cottages in the town have indeed in many cases been built back to back (as in Trevanson Street) or have been left unprovided with windows at the back or with back doors. Instances of the latter condition were observed in "Truscott's Cottages," "Hooper's Court," in cottages below the cliff in Foundry Road, and elsewhere. Cottages such as these have usually a single small room above and another below, each with an inadequate window in the front wall. Having been built right up to the road, they have no open space belonging to them. Overcrowding is occasionally met with in such dwellings.

The *Roadways* are mainly of macadam. That of Molesworth Street is in good condition. It is a public highway for which the Cornwall County Council are responsible. Elsewhere in the town roadways are in places uneven, and their guttering is imperfect. There are paved footways in certain streets, provided, I was informed, by owners or occupiers of houses therein.

Sewerage and House Drainage.—Along the greater length of Molesworth Street there runs an old so-called "sewer" leading directly to the river, where its outlet can be seen at low tide. This "sewer," locally termed a "stone sewer," is a mere channel below the surface of the roadway. It is rectangular in section, the floor being earth or rock, the sides three or four courses of stone, apparently put together without mortar, cement, or concrete, while large flat stones form its roof. Other "sewers" of similar construction are to be found elsewhere in the town, but their position is usually quite uncertain. Outlets of some of these rubble drains are to be observed on the river bank on either side of the Egloshayle bridge.

Surface water from the roads reaches these rubble drains by way of gullies placed at irregular intervals by the side of the roadway. These gullies are said to be commonly untrapped. Some are placed directly over the rubble drains, others are believed to be connected with a neighbouring rubble drain by a short channel built of stone, or by common drain-pipes. Rainwater from buildings is usually collected on the premises in tubs or tanks.



Few dwellings have inside drains, but most have a gully on or near the premises which receives surface water and slop water. The destination of matters thrown into these gullies is usually unknown, but probably in most cases they pass by rubble channels or by pipe drains to one of the "stone sewers," and so, nominally, to the river. Gullies of this class recently put down at the instance of owners or occupiers are, as a rule, trapped. The inhabitants of cottages which have no open space belonging to them dispose of slop water in gutters or gullies in the roadway. Certain single dwellings in the lower part of the town, facing the river or Polmorla Brook, appear to be drained to the waterside independently of neighbouring buildings.

Excrement and Refuse Disposal.—Several dwellings have water-closets. In some of the better class houses and shops water-closets are placed within the building, and are usually flushed with rainwater from tanks fixed below the roof. Elsewhere the water-closets are outside the dwelling, and these in almost all cases are destitute of flushing apparatus. Such closets are habitually foul. Soil pipes of water-closets in most cases are believed to be led to neighbouring drains, which discharge their contents into one or other of the "stone sewers."

A majority of dwellings are served by privies in their yards or gardens. Most privies have been provided, by occupier or owner, with pails or other movable receptacles. In other privies the space beneath the seat is connected either with a privy-pit—a capacious hole in the ground, provided with a stone cover—or with an open midden which also receives house refuse. Privies, privy-pits, and middens have not infrequently been placed objectionably close to dwellings. Certain privies and closets serve a number of houses in common. Thus a block of cottages in Trevanson Street has only two privies to eight dwellings. The inhabitants of other cottages (*e.g.*, those opposite the "Old Town Hall") have no privy or closet accommodation whatever.

House refuse is usually stored in pails or is heaped in some convenient corner near the dwelling. There is no system of public scavenging in Wadebridge, and there are no bye-laws imposing upon householders the duty of periodically removing excrement and refuse. Some of the inhabitants are able, on their gardens, to dispose of house refuse and contents of their privy-pail, privy-pit, or midden; and they do so when they think necessary. As regards dwellings unprovided with gardens, the inhabitants, at such times as they please, remove refuse from the proximity of their houses. Frequently they deposit it by a neighbouring road-side, and thus nuisance arises. At the time of my visit I found that, as a temporary measure authorised by a Committee dealing with the fever outbreak, a public scavenger had been busily employed in the town for several weeks. I was informed that before the advent of this scavenger, numerous and objectionable collections of excrement and refuse were to be met with in every part of Wadebridge.

The *Water Supply* of the town is derived from wells. The occupiers of certain houses have wells on their own premises, to which, either as a favour or in return for a small payment, they not infrequently allow their neighbours access. But the majority of householders resort to one or other of five public wells in the town. Wells in Wadebridge are said to be sunk usually 20 to 30 feet in the rock. They cannot readily be examined, as they are in each case fitted with a pump; their shafts can only be viewed after removing surface soil and raising a stone cover. "Craig's Well," one of the five public wells, which was opened for my inspection, has a depth of 25 feet. For a few feet below the ground level it has a steining consisting of courses of stone, not cemented together and permitting leakage into the well from the surrounding soil; the remainder of the well-shaft has no steining, the wall of the well being formed by the rock of the place. From inquiry I gathered that the generality of wells in the town, both public and private, do not differ materially in construction from "Craig's Well."

These wells furnish an uncertain quantity of water. Four of the public wells, and several private wells, are reported to have failed during one or another period of drought.

From the account that I have already given of Wadebridge it is not difficult to comprehend that the wells there are exposed to numerous risks of pollution. The rock in which they are sunk is itself in a measure disintegrated, and everywhere it shows fissures, both parallel and vertical to the dip of the strata. At many points in the town soakage of liquid filth into this pervious rock constantly occurs from accumulations of excrement and refuse heaped on the surface soil, and from privy-pits and middens. Worse still, the rock is traversed by rubble drains; underground channels the position of which no one knows, and from which liquid refuse and water-closet sewage can readily escape. As illustrative of the risks of pollution to which wells in the town are exposed I may refer to three wells: (1) the public "Wills' Well," which, when the roadway was taken up at the time of my visit, was found to have within 10 feet of it the Molesworth Street rubble "sewer" already described, while not more than 3 feet from it was found a pipe drain, with broken and leaky joints, passing to this "sewer" from a water-closet in a neighbouring house; (2) "Craig's Well," a public well to which reference will be made in connection with the fever outbreak; (3) a private well at White Rock, where within a radius of 12 yards are no fewer than three privy-pits, each so constructed as to permit soakage of its contents into the surrounding soil. Other examples of wells as obviously liable to pollution might be given. In September of this year samples taken from four of the five public wells were reported by the Analyst of the County of Cornwall as, in each case, "badly contaminated with sewage,"* while on analysis made at the instance of their owners, waters from certain private wells have recently been similarly condemned. In the case of one or two private wells, I was told, a particular sample sent to be analysed has not shown chemical evidence of sewage pollution. Nevertheless, having regard to the many places and the numerous ways in which the soil of Wadebridge is habitually fouled, it seems scarcely possible to assert for any well in the place that it is not liable at one or another time to dangerous contamination.

Sanitary Administration.

The Authority entrusted with the sanitary administration of Wadebridge is the St. Columb Major Rural District Council. The rural district administered by this Authority is of large area, 73,804 acres; it had in 1891 a population of 11,834, and its present value rateable for the District Rate is £50,442. Wadebridge lies on the eastern confines of the district, and the parish of St. Breock, of which it forms part, is represented by four members on the Council. This Rural Council have their offices at St. Columb Major, some 8 miles from Wadebridge by road.

The *Medical Officer of Health* is Mr. J. C. Mackay, M.D., who is engaged in private practice at St. Columb. Dr. Mackay has kept himself acquainted with the sanitary condition of the various parts of his district, and since his appointment in 1880, he has, in annual and monthly reports to his Council, persistently pointed out many of the needs of the district and remedial action requiring to be taken by his authority. His salary is £50, half of which is repaid from county funds.

The *Inspector of Nuisances*, Mr. R. G. Hawken, who resides at St. Columb, receives a salary of £55, half of which is similarly repaid. He also undertakes, without extra payment, certain of the functions of a District Surveyor. He appears to work hard at the duties of his office, to which he devotes nearly the whole of his time. The district is so large, however, that his days are fully occupied in making visits at different points on receipt of complaints, and for this reason he is seldom able to make thorough and systematic inspection of any one part of the district. He is hampered in his work by the smallness of his salary, which compels him to make his journeys on foot.

The St. Columb District Council have taken no steps to possess themselves of the important powers in sanitary matters which legislature has made available to them in the shape of adoptive Acts and Bye-laws. They have, it appears, been altogether negligent of their duties in repression of infectious disease.

* The fifth well, "Hendys," situated on the hill side at the head of Molesworth Street, above any dwellings, has no obvious source of pollution in its neighbourhood. Chemical analysis of a sample of water therefrom failed to show sewage contamination.

MAP SHOWING BOUNDARIES OF PROPOSED NEW URBAN DISTRICT OF WADEBRIDGE.

The red shaded area represents the locality of Trevanson Street, in which 22 dwellings were invaded by enteric fever.

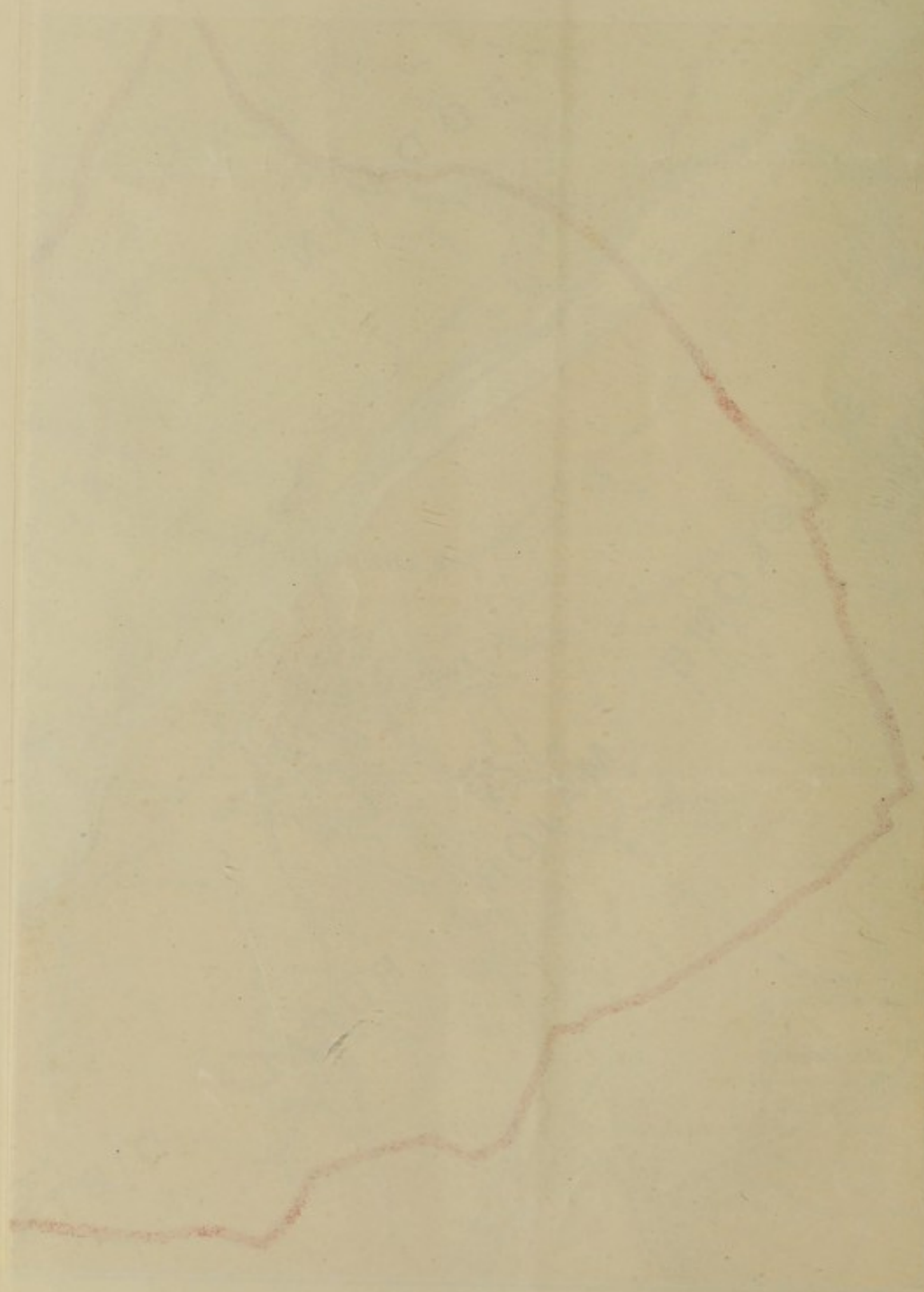
The red dots indicate the position of single invaded houses elsewhere in Wadebridge and Egloshayle.

Scale 6" to 1 Mile

KEY MAP SHOWING THE "TREVANSON STREET AREA".

- = Invaded houses. In each instance the number of dots corresponds to the number of persons attacked in the dwelling
- = Houses or premises the daily working place of persons attacked who lived outside the "Trevanson Street Area". In each instance the number of dots corresponds to the number of such persons.
- * A Shop referred to in text.
- Public wells.
- Private wells.





Thus they have not chosen to adopt the Infectious Disease (Notification) Act, 1889, and so, it would seem, they are nowise eager to be informed of the presence of preventable infectious maladies within their district. They have not adopted the Infectious Disease (Prevention) Act, 1890; they have taken no steps to provide a hospital for the isolation of infectious cases; and they have no disinfecting apparatus. No part of the Public Health Acts Amendment Act of 1890 has been adopted by this Authority. The only series of bye-laws which they possess relates to Common Lodging Houses, of which there are none in the district.

The town of Wadebridge, the only part of the St. Columb Rural District which I inspected, affords many illustrations of the evil consequences of the supineness of this District Council in sanitary matters. Thus, owing to the absence of bye-laws for New Streets and Buildings, a row of houses which has just been completed in Wadebridge has been provided with a "sewer" and with house-drains, the character and position of which are unknown to any officer of the District Council. Each of these houses, I found, has a "water"-closet of objectionable construction and without means of flushing. Gullies serving these houses have been provided with inefficient "stonemason's traps." Other recently built houses have been constructed without damp-proof courses. The effect in Wadebridge of the neglect of this Authority to adopt bye-laws relating to Nuisances has already been referred to. Owing, no doubt, to the absence of bye-laws relating to Slaughter-houses, I found that neither of the two slaughter-houses of Wadebridge is properly provided with water, while in the centre of the floor of one of them was discovered an objectionable pit which accumulated and retained blood and the washings of the slaughter-house. Again, the history of the present outbreak of enteric fever shows the extent to which this Authority is unprepared to deal efficiently with infectious disease prevalent in their district.

As regards Wadebridge therefore in particular, the question arises, have the St. Columb District Council been kept informed of the numerous and dangerous insanitary conditions of the place, and, if so, what remedial measures have they undertaken or attempted?

The first part of the question can readily be answered by a perusal of their Medical Officer of Health's Annual Reports from 1891 to 1896. Each of these reports draws the attention of the Council to the pressing need of a wholesome public water service for Wadebridge, and to various other sanitary defects in the town. Again, it appears that in their monthly reviews of the public health of the County, the Sanitary Committee of the Cornwall County Council since 1894 have frequently drawn the attention of the St. Columb District Council to the shortcomings of Wadebridge. Furthermore, during the same period the Board have on several occasions written to this Council, inquiring what steps would be taken in order to remedy the objectionable state of affairs in Wadebridge, reported annually by the Medical Officer of Health.

The second part of the question can, unfortunately, be equally easily answered. Notwithstanding all these representations, the St. Columb District Council have continued to neglect to authorise sanitary improvements in Wadebridge. Locally, I found, the explanation given for this neglect was in part that the St. Breock representatives on the District Council had not greatly bestirred themselves in the matter, but principally that the majority of members of the Council, who come from agricultural parts of the district, have been reluctant to take any steps which would bring about an increased District rate for purposes which, in their belief, would benefit only a particular section of that district. It appears, however, that this Council have pursued their habitual policy of inaction even where improvements in Wadebridge could have been in large measure borne by special rating within the town itself. Thus, in 1892, certain Wadebridge residents formed themselves a local Committee, and proceeded, with the approval of a public meeting in the town, to engage the services of an engineer and of a chemist to prepare a scheme for a public water supply from gathering grounds at Haycock, on St. Breock Down. The project was favourably reported on, and the cost of the necessary works was estimated. The District Council were urged either to adopt the scheme, or to make other provision for a public water service for Wadebridge. But that body instituted no inquiries as to the sufficiency and purity of the proposed

supply, or as to the other public health aspects of the matter. Being pressed, however, by the local Committee they were moved to apply to the Local Government Board that Wadebridge should be made a Special Drainage District, in order that a public water supply might be provided for it at the cost of its inhabitants. It was then explained to them by the Board that although the formation of a Special Drainage District might be entertained if, in addition to a water supply, the District Council desired to undertake a comprehensive scheme of sewerage and other public works in Wadebridge, yet if water supply alone were in question, the powers which the District Council already possessed under Section 56 of the Public Health Act, 1875, and under Section 9 of the Public Health (Water) Act, 1878, were practically sufficient to enable the cost of a water scheme to be thrown upon the inhabitants of the locality to be benefited. Notwithstanding this assurance, the District Council, after protracted correspondence with the local Committee, declined to proceed with any water scheme, or to pursue their application for a Special Drainage District. Similar representations since made to them by the Parish Council of St. Breock* have had no better result.

Proposed constitution of an Urban District of Wadebridge.

In February of this year the Cornwall County Council in pursuance of powers under the Local Government Act, 1888, caused public inquiry to be held at Wadebridge with a view to uniting in a single district, to be called the Wadebridge Urban District, the area enclosed within the red boundary shown on the accompanying map, and comprising that part of the parish of St. Breock, in the Union and Rural District of St. Columb Major, which constitutes Wadebridge, along with that part of the parish of Egloshayle in the Union and Rural District of Bodmin, which constitutes Egloshayle village and Egloshayle Road. Under such Order the proposed Wadebridge Urban District was to form part of the Union of Bodmin. The number of inhabited houses in the proposed district is computed as some 520, and its population as approximately 2,200.

At the inquiry certain objections to the suggested Order were made by the St. Columb Rural District Council and by the St. Columb Guardians. The County Council, however, made the Order, which provides that the new district shall come into existence on January 1st of next year. This Order was in July sent by the County Council to the Board, but in the following month both the St. Columb District Council and the St. Columb Guardians petitioned the Board that it should not be confirmed.

In September, however, I learnt in Wadebridge from the Chairman and Clerk of the St. Columb District Council that, as they then believed, this Authority does not now desire to pursue its objection to the Order. It is hardly surprising to find that this new attitude is locally construed to mean that the District Council now see that they will not be suffered to continue receiving sanitary rates from Wadebridge while doing little or nothing for the welfare of the place, and that they have come to welcome a scheme which will so speedily release them from the necessity of undertaking a comprehensive scheme of sanitary improvement in the town at the expense of the rates of a larger area.

PART II.—THE OUTBREAK OF ENTERIC FEVER.

With the assistance of Dr. Mackay, Medical Officer of Health of St. Columb, of Dr. Mudge, Medical Officer of Health of Bodmin Rural District (where infectious maladies are compulsorily notified), and of the two local medical practitioners, I was able to make a list of persons in Wadebridge and Egloshayle† who were pronounced on medical authority to have been attacked by enteric fever during the outbreak. These persons were 50 in number. Probably there were in addition certain mild cases which passed unrecognized. In the case of two children, for instance, I learnt of illness of comparatively short duration, but characterized by symptoms suspicious of enteric fever. But the total number of unrecognized cases in the area in question must needs have been relatively small.

* In April, 1895, the St. Breock Parish Council caused notices to be put up over certain of the public pumps cautioning persons against using the water for drinking. In the absence of an alternative supply, however, this caution has been almost wholly disregarded.

† Using "Egloshayle" to include Egloshayle Road as well as Egloshayle village.

Additional nine attacks of definite fever were heard of in persons who did not live in Wadebridge or in Egloshayle, but who having visited Wadebridge during the epidemic had subsequently fallen ill of the fever. One of these nine cases was reported to have been fatal. I was, however, unable to make personal inquiry into any of these cases, all of whom lived far away from the town.

The 50 Wadebridge and Egloshayle cases were distributed as follows as regards age and fatal result.

	0—	10—	20—	30—	40 and upwards.	Total.
Persons attacked (Males 29, Females 21.)	10	11	14	10	5	50
Deaths (Males 5, Females 4.)	1	1	7	—	—	9

Ascertaining as to each of these 50 cases the date on which medical advice was first sought, or if earlier, the date of onset of definite illness, I found that the number of persons attacked, fortnight by fortnight, could be approximately set out as follows :—

Fortnight ending	Persons attacked in Wadebridge and Egloshayle.	Houses in Wadebridge and Egloshayle newly invaded.
July 4	1	1
" 18	1	1
Aug. 1	9	6
" 15	14	10
" 29	17	8
Sept. 12	7	6
" 26	1	1
TOTAL	50	33

In 12 of the 33 houses invaded during the outbreak more than one case had occurred. In one of these houses five cases, in another two cases, in two others one case had occurred a fortnight or more after the first person in the house had been attacked. On the other hand each of the remaining eight out of these 12 households had sustained two attacks per house, occurring as far as could be ascertained either simultaneously or with less than a fortnight's interval between them.

Coming to investigate the circumstances of the persons attacked, the first prominent fact of the outbreak was that the bulk of the invaded houses were comprised within a small area, which I will call the "Trevanson Street area," at the northern end of the town. This area, shaded red on the accompanying map, included about 120 yards of the north side of Molesworth Street, between the Egloshayle bridge and Trevanson Street; a block of dwellings which on the west side abuts on Trevanson Street and on the east faces the quay; and a hut between this block and the waterside. The incidence of fever within this area is exhibited in detail on a separate key map. Of a total of 37 dwellings in Trevanson Street area as above defined, fever had occurred in no less than 22, whereas in the rest of Wadebridge and Egloshayle only 11 out of some 480 dwellings had been invaded. My first endeavour, therefore, was to seek for some agency of infection which had been peculiarly operative upon dwellers in the Trevanson Street area. The water supply of this area at once came under suspicion, the more as I found that Dr. Mackay was already in position to affirm that a large proportion of the inhabitants of the area, as well as certain

persons attacked who lived elsewhere in Wadebridge, had consumed water from a single public well within it. Before dealing with the question of water supply, however, I will briefly refer to other conditions which the inhabitants of the infected area, and particularly those who were attacked, might be thought to have had in common.

The houses in this area consist, in Molesworth Street, of some of the principal shops in the town, two or three of them having small workshops attached. The block between Trevanson Street and the quay consists of 17 cottages inhabited principally by agricultural labourers and artisans, and of the 10 houses of Marine Terrace, fronting the quay, which are of better class. The bulk of the inhabitants of the area are thus not habitually brought by occupation or otherwise into personal relations one with another. Within the area I found households of all three classes alike had been invaded.

Milk consumed within the area comes from a plurality of farms outside Wadebridge, and had been either purchased from shops in the town, or from itinerant vendors. Each of these shops and vendors supplies customers in the town other than those in Trevanson Street area. And in the case of those attacked I learnt that the milk, if any, consumed prior to the illness, could be traced to at least four vendors, supplying milk from four separate farms.

I could not learn that the households attacked within the area habitually resorted for other articles of food to any single shop, nor, indeed, is there any purveyor of food or drink in the neighbourhood whose customers can be thought of as being limited to the small group of houses in question.

The water supply of Trevanson Street area is obtained from four wells; one a public well, called "Craig's Well," and three private wells, serving respectively the premises of Messrs. X., Y., and Z. Mr. X.'s well is situate some 30 feet, Mr. Y.'s some 40 feet, and Mr. Z.'s some 50 feet from "Craig's Well."

The area served by these four wells was found almost to coincide with the heavily invaded "Trevanson Street area." Thus occupants of the uninvaded dwellings to the west of Trevanson Street were found in each case to have resorted to one of the public wells other than "Craig's Well," or to have been served by private wells outside the area. Again, while dwellings on the north side of Molesworth Street, in each instance served by one of the four implicated wells, had been severely invaded by fever, in each of the dwellings on the south side of this street, not one of which had been invaded, the inhabitants had resorted to wells other than "Craig's," X.'s, Y.'s, or Z.'s.

The suspicion which thus attached to the water of "Craig's" and three adjacent wells was confirmed by the following observations:—

1. Of 22 invaded houses in Trevanson Street area I found that the inhabitants of 17 had habitually obtained drinking water from "Craig's Well"; those of other three were said ordinarily to have resorted to other wells, but had occasionally obtained drinking water from "Craig's Well," while the inhabitants of the remaining two invaded houses, Mr. X.'s and Mr. Y.'s, had been served, as has been said, in each instance by a private well close by "Craig's Well."

2. Of the 15 households within the Trevanson Street area which escaped, that of Mr. Z. has its own well, already referred to as being also close to "Craig's Well." Although none of the Z. family suffered, a boy in their daily employ, who lives outside the Trevanson Street area, had been attacked. Only seven uninvaded households had used water from "Craig's Well," and of these seven, the inhabitants of three are old people, who may be considered unlikely to contract enteric fever, and the inhabitants of other two state that it has long been their custom to boil all water used for drinking. The occupants of the remaining seven uninvaded houses within the area stated in each instance that, mistrusting the purity of "Craig's Well" water, they had, during and for some time previous to the outbreak, resorted to one of two wells outside the area altogether.

3. Several of the persons attacked who lived elsewhere than in Trevanson Street area were ascertained to have come into relation with this area or to have

consumed water from one of the implicated wells within two weeks or so of their attack. Thus :—

A total of four persons living in Egloshayle were attacked during the outbreak. One was a man in daily employment at Mr. X.'s, in the Trevanson Street area at Wadebridge. He had gone to work as usual up to the time of sickening with fever. He informed me that he had frequently drunk water which came from Mr. X.'s well there. In the second case, which had been fatal, I ascertained that the sufferer, a girl in daily work at Wadebridge, had up to the time of her illness had her meals at the home of a relative in the Trevanson Street area, and had habitually drunk water from "Craig's Well." The third Egloshayle case, a builder's carpenter, was also in daily work at Wadebridge for several weeks prior to his attack. I ascertained that during that time he habitually dined, and, it is believed, drank water, at a house in the Trevanson Street area which obtains drinking water from "Craig's Well." This house, marked with a * on the map, was one of the seven using "Craig's Well" water at which no illness was reported among the inmates. The fourth Egloshayle case was a youth who had, a fortnight prior to the onset of his illness on August 5th, attended market at Wadebridge, and, it being a hot day, drank water copiously at another house within the area, also supplied from "Craig's Well."

In Wadebridge itself, eight persons living outside Trevanson Street area were attacked. In three cases, falling ill respectively about August 23rd, September 10th, and September 15th, I was unable to trace any association with Trevanson Street area or its water supply. It will be noted, however, that all three were attacked late in the epidemic. Other three worked daily within Trevanson Street area, in each instance on premises for which "Craig's Well" was the only source of supply resorted to; the seventh had drunk water from "Craig's Well" about two weeks before her attack; the eighth was a child said to be in the habit of drinking from the public pumps, and who may, therefore, have drunk from "Craig's Well."

Opportunities of pollution of "Craig's" and three adjoining wells had now to be looked for. I have already described the construction of "Craig's Well" on p. 3. I found within 10 yards of it a group of three privies which serve houses in Trevanson Street. Each of these privies has a movable receptacle beneath the seat. At the time of my inspection these receptacles were not full; but I was informed by several persons that some weeks before, each of them was in a filthy condition and that their contents overflowed on to the privy floors. These privy floors are slated but nevertheless would in places permit filth to soak through into the subjacent soil. Behind these three privies, and within 15 yards of the well, is another privy, used by persons employed at a wine merchant's store. The space beneath this privy is connected with a privy-pit of some 20 cubic feet capacity. This privy-pit is not made watertight by cement or otherwise, and its contents must needs pollute the soil in its neighbourhood. On ground between this privy-pit and the well, stable dung is stored, while within a few feet of the well is an open walled space now used chiefly for the deposit of broken bottles, but which is said to have accommodated, prior to the epidemic, a variety of objectionable refuse. On opening the roadway near "Craig's Well" a rubble drain was found. This rubble drain was ascertained to be the principal "sewer" of the town which here has received the drainage of the greater part of Molesworth Street. This "Molesworth Street sewer" leaves Molesworth Street at the junction of that street and Trevanson Street. It passes for a short distance along Trevanson Street to a point within 4 yards of "Craig's Well." At this point it bends at a right angle and passes on to its outlet below the Egloshayle bridge. Near this right-angled bend this "sewer" receives soil pipes from two closets, in Mr. X.'s and Mr. Y.'s premises respectively. The current in the "sewer" at this point is sluggish, and on the day the roadway was opened matters which had lodged at the opening of one of these soil pipes had not been washed away some four hours later, when the "sewer" was covered over.

The three private wells implicated, X.'s, Y.'s, and Z.'s, are each a little further removed than is "Craig's Well" from pollution from the privies, privy-pit, manure and refuse heap referred to. But all three are exposed to pollution

from the Molesworth Street rubble drain, which passes within 5 yards of each of them. Moreover, all four wells being close together and on the same level, they must needs draw upon the same limited body of water, so that a pollution of soil which occasions contamination of any one of them would also make for contamination of the other three.

In view of the numerous ways in which this group of wells may have been contaminated, there was difficulty in determining in what manner infection first reached them. It is clear that the water of each of these wells might readily have obtained its harmful quality, whether infectious matter from the first case or cases of enteric fever had been deposited in any one of the privies referred to, or on the adjacent dung heap or refuse heap, or whether brought into proximity of the well by way of the Molesworth Street rubble "sewer." I note, however, that the earliest of the 50 cases of fever of which I heard was the case of Mr. Y., whose attack preceded by nearly three weeks that of any other person ascertained to have suffered by the outbreak. The soil pipe of a water-closet in Mr. Y.'s dwelling, which was used by him during his illness, is one that has already been described as opening into the Molesworth Street rubble drain, close to the right-angled bend within four yards of "Craig's Well." Mr. Y.'s work, prior to his attack, took him every week to villages outside Wadebridge, but I could not ascertain that shortly before his illness he had come into relation with any antecedent case of enteric fever, either without or within the town. Whether or not, however, Mr. Y. was really the first person in Wadebridge to be attacked during the outbreak, there appears to be no doubt that the circumstances of his illness afforded a means of specific contamination of the water of the implicated wells, and that specific pollution from this source may have occurred almost day by day antecedent to the first weeks of the outbreak.

In view of the facts I have recorded, it may be concluded that the infective agent principally operative in this outbreak was drinking water derived from the group of wells in the Trevanson Street area. The facts do not, however, warrant assumption that every person attacked within Trevanson Street area had received his or her infection by way of drinking water. There can be little doubt that the soil of the area, and certain privies and closets serving premises there, became, in the course of the epidemic, polluted with infectious matters from enteric fever patients, and in exceptional cases such polluted soil, privies, or closets may have been the infecting agents. Nor, in respect of a certain few individuals, is it possible to exclude the supposition that they in each instance contracted infection within their own dwellings from some person or persons there who had already been attacked by the prevalent fever.

Action taken in repression of the Outbreak.

Although a number of persons in Wadebridge were recognised to be suffering from enteric fever in the month of July, neither Dr. Edwards, then acting as deputy to the Medical Officer of Health, nor any other officer of the St. Columb District Council became acquainted with the prevalence of fever in the place until August 12th. On this date Dr. Edwards learnt of a total of 14 cases. He at once made personal inquiry at Wadebridge, and subsequently reported to the St. Columb District Council and to the Board on the circumstances of the outbreak. That District Council meanwhile appointed its Wadebridge members a Committee to deal with the outbreak in conjunction with the St. Breock Parish Council. This Committee held several meetings, and, advised first by Dr. Edwards and later by Dr. Mackay, carried out a variety of remedial measures with commendable dispatch. A scavenger was appointed to give his whole time to removal of excrement and refuse from streets and premises; invaded houses were provided with pails for the reception of infected matters; these pails were collected twice a day by the scavenger and their contents buried in a field some distance out of the town; disinfectants were provided at invaded dwellings. Visits to invaded houses were made by the Medical Officer of Health and Inspector of Nuisances. In the absence of a hospital for infectious cases, little effective isolation of the sick could be practised. Two nurses were engaged,

and visited the poorer patients at their homes. Unfortunately several of the sufferers in small, crowded, ill-ventilated cottages had to be tended under conditions peculiarly unfavourable to their recovery. Persons in the town were cautioned by means of notices placed on the public pumps to boil all water previous to drinking. Although four of the five public wells of the town could be ascertained by observation of their surroundings to be liable to dangerous pollution, the Committee did not see their way to prohibit the use of these well waters until an adverse report respecting four out of the five had been received from the County Analyst. Then, on September 9th, the pumps serving three of these wells were locked, and three days later the pump of the fourth, "Craig's Well," was similarly dealt with. Carts were employed to bring water from a stream considered to afford a pure supply, at Pawton mill, two miles from Wadebridge. These carts delivered daily at houses in the town.

These arrangements were in force at the time of my visit, and appeared to be on the whole efficiently carried out. The Committee propose, I understand, so long as they have authority from the District Council, to retain the services of the public scavenger, and also to continue the cartage of water until arrangements can be made for a sufficient and wholesome public supply.

Before leaving Wadebridge I attended a meeting of this Committee, at which the Chairman and Clerk of the St. Columb Rural District Council were also present. I directed attention to the pressing need of obtaining a public supply of pure water for the place, and advised that, notwithstanding the decline of the epidemic and the inconvenience of having no water available from four of the public pumps, not one of them should be re-opened.

SUMMARY.

It has been set out, in Part I., how the town of Wadebridge has been allowed to remain in want of essentials to public health such as a pure water supply, a proper system of sewers, and a system of scavenging. It has also been shown, in Part II., how, when in one area in the town some case or cases of enteric fever occurred, the insanitary conditions arising from these deficiencies, culminating in the infection of the water of a group of wells, operated to produce an outbreak of fever severely affecting the inhabitants of that area and other persons elsewhere.

It is to be hoped that the authority responsible for the sanitary welfare of Wadebridge, whether the St. Columb Major Rural District Council or a newly constituted Wadebridge Urban District Council, will take heed of the lesson of this outbreak. Until, for the whole of Wadebridge, the provision of wholesome and sufficient water supply, of proper sewerage, and of systematic scavenging, has been effected, no preliminary steps will have been taken of the sort requisite to guard against outbreaks of a similar kind in future.

If the new Wadebridge Urban District Council be appointed, they will do well to undertake a comprehensive scheme of sanitary works without delay. Such works must needs provide for Egloshayle Road and Egloshayle, as well as for Wadebridge. In the details of such works, and in the many other matters which require attention, this new Authority will need the advice of trained and capable officers, and it is to be hoped that special pains will be taken to secure the best men available to fill the offices of Medical Officer of Health, Surveyor, and Inspector of Nuisances.

The outbreak has important lessons for the St. Columb District Council, whether or not Wadebridge be retained in their district.* As has been said, for years past the state of this town has again and again been brought to their notice by their Medical Officer of Health, by the Cornwall County Council, and by the Board. Had this Authority been mindful of their sanitary duties, a variety of unwholesome conditions which conduced to the outbreak would long ago have been removed. Clearly it behoves this Council to give far more serious

* This caution, I fear, is needed. I learn that on October 21st the St. Columb Rural District Council again rejected, by a substantial majority, a proposal that the Infectious Disease (Notification) Act should be adopted.

consideration than heretofore to representations respecting insanitary conditions in their district, and to take prompt and efficient action to remedy such conditions. There can be no question of the need in the St. Columb Rural District for the exercise of the powers which this Council can obtain under the provisions of the Adoptive Acts referred to on page 5, for the adoption by them of a code of bye-laws, and for the provision of a hospital for cases of infectious sickness. Finally, the Council would do well to take into consideration that, in view of the travelling necessary in so large a district, the services of their Medical Officer of Health and Inspector of Nuisances appear to be in each instance inadequately remunerated.

G. S. BUCHANAN.

November, 1897.