1886.

# Borough of Cardiff.

# REPORT

ON THE

# Sanitary Condition of Cardiff

DURING THE LAST

## FORTY YEARS,

AS ALSO

## FOR THE YEAR 1885.

BY

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CARDIFF,

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TO THE

# Cardiff Urban Sanitary Authority.

Gentlemen,

In the month of July last, the British Medical Association held its Annual Meeting in Cardiff; on that occasion I contributed a paper on "Cholera and other Zymotic Diseases in their Relation to Sanitation Practically Illustrated." This paper attracted some attention; it was based on the experience derived from careful observations, maintained in Cardiff, extending over a period of forty years.

At a subsequent Meeting of your Health Committee, it was resolved that this paper should be printed for general distribution. For various reasons this has been delayed. I was anxious that it should be carefully revised, any clerical errors corrected, and any necessary additions made that might elucidate the subject. It was also desirable that it should be accompanied with an outline map of the town, which would more clearly render many deductions that might otherwise be obscure. Moreover, I was impressed with the conviction that the objects the committee had in view would be best carried out by embodying it in my annual report.

This report will therefore not be confined to any particular year, but will embrace a far wider scope; it will, in fact, be a resumè of the Sanitary history of Cardiff, from a time immediately antecedent to the Public Health Act of 1848.

Some of the Epidemic visitations, to which it will be my desire to call your attention have long since passed away, yet a detailed description of the local conditions existing at each advent, which were considered to operate as predisposing or exciting causes of the disease, the measures taken to minimise its prevalence and intensity, and also to prevent a recurrence, with their results, may not be without interest or instruction.

The first important Epidemic to which I shall have to direct your attention is one of Typhus Fever. I may premise this by stating, that as the Delta of the Ganges is considered to be the birthplace of Cholera, so is Ireland that of Typhus Fever.

Typhus is the most infectious of all fevers ; its communicability from the sick to the healthy is in direct ratio to the contiguity to the patient, the duration of exposure, and the intensity of the virus in the atmosphere of the infected chamber ; hence it is those in immediate attendance on the sick rarely escape an attack of the disease. The specific nature of the contagia of Typhus Fever has not yet been discovered, many medical authorities are of opinion that it may be called into existence by destitution, filth, and misery ; but this is not in accord with the view of the late Dr. W. Budd, who first promulgated the theory that the septic poison of the zymotic diseases are specific organisms, possessing vitality ; that they never originate spontaneously, or *de novo*, and are only propagated by the law of continuous succession. This theory has been confirmed by the careful and patient researches instituted by our most eminent scientists such as M. Pasteur, Burdon-Sanderson, Koch, Klein and others. Which of these two opinions may be correct, further experience may be necessary to determine, but there can be no doubt that the predisposing and exciting causes of disease I have just enumerated, furnish a nutritive soil for rapid development and multiplication of the contagia.

The Epidemic was introduced into this district under the following circumstances. For some time previous to its introduction, the town of Cardiff was rapidly increasing in population, owing to the construction of Dock and Railway works, thus affording a large field for the employment of labourers, and many of this class were Irish, who were attracted here by the facilities of transit afforded by the large coasting trade, at that time existing, between this port and the South coast of Ireland. They established themselves here in small sectional colonies in different parts of the town, separate and distinct from the other inhabitants, notably, Stanley Street, Love Lane, Mary Ann Street, Little Frederick Street and David Street formed one section ; Mill Lane, Waterloo Place, the Hayes, Union Buildings and Carpenter's Arms Court another ; Landore Court, Kenton's Court, Court Coleman's Row, Whitmore Lane and Gainor's Court a third. The increase in the number of houses did not keep pace with that of the population, consequently houses in these localities were overcrowded ; many consisted of one living room on the basement, and two bedrooms above, with no through ventilation, no open area behind, and but a narrow roadway in front. Small as were these houses, they gave an avcrage of twelve inmates to each house.

In 1846-47 the potato disease committed great ravages throughout the Sister Island, causing most calamitous destitution

amongst the poor, and eventuating in an apalling outbreak of Typhus, graphically described as the "Famine Fever of Ireland." This caused an exodus of the terrified peasantry, who, owing to the facility of transit, sought here an escape from the perils that surrounded them from every side in their own homes. They came here in great numbers, some of them at the time suffering from, others carrying with them, the seeds of the disease. They took refuge amongst their brethren, living in the overcrowded houses I have described, there intensifying its virulence. When, during the height of the fever an inspection was organised, in one house kept by a man named Michael Harrington consisting of four rooms, there were 54 inmates, the beds being occupied by relays so that they were never vacant. The disease spread with great rapidity, to such an extent that 420 cases came under my observation, of these 179 died, either from the fever or its sequela dysentery. When the epidemic began to assume great proportions, permission was obtained from Government to utilise a small barracks, (at this time unoccupied) as a hospital for the reception of such cases as admitted of removal: 67 in number were admitted, and of these 22 were fatal. I may mention as showing its infectious character, that the whole of the attendants were attacked in succession, happily only one died.

The serious extent of the disease, and the mortality of this epidemic greatly alarmed the public mind; this was still further intensified by a general apprehension throughout the kingdom of an impending introduction of malignant Cholera, and an enquiry into the then sanitary condition of the town was determined upon, with the object of placing it under the provisions of the Public Health Act, 1848.

This enquiry demonstrated the following facts, deeply interesting at that time, and valuable for the future as indicating the directions in which sanitary operations were to be conducted.

The ground upon which the town of Cardiff has been built is nearly a dead flat, and very little above the ordinary level of the sea. The oldest part of the town, which is that furthest from the mouth of the river Taff, is but slightly raised above the sea level, the highest point, the Town Hall, is not more than ten feet above that level. The general surface of the flat is about two feet below the spring tide level, and about eight feet above the level of high water neaps.

The sub-stratum of the older or inland portion of the town as far down as Whitmore Lane (now called Custom House Street) is of gravel. From this line down to the sea, the gravel is overlapped by a stiff blue marine clay. This clay is full thirty feet deep on the shore line, and becomes thinner and thinner as it approaches Whitmore Lane where it disappears. I may here observe that as the district increased, East and West, a line drawn from Pengam

Farm through Whitmore Lane to the Bridge on the Cowbridge Road, crossing the South Wales Railway, for practical purposes defines the clay line, and is marked green on the map.

The upper part of the town is built on the gravel, this varies from six to eight feet in depth, and under it is a hard red marl ; the importance of this will be recognised when dealing with the next epidemic (Cholera).

The surface of the gravel has a gentle inclination towards the South, and in this direction the old town was built.

The average rainfall, as taken by the late Mr. DAVID, of Fairwater, for a period of 20 years, slightly exceeds 46 inches.

The houses, especially those more recently erected for occupation by the working classes, were built without regard to level or uniformity of any kind ; the authorities then existing having no power to attend to these points. The class of houses occupied by working people have been described as very indifferent as regards sanitary arrangements, and were at all times overcrowded. The better class of houses taken as a whole, was but little removed from third class houses of an ordinary county town. These points may be inferred by the following return of the rateable value of house property at this time.

Below is a return of the number of Dwelling Houses in the Parishes of St. John the Baptist and St. Mary in the Borough of Cardiff, in the County of Glamorgan; and also the gross estimated Rental and Rateable Value of House Property, extracted from the Poor Rates made and allowed for the said Borough on May 31st, 1849.

| Parishes. | £2 to £5 | £5 to £10 | £10 to £15 | £15 to £20 | £20 to £30 | £30 to £40 | £40 to £50 |
|---|---|---|---|---|---|---|---|
| St. John | 435 | 317 | 98 | 88 | 79 | 48 | 20 |
| St. Mary | 470 | 463 | 94 | 82 | 43 | 18 | 4 |
| Total | 905 | 780 | 192 | 170 | 122 | 66 | 24 |

| Parishes. | £50 to £60 | £60 to £70 | £70 to £80 | £80 to £90 | £110 to £120 | £140 to £150 | £410 to £420 |
|---|---|---|---|---|---|---|---|
| St. John | 3 | 2 | 2 | 1 | | 2 | |
| St. Mary | 3 | | 4 | 2 | 1 | | 1 |
| Total | 6 | 2 | 6 | 3 | 1 | 2 | 1 |

From this it will be seen that there were 1184 houses in St. Mary's parish rated at £9,962, while in St. John's there were 1075

houses rated at £11,228. In St. Mary's 470 houses and 435 in St. John's making a total of 905 assessed at under £5, shows the numerical preponderance of this description of house in St. Mary's parish.

The area of the district comprised 1756 acres, of these 828 were in St. Mary's parish and 928 in St. John's.

The population of Cardiff was, in

| | |
|---|---|
| 1801 ... ... | 4,672 |
| 1831 ... | 6,189 |
| 1841 ... ... | 10,079 |

The population during the last ten years was 200 per cent. more than that of the preceeding thirty years, and the increase was especially due, not simply to the attractions held out to labourers by the important works I have alluded to, but to the great development of the commerce of the town, as will be shown by the following comparative statement of the trade of the Port of Cardiff.

## Table 1.

| Year | Foreign Trade Vessels with Cargoes | | Coasting Trade Vessels with Cargoes | | Value of Exports £ | Total Vessels cleared, with Cargoes | Coal | |
|---|---|---|---|---|---|---|---|---|
| | Inwards | Outwards | Inwards | Outwards | | | Coastwise Tons | Foreign Tons |
| 1831 | 8 | 144 | 773 | 1,790 | 137,170 | 1,934 | | |
| 1841 | 18 | 334 | 921 | 2,704 | 372,446 | 3,038 | 153,667 | 4,066 |
| 1848 | 119 | 964 | 1165 | 6,522 | 729,094 | 7,486 | 544,196 | 115,604 |

As regards the government of the town of Cardiff, it may be here interesting to state that the Borough received a charter of incorporation either from Iestyn ap Gwrgan, the native Sovereign of Glamorgan, or from the first of the Norman lords. The oldest Charter extant is one of Hugh le Despencer, in the reign of Edward III., dated October 14th, 1388, and confirming the grants and privileges of his predecessors, Lord William de la Zouch, and Elinor his wife. Subsequently various Charters were granted by successive sovereigns ; those of the 42nd, Elizabeth, and 6th, James I, being the governing Charters until the Municipal Corporation Act. A further Charter was granted by James II, but this does not seem to have been acted upon.

By the Act of the 5th and 6th, William IV, the Corporation is styled the "Mayor, Aldermen and Burgesses.

The Local Acts for carrying out the paving, lighting and other such operations, was one in 1774 (14 George III, c. 7). This was repealed in 1837, when the existing local act (7 William IV) was passed. This Act vested the government of the local affairs

of the town in a body of Commissioners, of whom all resident Justices of the Peace, the Constable of the Castle, the Mayor, Aldermen and Town Clerk for the time being, were ex-officio members, together with 50 other persons named in this act. Upon any vacancies occurring by death, or refusal or neglect to act for two years, the act empowered the "Remaining Commissioners, from time to time, whenever they shall think proper to nominate others to take their places."

The jurisdiction of the Commissioners for this purpose extended throughout the Borough,(the boundary of which, as before stated, consisted of those of the two parishes of St. John and St. Mary) to any property within 100 yards of any public lane

With regard to rating, the Commissioners had power to raise a Rate of 3s. in the pound upon all property, except wharfs, and 1s. in the pound upon wharfs, or, with the consent of the Ratepayers in meetings duly assembled, of 4s. in the pound upon the former, and 1s. 4d. in the pound upon the latter.

They were also authorized to raise loans by way of mortgage upon the rates, to the extent of £7,000.

Under thc last provision, they had already raised £2,550, leaving a power of further borrowing to the extent of £4,450.

Their powers for the purpose of meeting the requirements of a town of this description were therefore very limited, and their pecuniary means less. It was consequently utterly impossible to meet the necessity of such a town as this. To illustrate it I may instance the lamentable deficiency of drainage works, and also water supply.

It will be gathered from what has been already stated, that Cardiff is not advantageously situated for purposes of drainage, the highest point at the Town Hall being only ten feet above ordinary high water level, whilst all the portions intervening between it and the Bristol Channel were below the level of spring tides. It would therefore require an application of scientific principles, uniformly and efficiently carried out, to overcome these natural difficulties, and at this time there was no system whatever of sewerage, for the refuse drainage of the town, but there were a few drains to carry away the surface water, and house slops.

The two main outfalls of these drains were into the Bristol Channel, one on the East side of the Bute Docks, and the other on the West side, into the then Packet Slip. Both these outfalls were furnished with flood-gates, which were closed at high water spring tides, but open at other times, being above the ordinary high tide level. That on the East side was an open ditch from the shore to Newtown, that on the West side open for about 1500 feet below St. Mary's Church, (but from this part it was covered to the outfall), it was nearly a dead level.

There were also four outfalls on the West side of the town into the river Taff, and one into the overflow of the canal. These drains were constructed with parallel walls, with a flag bottom, inclining from the sides to the centre. They were in size 3ft. high, by 1ft. 9in. wide. There were frequent deposits in all of them, not one had a sufficient current through it to keep it clean, but the deposits were kept under by a system of catch-pits at every grating. These pits were usually cleaned out every month or six weeks.

In other words, the then existing drains of Cardiff were not sewers in the ordinary and practical sense of the word, namely, channels through which sewage is carried off ; no excreta were allowed to communicate with them ; they were solely for carrying off the surface water and house slops.

All excretal matter was received into cesspits, and from the way these cesspits were flooded during wet weather, they overflowed, and liquid sewage matter would frequently spread itself over the back area, contiguous to the dwelling houses.

The roadway of many of the streets, especially those more recently formed, were not pitched or metalled, and as no means existed for carrying off the surface water, during the winter months, when wet weather prevailed, they were utterly impassible.

The water was obtained chiefly from shallow wells connected with houses ; there were however a few public pumps, one of these being situate in Smith Street, (now called Queen Street). This was supposed to be a well, but there is no doubt that it was principally supplied by percolation from the canal hard by.

## Table. 2

The following table, (Table 2) shows the total births ; the deaths according to age, as also deaths from zymotic disease during seven years, 1842-48 :

| Years. | Total Births. | | Deaths under 12 months. | | All Deaths under 5 years. | | All Deaths under 20 years. | | Total Deaths. | | Deaths from epidemic, endemic and Contagious diseases. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | St. John | St. Mary | St. John | St. Mary | St. John | St, Mary | St. John | St. Mary | St. John | St. Mary | St. John | St. Mary |
| 1842 | 169 | 203 | 42 | 53 | 66 | 86 | 79 | 93 | 152 | 158 | 19 | 23 |
| 1843 | 170 | 179 | 28 | 35 | 43 | 66 | 51 | 79 | 113 | 137 | 9 | 9 |
| 1844 | 138 | 168 | 29 | 36 | 66 | 77 | 91 | 100 | 182 | 168 | 36 | 48 |
| 1845 | 114 | 158 | 23 | 38 | 41 | 76 | 57 | 90 | 130 | 155 | 8 | 22 |
| 1846 | 134 | 211 | 30 | 48 | 53 | 76 | 65 | 89 | 125 | 168 | 7 | 13 |
| 1847 | 156 | 187 | 44 | 61 | 81 | 107 | 105 | 140 | 249 | 227 | 51 | 63 |
| 1848 | 170 | 275 | 44 | 87 | 90 | 182 | 110 | 223 | 213 | 355 | 35 | 73 |
| Total... | 1051 | 1381 | 240 | 358 | 440 | 670 | 558 | 814 | 1164 | 1368 | 165 | 251 |
| | 2,432 | | 598 | | 1,110 | | 1,372 | | 2,532 | | 416 | |

From the above table, the mean of population being 12,000, the yearly average death-rate was 30 per 1,000 inhabitants. The total births 2,432, the total deaths 2,532, so that the total deaths of these seven years exceeded the births by 100. The yearly increase of population was due to the immigration of strangers seeking employment here rather than to the natural productive powers of the place.

It was at this time (1849), and when the town was in this condition, that the first cholera visitation occurred in Cardiff.

There are several reasons which combine at the present time to make the subject of the relationship of sanitation to cholera and other zymotic diseases of especial interest. During the last two years, the heart of all Europe has been wrung by the accounts of the distress, desolation, and death, which fell like a pall on the fairest portions of three kingdoms, near to our own country in point of distance, and nearer still in ties of commerce and intercourse. The quick and subtle spread of the disease from town to town, and from province to province, caused as much alarm in the public mind as did its deadly ravages in any particular locality where its baneful germs found congenial ground to multiply. In many directions there were indications of panic, and it was thought that at any moment the disease might be carried to our shores, and that here, in our midst, might be found a re-enactment of those terrible scenes, the description of which had so moved the public. Even bold men grew grave, and asked, in anxious tones, how far we were prepared to cope with a foe which spread like a whirlwind, and numbered its victims by thousands and tens of thousands? The enquiry was not an unnatural one, for those who had not had occasion to mark particularly the great strides in sanitation which the last thirty years have witnessed, and who do not know with any precision the strong bulwarks which these improvements constitute against inroads of epidemic disease. Cardiff is a port which, owing to its intimate shipping connection with the Spanish and Mediterranean ports, is, of course, proportionately liable to the introduction of an epidemic. It may not be considered inappropriate for me instead of entering into any lengthened exposition of the etiology of various zymotic diseases, to explain the practical lessons in sanitation, which are, I think to be learnt from the outbreaks of cholera and zymotic diseases that have come under my observation during the time I have had the privilege of advising the authorities of this town.

I shall now deal with cholera. It is not necessary for me on this occasion to enter into the history of the discoveries of those who have made patient and painstaking investigation into the nature of the contagia, nor to apportion the exact relative pre-eminence of such men as Schevann, Spencer, Wells, Burdon-Sanderson, William Budd, Pasteur, Klein, Koch, and others to whom I have

alluded. It will suffice to accept what they have contributed to establish the germ theory. Leaving to the future the determination as to whether the cholera-germ is the comma-shaped microbe of Koch, or the baccillus of the French Commission, we can take the common ground of agreement that it is an organism as specific in its character as are the germs of other infectious diseases. One attribute pertaining to these germs or organisms, and one that constitutes an important factor for the consideration of the sanitarian in his action necessary to be taken for the prevention of infectious diseases, is that they retain the principle of vitality, in a latent state, for an indefinite period, taking on activity only when exposed to the influence of favouring circumstances. A most remarkable instance of this is the outbreak of cholera in Toulon three years ago.

When this epidemic occurred, its source of introduction was involved in much mystery. It was at first explained that it was probably due to the Captain of a British ship, who, having Cholera on board concealed the fact by falsifying his log. But on a commission being instituted for the purpose of further enquiry, the attention of the commission was directed to an old hulk named the "Montebello," that had been used in the Crimea, for the conveyance of troops when Cholera was known to have decimated the French army. This vessel subsequently returned home with some stores, consisting of old cartridge pouches and shakos; these had remained undisturbed in the hold of that vessel. The first two cases of Cholera were two sailors who displaced some of them. Hence the origin of this terrible outbreak. With these preliminary remarks let me now turn to the consideration of the epidemic in Cardiff to which I have referred.

The epidemic on this occassion, (1849) may be considered to have been introduced from inland. It had prevailed with some degree of intensity in Edinburgh and many of the Scotch towns, during the latter months of 1848 and the Spring of 1849, and subsequently slowly advanced southward. During the first week of May some deaths from Cholera were registered in the city of Gloucester, and at Rhymney in Monmouthshire. In the latter part of that month a death from Cholera was reported in Caroline Street, Cardiff, and within a few days the disease spread throughout the contiguous streets ; these streets being built on that part of the district where the gravel joined the clay deposit, and where the subsoil was waterlogged, and the water supply as I have already stated, polluted by the infiltration of the liquid cesspools into the wells connected with houses, these wells being practically catch-pits for these pollutions.

A reference to the accompanying map will show that the epidemic was most fatal in Love Lane, David Street, Stanley

Street, Millicent Street. and other streets contiguous to the green line, which marks the limitation of the clay deposit when it ceases to overlap the gravel. All the houses in these streets, with the exception of those in Millicent Street, were occupied by the families of Irish labourers; they were overcrowded, filthy to a degree, and ill-ventilated. It was in these houses, and amongst these people, that the typhus epidemic had just previously been very fatal. Cholera was for some time almost exclusively confined to these streets; and it is most noteworthy that, when afterwards it spread westwards, it still observed the same geological topography. The other parts of the town suffered but little, except one small sub-district, where some houses were built closely adjacent to the sea-lock, at the entrance of the Glamorganshire Canal. The water from this Canal had been let out for the purpose of clearing away the mud that had been deposited on the side of the canal near to these houses. The exhalations from the mud were most offensive, and to it was attributed the severity of the disease in this locality.

The total number of deaths in Cardiff from this epidemic were 351 out of a population of 16,693, or at a death rate slightly exceeding 21 per 1,.000

To mitigate the severity of the disease, the following measures were adopted. A temporary hospital was erected for the reception of the cases of cholera that could not be treated in their own homes. A house to house visitation was instituted to detect cases of sickness in the earliest stages ; depôts were established in various parts of the town where all suffering from premonitory symptoms could obtain medicine free of charge. The town was divided into sections, each section being allotted to the nearest medical man, whose duty it was to attend to all applications made to him. A fund was raised to provide articles of clothing, food, stimulants, and all necessaries to those who were unable to procure them, and disinfectants, (carbonate of lime) were freely distributed.

Soon after the cessation of this epidemic, the borough was placed under the Health of Towns Act, 1848. Immediate steps were taken for the purpose of carrying out a complete system of drainage, and obtaining an efficient water supply. Alleys and courts were put in a satisfactory state, unfinished streets were paved, the roadways were metalled, owners of houses and other properties were required to remedy any sanitary defects, and Inspectors of nuisances were appointed to prevent overcrowding, enforce cleanliness, the abatement of nuisances in or around houses, and to discharge all other duties under the instruction of the Officer of health.

The progressive and successful results of these sanitary operations may be recognized by the two tables Nos. 4 and 10. Table 10 shows the population, the births, the deaths, indicating when the deaths were in excess of births, or births in

excess of deaths. Table 4 gives the population, the deaths from all causes and death rate, the deaths from the seven chief zymotic diseases, and death rate, also the mean rates of every ten years ; as also the following table indicating the street list showing the number of fatal cases of Cholera in each of the three epidemics, namely as they occurred in 1849, 1854, and 1866.

## Table 3.

### Street List of Cholera for the years 1849, 1854 & 1866.

| Streets. | 1849 | 1854 | 1866 | Streets. | 1849 | 1854 | 1866 |
|---|---|---|---|---|---|---|---|
| Angel | 1 | 1 | | Gas | 3 | | |
| Alice | | 3 | 1 | Glass House Ct. | 3 | | |
| Bridge | 5 | 5 | 1 | Golate | 2 | | |
| Bute | 12 | 3 | | Gower's Court | 1 | | |
| Bute Docks | 33 | 15 | 2 | Greengarden | 1 | | |
| Bute Terrace | 5 | | | Hayes | 4 | 5 | |
| Bute Town | 1 | | | High | 1 | | |
| Baker's Row | 2 | 1 | | Hills' Terrace | 4 | 1 | |
| Blue Anchor | | 2 | | Homfray | 1 | | 2 |
| Canal | 3 | 2 | | Henry | | 1 | 1 |
| Canal Bank | 3 | 2 | | Harrowby | | | 1 |
| Carpenter's Arms | 2 | | | Harris' Court | | | 1 |
| Caroline | 4 | 1 | | Herbert | | | 1 |
| Charlotte | 5 | 4 | | John | 5 | 3 | 1 |
| Church | 3 | | | Jones' Court | 1 | | |
| C. Coleman Row | 1 | | | James | | 3 | 2 |
| Crockherbtown | 1 | | | King's Castle | 2 | | |
| Cross | 1 | | | Kingston Court | 12 | | |
| Christina | | 1 | | Landore ,, | 5 | 2 | |
| Crichton | | 4 | | Lewis | 4 | | |
| Dalton's Court | 1 | 2 | | Little Frederick | 10 | | |
| David | 16 | | | Love Lane | 8 | 2 | |
| Dry Dock | 2 | | | Louisa | | 3 | 1 |
| Duke | 1 | 1 | | Mary Ann | 13 | 2 | |
| Davies | | | 1 | Millicent | 18 | 16 | |
| Evans' Court | 1 | 3 | | Mill Lane | 11 | 2 | |
| East | | 3 | | Margaret | | 1 | 1 |
| Ellen | | 7 | | Maria | | 1 | |
| Frederick | 4 | 3 | 1 | Morgan | | 3 | |
| Frederica | | 2 | 1 | New Inn Court | 3 | | |
| Friends' Place | | 1 | | New Wharf | 1 | | |
| Francis | | | 2 | Newtown | 9 | | |
| Gainor's Court | | 1 | | Nelson | | 1 | |
| George | | 2 | | Noah | | 1 | |
| Godfrey | | 2 | | North | | 1 | |
| Gough | | | 2 | North Church | | 2 | |

| Streets. | 1849 | 1854 | 1866 |
|---|---|---|---|
| Old Gas Yard | 1 | 1 | |
| Old Workhouse | 24 | | |
| Old Barracks | | 1 | |
| Plymouth | 1 | | |
| Paradise Place | | 2 | |
| Patrick | | 3 | |
| Peel | | 2 | |
| Perth Place | | 1 | |
| Quay | 3 | | 1 |
| Rising sun court | 1 | | |
| Rodney | 2 | 1 | |
| Rowe's Square | 3 | 1 | |
| Ruperra | 3 | 2 | |
| Rothesay terrace | 1 | 1 | |
| Rosemary | | | 1 |
| „ Cottage | 1 | | |
| Refuge | | 2 | |
| Sea Lock | 12 | 3 | 1 |
| St. Mary | 3 | 4 | |
| Stanley | 19 | 2 | |
| Sophia | | 1 | |
| Stuart | | 2 | |
| Scott | | | 2 |
| South William | | | 1 |
| Tabernacle Ct. | 3 | | |
| Thomas | | 3 | 1 |
| Three Cranes | 1 | | |
| Tredegar | 1 | 1 | |
| Tunnel | 2 | 2 | |
| Tyndall | | 2 | 7 |
| Union Building | 5 | 2 | |
| Union | 3 | | |
| Upper Bute | 2 | | |
| Union workhouse | | | 6 |
| Vachell's Court | 2 | | |
| Waterloo builds. | 6 | | |
| Wharton | 3 | | |
| Whitmore lane | 13 | 2 | 1 |
| Womanby | 2 | | |
| Working | 5 | 3 | |
| West Bute | | 2 | |
| West Church | | 1 | |
| White house bridge | | 1 | |
| Winstone Court | | 1 | |
| William | | 2 | |
| Wood | | | 1 |
| | 351 | 172 | 44 |

Some of these streets have ceased to exist; thus, Whitmore Lane in the Map is called Custom House Street, Love Lane in the Map is the street parallel to David Street.

During the year 1853, considerable anxiety was evinced respecting the possibility of another outbreak of Cholera in this country. This anxiety was intensified in Cardiff, in consequence of a man being found in the streets suffering from choleraic symptoms. He had arrived a few hours previously from Bristol, and was removed into a building attached to the Union Workhouse. Here he ultimately recovered, but the man in charge of the building was taken ill, and died in two or three days, as did also the nurse, while others suffered from diarrhœa; but there were no further deaths. Closely adjacent to the building at this time was a very offensive ditch containing stagnant water; this nuisance was abated, and the epidemic passed away. I paid great attention to the excreta; they always contained ordinary fœcal matter, and there was an absence of the rice-water dijuta.

In March, 1854, after an interval of four months, some deaths were registered from sporadic cholera and choleraic diarrhœa; three were adults and five were infants; but no further cases of

a diarrhœal character were reported. At the latter end of July however, my attention was called to a foreign seaman in a seamen's boarding house, No. 49, Millicent Street; I found him to be suffering from malignant Cholera, and he died in a few hours. The source of the disease was traced to a foreign vessel. Two days later, Cholera broke out in Millicent Street, and, it is important to note, close to the house of the first case. Two deaths were registered in No. 49, five in No. 48, two in No. 47, one in No. 44, one in No. 55, one in No. 24, and one in No 31, making a total of thirteen within seventeen days. This circumstance induced me to believe that the infection was given off from the excreta, and I determined to reverse the procedure I had adopted in regard to the location of the patients during the epidemic of 1849. The temporary hospital was still in existence, and, when called to an infected house, I removed the convalescents to this building, where they remained a few days on probation to satisfy myself that they were free from infection ; after this they were discharged. I procured a nurse to take charge of the sick patient, and when the case terminated, I took possession of the house, and had it thoroughly disinfected, and well fumigated with sulphurous or chlorine gas before re-occupation. The success of this action was most marked; no second case was accorded in the same family thus managed. Although I made a most careful enquiry into the history of each fresh case coming under my observation, I had no reason to believe the disease was communicated by those who had been removed from an infected house.

The effect of this procedure is shown on the map of the three epidemics. Table 3 denotes the deaths from these, and visitations, it will be observed that, while the gross mortality was greatly reduced, there was a corresponding decrease in each street where the disease made its appearance.

There is another cause which greatly contributed to this. I prohibited the use of the well water by the occupiers of houses in contiguous streets,—Love Lane, David Street, Stanley Street, Mary Ann Street and Little Frederick Street—having obtained permission from the representatives of Lord Bute to have water from the Feeder stream connected with his docks ; the result being that while in 1849 there were 66 deaths registered in these streets, in 1854 there were only six. I should add that the symptoms of each individual case coming under my observation, were as severe, and as rapid in their course as in the epidemic of 1849 ; but the mortality was considerably reduced, as on this occasion, in face of the increased population, the deaths fell to 172.

The next epidemic took place in 1866, on which occasion it was again introduced from seaboard. For some time the epidemic was confined to the shipping, and to those whose occupations were connected with it here. Afterwards cases occurred sparsely scattered throughout the town, but the total mortality was only 44.

There was one particular circumstance during this epidemic, which illustrated the influence of polluted water. I was called to some cases of Cholera in North Morgan Street, Canton ; these were in a block of nine houses. These houses were supplied with water, not from the public waterworks, but from a pump attached to No. 1 ; eight of the houses had this supply. In these, three of the inmates died from Cholera ; seven others were attacked with the disease, but recovered. It is very notable that, while cases occurred in each of the eight houses, the occupier of the ninth house obtained water from the public supply in Wellington Street, and no one in that house suffered from the disease.

I had this water analysed with the following result.—

| | Grains in Imperial Galls |
|---|---|
| Carbonate of Lime and Magnesia | 24·54 |
| Sulphate of Lime and Magnesia | 36·60 |
| Chloride of Sodium | 27·18 |
| Iron Alumina | 0·22 |
| Silicia | 0·30 |
| Organic Matters and loss | 3·09 |
| Total | 91·93 |

During the year 1884, great fears were again entertained of the introduction of this disease from Toulon, Marseilles, and other Mediterranean Ports. With these ports there is a constant communication ; and Cardiff, from this circumstance, was exposed to the possible danger of infection. The measures adopted to guard against this were these :—A Steamer was employed to intercept all vessels arriving here from these ports. Instructions were given to pilots on boarding a vessel, to cause the yellow flag to be hoisted. It was the duty of the officer on board the quarantine boat, when the signal was given, to put the cholera questions. The captain had to reply to these and affix his signature, signifying that the information was correct, and any falsification rendered him liable to severe penalties. In the event of the information being unsatisfactory, the vessel was required to proceed to the mooring station, and was there detained until inspected by the port Sanitary Medical Officer. On his visit, if there were any cases of a choleraic character, the patient was removed to a temporary hospital erected on the island of the Flat Holmes, and the remainder of the crew carefully inspected. All infected vessels underwent thorough disinfection before being admitted into port, care being taken to discharge the bilge-water. Four infected vessels arrived in the roads, from which four cases of Cholera were removed to, and treated in the hospital, only one proving fatal.

The experience of Cardiff may therefore be taken to prove, that, by increased sanitation, Cholera is robbed of its chief terror. In the outbreak of 1849, there were all the unsanitary conditions

of soil, drainage, polluted waters, and general circumstances, which would contribute to the spread of the epidemic, and we see that then, it was limited mainly to the area in which it throve with such fatal vigour. In 1854, the second outbreak came before there was any improvement in the drainage or water-supply, and again we find the same area to be the centre from which it spread, modified however, by the change in the location of patients, and by the prohibition of the use of polluted water. In 1866, again it visited the town, in as virulent a form as before, but was met and checked at once by the improved sanitation and water supply, while the only striking incident of the epidemic, was one isolated case which demonstrated the enormous powers for evil which polluted water possesses. The lessons are the same as those to be learned in other places and countries, but here they are perhaps more sharply inculcated. Foul water, running kennels, noxious cesspools, open drains, stagnant pools, and all noxious abominations, which in former times abounded, are the conditions under which zymotic germs live, thrive, and multiply ; and Cholera is a powerful enemy to be dreaded. Change these conditions, give pure water, good drains, and healthy arrangements, and its power is gone.

Having detailed the history of these epidemics, and the means taken to arrest their prevalence, I may point out the important results indicated by their history. Up to the termination of the second epidemic, the very limited means, within the powers of the authority, a very modified diminution in severity occurred in the second, but at the termination of this, one very important element of sanitation was accomplished ; I allude to the first section of the sewage system coming into operation. This system was adopted as early as possible after the town came under the Public Health Act. It was a very important one ; the engineering difficulties I have described being due to the topographical description of this town, and the particular system could not be determined on hastily, but after grave consideration, the first plan selected was that of Mr. Rammell, then known as the pipe system. This was subsequently abandoned, and the present one, that of Mr. Hawkshaw, determined on. This took nearly four years before any section of it could be made available. After this, from time to time further sections were completed ; others are now in course of construction, and owing to the extraordinary growth of the town, large sums have been yearly expended in this direction.

This system I have detailed minutely, in a former report, I therefore now only briefly summarise it. The main trunks of this plan follow the line of inclination ; that of the older parts of the town, viz., from North to South, but recently the enlargement of the town has been chiefly East and West, and here the low level of the flat upon which the town is now built obtains, so that the lateral sewers connected with the main trunks have low gradients,

very little removed from no gradients at all. This is the weak part of the present system of sewerage, as the flushing of them is dependent mainly on the storm water, little or no means can be obtained from your water supply, owing, as I shall presently show, to its inadequate quantity ; hence the solid excreta pass into the sewers from the house drains and form deposits; during the existence of droughts, these become a source of offensive exhalations from the ventilation shafts constructed in the centre of streets, and are removable only by storm water, at all times a very objectionable means, as when they first occur they disturb these deposits, and the exhalations from the shaft are thereby aggravated.

The polluted quality of the water supply which was at the time recognized, eventuated in a private scheme for the establishment of the present waterworks at Lisvane, with a storage capacity of 100,000,000 gallons. For a time this supply was ample in quantity and good in quality, therefore, in every respect meeting the requirements of the town, both for domestic and municipal purposes. When first constructed the supply gave a daily average of 35 gallons to each inhabitant ; to obtain this, however, it utilised all that could be obtained from this water-shed, so that afterwards as the population increased in the rapid manner it did, this daily average was progressively less, and an additional source was obtained near the village of Ely. This new and additonal supply was equally pure, but was objectionably harder, containing a considerable amount of lime salts in solution; but the last few years even this additional supply has not been equal to the requirements of the town. Assuming the present population to be 111,000, and the daily average supply to be 15,000,000 gallons, this would give an average of a little more than 13 gallons per head. I have for some time brought this serious matter before the local authorities, and within the last seven years the Corporation acquired the property from the Cardiff Waterworks Company. Immediately after this acquisition, extensive operations were commenced, and an additional reservoir with a capacity of 300,000,000 gallons is now in course of construction but even with this extent of storage capacity, this could only temporarily tide over the yearly growing wants of the town, and it became necessary to make application to parliament for powers to obtain another source. This source is from a water shed afforded by the Taff Vawr, a few miles North of Merthyr. The water here is of the purest kind, and has only three degrees of hardness, and is practically inexhaustible.

In addition to these sanitary operations, large sums are yearly expended in improving the roadways of the older streets, and constructing new ones, that are yearly formed.

Having thus described the four most important epidemic visitations that have occurred in this town during the last forty

years, for the purpose of illustrating the advantages to be obtained from sanitation, I now submit the following observations on zymotic diseases generally, but more especially those designated by the Registrar-General the seven chief zymotic diseases, as being preventible or amenable to sanitary control.

Bearing on this subject it will be convenient here to insert the annexed table:

# Table 4.

| Year. | Population. | Deaths from all Causes. | D ath Rate. | Mean of 10 years | Deaths, Zymotic Diseases | Death Rate | Mean of 10 years. |
|---|---|---|---|---|---|---|---|
| 1845 | 13,385 | 324 | 24·2 | | 51 | 3·8 | |
| 1846 | 14,212 | 321 | 22·6 | | 50 | 3·5 | |
| 1847 | 15,039 | 484 | 32·2 | | 133 | 8·8 | |
| 1848 | 15,866 | 579 | 36·5 | | 186 | 11·7 | |
| 1849 | 16,693 | 864 | 51·7 | | 483 | 28·9 | |
| 1850 | 17,520 | 485 | 27·7 | | 116 | 6·6 | |
| 1851 | 18,354 | 525 | 28·6 | | 81 | 4·4 | |
| 1852 | 19,724 | 620 | 31·4 | | 175 | 8·8 | |
| 1853 | 21,094 | 644 | 30·5 | | 129 | 6·1 | |
| 1854 | 22,464 | 925 | 41·1 | 32·7 | 353 | 15·7 | 9·8 |
| 1855 | 23,834 | 641 | 26·9 | | 65 | 2·7 | |
| 1856 | 25,204 | 772 | 30·6 | | 136 | 5·3 | |
| 1857 | 26,574 | 883 | 33·2 | | 234 | 8·8 | |
| 1858 | 27,944 | 753 | 26·9 | | 128 | 4·5 | |
| 1859 | 29,314 | 826 | 28·1 | | 212 | 7·2 | |
| 1860 | 30,684 | 662 | 21·5 | | 95 | 3·0 | |
| 1861 | 32,054 | 837 | 26·1 | | 100 | 3·1 | |
| 1862 | 32,804 | 695 | 21·2 | | 132 | 4·0 | |
| 1863 | 33,552 | 862 | 25·7 | | 268 | 7·9 | |
| 1864 | 34,300 | 932 | 27·1 | 26·7 | 250 | 7·3 | 5·4 |
| 1865 | 35,048 | 867 | 24·7 | | 161 | 4·5 | |
| 1866 | 35,796 | 882 | 24·6 | | 192 | 5·3 | |
| 1867 | 36,544 | 873 | 23·8 | | 116 | 3.1 | |
| 1868 | 37,292 | 843 | 22·6 | | 109 | 2·9 | |
| 1869 | 38,040 | 1005 | 26·4 | | 156 | 4·1 | |
| 1870 | 38,788 | 903 | 23·2 | | 133 | 3·4 | |
| 1871 | 39,536 | 891 | 22·5 | | 158 | 3·9 | |
| | 59,494 | | | | | | |
| 1872 | 40,284 | 916 | 22·7 | | 234 | 5·8 | |
| | 62,086 | | | | | | |
| 1873 | 41,032 | 995 | 24·2 | | 103 | 2·5 | |
| | 64,674 | | | | | | |
| 1874 | 41,780 | 885 | 21·2 | 23·6 | 154 | 3·6 | 3·9 |
| | 67,262 | | | | | | |
| 1875 | 69,850 | 1547 | 22·1 | | 294 | 4·2 | |
| 1876 | 72,438 | 1455 | 20·8 | | 339 | 4·6 | |
| 1877 | 75,026 | 1475 | 19·6 | | 255 | 3·5 | |
| 1878 | 77,614 | 1468 | 18·9 | | 197 | 2·5 | |
| 1879 | 80,202 | 1428 | 17·6 | | 137 | 1·7 | |
| 1880* | 82,790 | 1634 | 19·7 | | 306 | 3·7 | |
| 1881 | 85,378 | 1556 | 18·2 | | 164 | 1·9 | |
| 1882 | 88,603 | 1724 | 19·4 | | 293 | 3·3 | |
| 1883 | 91,204 | 1807 | 19.8 | | 253 | 2·7 | |
| 1884 | 93,468 | 2250 | 24·0 | 20·0 | 476 | 5·0 | 3·3 |
| 1885 | 97,034 | 2481 | 25·5 | | 521 | 5·3 | |

NOTE.—In 1874 the Urban Sanitary District of Cardiff was enlarged by the absorption of Roath and Canton. The double populations inserted in 1871, 1872, 1873 and 1874 are intended to show the population of Cardiff proper and the population as it would have been had the addition of Roath and Canton taken place in 1871

This table gives the population of each year from 1845 to 1885; the annual deaths from all causes, and death-rate. The same from the seven chief zymotic diseases with the mean of death rates of the four decennial periods.

It will be remembered that during the first decennial period, when the town was in the insanitary condition I have described in the earlier part of this report, and the local authorities powerless, except to a very limited degree, to cope with the then existing causes of disease, the mean of death-rate from the seven chief zymotic diseases was 9·8 per thousand inhabitants.

At the commencement of the second decennial period two important sanitary improvements came into operation, viz., in 1855 the first section of main sewers was completed, and two years after the first main of the new water supply was made available. All the advantages to be obtained from the improvements, could not however, be at once realized. The house drains had to be connected with the main sewers. Some delay was experienced in getting the owners of house property to adopt the new water supply, partly owing to indifference, and partly owing to an unwillingness to accept the cost; still, with these drawbacks, the death-rate from the zymotic diseases fell to 5·4.

During the third decennial period the progressive sanitary improvements that were carried on with activity reduced the death-rate to 3·9.

In 1874, at the commencement of the fourth decennial period, the local authority appointed a public analyst, Mr. J. W. Thomas, F.C.S., and active measures were immediately taken to cause all wells to be peremptorily closed when such a necessity existed. Table 18 illustrates the results of analyses of water obtained from certain shallow wells in different parts of the town. I have selected these to show that the water thus obtained, owing to the porous nature of the sub-soil, was saturated with impurities such as sewage and the soakings from surface offensive decomposing matter so as to render it totally unfit for drinking purposes.

To enable you to recognise the extent of these pollutions, at the foot of the table will be seen the constituents of two samples of water, one indicates a pure water, the other a standard of impurity, beyond the limits of which, it is unsafe for drinking purposes. After this action the mean death-rate of the last decennial period did not exceed 3·3. The following table (5) shows the mean of death-rate in Cardiff as compared with that of the kingdom from the seven chief zymotic diseases during the first decennial period, as also the same during the decennial period ending 1883.

## Table 5.

| | | Decennial Period, 1845 to 1854. | | Decennial Period, 1874 to 1883. | |
|---|---|---|---|---|---|
| | | Cardiff Mean Death-rate. | Kingdom Mean Death-rate. | Cardiff Mean Death-rate. | Kingdom Mean Death-rate. |
| Seven Chief Zymotic Diseases. | Small-pox | 1·49 | 0·25 | 0·02 | 0·07 |
| | Measles | 0·86 | 0·40 | 0·45 | 0·38 |
| | Scarlet fever | 0·73 | 0·90 | 0·76 | 0·68 |
| | Diphtheria | 0·00 | | 0·15 | 0·13 |
| | Whooping Cough | 0·65 | 0·49 | 0·56 | 0·50 |
| | Fever | 1·97 | 1·13 | 0.38 | 0·39 |
| | Diarrhœa | 1·56 | 0·96 | 0·81 | 0·79 |
| | | 7·26 | 4·13 | 3·13 | 2·94 |

This table does not include the deaths from epidemic cholera.

According to this table the diminution of mortality from these diseases may easily be recognised. During the first decennial period, 1845-54 (sanitation being nil), the death-rate was 7·26 per thousand in Cardiff as against 4·13 that of the kingdom. In 1874-83 the death-rate relatively was 3·13 in Cardiff and 2·94 that of the kingdom; at this time Cardiff being only 0·19 in excess of the latter.

Amongst the seven zymotic diseases the great improvement was in fever, diarrhœa, and small-pox, and to these I shall refer. I may here explain that the latter decennial period (1874-83) was selected from the circumstance that in the report of the Registrar-General, just published, the mortality from special diseases is brought down only to the end of 1883.

As regards small-pox I may state that this town has been frequently subjected to the introduction of this disease by means of the shipping, and in 1857 the town suffered from it in a very severe epidemic form, as in this year no less than 161 cases were registered. On this occasion, the first case coming under my observation was that of a sailor received into a seaman's boarding house. It then spread rapidly throughout the district. Owing to this circumstance, action was taken to establish a seamen's hospital and by all available means to intercept cases of small-pox and other infectious disease, and prevent their introduction into the town. For this purpose an application was made to the Admiralty for the grant of an unused frigate, and a ship called the Hamadryad was placed at our disposal; this was fitted up as a hospital at the cost of the public, and has since been maintained by voluntary contributions from the shipping arriving at this port. The experiment was eminently successful, the receipts always being in excess of the

expenditure. The accommodation was for a considerable time sufficiently extensive to receive all cases of sickness amongst the shipping, either infectious or non-infectious diseases, but within the last eighteen years a building for the reception of infectious cases has been erected in close contiguity to it.

During the epidemic of 1857 an enquiry into the efficiency of vaccination was instituted and the result not being satisfactory, measures were taken to improve this condition of things. These means were amplified on the passing of the Vaccination Act, and similar enquiries being from time to time made, vaccination is now much more satisfactorily carried out. Since the establishment of the Hamadryad, when any case of small-pox, either among the shipping or in the town, takes place and comes under the observation of the Medical Officer of Health, it is removed into that institution; practically, all cases are so met, exceptions being allowed only when the accommodation of the house admits of complete isolation, and, since 1857, small-pox only to a very limited degree.

Typhoid Fever shows a very marked improvement since the construction of the new system of drainage and water supply as will be seen by reference to table 5. In the first decennial period the death-rate from this disease was 1·97 per thousand, in the latter decennial period it was 0·38, being slightly under the mean of the Kingdom, and typhoid fever now as an epidemic, even to a limited degree, rarely prevails.

Diarrhœa may be a disease *per se* or it may only be a symptom associated with an abnormal disturbance of the system. As a disease it may be endemic, it is then confined to a locality wherein predisposing or exciting causes exist. It may be epidemic, as when it prevails over a larger area, but, introduced into a district, local causes may intensify its severity. Or it may be sporadic, then being due to individual causations, such as errors of diet, or the consumption of deleterious ingesta, which may set up severe or even fatal gastro-intestinal irritation.

In 1882, Dr. BALLARD, Medical Inspector of the Local Government Board, called on me. He had been for some time engaged in making exhaustive researches respecting the etiology of diarrhœa. He then expressed a desire to be furnished with any information I might be able to afford him based on my experience of the disease in this town.

In carrying out his wishes, I first ascertained the mortality from diarrhœa in Cardiff during the ten years 1845 to 1854, at which time the town was in the insanitary condition I have alluded to in the earlier portion of this report (namely, an almost entire absence of drainage and a very polluted water supply). I then found that the mortality from diarrhœa gave a total of 268 deaths, Of these, 105 were registered under the age of five years, being at the rate of nearly 40 per cent. of total deaths from this disease;

and 163 above that period of life, the latter representing a death-rate of 60 per cent. on the total deaths from this disease, the aggregate deaths (268) representing a death-rate of 1·56 per 1,000 population as against 0·96 the mean average of deaths from diarrhœa of the entire Kingdom.

In the ten years 1874 to 1883 sanitary operations had been very actively carried out, and there had also been a very large increase of population. The total deaths from this disease were 663; of these 565 were under the age of five years, or at the rate of 89 per cent. of the total deaths from diarrhœa; above that period of life there were registered 68 deaths, these being at the rate of 11 per cent., thus making a very material change in the character of this disease.

The death-rate, as compared with that of the Kingdom during the ten years, being relatively 0·81 as against 0·79, so that the diarrhœa death-rate at this time, in Cardiff, was only 0·02 in excess of that of the Kingdom.

I may here explain that the latter decennial period has been selected from the circumstance that the last published Annual Report of the Registrar General carries down the returns of special causes of deaths only to the end of 1883.

It will thus be seen that for some time antecedent to 1882, when my attention had been especially directed to this disease, its mortality had sensibly and progressively decreased.

An examination of the register of deaths shews that whilst there have been fatal cases throughout each entire year, diarrhœa prevailed in an epidemic form only at one particular period. From the circumstance that it does so prevail throughout the whole Kingdom it has been significantly termed "The Summer, or Third Quarter Diarrhœa," and is then usually considered to be a specific form of the disease, and, in determining the probable exciting causes of the disease, and the sanitary precautions necessary to be adopted to control its prevalence and severity, there are four factors to be considered, these are Temperature, Age, Diet, and Locality, each of which may operate separately or conjointly.

For the purpose of illustrating the degree to which temperature contributes to the mortality from diarrhœa, the following tables have been compiled:

Table 6 shews the general distribution of deaths throughout the years 1882, 1883, and 1884.

## Table 6.

| Months. | | No. of Deaths, 1882. | No. of Deaths, 1883. | No. of Deaths, 1884. |
|---|---|---|---|---|
| January | ... | 2 | 2 | 1 |
| February | ... | 3 | 3 | 2 |
| March | ... | 6 | 3 | 1 |
| April | ... | 0 | 1 | 3 |
| May | ... | 5 | 0 | 3 |
| June | ... | 6 | 3 | 4 |
| July | ... | 10 | 6 | 19 |
| August | ... | 41 | 21 | 65 |
| September | ... | 16 | 17 | 32 |
| October | ... | 16 | 14 | 17 |
| November | ... | 4 | 3 | 9 |
| December | ... | 1 | 1 | 2 |
| | Total | 110 | 74 | 158 |

From this table it will be seen that in 1882 of 110 deaths from this disease during the whole year the per centage was 75·4; in 1883 the per centage was 78·3, and in 1884 it was 84·1.

The following tables shew the maximum as well as the mean monthly temperature, the number of days when 0·01 or more rain fell, and total deaths.

The importance to be attached to the number of days on which rain fell will be considered when speaking of locality as an exciting cause.

## Table 7.

| Months. | Maximum. | Mean of Month. | No. of Wet Days. | No of Deaths. |
|---|---|---|---|---|
| 1882. | | | | |
| July | 74°·0 | 60°·1 | 24 | 10 |
| August | 76°·3 | 60°·2 | 16 | 41 |
| September | 66°·8 | 54°·3 | 17 | 16 |
| October | 64°·4 | 50°·3 | 23 | 16 |
| 1883. | | | | |
| July | 76°·3 | 58°·4 | 21 | 6 |
| August | 74°·5 | 60°·0 | 16 | 21 |
| September | 70°·9 | 56°·9 | 19 | 17 |
| October | 58°·0 | 50°·1 | 17 | 14 |
| 1884. | | | | |
| July | 75°·4 | 59°·8 | 20 | 19 |
| August | 82°·8 | 63°·1 | 9 | 65 |
| September | 75°·7 | 59°·8 | 15 | 32 |
| October | 62°·5 | 49°·4 | 17 | 17 |

The Summer of 1882 was, on the whole, warmer than the average, and set in somewhat earlier, causing a slight increase in diarrhœal disease during May and June. In July the mean temperature of the month reached 60°, but there were 24 days

when 0·01 inches or more rain fell ; the deaths were 10. During August the mean of temperature increased, there were 16 days when rain fell, and the deaths rose to 41. In September and October, with a reduced temperature, the deaths registered in each of these months were 16.

In 1883, the temperature of the Summer months was below the average, the mean of July was 58°·4, with 21 wet days, the deaths registered from diarrhœa were 6. In August the mean rose to 60°, with only 16 rainy days, the deaths increased to 21 ; but in September, with a reduced temperature, the deaths fell to 17, and in October, when the mean was only 50°·1, the deaths were 14.

The Summer of 1884 was exceedingly hot, the mean temperature of July reached nearly 60°, but the effects of this temperature was greatly modified by the rain that fell on 20 days in August, with a maximum reaching 82°·8, and a mean of 63°·1, with only 9 wet days, the deaths reached 65. September had a somewhat reduced temperature, and 15 days on which rain fell, the deaths registered were 32.

In October when there was a very reduced temperature, namely a mean of 49°·4, the deaths fell to 17.

These tables show that temperature exercises an important influence on these diseases, and as the mean heat approaches 60°, there is always an increase in mortality from diarrhœa ; but it may be noted that the effect is not immediately perceptible in the death rate, as it takes time to produce a fatal result, and the disease does not subside at once, as the effect is cumulative, and tends to continue for a while after the heat begins to decline.

The following table, (8) shows the deaths at ages during the three years :—

**Table 8.**

| | 1882 | Per Centage | 1883 | Per Centage | 1884 | Per Centage |
|---|---|---|---|---|---|---|
| Under the age of 1 year | 92 | 83·6 | 54 | 73·0 | 123 | 77·8 |
| 1 and under 2 years | 7 | 6·4 | 14 | 19·0 | 21 | 13·2 |
| 2 and under 15 years | 1 | | ... | | 1 | |
| 15 and under 25 years | ... | | ... | | ... | |
| 25 and under 60 years | 7 | | 5 | | 6 | |
| 60 years and upwards | 3 | | 1 | | 7 | |
| Total | 110 | | 74 | | 158 | |

From the above table it will be seen, that in 1882, the per centage of deaths under one year, to total deaths, was 83·6 per cent ; in 1883, 73·0, and in 1884, 77·8 per cent. At the age of one year, and under two, the death rate in 1882 was 6·4 per cent ; 1883, 19·0 per cent., and in 1884, 13·2 per cent. The rates in each of these three years in infant mortality under the age of two years, slightly exceeded 90 per cent., the per centage of deaths above two

years being only 10 per cent., so that the diarrhœa mortality of Cardiff was infantile, and infantile diarrhœa is always especially fatal during the Summer months.

In 1882, from the circumstance that the great mortality from diarrhœa of late years have been especially amongst infants, my attention was directed as to how far diet might be an important factor in causing infantile diarrhœa.

I therefore visited every fatal case for the purpose of inquiring into its history and etiology. The result of these inquiries induced me to conclude that temperature, age and diet were important factors in contributing to the excessive mortality of this disease.

Temperature and age I have already spoken of. I have therefore now to refer especially to diet. A reference to Table 8, shews that out of 110 deaths from diarrhœa, 99 were at the nursing period of life. Seventy-six infant deaths occurred between the 26th June and the 31st of October. A careful enquiry was instituted of into the diet of these children, which elicited the following facts :—

One had been fed on breast milk alone ;
Six had been fed on breast and cows' milk ;
Nine had been fed on breast, cows' milk with sugar, and farinaceous food ;
Seventeen had been fed on cows' milk with sugar & water only;
Thirty-two had been fed on cows' milk, farinaceous and other food ;
Six had been fed on condensed milk ;
Two had been fed on condensed milk and cows' milk ;
Three had been fed on condensed milk and farinaceous food.

It will thus be seen that only one death was recorded when the infant was fed by breast milk alone, the remainder being fed on animal milk, with or without farinaceous food. The difference between breast milk and cow's milk is not great, as will be seen by the following analysis :—

| | Woman's Milk. | Cows' Milk. |
|---|---|---|
| Water | 88·35 | 86·80 |
| Casein and Albumen | 3·15 | 4·14 |
| Sugar | 4·37 | 4·53 |
| Butter | 3·87 | 3·93 |
| Salts | ·26 | ·70 |

Cows' milk is richer, but, if diluted with water and given in proper quantities, is undoubtedly the best article of diet, when the mother is unable to nurse her infant. Cows' milk may, however, become injurious as an article for infantile diet under the following circumstances ;—if it is rendered abnormal in composition by foreign matters floating in the atmosphere, or by germs evolved from the excreta of sewage ;—if polluted by water, contaminated with sewage matter, either added as a diluent, or employed for the purpose of cleansing milk vessels ;—if mixed with the acid residuum

left in feeding bottles improperly washed,—or if it has been exposed in open vessels where noxious gases are set free.

Human milk, immediately after the birth of the infant, or cows' milk directly after calving, contains a peculiar principle termed colostrum ; this is a laxitive in its effect, and is intended by nature, to remove the meconium or contents of the intestines of the new-born offspring. The colostrum contained in cows' milk is a much more powerful laxitive than that present in the human secretion, hence it follows, that cows' milk in this condition is calculated to exert an injurious effect and give rise to intestinal irritation if taken by infants. As a matter of fact, it is generally considered that the milk obtained from the cow, that has calved within three weeks, is unfit food for infants, especially during the hot months, when there is a proclivity to intestinal disturbance. In this district the demand for milk is much in excess of the local supply, and as a consequence, the sale of milk affords more profit to the cowkeeper than if it were used for feeding calves, hence there is a temptation to mix the milk of cows which have recently calved with the ordinary supply.

*Milk changed in Chemical Constitution*:—During the Summer months cows' milk rapidly becomes sour. This change of condition, until recently, was regarded as an instance of simple chemical decomposition, whereby the several ultimate elements became separated and entered into new combinations; but the experiments of M. PASTEUR now prove that this changed condition is due to microscopic life in the form of organisms, which, floating in the air, find their way into the milk. Liquids like milk, containing a large proportion of nitrogenous matter, afford a nutritive soil for these organism. They develope themselves with great rapidity, especially when temperature favors this, and the milk becomes what is called sour, and taken in this state may produce severe diarrhœa.

I have entered somewhat elaborately into the dangers to be apprehended from the use of milk in an abnormal condition as an article of food for infants. That these dangers do obtain to a great degree, I may observe that amongst our Irish population, numbering some thousands, the high price of milk is prohibitory, so that infants as a rule are nursed at the breast and diarrhœa is comparatively unknown.

It is highly important that great care should be taken in the temporary storage of the milk, that the vessels in which it is placed are always kept clean, as also the feeding bottles; that it should not be exposed to the effect of a high temperature, or where the atmosphere is likely to be contaminated with noxious germs.

The ill effects of the latter have been more especially instanced where local causes have operated to intensify them.

To illustrate this the following table is inserted :—

## Table 9.

| Districts. | 1882. | Population. | Death-rate. | 1883. | Population. | Death-rate. | 1884. | Population. | Death-rate. |
|---|---|---|---|---|---|---|---|---|---|
| Cardiff, North | 15 | 14,483 | 1·0 | 16 | 16,462 | 0·9 | 27 | 17,131 | 1·5 |
| ,, South | 35 | 32,775 | 1·0 | 17 | 35,312 | 0·4 | 42 | 35,982 | 1·0 |
| Roath, North | 8 | 5,459 | 1·4 | 8 | 6,475 | 1·2 | 13 | 7,381 | 1·7 |
| ,, South | 35 | 16,215 | 2·1 | 16 | 19,231 | 0·8 | 26 | 20,756 | 1·2 |
| Canton, North | 9 | 8,847 | 1·0 | 6 | 9,306 | 0·6 | 16 | 9,993 | 1·6 |
| ,, South | 4 | 6,023 | 0·6 | 7 | 7,143 | 0·9 | 20 | 8,237 | 2·4 |
| Grangetown | 4 | 5,100 | 0·7 | 4 | 5,971 | 0·6 | 14 | 6,743 | 2·0 |
| TOTAL | 110 | | | 74 | | | 158 | | |

Table 9 subdivides the town into Northern and Southern sections. The line of demarcation is well defined and may be recognised by referring to the map, and following the main road from Pengam to Ely Common. In describing the natural configuration of the district, it has been already shewn that the inclination of the ground on which Cardiff is built is from north to south, and in this direction the main trunk sewers are laid. The fall is nowhere great, but in the southern sections the houses are built on an almost dead flat, especially in those portions of Roath and Canton. The sewers for relieving the streets, which run parallel to the main road in Roath, are what may be termed blind sewers, they are constructed with very low gradients and require frequent flushing to prevent the solid excrementitious matter entering them from forming deposits.

The inefficient water supply does not afford this, and, practically, the chief reliance is on storm water, at all times a very undesirable one, hence it has constantly occurred that during the hot and dry weather the escape of sewer gases through the ventilating shafts in the centre of the streets in this district, renders the atmosphere exceedingly offensive, and has been a frequent source of complaint by the inhabitants. These gases contain a large amount of bacterial organisms. In speaking of milk I have alluded to it as a nutritive soil for the active development of these organisms when they find their way into it. Frequently, on making enquiries as to the place where the milk is kept, I found that it was a pantry, separated by a door from the back kitchen or scullery, in which there was an untrapped waste water pipe connected with the soil pipe; or else immediately in front of the window of the pantry a similar state of things existed, and by causing water to be thrown down the w.c. an escape of sewer gas would take place.

Table 9 shews, that when, in 1882, this state of things existed, the mortality from infant diarrhœa was 100 per cent. greater in the Southern portion of Roath than in any other locality in the district, being here 2·1 per 1000.

The sewers in the Canton district have equally low gradients, but the pressure of the clay on the porous gravel on the Southern portion of this district, caused the subsoil water to be retained here, this finding its way into the sewers kept these flushed, hence the diarrhæal mortality here was only 0·6 per 1000; but in 1884, when the month of August was dry and hot, this subsoil water failed, and the mortality in the South portion of Canton rose to 2·4.

In 1883 I caused the sewers in the Roath Southern district to be daily flushed by means of a watercart and hose; the water used in this cart contained a solution of Iron Salts, or Carbonate of Lime or Sulphide of Calcium. This effectually prevented the offensive effluvia from the ventilating shafts, and the death-rate for this year went down to 0·8.

Subsequently automatic tanks were constructed for storing water, for the purpose of flushing many of the streets of this sub-district with great advantage, and in 1884 when the hot and dry Summer greatly increased the diarrhœa mortality throughout Cardiff, the death-rate of the Southern section of Roath was with one exception the lowest.

Amongst the zymotic diseases, although not attended with any undue mortality, there was an interesting one requiring consideration from the circumstance, that for some time considerable attention on the part of Medical Officers of Health has been given to the possible communication of disease from animals to man; that this can be done by inoculation has never been doubted; glander, hydrophobia, vaccination, etc., are typical instances, also that the consumption of diseased animal food may set up severe gastro-intestinal irritation, as also feveral symptoms even to a fatal termination. At the present time, the question as to the possibility of the consumption of the flesh or milk of animals suffering from tuberculosis or other constitutional diseases may introduce the seeds of these into the system, requiring only favourable circumstances for development, is of paramount importance.

Dr. VACHER, the very able Medical Officer of Health at Birkenhead, has written some valuable monographs on this subject, and although the degree to which such diseases may be introduced into the human system has not yet been defined, there can be no question that such introduction has been recognised.

The epidemic, to which I desire to call your attention, occurred during the Summer of 1875, when a severe affection of the throat, accompanied by great constitutional disturbance came under my observation; although somewhat analagous to diptheria, it was not attended with the same fatality that is associated with the latter disease. The sloughing in the mouth and throat was less extensive and there was an absence of the albuminoid exudation peculiar to diptheria. The ulceration of the throat and mouth partook more of a vesicular and apthous character. I also met cases of skin eruption which assumed the form of penphigus, in more than one instance well marked near the finger nails. At this time foot and mouth disease prevailed among cattle and largely among cows. With the active assistance of Mr. MOIR, Veterinary Surgeon of this town and Cattle Inspector for the district, as also of Mr. THOMAS, Borough Analyist, we made daily examinations of samples of milk offered for sale and obtained by Mr. JAMES one of the Sanitary Inspectors. We detected, in a very considerable majority of these samples, that the milk was in a diseased state and taken from cows labouring under foot and mouth disease; I then called the attention of the public and my professional brethren to the fact. The sale of diseased milk was immediately checked, and with considerable advantage to the public health.

The following is the result of the microscopical examination and analyses by Mr. THOMAS of diseased milk obtained from cows suffering from foot and mouth disease.

*Ocular demonstration.*—In the first stage of the disease little or no difference is observed with the exception that small particles of solid matter (fat) of a star-like form are seen. As the disease advances these star-like masses become larger and larger. This is especially the case if the milk has remained for some time in the udder.

When the disease has attained its height and the milk-glands, either from sympathy, fever, or other local cause, become attacked, the milk generally gives a strong acid reaction, while the casein is at the same time coagulated. Doubtless, the casein then exists in a modified form; several such samples having withstood the action of strong acids for some time before coagulating. Again, if the milk, while in this state, be slightly agitated for a short time, masses of fat rise to the surface, and, from a pint of milk, it is easy to obtain a mass of butter weighing no less than 1 or 1½ ounce. Healthy milk, if shaken for twice the time, will give no such reaction. Moreover, the colour of the milk when much diseased is yellowish brown, of strong colour, and of such consistency as to be easily distinguished from healthy milk. If water be added to it when freshly drawn from the cow, the colour and consistency are of course reduced, but the fatty masses are not dissolved and are easily recognised.

*Microscopical Examination.*—In the first stage the milk appears moderately healthy. Masses of fat of small size are visible, and membraneous and other matters are mostly present. Mucous and an *etuated* membraneous tissue, and sometimes pus corpuscles, are more often observed during the first and latter stages of the disease than even in its most virulent form. The fat globules are also much more minute in these stages. Several samples of milk in the first stage were very poor. As the disease advances the milk becomes much richer (containing often as much as 24 per cent. of solids); the fat globules also attain a much larger size, and the extreme richness of the milk is very apparent under the microscope. The fatty masses now often cover the whole "field" of the microscope, and sometimes three or four times the "field," (power 240 etc. diameter). These masses give a strong iridescence by sunlight and fluorescence by diffused daylight. The network of fibres is sometimes observed in combination with the fatty masses, as well as a quantity of colouring matter resembling hermatine.

Epithelium is scarcely ever absent and is often seen in a very marked scale. A peculiar fibrous cell-like membrane, colored red, is almost invariably present; but I have not, however, been able to identify it. The most marked and constant indication of

this disease is the affinity which the apparently healthy fat globules have of congregating in masses and leaving the greater portion of the field unoccupied. This is readily observed during every stage of the disease, and is often noticeable for some considerable time after the animal is apparently convalescent. When the fat globules have agglomerated, their shape changes from round to oval, hexagonal and broken down forms, and the masses of fat globules are often so dense as to present a black appearance under the microscope. This can be attributed to the casein existing in a modified form, the caseous envelopes surrounding the flat globules being so thin and so weak as to allow them to congregate and even unite in the manner in which they are to be seen in the milk.

The casein is sufficiently glutinous, as it were, and of sufficient consistency in healthy milk, to envelop and compel the fat globules to remain equally distributed throughout the field of the microscope.

The foregoing comprised the most serious epidemics that have occurred in this town during recent years. In narrating the history of each of them, I have described the local existing conditions that favoured its introduction, or influenced its prevalence. These local conditions being altered, important results follow. Great as may have been these results in the saving of human life, they have not been confined entirely to this class of diseases, as the benefits of sanitation have marked a great improvement in public health generally, and also a great diminution in the mortality from all causes.

For the purpose of showing the altered condition of the public health, the annexed table is introduced. (Table 10).

# Table 10.

| Year. | Population. | Births. | Deaths. | Excess of Deaths over Births. | Excess of Births over Deaths. |
|---|---|---|---|---|---|
| 1845 | 13,385 | 320 | 324 | 4 | ... |
| 1846 | 14,212 | 384 | 321 | ... | 60 |
| 1847 | 15,039 | 331 | 484 | 153 | ... |
| 1848 | 15,866 | 428 | 579 | 151 | ... |
| 1849 | 16,693 | 466 | 864 | 398 | ... |
| 1850 | 17,520 | 504 | 485 | ... | 19 |
| 1851 | 18,354 | 575 | 585 | ... | 50 |
| 1852 | 19,724 | 696 | 620 | ... | 76 |
| 1853 | 21,094 | 865 | 644 | ... | 221 |
| 1854 | 22,464 | 950 | 925 | ... | 25 |
| 1855 | 23,834 | 1079 | 641 | ... | 438 |
| 1856 | 25,204 | 1227 | 772 | ... | 455 |
| 1857 | 26,574 | 1367 | 883 | ... | 484 |
| 1858 | 27,944 | 1356 | 753 | ... | 603 |
| 1859 | 29,314 | 1336 | 826 | ... | 510 |
| 1860 | 30,684 | 1246 | 662 | ... | 584 |
| 1861 | 32,054 | 1223 | 837 | ... | 386 |
| 1862 | 32,804 | 1268 | 695 | ... | 573 |
| 1863 | 33,552 | 1302 | 862 | ... | 440 |
| 1864 | 34,300 | 1399 | 932 | ... | 467 |
| 1865 | 35,048 | 1382 | 867 | ... | 515 |
| 1866 | 35,796 | 1331 | 882 | ... | 449 |
| 1867 | 36,544 | 1397 | 873 | ... | 524 |
| 1868 | 37,292 | 1387 | 843 | ... | 544 |
| 1869 | 38,640 | 1414 | 1005 | ... | 409 |
| 1870 | 38,788 | 1406 | 903 | ... | 503 |
| 1871 | 39,536 | 1391 | 891 | ... | 500 |
| | 59,494 | | | | |
| 1872 | 40,284 | 1358 | 916 | ... | 442 |
| | 62,086 | | | | |
| 1873 | 41,032 | 1430 | 995 | ... | 435 |
| | 64,674 | | | | |
| 1874 | 41,780 | 1550 | 885 | ... | 665 |
| | 67,262 | | | | |
| 1875 | 69,850 | 2716 | 1547 | ... | 1169 |
| 1876 | 72,438 | 2707 | 1455 | ... | 1252 |
| 1877 | 75,026 | 2772 | 1475 | ... | 1297 |
| 1878 | 77,614 | 2795 | 1468 | ... | 1327 |
| 1879 | 80,202 | 2969 | 1428 | ... | 1541 |
| 1880 | 82,790 | 2893 | 1634 | ... | 1295 |
| 1881 | 85,378 | 3145 | 1556 | ... | 1589 |
| 1882 | 88,603 | 3399 | 1724 | ... | 1675 |
| 1883 | 91,204 | 3526 | 1807 | ... | 1719 |
| 1884 | 93,468 | 3920 | 2250 | ... | 1670 |
| 1885 | 97,034 | 4164 | 2481 | ... | 1683 |

This table gives for a period of 40 years the population of each year, the number of births and deaths, the excess of deaths over births, and the excess of births over deaths, as the case may be.

Again bearing in mind the divisions into four decennial periods, the first decade shows an excess of deaths over births amounting to 258. In this decade it will be remembered that sanitation was practically *nil*. At the commencement of the next decade in 1855, the section of the new sewerage system became available, and from that time, and progressively as other important sanitary improvements were carried out, there was a concurrent increase in the excess of births over deaths up to the end of 1884, at which time the relative proportion of births to deaths exceeds that of almost all other populous towns.

In order to show the number of lives saved, I might have taken the mean death-rate of the first decade, (which was 32·7 per 1000) for comparison, but this may probably be deemed excessive as it included two epidemics of Asiatic Cholera, a disease foreign in this country. I therefore prefer to select the death-rate of the previous ten years, which was 30 per 1000, and fairly represents the mortality of the town in its pre-sanitary condition. In the next decennial period ending with 1864, the mean death-rate fell to 26·5, therefore at that time, (the mean population being 29,626) there was an annual saving of life 3·5 per 1000, making a total of 910 in the ten years. During the next decade the mortality fell to 23·5, which, as compared with a death-rate of 30 per 1000, gives an annual saving of 6·5 per 1000 ; the mean population at that time amounted to 38,414. Multiplying 38,000 by 6·5, gives 2,470 as the number of lives saved in that period. In the last decennial term, the mean death-rate was reduced to 20 per 1000, the mean population was 81,657, and this multiplied as before, shows an annual saving of 810, or a total of 8,100 lives in the ten pears.

The whole number of lives saved thus, making a grand total of 11,480.

I shall now summarise the nature and cost of the sanitary works carried out under the authority of your board since it was first constituted, the total saving of life effected by these works, and then submit for your consideration such data as may enable you to determine whether the expenditure has been an economical and judicious one.

The following information has been obtained from the last published Financial Statement of the Borough Treasurer up to the year ended 1884.

| | £ | s. | d. |
|---|---|---|---|
| To the construction of sewerage works; expended to March 31st, 1884 ... ... ... | 109,549 | 10 | 8 |
| To special improvements such as the construction and improvement of streets and roadways; the repairs of old streets, the purchase of houses and land where the streets have been too narrow, the houses unfit for human habitation, &c. &c. ... ... | 185,794 | 14 | 10 |
| To Law Expenses ... ... ... ... | 1,529 | 14 | 10 |
| Total £ | 296,874 | 0 | 4 |

This expenditure does not include the sum of £376,865 16s. 2d. on account of waterworks, as this outlay is itself a source of profit derived from the receipts obtained from the consumers. The capital sum thus expended is therefore not taken into consideration in the estimated return on the outlay to be now referred to.

The late Dr. FARR who devoted his life's history to vital statistics, estimated the pecuniary value of a life saved to the productive industry of the country at £300 for every male, and £150 for every female. Without entering into the details on which he based this estimate, it may be safely stated that this is a low computation. It may be recognised as so by one fact.

Out of every 100 births, 40 per cent. die under the age of 15 years, and have therefore contributed nothing to the industrial wealth of the kingdom. After that age they may be bread-winners. Of these a certain number would be of the working classes whose earnings are limited, as their labour represents only the work of their hands. Above that class, mental work which receives a higher reward comes into play, and in category are embraced all those who are engaged in trade, commerce and large industrial undertakings of various kinds, the professional classes and great capitalists who supply the means for carrying on all enterprises. The individual life value of these would far exceed Dr. FARR'S moderate estimate. Taking then the total number of lives saved, 11,480, half males at £300 a head would give £1,722,000, the other half females at £150, £861,000, giving £2,583,000, upwards of two millions and a half as the value of the lives saved in hard cash.

In the foregoing history of the sanitary aspect of Cardiff during the last 40 years, I have endeavoured to give an accurate account of the facts, and to draw from them legitimate conclusions. A record extending over so long a time in a populous and rapidly growing town, under one Board and the same Medical Officer, must be a matter of uncommon occurrence, and it cannot fail to be interesting to the Sanitary Boards and Officers of other towns, and to all who are engaged in a hand to hand struggle with zymotic and other diseases; but, beyond this general interest, the

case of Cardiff presents special and noteworthy features. It furnishes a striking illustration of the influence of geological formation, and the physical configuration of the land surface in ameliorating or intensifying the destructiveness of maladies of this kind. Cardiff is almost unique in its twofold character of an ancient stronghold from the earliest times on the one hand, and the most remarkable example of modern enterprise in coal, iron, shipping and other industries and great docks on the other, which are curiously blended in its history. The foundations of its earlier and more military state were laid by the Romans and continued with suitable modifications through the Norman and later periods, which, practically, only terminated near the close of the last century. During these long ages the population was small, and the evil effects of the absence of sanitary surroundings were consequently minimised. Its modern improvements began with the construction of the Glamorganshire Canal from Merthyr Tydfil to Cardiff, which was completed in 1798. This was followed in first half of the present century by the West Bute Dock and Taff Vale Railway and later on by the Great Western Railway, extensions of the Bute Docks, and the Rhymney Railway. When, under these powerful incentives to industry, the population increased with rapid stride , the effect of the absence of all attention to sanitary laws became painfully and fatally manifested. We have seen the evidence of this in the abnormal fact of the deaths having exceeded the births amongst a naturally prolific people, and the immediate, progressive, and abiding results of the application of scientific principles to the engrossing problem of health and life.

Further, it is to be hoped that I have succeeded in showing that sanitary laws, judiciously applied, promote not only the well-being and longevity of the inhabitants, viewed from the standpoint of humanity, but also—and it is a most important consideration in this prosaic age—that they are the best possible investment of public money, yielding as they do an enormous per centage on the capital expended on sanitary works. They produce, too, an immense saving in the poor rates by the diminished sickness and death of the bread-winners and the permanent pauperism of their suffering and bereaved families.

I have now to direct your attention to the sickness and mortality prevalent in Cardiff during 1885. In the earlier months of this year, public attention was called to the high death-rate recorded in the weekly returns of the Registrar General, and as a high death-rate is usually taken to indicate an insanitary condition of a district, considerable anxiety was felt that this high death-rate was due to such a cause. I was therefore directed by your committee to make a special report on the subject. In this report I dwelt on the necessity that the estimate of population on which the death-rate was based should be as accurate as possible. The formula adopted by the Registrar General is to take the total increase of population between the last and preceding censuses, to ascertain the mean of annual increase of this decennial period, and add this mean to each year that has elapsed since the last census. This hypothesis is applicable to the Kingdom as a whole, in that the increase is made up by the excess of births over deaths, allowance being made for emigration or immigration, but as these two latter factors annually vary but little in England, they do not affect the results to any appreciable degree. But when this formula is adopted for the purpose of estimating the population of individual districts it fails; thus, in a locality where there is a constantly increasing field for the employment of labourers, or a rapid development of commercial enterprises, these attract new-comers at the expense of other districts where these circumstances are either stationary or are decreasing. Cardiff is essentially such an exceptional district, and I may instance this proposition, by extracting from the last public census return, the relative increase, or decrease of population as shown in certain towns in our immediate neighbourhood, and therefore easily to be recognised.

| Towns. | Population 1871. | Population 1881. | Increase. | Decrease. |
|---|---|---|---|---|
| Cardiff | 59,494 | 85,378 | 25,884 | |
| Gloucester | 31,844 | 36,552 | 4,708 | |
| Newport | 27,069 | 35,382 | 8,313 | |
| Swansea | 57,702 | 63,739 | 12,037 | |
| Merthyr | 51,948 | 48,857 | | 3,092 |

In the reports that I have from time to time made to your Board, I have alluded to the necessity of adopting some other formula for estimating the population of Cardiff, and I have submitted two other hypotheses, either of which would give a result sufficiently near for all practical purposes. One based on the births registered in the year, the other on the number of inhabited houses.

The birth formula is as follows:—The total population, as also the registered number of births, having been ascertained, the births are calculated as 1,000's and divided by the population, this is seen in 1861 by the following equation—$\frac{1223000}{32054}=38{\cdot}1$

| Year. | Population. | No. of Births. | Birth-rate. |
|---|---|---|---|
| 1861 | 32,054 | 1,223 | 38·1 |
| 1871 | 39,536 | 1,391 | 35·1 |
| 1881 | 85,378 | 3,145 | 36·5 |

Mean of the three years 36·5.

The annual birth-rates of the entire Kingdom during the last decennial period are shewn below.

| Years | 1875 | 1876 | 1877 | 1878 | 1879 | 1880 | 1881 | 1882 | 1883 | 1884 |
|---|---|---|---|---|---|---|---|---|---|---|
| Birth-rate | 35·4 | 36·4 | 36·0 | 35·6 | 34·7 | 34·3 | 33·9 | 33·7 | 33·3 | 33·5 |

The mean of the three years being 34·7.

The proportionate number of births in Cardiff in each of the years furnishing the three means, varies so little that they may be fairly taken to illustrate my proposition, viz., that 36·5 births in Cardiff represent a thousand population, and 34·7 that of the Kingdom.

The circumstance that the mean of birth-rate observed in Cardiff being 1·8 in excess of that of the Kingdom may be explained, viz., that an unusually large proportion of the population of Cardiff consists of mechanics, artisans, and labourers who contract marriages earlier than the better classes.

The total births registered in this district in 1885 were 4143; if these are divided by 36·5, carrying the division of excess through decimal fractions down to units, this equation would give us as a result, a population of $\frac{4143{\cdot}0+000}{36{\cdot}5}=113{\cdot}506$.

The other hypothesis, that a satisfactory estimate of population may be arrived at, by ascertaining the existing number of inhabited houses and multiplying these by the average of inmates found to occupy each house in known years.

The census year again furnishes authentic information bearing on the subject. On the occasion of the three last censuses, after deducting the floating population, the process just mentioned gave relatively 6·25 to 6·75 inmates per house.

In the Autumn of 1885, I caused a very careful survey of the town to be made and obtained the following information, which I have every reason to believe accurate; there were 16,938 inhabited houses, 408 vacant houses, and 534 in course of construction. Multiplying the 16,938 inhabited houses by 6·25, the result would give 105,863 as an estimate of population proper; to these are to be added 7,000 as the floating population, making a total of 112,863.

The average number of inmates in each house in Cardiff exceeds that observed throughout the Kingdom, which varies from 5 to 5·25; this arises from the fact, that in Cardiff nearly the whole of the houses are built on a lease tenure. The great demand for ground for building purposes eventuates in a high ground rent, hence the houses to be occupied by the working classes are

constructed to afford accommodation for two or more families, to enable the tenant to pay his rent, and practically more than two-thirds of the houses in Cardiff afford this accommodation.

This is confirmed by the following statement obtained from the assistant overseers of the several parishes comprising this district.

**Return of comparative Assessment of Houses.**

| Under £5 | No. of these compounded Assessments for | £5 & under £10 | £10 & under £20 | £20 & under £30 | £30 & under £40 | £40 and upwards. | Totals. |
|---|---|---|---|---|---|---|---|
| 36 | *543 | 3072 | 9226 | 2079 | 934 | 1122 | 16469 |

* These compounded assessments are included in 3072.

The rapidly yearly increasing number of houses is borne out by the comparative rateable value of house property in the preceding and recent Assessments, the last of which has just been completed and furnished me by the Clerk of Assessment Committee.

The Assessment 1880. £372,302
" " 1885. £566,405

as also the return of house plans submitted to, and passed by the Public Works Committee yearly since 1880.

| Years. | Total No. |
|---|---|
| 1881 | 904 |
| 1882 | 686 |
| 1883 | 980 |
| 1884 | 1,445 |
| 1885 | 1,345 |

These several facts induced me to believe that the estimate of the population of Cardiff in the returns of the Registrar General, was much below the actual population. I accordingly suggested that they should be submitted for his consideration; this was done, and the following reply has been received from the Secretary to the Statistical Department acting under his authority.

General Registrar Office,
Somerset House, 7th Jan., 1886.

Sir,

With reference to recent correspondence respecting the Registrar General's estimate of the present population of Cardiff, and the return of the inhabited houses of the Borough of Cardiff in each of the five years 1881-5 with which you recently favoured him; I am desired to inform you, that on the hypothesis that the rate of increase of population in the borough since 1881 has been the same as that which prevailed between 1871 and 1881, the estimate for the middle of 1886 is 100,736. On the other hand, if the population since 1881 has increased at the same rate as the inhabited houses on the rate books of the borough between 1881 and 1885, a

somewhat doubtful hypothesis, the estimate would become 114,631 ; this is probably nearer the correct number. A note will therefore be added to the Registrar General's Returns for 1886, stating that the death-rate as calculated on the usual basis, is probably overstated to the extent of about *One Eighth.*

I am, Sir,

Your obedient servant,

W. OGLE, M.D.,

Superintendent of Statistical Department.

J. L. WHEATLEY, Esq.,
Town Clerk, Cardiff.

For the obvious reason, that a departure from the method of computing the population in individual towns, would be inconvenient and not desirable, the yearly estimated increment is continued as before, but the Registrar-General in his weekly returns of the death rates of the twenty-eight large towns appends the the following foot-note:—

"The population of the twenty-eight towns is estimated on the hypothesis that the rate of increase in the last inter-censal period has been maintained since 1881. There are however reasons to believe that by this method the populations of Leicester, Salford, and Bradford are over-estimated and that of Cardiff under-estimated. If the population be estimated by the increase of inhabited houses in the rate books, the above death-rates for Leicester, Salford, and Bradford are under-stated by one fifteenth, one thirteenth, and one tenth respectively, and those for Cardiff over-stated by one eighth.

In the letter above quoted, the Registrar-General names 114,631 as the probable population in the middle of the year 1886. In my estimate I gave the population of the town in the year 1885 as 107,393, and 114,000 for the middle of 1886, the population of the district at the end of 1885 would be 111,012, and this probably is very proximate.

In my future reports to your Board, I shall add the proportionate monthly increment to the end of the year, namely 603, this will represent on each occasion, the then rate of mortality instead of taking the mean of the year. The result at the end of the year will furnish the same mean death-rate by either process.

With these preliminary remarks necessary for determining the population of this district, when considering its sanitary condition, I now pass on to certain subjects which, either separately or conjointly, affect the public health.

The disadvantages associated with the configuration and geology of this district (alluded to in the earlier part of this report) have been continuously, and with satisfactory results, met by your Engineering Department, but the ever varying influences of meteorology require some consideration and are detailed in the following remarks bearing on them :—

## THE RAINFALL.

The rainfall during the year 1885, as observed by Mr. W. ADAMS. C.E., F.G.S., at his residence, Cambridge House, Park Place, Cardiff, is shewn by the subjoined table :—

Latitude, N., 51 deg., 9 min. 10 sec.
Longitude, W., 3 deg., 9 min. 55 sec.
Diameter of Receiver of Gauge, 5 inches.
Height above ground, 1 foot.
Height above sea-level, 43 feet.

## RAINFALL. TABLE No. 1.

The following table shows the monthly rainfall, the greatest fall in 24 hours, with date, and the number of days on which 0·01 in. or more rain fell :—

| Month. | Total Depth. | Greatest fall in 24 hours. | Date. | Days on which ·01 inches or more fell. |
|---|---|---|---|---|
| | Inches. | Inches. | | |
| January ... | 3·71 | 0·58 | 9th | 20 |
| February ... | 3·65 | 0·67 | 26th | 22 |
| March ... ... | 1·87 | 0·53 | 29th | 16 |
| April ... ... | 2·52 | 0·67 | 1st | 16 |
| May ... ... | 3·86 | 0·71 | 19th | 27 |
| June ... ... | 2·61 | 1·04 | 23rd | 13 |
| July ... ... | 0·72 | 0·31 | 18th | 6 |
| August ... | 2·74 | 1·07 | 6th | 12 |
| September ... | 6·51 | 1·76 | 10th | 23 |
| October ... | 5·59 | 1·60 | 22nd | 22 |
| November ... | 5·47 | 1·11 | 27th | 16 |
| December ... | 1·74 | 0·05 | 5th | 17 |
| | 40·99 | | | 210 |

## TABLE No. 2.

The following is the rainfall for the year 1885, as compared with six previous years:—

| Month. | 1879 | 1880 | 1881 | 1882 | 1883 | 1884 | 1885 |
|---|---|---|---|---|---|---|---|
| | Inches. | Inches. | Inches. | Inches. | Inches. | Inches. | Inches. |
| January ... | 4·71 | ·87 | ·92 | 3·19 | 5·75 | 6·03 | 3·71 |
| February ... | 5·95 | 3·88 | 4·81 | 2·56 | 3·73 | 4·40 | 3·65 |
| March ... | 1·14 | 1·90 | 3·88 | 2·26 | ·60 | 3·39 | 1·87 |
| April ... | 2·64 | 1·98 | 1·44 | 5·68 | ·67 | 1·56 | 2·52 |
| May ... | 2·85 | 1·45 | 2·62 | 2·72 | 1.90 | 2.37 | 3·86 |
| June ... | 6·48 | 2·38 | 3·59 | 4·28 | 1·81 | 1·92 | 2·61 |
| July ... | 4·00 | 6·64 | 2·62 | 5·77 | 3·56 | 4·05 | 0·72 |
| August ... | 8·12 | ·77 | 6·94 | 6·75 | 2·09 | 2·21 | 2·74 |
| September | 4·85 | 3·67 | 2·09 | 3·94 | 6·14 | 1·96 | 6·51 |
| October ... | 1·51 | 4·94 | 3·23 | 8·33 | 4·23 | 1·01 | 5·59 |
| November | 0·43 | 3·67 | 4·98 | 6·26 | 6·38 | 2·12 | 5·47 |
| December... | 2·11 | 6·70 | 4.50 | 4·86 | 1·92 | 5·87 | 1·74 |
| | 44·79 | 38·85 | 41·62 | 56·60 | 38·78 | 36·89 | 40·99 |

The average rainfall of the six previous years was 42·9, that of the present year 40·9, or 2·0 below the average.

The month of January was moist but without excessive rainfall. The direction of wind was chiefly E. There was frost on many nights but the temperature on the whole was below the average. The barometric readings were as follows :—the highest, 30·339 in. on the 7th ; the lowest, 29·034 in. on the 11th. The mean of the months 29·860 in. The maximum temperature registered in the shade was 51°·8 on the 28th ; the minimum, 28°·0 on the 9th. The mean of maximum, 42°·0; the mean of minimum, 35°·1. The mean of the month, 38°·5. The temperature was at or below 32° on nine days. The mean reading of hygrometric dry bulb was 38°·2 ; of wet bulb, 37°·0. There were 20 days on which 0·01 in. or more rain fell. The greatest fall in 24 hours being 0·58 in. on the 9th. The total rainfall of the month being 3·71 in.

February was marked by large S.E. winds which produced much moisture, as also many wet days. The barometer was on the whole low and unsteady, the highest reading was 30·089 in. on the 21st ; the lowest, 29·007 in. on the 2nd and 10th. The mean for the month, 29·592 in. The highest temperature was 54°·8 on the 27th, the lowest, 28°·3 on the 19th. The mean of maximum, 48°·7; of minimum 39°·5. The mean of month, 44°·1. There were four days when the temperature was at or below 32°. The mean of hygrometric dry bulb was 43°·6, of wet bulb, 42°·2. There were 22 days on which 0·01 in. or more rain fell. The greatest fall in 24 hours was 0·67 in. on the 26th. The total rainfall was 3·65 in.

March shewed a preponderance of N.E. winds which dried up the moisture and brought colder weather. The barometer was low during the earlier part of the month but was high and steady during the middle and latter part. The highest reading was 30·514 in. on the 14th, the lowest, 29.355 on the 6th. The mean of month 30.024 in. The highest temperature registered was 54°·4 on the 20th, the lowest, 28°·3 on the 8th. The mean of maximum. 48°·3, of minimum, 36°·5. The mean of month 42°·9. The temperature was at or below 32° on three days. The mean of hygrometric dry bulb was 42°·2, of wet, 39°·4. There were 16 days on which 0·01 or more rain fell. The greatest fall in 24 hours being 0·53 in. on the 29th. The total rainfall of month was 1·89 in.

The mean of temperature for the quarter at Cardiff, as compared with Greenwich, is as under :—

| Month. | Cardiff. | Greenwich. | Above. | Below. |
|---|---|---|---|---|
| January | 38°·5 | 36°·6 | 1°·9 | |
| February | 44°·1 | 43°·9 | 0°·2 | |
| March | 42°·9 | 40°·3 | 1·°6 | |
| Mean of Quarter | 41°·8 | 40°·3 | 1°·5 | |

April was distinguished by E. winds tempered by S., and in combinations the weather was dry and rather ungenial, not conducive to vegetation. The barometer was unsteady throughout the whole of the month, its highest reading was 30·232 in. on the 19th, its lowest, 29·183 in. on the 25th; the mean of month 29·738 in. The highest temperature was 69°·2 on the 21st, the lowest, 30°·9 on the 3rd. The mean of maximum 54°·5; the mean of minimum, 38°·2. The mean of month, 46°·3. There was one day when the temperature was at or below 32°. The mean of hygrometric dry bulb was 47°·2; of wet bulb, 44°·0. There were 16 days on which 0·01 in. or more rain fell. The greatest fall in 24 hours was 0·67 in. on the the 21st. The total rainfall was 2·52 in.

May was cold with a prevalent N.W. wind, the weather was very unsettled until near the end of the month when an improvement set in. The barometer was somewhat low and unsteady throughout the whole month. Its highest reading was 30·136 in. on the 12th; its lowest, 29·302 in. on the 22nd. The mean of the month was 29·767 in. The maximum temperature, 65°·2, was registered on the 29th; the minimum, 33°·8 on the 8th. The mean of maximum, 57°·0; the mean of minimum, 42°·8. The mean of hygrometric dry bulb, 51°·1; of wet bulb, 47°·1. There were 27 days on which 0·01 in. or more rain fell. The greatest fall in 24 hours was 0·79 in. on the 19th; The total rainfall was 3·86 in.

June was a fine month without any great extremes, and very favourable for harvest work; there was no predominence of any particular winds. The barometer was high and steady. Its highest reading was 30·306 in. on the 11th; the lowest, 29·039 in. on the 6th. The mean of month, 29·975 in. The highest temperature was 78°·3 on the 14th; the lowest, 42°·3 on the 2nd. The mean of maximum was 67°·6; of minimum, 50°·8. The mean of month, 59°·2. The mean of hygrometric dry bulb was 60°·4; of wet bulb, 58°·4. There were 13 days on which 0·01 in. or more rain fell. The greatest fall in 24 hours was 1·04 in. on the 23rd. The total rainfall was 2·61 in.

| Month. | Cardiff. | Greenwich. | Above. | Below. |
|---|---|---|---|---|
| April | 46°·3 | 47°·7 | ... | 1°·4 |
| May | 49°·9 | 49°·9 | ... | ... |
| June | 59°·2 | 59°·5 | ... | 0°·3 |
| Mean of Quarter | 51°·8 | 52°·4 | ... | 0°·6 |

July was favoured with S.W. winds; the weather was very genial without being excessively hot, the barometer being high and steady, its highest reading being 30·333 in. on the 22nd; its lowest, 29·833 in. on the 19th. The mean of month, 30·130 in. The maximum temperature was 86°·2 on the 26th; the minimum

45°·4 on the 13th. The mean of maximum, 71°·7; of minimum, 54°·5. The mean of month, 63°·1. The hygrometric dry bulb, 63°.3; of wet bulb, 60°·1. There were only six days on which 0.01 in. or more rain fell. The greatest fall in 24 hours was 0·31 in. on the 18th. The total rainfall during the month was only 0·75 in.

AUGUST was also a dry month, very fine, with a prevalence of N.W. winds and a cooler temperature. The barometer was steady; its highest reading was 30·267 in. on the 16th; its lowest, 29·567 in. on the 10th. The mean for month, 29·985 in. The maximum temperature was 75°·9 on the 16th; the minimum, 43°·2 on the 14th. The mean of maximum was 67°·4; the mean of minimum, 50°.9; the mean of month, 59°·0. The mean of hygrometric dry bulb was 59°·4; of wet bulb, 54°·8. There were 12 days on which 0·01 in. or more rain fell. The greatest fall in 24 hours was 1·07 in. on the 6th. The total rainfall was 2·74 in.

SEPTEMBER shewed an excess of S.W. winds and an absence of sunshine. The barometer was low; the highest reading was 39·290 in. on the 8th; the lowest, 29·502 in. on the 5th. The mean of month was 29·879 in. The maximum temperature was 70°·5 on the 15th; the lowest, 32°·9 on the 28th. The mean of maximum was 63°·1; of minimum, 49°·5. The mean of month, 56°·3. The mean of hygrometric dry bulb, 56°·4; of wet bulb, 53°·8. There were 25 days on which 0·01 in. or more rain fell. The greatest fall in 24 hours was 1·76 in. on the 10th. The total rainfall for month was 6·51 in.

| Month. | Cardiff. | Greenwich. | Above. | Below. |
|---|---|---|---|---|
| July | 63°·1 | 63°·8 | ... | 0°·7 |
| August | 59°·0 | 58°·5 | 0°·5 | ... |
| September | 56°·3 | 55°·1 | 1°·2 | ... |
| Mean of Quarter | 59°·3 | 59°·1 | 0°·2 | ... |

OCTOBER was very cold and wet with a great deal of N.W. winds. The barometer oscillated very much and was at times low; the highest reading was 30·107 in. on the 17th; the lowest, 29·025 in. on the 10th. The mean of month was 29.669 in. The highest temperature registered was 58°·4 on the 3rd; the lowest, 32°·0 on the 5th. There was one day when the temperature was at or below 32°. The mean of maximum was 49°·5; of minimum, 41°·4. The mean of month was 45°·4. The mean hygrometric dry bulb was 46°·6; of wet 45°·0. There were 22 days on which 0·01 in. or more rain fell. The greatest fall in 24 hours was 1·60 in. on the 9th. The total rainfall was 5·59.

NOVEMBER continued wet but not quite so dull in proportion; E. winds predominating. The barometer was changeable. The highest reading was 30·259 in. on the 16th; the lowest, 29·146 in. on the 28th. The mean of month was 29·813 in. The

maximum temperature registered was 55°·9 on the 29th; the minimum, 31°·1 on the 18th. The mean of maximum was 47°·2; of minimum, 40°·8. The mean of month was 44°·0. There was only one day when the temperature was at or below 32°. The mean of hygrometric dry bulb was 43°·7; of wet bulb, 42°·8. There were 16 days on which 0·01 in. or more rain fell. The greatest fall in 24 hours was 1·11 in. on the 27th. The total rainfall for the month was 5·47 in.

DECEMBER was much drier and rather cold with a prevalence of N.W. winds. There was a great absence of sunshine, with fogs. The barometer was high and steady; the highest reading was 30·546 in. on the 23rd; the lowest, 29·450 in. on the 6th. The mean of month was 30·163. The maximum temperature was 52°·0 on the 30th; the minimum, 21°·9 on the 11th. The mean of maximum was 43°·7; of minimum, 33°·9. The mean of month was 38°·8. There were 11 days when the temperature was at or below 32°. The mean of hygrometric dry bulb was 37°·9; of wet, 37°·1. There were 17 days on which 0·01 in. or more rain fell. The greatest fall in 24 hours was 0·05 in. on the 5th. The total rainfall for month was 1·74.

| Month. | Cardiff. | Greenwich. | Above. | Below. |
|---|---|---|---|---|
| October | 45°·4 | 46°·1 | ... | 0°·7 |
| November | 44°·0 | 43°·3 | 0°·7 | ... |
| December | 38°·8 | 38°·9 | ... | 0°·1 |
| Mean of Quarter | 42°·7 | 42°·8 | ... | 0°·1 |

## Table 11.

The temperature of the year, as compared with that of the previous five years.

| Month. | 1880 | 1881 | 1882 | 1883 | 1884 | Mean of 5 years. | 1885 |
|---|---|---|---|---|---|---|---|
| January ... | 34°·6 | 32°·1 | 42°·1 | 40°·5 | 44°·5 | 38°·8 | 38°·5 |
| February ... | 42°·7 | 39°·6 | 43°·6 | 42°·0 | 42°·2 | 42°·0 | 44°·1 |
| March ... | 45°·4 | 40°·7 | 46°·3 | 37°·5 | 45°·7 | 43°·1 | 42°·4 |
| April ... | 47°·4 | 47°·7 | 48°·7 | 48°·1 | 45°·4 | 47°·5 | 46°·3 |
| May ... | 53°·4 | 50°·0 | 52°·5 | 52°·5 | 52°·7 | 52°·2 | 49°·9 |
| June ... | 58°·0 | 57°·4 | 56°·2 | 57°·4 | 58°·6 | 57°·5 | 59°·2 |
| July ... | 61°·6 | 62°·1 | 60°·1 | 58°·4 | 59°·8 | 60°·4 | 63°·1 |
| August ... | 63°·2 | 58°·7 | 60°·2 | 60°·0 | 63°·1 | 61°·0 | 59°·1 |
| September | 59°·6 | 56°·0 | 54°·3 | 56°·9 | 59°·8 | 57°·3 | 51°·3 |
| October ... | 46°·8 | 47°·3 | 50°·3 | 50°·1 | 49°·4 | 48°·8 | 45°·4 |
| November | 43°·7 | 49°·7 | 44°·1 | 43°·8 | 43°·8 | 46°·2 | 44°·0 |
| December | 44°·1 | 41°·1 | 40°·3 | 41°·2 | 41°·7 | 41°·7 | 38°·8 |

# TABLE 12.

The following is a Monthly Summary of the Meteorological observations recorded during the year:—

| MONTH. | BAROMETER. | | | THERMOMETER. | | | | | | HYGROMETERS. | | TOTAL RAINFALL, |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Mean of Month. | Maximum. | Minimum. | Mean of Max. | Mean of Min. | Mean of Month. | No. of days at or below 32 deg. | Mean of Dry Bulb. | Mean of Wet Bulb. | |
| | Date. | Date. | | Date. | Date. | | | | | | | |
| January | 7. 30·339″ | 11. 29·034″ | 29·860″ | 28. 51°·8 | 6. 28°·0 | 42°·0 | 35°·1 | 38°·5 | 9 | 38°·2 | 37°·0 | 3·71″ |
| February | 21. 30·089″ | 2. 29·007″ | 29·592″ | 27. 54°·8 | 19. 28°·3 | 48°·7 | 39°·5 | 44°·1 | 4 | 43°·6 | 42°·2 | 3·65″ |
| March | 14. 30·514″ | 6. 29·355″ | 30·024″ | 20. 54°·4 | 8. 28°·3 | 48°·3 | 36°·5 | 42°·4 | 3 | 42°·2 | 39°·4 | 1·87″ |
| April | 19. 30·232″ | 25. 29·183″ | 29·738″ | 21. 69°·2 | 3. 30°·9 | 54°·5 | 38°·2 | 46°·3 | 1 | 47°·2 | 44°·0 | 2·52″ |
| May | 12. 30·136″ | 22. 29·302″ | 29·767″ | 29. 65°·2 | 8. 33°·8 | 57°·0 | 42°·8 | 49°·9 | 0 | 51°·1 | 47°·1 | 3·86″ |
| June | 11. 30·306″ | 6. 29·039″ | 29·975″ | 14. 78°·3 | 2. 42°·3 | 67°·6 | 50°·8 | 59°·2 | 0 | 60°·4 | 58°·4 | 2·61″ |
| July | 22. 30·333″ | 19. 29·833″ | 30·136″ | 26. 86°·2 | 13. 45°·4 | 71°·7 | 54°·5 | 63°·1 | 0 | 63°·3 | 60°·1 | 0·72″ |
| August | 16. 30·267″ | 10. 29·567′ | 29·985″ | 16. 75°·9 | 14. 43°·2 | 67°·4 | 50°·9 | 59°·1 | 0 | 59°·4 | 54°·8 | 2·74″ |
| September | 8. 30·290″ | 5. 29·502″ | 29·879″ | 15. 70°·5 | 28. 32°·9 | 63°·1 | 49°·5 | 51°·3 | 0 | 56°·4 | 53°·8 | 6·51″ |
| October | 17. 30·107″ | 10. 29·025″ | 29·666″ | 3. 58°·4 | 25. 32°·0 | 49°·5 | 41°·4 | 45°·4 | 1 | 46°·6 | 45°·0 | 5·59″ |
| November | 16. 30·259″ | 28. 29·146″ | 29·813″ | 29. 55°·9 | 18. 31°·1 | 47°·2 | 40°·8 | 44°·0 | 1 | 43°·7 | 42°·8 | 5·47″ |
| December | 23. 30·546″ | 6. 29·540″ | 30·163″ | 31. 52°.0 | 11. 21°·9 | 43°·7 | 33°·9 | 38°·8 | 11 | 37°·9 | 37°·1 | 1·74″ |

**TABLE 13.—Illustrates the daily Direction of Winds throughout the Year.**

| Direction of Winds. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sep. | Oct. | Nov. | Dec. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N.W. ... | 5 | 1 | ... | 1 | ... | 2 | ... | ... | 2 | 6 | 3 | 7 | 27 |
| N. ... | 3 | 1 | 2 | ... | ... | ... | ... | ... | 1 | 1 | ... | 1 | 9 |
| N.E. ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... | 6 | 3 | 4 | 14 |
| E. ... | 10 | 10 | 22 | 19 | 10 | 20 | 14 | 14 | 16 | 8 | 16 | 3 | 162 |
| S.E. ... | 1 | ... | ... | ... | ... | ... | ... | 1 | ... | 2 | 2 | 2 | 8 |
| S. ... | 4 | 10 | 3 | ... | 2 | 1 | ... | ... | 1 | ... | ... | ... | 21 |
| S.W. ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | 1 | 1 | 1 | 4 |
| W. ... | 8 | 6 | 4 | 10 | 19 | 6 | 16 | 16 | 10 | 7 | 5 | 13 | 120 |

## THE DRAINAGE.

In my report for 1882, assisted by your Surveyor, I described your system of sewerage at the end of that year; since then large extensions necessary to meet the requirements of this rapidly growing town have been made. This system is undoubtedly the best that could have been devised, but, owing to engineering difficulties, due to the configuration of the district, there are at times temporary disturbing causes which operate adversely to its perfect working. These are of a temporary character, as when drought obtains, and there is an inability to obtain efficient flushing. This causes solid excretal deposits in the sewers, and in certain parts of the district a consequent escape of sewer gas through the ventilating shafts in the streets operates adversely to the public health. To obviate this evil, automatic water tanks have been and are still being placed at the heads of certain sewers where necessary, with considerable advantage, but when your new source of water supply becomes available this difficulty will be effectually overcome.

It is now to the house-drainage I wish to direct your attention. For some considerable time cases of zymotic diseases such as diphtheria, and enteric or typhoid fever have come under my observation. In many of these I have had little difficulty in tracing the source to the escape of sewer gas into the house. I have, therefore considered it necessary to institute a very careful inspection of house drains in the streets where I have had reason to believe such a serious evil might exist. This inspection has been carried out with great activity during the last eighteen months, and very many defective house drains have been detected, such as the defective condition of the water closet, whereby sewer gas escapes whenever this is used—defects in the soil pipe, or at its joints, the sink of waste water-pipe communicating direct with soil pipe or drain untrapped—house drains passing under the floor of the house with broken, disjointed, or badly connected pipes—untrapped overflow pipe of bath connected with soil pipe or drain—untrapped waste pipe of lavatory communicating with drain—the drain for carrying off the surface water untrapped, closely adjacent to window of house, also communicating with drain—holes in the pipe or drain caused by rats, &c.

Of course it is not to be expected that if once laid down in an efficient manner house drains will always remain in that perfect state, for as gas and water pipes frequently get out of order and become leaky, so house drains, which are laid down in so many more pieces, and with innumerable joints, will frequently from one cause or another become defective, but the defects are not easily detected as in the case of a burst water pipe or leaky gas service. Your Inspectors are, however, paying great attention to the matter of defective house drains, and, wherever detected, means are at once taken to remedy the defects.

For the purpose of relieving the drainage system at the eastern end of Roath, and providing drainage for the large area of building land to the north east of Roath and Penylan, it has become necessary to carry out an independent supplemental system of sewers. Of this system, the main sewer, six feet in diameter, will commence by an outlet into the Bristol Channel at the mouth of the river Rumney, from which point it will run in a straight line, with an inclination of 1 in 2,000, to Newport Road at the junction of Pengam Road. At this point your Borough Engineer has introduced a huge syphon, which will intercept the sewer gases formed in the main sewer, and prevent them passing to the populated districts beyond. At this syphon the sewer divides into two branches, the largest of these being four feet in diameter and runs along Newport Road and Albany Road to near Roath Church, with an inclination of 1 in 1,000; the other runs along Newport Road towards the Rumney River, at an inclination of 1 in 1,000, the size being 3ft. 9in. by 2ft. 6in., egg-shaped. From the end of the main 4ft. sewer near Roath Church a 3ft. 9in. by 2ft. 6in. egg-shaped sewer will continue along Albany Road and Penylan Road, as far as the "Red Houses." The following branch sewers, each 3ft. 3in. by 2 ft. internal dimensions, are also to be made, viz.—1, a branch running along Albany Road from end of Penylan Road to Donald Street; 2, a branch from the main 4ft. sewer in Albany Road to back of Roath Church for drainage of houses in Penylan View; 3, a branch from end of Albany Road along Newport Road, and Oakfield Street; 4, a branch from Newport Road along the entire length of Broadway. These latter sewers will have the effect of turning the drainage of Oakfield Street and the whole of the district situate between Newport Road and Broadway into the new system and will thereby relieve considerably the existing Roath sewers. This work, which is now well in hand, will be completed by the end of the present year, and, when in operation, will comprise one of the best systems of main sewers in the Borough.

The following is a detailed statement of defects in the sewerage arrangements of houses:—

## Table 14. HOUSE INSPECTION

CARDIFF DISTRICT.

| Name of Street. | Number of Houses Inspected. | Defective Drains. | Choked Drains. | W. C. Pans and Syphons Defective. | Defective Stench Traps permitting an escape of sewer gas. | Scullery Sinks connected with Drains. | Inside Closets not ventilated. | Closets not supplied with Water. | Other Nuisances. |
|---|---|---|---|---|---|---|---|---|---|
| Bute Terrace | 30 | ... | ... | 6 | 3 | 1 | ... | 30 | 12 |
| Buzzard Street | 32 | ... | ... | ... | 2 | 14 | ... | 32 | 5 |
| Canal ,, | 27 | ... | ... | 5 | 3 | ... | ... | 27 | 4 |
| Canal Parade | 27 | ... | ... | 2 | 7 | ... | ... | 27 | 2 |
| Castle Court | 7 | ... | ... | ... | ... | ... | ... | 7 | ... |
| Crichton Street | 37 | ... | ... | 1 | 2 | 3 | ... | 37 | 1 |
| Crichton Place | 13 | ... | ... | 1 | ... | 2 | ... | 13 | 2 |
| David Street | 35 | ... | ... | 2 | 3 | 3 | .. | 35 | 7 |
| Davis ,, | 33 | 2 | ... | ... | 4 | ... | ... | 33 | ... |
| Dudley Place | 9 | . | ... | ... | 3 | 1 | 13 | 9 | 1 |
| Dumfries ,, | 24 | 21 | ... | 1 | 5 | 9 | ... | 10 | ... |
| East Terrace | 20 | ... | ... | 1 | 2 | 2 | ... | 20 | 2 |
| Edward Street | 42 | 1 | ... | 5 | 4 | 1 | ... | 42 | 10 |
| Frederick ,, | 133 | 1 | ... | 15 | 14 | 5 | ... | 133 | 10 |
| Frederica ,, | 46 | 2 | ... | 11 | 3 | 1 | ... | 46 | 8 |
| Hannah ,, | 13 | ... | ... | 2 | ... | ... | ... | 13 | 1 |
| Hills' Terrace | 61 | 2 | ... | 6 | 5 | ... | ... | 61 | 10 |
| Hills' Street | 9 | ... | ... | 1 | ... | ... | ... | 9 | 4 |
| Homfray ,, | 24 | ... | 1 | 4 | 3 | ... | ... | 24 | 5 |
| Kite ,, | 5 | ... | ... | ... | ... | 1 | ... | 5 | 1 |
| Maria ,, | 47 | ... | ... | 4 | 2 | ... | ... | 47 | 6 |
| Margaret ,, | 38 | 1 | ... | 3 | 2 | 2 | ... | 38 | ... |
| Millicent ,, & Courts | 79 | ... | ... | 10 | 6 | 5 | ... | 75 | 9 |
| Patrick Street | 33 | ... | ... | 1 | 3 | 4 | ... | 21 | 1 |
| Rodney ,, | 17 | ... | ... | ... | ... | 5 | ... | 17 | ... |
| Ruperra ,, | 16 | 1 | ... | 5 | 1 | ... | ... | 16 | 1 |
| Russell ,, | 47 | 1 | ... | ... | 4 | ... | ... | 47 | 11 |
| Richards ,, | 31 | 5 | ... | ... | 2 | ... | ... | 31 | 5 |
| Sandon ,, | 19 | ... | ... | 2 | 3 | ... | ... | 19 | 2 |
| Sandon Place | 36 | ... | 1 | 2 | 11 | 1 | ... | 36 | 3 |
| Sophia Street | 50 | ... | ... | 12 | 5 | 1 | ... | 50 | 13 |
| Station Terrace | 18 | 4 | ... | 2 | 1 | 3 | ... | 18 | 4 |
| Tredegar Street | 54 | ... | ... | 6 | 4 | 5 | ... | 54 | 7 |
| Tyndall ,, | 54 | 3 | 2 | 6 | 4 | 4 | ... | 54 | 9 |
| Union ,, | 67 | ... | 1 | 6 | 6 | 3 | ... | 67 | 10 |
| TOTAL ... | 1233 | 44 | 5 | 122 | 117 | 76 | 13 | 1203 | 166 |

## HOUSE INSPECTION—*Continued*

ROATH DISTRICT.

| Name of Street, | Number of Houses Inspected. | Defective Drains. | Choked Drains. | W. C. Pans and Syphons Defective. | Defective Stench Traps permitting an escape of sewer gas. | Scullery Sinks connected with Drains. | Inside Closets not ventilated. | Closets not supplied with Water. | Other Nuisances. |
|---|---|---|---|---|---|---|---|---|---|
| Arthur Street | 37 | 2 | 1 | ... | 1 | ... | ... | 37 | 4 |
| Agate „ | 18 | ... | 1 | ... | 2 | ... | ... | 18 | 3 |
| Broadway | 182 | 3 | 2 | ... | 4 | ... | ... | 174 | 7 |
| Booker Street | 14 | 1 | 1 | 2 | 1 | ... | ... | 14 | 1 |
| Cycle „ | 30 | ... | ... | 1 | 4 | ... | ... | 30 | ... |
| Clive Place | 9 | ... | ... | 1 | ... | ... | ... | 9 | 3 |
| „ Street | 49 | ... | 2 | ... | ... | ... | ... | 49 | 7 |
| Cecil „ | 73 | ... | 1 | 4 | 2 | ... | ... | 73 | 5 |
| Donald „ | 41 | ... | ... | ... | ... | ... | ... | 41 | 4 |
| Elm „ | 96 | 2 | 1 | ... | 3 | ... | ... | 90 | 2 |
| Fox „ | 12 | ... | ... | 1 | ... | ... | ... | 12 | 2 |
| Fort | 13 | ... | 1 | ... | ... | ... | ... | 13 | 3 |
| Gwendoline Street | 30 | ... | 1 | ... | 1 | ... | ... | 30 | 3 |
| Howard „ | 24 | ... | ... | ... | 1 | ... | ... | 24 | ... |
| Harbershon „ | 68 | ... | 1 | 3 | ... | ... | ... | 68 | 7 |
| Inverness Place | 58 | ... | ... | ... | ... | ... | ... | 58 | 5 |
| Lucas Street | 7 | ... | 2 | ... | 3 | ... | ... | 7 | 4 |
| Maud „ | 40 | 3 | 1 | 1 | 5 | ... | ... | 40 | 4 |
| Moon „ | 24 | ... | 2 | ... | 4 | ... | ... | 24 | 2 |
| Newport Road | 60 | 7 | ... | ... | 1 | 2 | ... | ... | 8 |
| Platinum Street | 18 | ... | ... | 3 | 2 | ... | ... | 18 | 4 |
| Richard's Terrace | 87 | 1 | 1 | 2 | 4 | ... | ... | ... | 2 |
| Robert Street | 10 | ... | 1 | ... | 3 | ... | ... | 10 | 1 |
| Stacey Road | 83 | 5 | ... | ... | ... | 3 | 2 | ... | 6 |
| Tyler Street | 16 | ... | 1 | ... | ... | ... | ... | 16 | 1 |
| TOTAL ... | 1099 | 24 | 20 | 18 | 41 | 5 | 2 | 855 | 88 |

## HOUSE INSPECTION—*Continued.*

CANTON & GRANGETOWN DISTRICT.

| Name of Street. | Number of Houses Inspected. | Defective Drains. | Choked Drains. | W. C. Pans and Syphons Defective. | Defective Stench Traps permitting an escape of sewer gas. | Scullery Sinks connected with Drains. | Inside Closets not ventilated. | Closets not supplied with Water. | Other Nuisances. |
|---|---|---|---|---|---|---|---|---|---|
| Andrew's Crescent | 28 | ... | 2 | ... | ... | ... | ... | 20 | 5 |
| Amherst Street | 25 | 3 | ... | ... | 3 | 2 | ... | 25 | 3 |
| Bromsgrove ,, | 26 | ... | ... | ... | ... | ... | ... | 26 | 1 |
| Bromfield ,, | 26 | ... | ... | ... | 2 | ... | ... | 26 | 1 |
| Bradford ,, | 26 | ... | ... | 2 | 1 | ... | ... | 26 | 3 |
| Commercial ,, | 5 | ... | ... | ... | ... | ... | ... | 5 | ... |
| Canton Square | 14 | ... | 1 | ... | ... | ... | ... | 7 | 2 |
| Caroline Street | 43 | 11 | 1 | 4 | ... | ... | ... | 43 | 6 |
| Cross ,, | 7 | ... | ... | 2 | ... | ... | ... | 4 | 1 |
| Crown Court | 7 | ... | 2 | ... | ... | ... | ... | 4 | ... |
| Carmarthen Street | 12 | 1 | ... | ... | ... | ... | ... | 12 | ... |
| Davies Place | 5 | 5 | ... | ... | ... | ... | ... | 5 | ... |
| Daisy Street | 24 | 0 | 4 | ... | ... | ... | ... | 24 | 2 |
| Dalton Court | 8 | 2 | ... | ... | ... | ... | ... | 8 | ... |
| Evan's Terrace | 11 | 1 | ... | ... | 3 | ... | ... | ... | 2 |
| Evan's Buildings | 11 | ... | ... | ... | ... | ... | ... | 11 | 11 |
| East Street | 18 | ... | 2 | ... | 5 | ... | ... | 18 | ... |
| Edward ,, | 74 | ... | ... | 1 | 8 | ... | ... | 74 | 8 |
| Earl ,, | 22 | ... | 2 | ... | ... | ... | ... | 22 | 3 |
| Gloucester Street | 26 | ... | 3 | ... | ... | ... | ... | 26 | 5 |
| Green Garden Ct. | 6 | ... | ... | ... | ... | ... | ... | 6 | 1 |
| Gladstone Terrace | 21 | ... | ... | ... | ... | 3 | ... | 21 | 4 |
| Halket Street | 51 | ... | 4 | 5 | 2 | ... | ... | 51 | 27 |
| Hewell ,, | 10 | ... | 1 | 2 | ... | ... | ... | 10 | 3 |
| Heath Cottages | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Half-way Place | 6 | ... | ... | 1 | ... | ... | ... | 6 | ... |
| Kent Street | 56 | ... | 1 | ... | 3 | 3 | ... | 56 | 6 |
| Kingston Court | 10 | ... | 1 | ... | ... | ... | ... | 4 | ... |
| Llandaff Road | 70 | 5 | 1 | 6 | ... | 10 | ... | 50 | 1 |
| Lewis Building | 9 | ... | ... | ... | ... | ... | ... | 9 | 1 |
| Lewis Terrace | 7 | ... | 2 | ... | ... | ... | ... | 7 | ... |
| *Carried Forward* | 664 | 28 | 27 | 23 | 27 | 18 | ... | 606 | 26 |

# HOUSE INSPECTION.

CANTON & GRANGETOWN DISTRICT—*Continued.*

| Name of Street. | Number of Houses Inspected. | Defective Drains. | Choked Drains. | W. C. Pans and Syphons Defective. | Defective Stench Traps permitting an escape of Sewer Gas. | Scullery Sinks connected with Drains | Inside Closets not ventilated. | Closets not supplied with Water. | Other Nuisances. |
|---|---|---|---|---|---|---|---|---|---|
| *Brought Forward* | 664 | 28 | 27 | 23 | 27 | 18 | ... | 606 | 26 |
| Lucknow Street | 12 | ... | ... | ... | 1 | ... | ... | 12 | 1 |
| Landore Court | 20 | ... | ... | 2 | ... | ... | ... | 20 | ... |
| Ludlow Street | 24 | ... | ... | 3 | 2 | ... | ... | 24 | 3 |
| Mary Ann ,, | 11 | ... | ... | ... | 2 | ... | ... | 11 | 5 |
| Mortimore Road | 40 | ... | 2 | 2 | 5 | ... | ... | 40 | 3 |
| Market Road | 29 | ... | ... | ... | ... | ... | ... | 29 | ... |
| Newport Street | 26 | ... | 1 | ... | 3 | ... | ... | 26 | 1 |
| Pontcanna Place | 22 | ... | ... | 1 | 4 | ... | ... | 20 | 4 |
| ,, Terrace | 12 | ... | ... | 1 | 1 | ... | ... | 12 | 3 |
| Romilly Road | 31 | ... | 1 | ... | ... | ... | ... | 31 | 2 |
| Rolls Street | 38 | ... | 2 | 2 | ... | ... | ... | 38 | 8 |
| Railway Terrace | 20 | ... | ... | 1 | 2 | ... | ... | 20 | 3 |
| Stacey ,, | 10 | 1 | 1 | ... | ... | ... | ... | 10 | 1 |
| Sea View ,, | 16 | ... | 1 | ... | ... | ... | ... | 16 | 2 |
| Thomas St. Grange | 45 | ... | 3 | 6 | ... | ... | ... | 45 | 6 |
| ,, ,, Canton | 14 | ... | ... | ... | ... | ... | ... | 14 | ... |
| Tresillian Terrace | 37 | ... | 1 | 2 | ... | 1 | ... | 20 | 2 |
| Wharton Place | 6 | 1 | ... | ... | ... | ... | ... | 6 | ... |
| Wells Street | 25 | 1 | 1 | 2 | ... | ... | ... | 25 | 7 |
| York Place | 6 | ... | ... | 1 | 3 | ... | ... | 6 | ... |
| TOTAL ... | 1108 | 31 | 40 | 46 | 50 | 19 | ... | 1031 | 147 |

## HOUSE INSPECTION.

### District Summary.

| Name of District | Number of Houses Inspected. | Defective Drains. | Choked Drains. | W. C. Pans and Syphons Defective. | Defective Stench Traps permitting an escape of sewer gas. | Scullery Sinks connected direct with Drains. | Inside Closets not ventilated, | Closets not supplied with Water. | Other Nuisances. |
|---|---|---|---|---|---|---|---|---|---|
| Cardiff | 1233 | 44 | 5 | 122 | 117 | 76 | 13 | 1203 | 166 |
| Roath | 1099 | 24 | 20 | 18 | 41 | 5 | 2 | 855 | 88 |
| Canton | 1108 | 31 | 40 | 46 | 50 | 19 | ... | 1031 | 147 |
| Total | 3440 | 99 | 65 | 186 | 208 | 100 | 15 | 3089 | 401 |

## THE WATER SUPPLY.

Six wells have been closed by order of the Magistrates. Samples of water obtained from them having been transmitted to your Analyst for examination, the result being that they clearly established the fact that they are at all times undesirable for dietetic purposes, and may, under special circumstances, be very dangerous for consumption. Table 18 gives the constituent elements of the waters obtained from these shallow wells. In this table, for the purpose of enabling you to judge of their character, the analyses of your two present water supplies, "the Lisvane gathering grounds," and pumping station at Ely are inserted, as also one giving a standard limit of purity and one recommended as a limit of impurity, beyond which this water is unfit for domestic use.

In a densely populated district, especially such an one as Cardiff, where the sub-soil is chiefly gravel, or other porous material, water obtained from shallow wells is always undesirable when it is to be used for domestic purposes. In the old borough where main sewers have so long been constructed, the nitrogenous cesspool matter must have become oxidised and removed, hence it is not that much of the oxidation products of sewage and animal matter found in the well water of Cardiff is derived from cesspool soakage; but with regard to leakage from earthenware socket drain pipes, unless these are thoroughly cemented at the joints, and in nineteen cases out of twenty they are not, diffusion always takes place in the damp earth around and the liquid in the pipes, and when the sub-soil is sending a rapid current of water to the sewers (below the lines of the earthen pipes), the suction caused in the earth above induces the withdrawal of the liquid sewage from the pipes and thus assists natural liquid diffusion; in this manner the sub-soil becomes more or less saturated with liquid sewage which is rapidly oxidised. This pollution is of itself sufficient to render town wells dangerous to health by reason of the germs of disease resisting the effects of, and not being removed by, active filtration. It is from the sewers that the greatest amount of pollution comes. The tendency of all liquid sewage to diffuse and dialyse, however slow the progress may be in some cases, is an element of danger; but when ample means of communication exist by which the admixture of the liquid sewage in the drain and the sub-soil water outside can readily take place, it stands to reason that any wells sunk beneath the level of the sewer will be simply a catch-pit for sewer contaminations. Some persons labour under the misapprehension that brick sewers are made water-tight, but this is a fallacy, and it would not be always desirable that they should be so made, as the removal of the excess of subsoil water prevents the strata becoming water-logged, and the damp that would otherwise be experienced in the ground floors of houses;

moreover, the sub-soil water finding its way into the flat drains, as at Canton, assists in flushing these and keeping them clear from excretal deposits. That the inter-mixture of the liquids from drains and sewers takes place is well established, and is in harmony with known scientific laws; but, in addition to this, the chemical constituents of the well waters prove conclusively that this is the case. For these and other reasons I urge that all wells in this town should be permanently closed.

I may now state for your satisfaction that whilst the inefficient supply of water of this district has been a matter for serious anxiety during the last two or three years, especially when periodical droughts have prevailed, this difficulty will be very effectively met in the autumn of the present year when your new storage reservoir, capable of containing an additional 300,000,000 gallons of water will become available.

## THE FOOD SUPPLY.

The condition or quality of the food used for human consumption has attracted considerable attention on the part of those to whom the public health has been entrusted.

It has long been recognised that animal matter undergoing decomposition, even in the early stages, and the consumption of vegetable or unripe fruit, by setting up dyspepsia, may produce severe or even fatal symptoms of gastro-intestinal disturbances. On enquiring recently into the history of a case of choleraic diarrhœa, fatal in twelve hours, I ascertained that the deceased, an adult female, had partaken freely of pickled pigs' feet, these being in the early stage of putridity; within an hour severe vomiting diarrhœa, and cramp supervened, and she rapidly sank in a collapsed condition. Other members of the family suffered, but in a lesser degree from these symptoms, as also a female relative resident in a different part of the town, but who had visited the house that evening and partaken of the same food.

Many of our best authorities have expressed a strong opinion founded on instances coming under their observation, that, the flesh of animals suffering from disease, when eaten have been the means of communicating such to man. I have already alluded to one, where an extensive prevalence of sore throat, with other constitutional symptoms resulting from the consumption of milk obtained from cows suffering from foot and mouth disease. I need hardly suggest that the question presents itself, that, if disease can be introduced into the human system through a secretion, why not by the consumption of the flesh of animals slaughtered at a time when these have been labouring under disease. I may instance that the Cysticercus, a parasite found in the flesh of the pig and

other animals, when the former is suffering from this parasite, a slight eruption on the skin appears, hence the disease is called measles, and when introduced into the human system, when such flesh has been taken as an article of diet, has set up *Tœnia Solium* (Tape Worm). In Germany a much more fatal disease, the Trichiniasis, due to the parasitic worm termed trichina spirales. Both these entozoa are stated to be destroyed when, by the process of cooking, they have been exposed to a high temperature, viz :— that exceeding 130° Fahrenheit. This may be true, but a dangerous fact remains, that although the outer portion of a joint of pork (when the animal has been suffering from these diseases) may be exposed to a much higher temperature, the inner portion has not been so exposed, hence the danger of eating underdone pork.

Numerous instances are not wanting in which persons after eating butcher's meat have suffered not only from severe gastro-intestinal symptoms but also serious febrile attacks ; these at times being associated with cerebral and nerve symptoms of the typhus character. Hence it may very fairly be assumed that when a fatal case so marked has occurred, and on enquiry into its history when no exciting cause can be discovered that would indicate its source, it may be due to the use of diseased animal food.

I shall now direct your attention to the circumstances under which animal food may be prejudicial to the health of the person eating it. (1).—The flesh of healthy animals when undergoing decomposition may set up the symptoms I have just described. (2).—The flesh of over-driven animals, according to Professor Gamgee (Professor of Veterinary Medicine, University of Edinburgh), may produce eczema on the skin and other bad symptoms. 3.—The flesh of animals labouring under tuberculosis may introduce the morbid germs of these diseases into the human system, requiring only favouring circumstances for development. (4).—Chronic nervous diseases. (5).—Epidemic pleuro-pneumonia. (6).—Anthrax and malignant pustules. (7).—Splenic apoplexy or braxy of sheep. (8).—Small-pox of sheep. (9).—Foot and mouth disease. (10).—Cattle plague, rinderpest or typhus contagiom (11).—The cysticercus celulosus of the pig, already spoken of, as also the trichina spiralis and (12) echinococcus disease (rot in sheep). Thus enumerating the diseases of animals that may, under certain conditions, be the cause of like disease in man. I may state that the flesh of animals suffering from these diseases may be recognised by a technical observer ; before death, the diagnostic symptoms of the disease by a veterinary authority. Under such circumstances it is desirable that animal food intended for sale, especially in the meat market, should be inspected by a competent official, such as an inspector duly instructed by a veterinary surgeon. Under the Contagious Diseases (Animals) Act, a veterinary surgeon is appointed by the district authorities to visit cases of animals suffering

from certain zymotic diseases, such as swine fever, foot and mouth disease and pleuro-pneumonia. I would suggest the desirability of enlarging his powers so that he might visit and enquire into the nature of the disease of an animal when reported to him, and deal with it according to the requirements of the case, and in such a way as may prevent injury to the public health, and that the inspector of meat to which I have alluded should be educated by him to detect diseased food, and report any case coming under his observation to the veterinary authority, so that he might visit and determine whether it is unfit for consumption.

## THE DWELLINGS OF THE WORKING CLASSES.

The same inspection that has hitherto been effectually carried out by your Inspectors has been maintained during the past year.

The yearly increase in the number of new houses that are erected in this town provides ample accommodation to meet the requirements of the working classes, and overcrowding to any great extent does not occur as formerly; when it does, notices are served to reduce the number of inmates, and these notices are fairly well complied with. As a matter of fact, few proceedings against the occupiers of these houses during the past year have been necessary, general cleanliness and ventilation of the bedrooms are rigidly enforced, as also the abatement of all nuisances that may have been discovered in or around these houses, and I have to report that corresponding improvement has taken place, as regards the health of the inmates.

The yearly increase of houses is shown by the following return obtained from your Surveyor of the number of plans for new houses passed by your Board during the last five years :—

| Years | | Total Number |
|---|---|---|
| 1881 | ... | 904 |
| 1882 | ... | 686 |
| 1883 | ... | 980 |
| 1884 | ... | 1,445 |
| 1885 | ... | 1,345 |

## POPULATION.

For the purpose of calculating the several rates (births and deaths) it will be necessary to remember that the estimated population in the middle of the year 1885, was 97,034 according to the estimate of the Registrar-General, and 107,034 according to an estimate based on the number of inhabited houses.

## THE MARRIAGES.

The total number of marriages registered from 31st December, 1884, to 31st December, 1885, as furnished by the Deputy Superintendent Registrar, were :—

| | | | |
|---|---|---|---|
| At the Established Churches | | ... | 444 |
| ,, | Nonconformist Churches | ... | 191 |
| ,, | Catholic Churches | ... | 84 |
| ,, | Synagogue, &c., (Jewish) | ... | 4 |
| ,, | Register Office ... | ... | 538 |
| | | | 1,261 |

## THE BIRTHS.

The total births registered in Cardiff during 1885 were 4,164; of these, 2,125 were males and 2,039 females, showing an excess of 244 births over those of the previous year.

The births were distributed over the sub-districts as under :—

| Quarter ending | Cardiff | Roath | Canton | Total | Rate per 1000 | Large Towns | Rate of Kingdom |
|---|---|---|---|---|---|---|---|
| April 4th | 514 | 329 | 250 | 1093 | 45·2 | 35·3 | 32·7 |
| July 4th | 470 | 292 | 234 | 996 | 41·2 | 32·9 | 31·5 |
| Oct. 3rd | 480 | 322 | 251 | 1053 | 43·6 | 32·5 | 30.3 |
| Jan. 2nd | 458 | 328 | 236 | 1022 | 42·3 | 33·3 | 30·5 |
| TOTAL | 1922 | 1271 | 971 | 4164 | 43·1 | 33·5 | 31·2 |

It will thus be seen that the birth-rate in Cardiff was 12 above that of the Kingdom, and nearly 10 that of the large towns. This difference would have been still greater had the floating population (7,000) been deducted from the 97,034, as these comprise the floating population, whose families reside elsewhere, therefore do not contribute to the birth-rate of the population proper; the rate would then be 46·2 instead of 43·1.

## THE DEATHS.

The total deaths registered in the Urban Sanitary District of Cardiff were 2,481; of these 1328 were males and 1153 females. The deaths were distributed throughout the sub-districts as follows :—

| | | Cardiff | Roath | Canton | Total |
|---|---|---|---|---|---|
| Winter Quarter ending | March | 401 | 246 | 148 | 795 |
| Spring " " | June | 328 | 185 | 104 | 617 |
| Summer " " | September | 325 | 122 | 101 | 548 |
| Autumn " " | December | 278 | 147 | 96 | 521 |
| TOTAL ... | | 1332 | 700 | 449 | 2481 |

The death-rate on the year, based on the estimated population of the Registrar-General, was 25·6, but on the inhabited houses estimate 23·1. These rates, compared with the twenty-eight typical large towns,—the 134 districts and 57 sub-districts comprising chief towns—the remaining districts and sub-districts comprising chiefly small towns and country parishes, and the mean of death-rate of the whole Kingdom may be seen by the following table:—

| | Quarters Ending March. | June. | Sept. | Dec. | Death Rate of Year. |
|---|---|---|---|---|---|
| Cardiff: Registrar-General's Estimate, ... ... | 32·9 | 25·5 | 22·7 | 21·6 | 25·6 |
| According to inhabited houses | 29·6 | 23·0 | 20·4 | 19·4 | 23·1 |
| Twenty-eight large towns ... | 22·7 | 20·6 | 18·8 | 20·0 | 20·5 |
| The 134 districts and 57 sub-districts, comprising chief towns ... ... | 22·3 | 20·2 | 17·8 | 19·7 | 20·0 |
| The remaining districts and sub-districts, comprising chiefly small towns and country parishes ... | 21·0 | 17·9 | 14·4 | 19·7 | 18·5 |
| Death-rate of whole Kingdom | 22·0 | 19·5 | 16·2 | 18·2 | 18·9 |

It will thus be seen that the mortality of Cardiff was considerably in excess throughout the whole of the year; this was mainly due to the prevalence of infantile diseases, and will be more particularly alluded to in a subsequent part of this report.

Table 15 shows the total deaths registered in each week, distinguishing deaths from all causes as also those due to the seven chief zymotic diseases with proportionate death-rates, calculated on the Registrar-General's estimate of population, and that based on number of inmates of inhabited houses.

# Table 15.

| No. | Week ending. | No. of Deaths | Death-rate estimated population Registrar-General, 97,034 | Death-rate estimated population inhabited houses, 107,393 | Seven Chief Zymotic Deaths. | | |
|---|---|---|---|---|---|---|---|
| | | | | | Deaths | Death rate 97·034 | Death-rate 107,393 |
| 1 | January 10 | 67 | 36·0 | 32·4 | 28 | 15·1 | 13 5 |
| 2 | „ 17 | 61 | 32·8 | 29·5 | 16 | 8·6 | 7·7 |
| 3 | „ 24 | 76 | 40·9 | 36·7 | 19 | 10·2 | 9·2 |
| 4 | „ 31 | 65 | 34·9 | 31·4 | 20 | 10·8 | 9·6 |
| 5 | February 7 | 45 | 24·2 | 21·7 | 11 | 5·9 | 5·3 |
| 6 | „ 14 | 60 | 32·3 | 29·0 | 12 | 6·5 | 5·8 |
| 7 | „ 21 | 62 | 33·3 | 30·0 | 13 | 7·0 | 6·3 |
| 8 | „ 28 | 59 | 31·7 | 28·5 | 17 | 9·1 | 8·2 |
| 9 | March 7 | 70 | 37·6 | 33·8 | 21 | 11·3 | 10·1 |
| 10 | „ 14 | 38 | 20·4 | 18·4 | 8 | 4·3 | 3·8 |
| 11 | „ 21 | 59 | 31·7 | 28·5 | 11 | 5·9 | 5·3 |
| 12 | „ 28 | 78 | 41·9 | 37·7 | 21 | 11·3 | 10·1 |
| 13 | April 4 | 55 | 29·6 | 26·6 | 16 | 8·6 | 7·7 |
| 14 | „ 11 | 59 | 31·7 | 28·5 | 9 | 4·8 | 4·3 |
| 15 | „ 18 | 62 | 33·3 | 30·0 | 13 | 7·0 | 6·3 |
| 16 | „ 25 | 65 | 34·9 | 31·4 | 12 | 6·5 | 5·8 |
| 17 | May 2 | 30 | 16·1 | 14·5 | 8 | 4·3 | 3·8 |
| 18 | „ 9 | 46 | 24·7 | 22·2 | 8 | 4·3 | 3·8 |
| 19 | „ 16 | 41 | 22·0 | 20·7 | 6 | 3·2 | 2·9 |
| 20 | „ 23 | 48 | 25·8 | 23·2 | 7 | 3·8 | 3·3 |
| 21 | „ 30 | 53 | 28·5 | 25·6 | 13 | 7·0 | 6·3 |
| 22 | June 6 | 42 | 22·6 | 20·3 | 8 | 4·3 | 3·8 |
| 23 | „ 13 | 35 | 18·8 | 16·9 | 7 | 3·8 | 3·3 |
| 24 | „ 20 | 59 | 31·7 | 28·5 | 11 | 5·9 | 5·3 |
| 25 | „ 27 | 40 | 21·5 | 19·3 | 4 | 2·2 | 1·9 |
| 26 | July 4 | 37 | 19·9 | 17·9 | 6 | 3·2 | 2·9 |
| 27 | „ 11 | 41 | 22·0 | 19·8 | 3 | 1·6 | 1·4 |
| 28 | „ 18 | 37 | 19·9 | 17·9 | 4 | 2·2 | 1·9 |
| 29 | „ 25 | 37 | 19·9 | 17·9 | 3 | 1·6 | 1·4 |
| 30 | August 1 | 39 | 21·0 | 18·8 | 7 | 3·8 | 3·3 |
| 31 | „ 8 | 47 | 25·3 | 22·7 | 12 | 6·5 | 5·8 |
| 32 | „ 15 | 43 | 23·1 | 20·8 | 10 | 5·4 | 4·8 |
| 33 | „ 22 | 45 | 24·2 | 21·7 | 10 | 5·4 | 4·8 |
| 34 | „ 29 | 35 | 18·8 | 16·9 | 14 | 7·5 | 6·7 |
| 35 | September 5 | 47 | 25·3 | 22·7 | 13 | 7·0 | 6·3 |
| 36 | „ 12 | 45 | 24·2 | 21·7 | 11 | 5·9 | 5·3 |
| 37 | „ 19 | 44 | 23·7 | 21·3 | 11 | 5·9 | 5·3 |
| 38 | „ 26 | 41 | 22·0 | 20·7 | 4 | 2·2 | 1·9 |
| 39 | October 3 | 47 | 25·3 | 22·7 | 6 | 3·2 | 2·9 |
| 40 | „ 10 | 42 | 22·6 | 20·3 | 5 | 2·7 | 2·4 |
| 41 | „ 17 | 43 | 23·1 | 20·8 | 5 | 2·7 | 2·4 |
| 42 | „ 24 | 39 | 21·0 | 18·8 | 8 | 4·3 | 3·8 |
| 43 | „ 31 | 39 | 21·0 | 18·8 | 6 | 3·2 | 2·9 |
| 44 | November 7 | 37 | 19·9 | 17·9 | 2 | 1·1 | 0·9 |
| 45 | „ 14 | 42 | 22·6 | 20·3 | 2 | 1·1 | 0·9 |
| 46 | „ 21 | 34 | 18·3 | 16·4 | 4 | 2·2 | 1·9 |
| 47 | „ 28 | 33 | 17·7 | 15·9 | 3 | 1·6 | 1·4 |
| 48 | December 5 | 43 | 23·1 | 20·8 | 4 | 2·2 | 1·9 |
| 49 | „ 12 | 41 | 22·0 | 20·7 | 3 | 1·6 | 1·4 |
| 50 | „ 19 | 40 | 21·5 | 19·3 | 1 | 0·5 | 0·4 |
| 51 | „ 26 | 48 | 25·8 | 23·2 | 2 | 1·1 | 0·9 |
| 52 | January 2 | 40 | 21·5 | 19·3 | 4 | 2·2 | 1·9 |

The deaths at ages were:—

| | |
|---|---|
| Under one year of age ... ... ... | 696 |
| One year and under five years ... ... | 520 |
| Five years and under fifteen years ... | 130 |
| Fifteen years and under twenty-five years | 146 |
| Twenty-five years and under sixty years | 721 |
| Sixty years and upwards ... ... ... | 268 |
| | 2,481 |

The proportion of deaths under the age of one year is 169 per 1,000 births. This was greater than the average of the Kingdom, as also that of the large towns.

| Quarter ending | The Kingdom. | The Large Towns. | Cardiff. |
|---|---|---|---|
| April ... ... | 144 | 144 | 183 |
| July ... ... | 133 | 147 | 150 |
| October ... ... | 141 | 185 | 186 |
| January ... | 135 | 146 | 158 |
| Average of year | 138 | 155 | 169 |

The following is the classification and distribution of the registered causes of death during the year :—

| | Cardiff | Roath | Canton | Total |
|---|---|---|---|---|
| Zymotic diseases | 203 | 212 | 191 | 606 |
| Constitutional diseases | 213 | 102 | 85 | 400 |
| Local diseases | 685 | 254 | 121 | 1060 |
| Developmental diseases | 172 | 94 | 34 | 300 |
| Violent diseases | 59 | 38 | 18 | 115 |
| Total... | 1332 | 700 | 449 | 2481 |

In the appendix inserted at the end of this Report will be found a tabular statement illustrating the total number of registered causes of death from each of the diseases contained in the above classes, as also the ages at which these deaths occurred and the rate of mortality obtained in this district during the year 1885 as compared with the mean of death-rate of the Kingdom during a period of thirty years.

Two returns are also inserted, in accordance with instructions of the Local Government Board, intended to indicate the sickness and mortality due to the seven chief zymotic diseases, and as it will be observed that the excess of mortality of the year has been occasioned by diseases comprised in this class, it will be desirable to determine the extent to which the insanitary condition of the district may have contributed to it. For this purpose I have divided these diseases into two groups; the first includes small pox, measles, scarlatina, diphtheria and whooping cough. These diseases appear

in a district when the specific infection of each has been introduced into a locality; they are then transmissable from the person of the sick to the healthy, who are exposed to, and susceptible of the contagium, The extent of prevalence is little affected by the sanitary condition of the locality, and the powers to be exercised by the local authority are limited to the action to be taken by the Medical Officer of Health, whose duty it is to enforce as far as practicable all measures necessary to prevent further extension of the disease, to enforce isolation of the sick, to prescribe the free use of disinfectants, and when expedient, to cause the removal of cases of small pox and such-like diseases to a hospital used for the reception of such cases, when the house of the patient does not afford sufficient accommodation. The efficiency of these hygienic measures can only be obtained by the assistance and co-operation of those who have charge of the sick.

The second group consists of fever and diarrhœa; these diseases when they appear in an epidemic form, the existing causes are considered to be associated with an insanitary condition of the locality, such as an impure water supply, inferior sewer arrangements (public and private), unwholesome dwelling houses, noxious exhalations from offensive and decomposing animal and vegetable matters and such like, all of which it is the especial duty of a sanitary authority to prevent or remove.

The most important infectious diseases that have prevailed during the year have been small pox, measles, whooping cough, fever and diarrhœa, and it is to these that I have especially to direct your attention.

The following table shows the distribution of the mortality from these diseases throughout the district—dividing each district for reasons to be hereinafter stated into Northern and Southern divisions:—

## Table 16. CARDIFF DISTRICT.

### North Side.

| Names of Streets. | S. Pox | Measles | Scarlatina | Diphtheria | W. Cough | Fever. | Diarrhœa | Total |
|---|---|---|---|---|---|---|---|---|
| Bedford | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Cranbrooke | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Cairn | 0 | 5 | 0 | 0 | 1 | 0 | 1 | 7 |
| Coburn | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 3 |
| Cogan Terrace | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| Cathedral Road | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Catherine | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Crwys Road | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Castle Road | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| Cathays Terrace | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Gordon Road | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Harriet | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| Hirwain | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Letty | 0 | 1 | 0 | 4 | 1 | 0 | 1 | 7 |
| Llandough | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| Llantwit | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Llantrissant | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| May | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 4 |
| Munday Place | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Minny | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 3 |
| Miskin | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Minister | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| New Cemetery | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Richard | 0 | 1 | 0 | 3 | 0 | 0 | 2 | 6 |
| Richmond Road | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Salisbury Road | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| St. Peter | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Treorky | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Thesiger | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| Woodville Road | 0 | 1 | 1 | 2 | 0 | 0 | 1 | 5 |
| Total | 0 | 20 | 5 | 14 | 4 | 1 | 22 | 66 |

# CARDIFF DISTRICT.

## South Side.

| Names of Streets. | S. Pox | Measles | Scarlatina | Diphtheria | W. Cough. | Fever. | Diarrhœa | Total. |
|---|---|---|---|---|---|---|---|---|
| Adam | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| Adelaide | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Adelaide Place | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Alice | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Augusta | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Baker's Row | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| Beauchamp | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Bute | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 4 |
| Bute Terrace | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Bute Lane | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Bridge | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Buzzard | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Brook | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Canal | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Carpenter's Arms Ct. | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Charlotte | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Crichton Place | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 |
| Christina | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 |
| Corporation Building | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Coldstream Terrace | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| David | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Davis | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| De Burgh | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Despencer | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| Dudley | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Dudley Terrace | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Edward | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 3 |
| Evelyn | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Esteddfod | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 4 |
| Frederica | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Frederick | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 3 |
| Garth | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 3 |
| Garth Court | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| Gough | 0 | 2 | 0 | 0 | 0 | 3 | 0 | 5 |
| George | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 3 |
| Gloucester | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 |
| Havelock | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Harris' Court | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Carried Forward | 0 | 24 | 3 | 1 | 17 | 13 | 14 | 72 |

# CARDIFF DISTRICT.

## South Side—*Continued.*

| Names of Streets | S. Pox | Measles | Scarlatina | Diphtheria | W. Cough | Fever | Diarrhœa | Total |
|---|---|---|---|---|---|---|---|---|
| Brought Forward | 0 | 24 | 3 | 1 | 18 | 12 | 14 | 72 |
| Herbert | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Hodge's Row | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Hospital Ship | 2 | 0 | 1 | 0 | 0 | 2 | 0 | 5 |
| Havanah Ship | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Hayes | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Hills' Terrace | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 5 |
| Ivor Place | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| James | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Kingstone Court | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Kite | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Little Frederick | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Loudon Square | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Louisa | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Mill Lane Court | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Millicent | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Mary Ann | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 3 |
| Masons' Arms Court | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| Moira | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Moira Terrace | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| Moira Place | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| Martha | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Margaret | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Nelson | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 6 |
| North Church | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| North Luton Place | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| Old Barracks | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Park Terrace | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Paradise Place | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Peel | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Rowland's Court | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Stanley | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Sandon Place | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Scott | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| St. Mary | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Spring Garden Court | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Sandon | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Thomas | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Carried Forward | 2 | 49 | 4 | 4 | 37 | 16 | 21 | 133 |

## CARDIFF DISTRICT.

### South Side—*Continued.*

| Names of Streets. | S. Pox | Measles | Scarlatina | Diphtheria | W. Cough | Fever | Diarrhœa | Total |
|---|---|---|---|---|---|---|---|---|
| Brought Forward | 2 | 49 | 4 | 4 | 37 | 16 | 21 | 133 |
| Tudor | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Tredegar | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| The Union | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 5 |
| Tyndal | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| Tunnel Court | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Union Building | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 3 |
| Vnion | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Victoria | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Womanby | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Wood | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 3 |
| Working | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Wellington | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Total | 2 | 56 | 4 | 5 | 44 | 20 | 25 | 156 |

## ROATH DISTRICT.

### North Side.

| Names of Streets | S. Pox | Measles | Scarlatina | Diphtheria | W. Cough | Fever | Diarrhœa | Total |
|---|---|---|---|---|---|---|---|---|
| Arabella | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Charles | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Clive | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 3 |
| Clive Place | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Castle Road | 0 | 2 | 0 | 1 | 0 | 2 | 0 | 5 |
| Donald | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Elm | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 |
| Grouse | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| James | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| Milton | 0 | 7 | 0 | 0 | 1 | 0 | 0 | 8 |
| Oxford | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 |
| Penylan Rotd | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Rose | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Shakespeare | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 3 |
| Vere | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Total | 0 | 22 | 2 | 1 | 8 | 2 | 2 | 37 |

# ROATH DISTRICT.

## South Side.

| Names of Streets | S. Pox | Measles | Scarlatina | Diphtheria | W. Cough | Fever | Diarrhœa | Total |
|---|---|---|---|---|---|---|---|---|
| Adeline | 0 | 6 | 1 | 0 | 1 | 0 | 2 | 10 |
| Arthur | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| Asgog | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Bertram | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| Broadway | 0 | 3 | 1 | 0 | 0 | 0 | 2 | 6 |
| Comet | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| Cecil | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 4 |
| Carlisle | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 6 |
| Clifton | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 4 |
| Constellation | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 4 |
| Copper | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Cycle | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| Diamond | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Emerald | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 3 |
| Gwendoline | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 3 |
| Gold | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Helen | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 4 |
| Harbershon | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 8 |
| Harold | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| Iron | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 4 |
| Infirmary | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Inchmarnock | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| Janet | 0 | 4 | 0 | 0 | 0 | 0 | 1 | 5 |
| John | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 5 |
| Kerrycroy | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Killcatton | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| Lead | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| Moon | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| Metal | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Maud | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 3 |
| Marion | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| Newport Road | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Ordell | 0 | 9 | 0 | 0 | 0 | 0 | 1 | 10 |
| Orbitt | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Pearl | 0 | 4 | 1 | 0 | 1 | 0 | 3 | 9 |
| Prince Leopold | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Railway | 0 | 2 | 0 | 2 | 2 | 0 | 0 | 6 |
| Richard's Terrace | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 3 |
| Carried Forward | 0 | 65 | 9 | 9 | 26 | 7 | 18 | 134 |

## ROATH DISTRICT,

SOUTH SIDE—*Continued*

| Names of Streets | S. Pox | Measles | Scarlatina | Diphtheria | W. Cough | Fever | Diarrhœa | Total |
|---|---|---|---|---|---|---|---|---|
| Brought Forward | 0 | 65 | 9 | 9 | 26 | 7 | 18 | 134 |
| Ruby | 0 | 5 | 0 | 0 | 0 | 0 | 1 | 6 |
| Roath Market | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Stacey Road | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| System | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Sapphire | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 |
| Silver | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| Topaz | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| Tin | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| Theodera | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 5 |
| Zinc | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 3 |
| Fort | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| TOTAL | 0 | 80 | 11 | 9 | 32 | 8 | 22 | 162 |

## CANTON DISTRICT.—NORTH SIDE.

| Names of Streets | S. Pox | Measles | Scarlatina | Diphtheria | W. Cough | Fever | Diarrhœa | Total |
|---|---|---|---|---|---|---|---|---|
| Cowbridge Road | 0 | 0 | 0 | 1 | 2 | 0 | 2 | 5 |
| Conybear Road | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Carmarthen | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| Ethell | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Glynne | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| Glamorgan | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Halket | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| Harvey | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| Harris Terrace | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| King's Road | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 6 |
| Llandaff Road | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 2 |
| Loftus | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| Market Road | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Mortimer Road | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Matthew's Terrace | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Pwll Coch | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Romilly Crescent | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| Romilly Road | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Springfield Place | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 3 |
| Stag Terrace | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Severn Road | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| Union | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Wyndham Crescent | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 4 |
| Wyndham Road | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 |
| TOTAL | 0 | 14 | 2 | 2 | 15 | 2 | 15 | 50 |

# CANTON DISTRICT.

## South Side.

| Names of Streets | S. Pox | Measles | Scarlatina | Diphtheria | W. Cough | Fever | Diarrhœa | Total |
|---|---|---|---|---|---|---|---|---|
| Cowbridge Road | 0 | 1 | 1 | 0 | 3 | 0 | 2 | 7 |
| Craddock | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Eldon Road | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Edward | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Grover Court | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Heath | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| Picton Place | 0 | 2 | 0 | 0 | 4 | 0 | 0 | 6 |
| Railway Terrace | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Stacey Terrace | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Wyndham | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Wellington | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 3 |
| Total | 0 | 3 | 1 | 1 | 14 | 1 | 5 | 25 |

# UPPER GRANGE.

| Names of Streets | S. Pox | Measles | Scarlatina | Diphtheria | W. Cough | Fever | Diarrhœa | Total. |
|---|---|---|---|---|---|---|---|---|
| Andrew's Terrace | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Lucknow | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Rookwood | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| Total | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 4 |

# LOWER GRANGE.

| Names of Streets | S. Pox | Measles | Scarlatina | Diphtheria | W. Cough | Fever | Diarrhœa | Total |
|---|---|---|---|---|---|---|---|---|
| Amherst | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 2 |
| Bromsgrove | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Bromfield | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Clive | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| Earl | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Holmsdale | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| Hewell | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| Herbert | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| Kent | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| Newport | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Sevenoak | 0 | 1 | 0 | 2 | 0 | 0 | 1 | 4 |
| Total | 0 | 2 | 1 | 7 | 1 | 4 | 9 | 21 |

| Seven chief Zymotic Diseases | Cardiff. | | Roath. | | Canton. | |
|---|---|---|---|---|---|---|
| | North. | South. | North. | South. | North. | South. |
| | Rate and pop. 18,750 | Rate and pop. 36,156 | Rate and pop. 8,412 | Rate and pop. 21,306 | Rate and pop. 10,518 | Rate and pop. 17,718 |
| Small Pox | ... | 0·05 | ... | ... | ... | ... |
| Measles | 1·06 | 1·54 | 2·61 | 3·75 | 1·33 | 0 33 |
| Scarlatina | 0·26 | 0·11 | 0·23 | 0·51 | 0·19 | 0·11 |
| Diphtheria | 0·74 | 0·13 | 0·11 | 0·42 | 0·19 | 0·45 |
| Whooping Cough | 0·21 | 1·21 | 0·95 | 1·50 | 1·42 | 0·84 |
| Fever | 0·05 | 0·58 | 0·23 | 0·37 | 0·19 | 0·33 |
| Diarrhœa | 1·17 | 0·68 | 0·23 | 1·03 | 1·42 | 0·73 |
| Total ... | 3·49 | 4·30 | 4·36 | 7·58 | 4·74 | 2·79 |

The history and the circumstances connected with the incidences of these seven diseases I have now to detail.

## Small-Pox.

This is a disease to which Cardiff must be constantly exposed in consequence of its extensive shipping trade and immigration of strangers; many of them arriving from countries where vaccination has been little cared for.

During the year 1885, seventeen cases came under my observation; two of these were fatal. The death-rate from small-pox has been 0·02 per 1,000 population. The several cases of small-pox came under my notice as follows:—

On the 18th of January I was requested to visit a house in Christina Street; I there found one of the inmates to be suffering from small-pox in a very modified form after vaccination. I caused the patient immediately to be removed to the infectious ward attached to the Hamadryad Hospital. I then caused the house to be thoroughly disinfected, the walls and ceiling of the room to be scraped and afterwards well saturated with a concentrated solution of carbolate of lime and sulphide of calcium, as also the floor; and I forbid the room to be used again until I had reason to believe it was free from infection. I caused the other inmates of the house to be vaccinated, or re-vaccinated, as might be necessary. The houses in this and the adjoining streets were under constant supervision, so as to detect fresh cases of sickness from this disease, if any should occur. These precautions were successful, as there was no extension of small-pox in this locality. I may here state that these sanitary precautions were adopted in all subsequent cases.

On the 19th, a case of small-pox was reported to me by the medical attendant in a house in Eclipse Street, Roath. On enquiry I found the patient to be a female who had been visiting some of her family who resided at Chepstow, some of whom were suffering from small-pox; not feeling well she returned home, and in two or three days a variolous eruption developed itself; she was hourly expecting her confinement and could not be removed; complete isolation was adopted. The room in which she lay was constantly exposed to the action of vapourised spray of a solution of carbolic acid, and alternately with a solution of empireumatic oil of sanitas, the latter being used to render the atmosphere of the room less offensive. Sheets saturated with a solution of carbolate of lime were suspended outside the door of this room, and as it was necessary ventilation should be enforced, the windows were partially opened, but curtains saturated with a similar solution were also suspended to prevent the escape of the infectious matter into the surrounding atmosphere. All the other precautions alluded to, which were detailed in the first case, were also adopted here with equal success.

On the 20th January I was called to a case of small-pox in Adelaide Street, Bute Docks. The patient was a shipwright. I caused him immediately to be removed to the small-pox hospital. The same action to prevent the spread of the disease as in the former cases was taken in this and all subsequent cases.

On the 1st of February a case of sickness was reported to me on board the ship "Benan," lying in the Penarth Docks. On visiting this vessel I found one of the crew to be suffering from small pox. On inquiry, I ascertained that the poor man had been taken ill on the passage from London to this port. I caused him immediately to be removed to the small-pox hospital in which institution he died on the 7th. The patient had not been previously vaccinated. Immediately after his removal I examined the remainder of the crew. I found one of them not to have been previously vaccinated; I caused, in his case, this operation to be performed; the remainder of the crew were re-vaccinated. Four days afterwards the arm of the first man gave indication that the vaccination was successful; concurrent with this, however, a small-pox rash developed itself, but in a very light and modified form; he was also removed to the small-pox hospital.

On the 11th of February a seaman was reported to be suffering from small-pox in a very modified form, in a seaman's boarding house in Nelson Street. The patient had been vaccinated when young. He was removed to the hospital and soon became convalescent.

On February 26th, a man employed in the Mercantile Marine Department at Penarth was reported to me as suffering from small-pox in a very confluent form. He had not been vaccinated. On

enquiry, I found that he had visited the "Benan" and incautiously gone into the cabin occupied by the first case on board that ship.

On 24th of February, the wife of a ship's steward residing in James Street, Bute Docks, was reported to me by the medical attendant to be suffering from small-pox; she was removed to the hospital. On the same day two other cases of confluent small-pox were reported to me; one was that of a male adult residing in Rowe's square. In this case the disease was in a very advanced stage when brought under my notice. It was much to be regretted this was not done earlier. He was removed into the hospital, but, unfortunately, on visiting the next house I found a female suffering from the premonitory symptoms of the disease, but she had been vaccinated and passed through the disease in a very modified form.

On the 26th of March, a case occurred in Cycle Street, Roath; and on the 27th, another in Ely Road; Canton; and on the 9th of April one in Devonshire Place, Canton; and on the 10th, one in Frederick Street, Cardiff. Of these, the one in Cycle Street was in a modified form, and this patient was treated in her own room; the accommodation of the house admitting of perfect isolation and proper nursing. The remaining three were removed to the small-pox hospital. The source of the infection in Frederick Street was due to the patient having visited the house in Cycle Street when the person at that house first developed the disease. The case in Devonshire Place was probably owing to the circumstance that the wife of the patient visited her mother, who was dying from small-pox at Pontypool. After she returned home she had small-pox in a very modified form, as not to require medical attendance. Subsequently her husband had the disease very lightly, both of these having been vaccinated when young.

In the early part of May a case of small-pox came under my observation on board the "City of Truro." On visiting the ship I ascertained she left Porte, in the Black Sea, on the 1st of April and arrived at Gibraltar on the 14th. While there, one of the crew left the vessel on business connected with the ship, I could not trace that he had visited anyone suffering from the disease, but a few days after leaving Gibraltar he developed small-pox, when the vessel arrived at Falmouth he was removed into a hospital. After the vessel left Falmouth on passage to Cardiff, his brother, one of the crew, complained of sickness. When the vessel arrived here the sickness was reported to me, and on visiting the ship I found the patient suffering from the disease in a very modified form; he was removed to the hospital. The remainder of the crew were re-vaccinated successfully, the vessel kept under supervision while in dock, but there was no further extension of the disease. After this date no other case of small-pox came under observation.

Measles.—This disease, like all infantile epidemics, appears in a district periodically, and then attacks all who are exposed to,

and susceptible of, the infection; the extent of prevalence is in direct ratio to the interval that has elapsed between each visitation. The last epidemic of measles, previous to the present, was in 1880; on that occasion 67 deaths were registered.

During 1885, the total deaths from measles were 198, these occurred in the Winter and Spring Quarters, but chiefly during the former; it was to this disease the high death-rates recorded in these two quarters were to be ascribed, which caused much uneasiness, that these high death-rates were due to an insanitary condition of the district; it is, therefore necessary to show the circumstances that conduced to this mortality.

Measles is very infectious throughout its whole course, and, perhaps, at no period more so than during the premonitory symptoms, and these so closely resemble a common catarrh that they attract little attention on the part of the parents, and it is only when the eruption appears that isolation is attempted; hence, the atmosphere of the entire house becomes affected, and to this circumstance measles, of all the zymotic diseases, is least under the control of a Sanitary Authority. Sanitation, to a great extent, is dependent on the care taken by those who have charge of the sick.

The epidemic first appeared during the last few days of October, 1884, in Grangetown. Grangetown is a well-defined sub-district of the southern part of Canton, and, as will be observed on the map, the houses are built low down on the clay formation. From this circumstance, the lands in the immediate vicinity retain much water on their surface owing to the impervious nature of the subsoil; this is especially the case during the winter months, and frequent fogs prevail; the atmosphere is then loaded with humidity; in addition, when the disease broke out the weather was exceedingly cold and exercised an unfavourable influence on the progressive stages usually observed in its ordinary course, and so continued throughout the winter and early spring.

When my attention was first called to the epidemic I visited Grangetown. The houses in Lower Grangetown are occupied by mechanics and a better class of artizans; they are not what may be termed over-crowded. They are kept cleanly, but for the most part afford accommodation for more than one family. The houses in Upper Grangetown are tenanted by Irish labourers, with the exception of those facing the main road to Penarth. A Board School exists in Lower Grangetown; this affords instruction to some hundreds of children, there is also a National School, and a Catholic School in Upper Grangetown. On visiting the district I found the epidemic rapidly spreading. I attributed this to a circumstance that immediately came under my observation, namely, that children from infected houses were daily attending school. Out of 78 houses I ascertained 27 came under this category, and were thus carrying with them the germs of the

infection. Impressed with the gravity of this evil, I placed myself in communication with the Chairman of the School Board, who immediately convened a meeting of his colleagues at which I was present; and I strongly urged the expediency of temporarily closing the schools; this suggestion met with opposition, but, as an alternative, additional School Attendance Officers, were appointed with instructions to prevent recurrence of the practice, and I have reason to believe with success. I desire here to point out unless some great attention is given to the subject, these large schools will always furnish an element of danger on the recurrence of infantile epidemics; even now it constantly comes to my knowledge that when my attention is called to cases of scarlatina, diphtheria, whooping-cough, and even small-pox, children from these infected houses are sent to school.

The following mortality return has been compiled from information obtained from the register of deaths book:

| Sub-District. | 1884. | | | Total | 1885. | | | | | | Total | Total during epidemic. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oct. | Nov. | Dec. | | Jan. | Feb. | Mar. | Apr. | May. | June | | |
| Cardiff, North | 0 | 0 | 0 | 0 | 2 | 6 | 6 | 1 | 2 | 1 | 18 | 18 |
| ,, South | 0 | 0 | 14 | 14 | 17 | 10 | 9 | 13 | 2 | 1 | 52 | 66 |
| Roath North | 0 | 1 | 0 | 1 | 0 | 1 | 11 | 5 | 4 | 2 | 23 | 24 |
| ,, South | 1 | 1 | 1 | 3 | 46 | 12 | 11 | 3 | 4 | 4 | 80 | 83 |
| Canton, North | 1 | 5 | 0 | 6 | 5 | 3 | 2 | 1 | 1 | 0 | 18 | 24 |
| ,, South | 10 | 43 | 6 | 59 | 3 | 4 | 0 | 0 | 0 | 0 | 7 | 66 |
| Total ... | 12 | 50 | 21 | 83 | 73 | 42 | 39 | 23 | 13 | 8 | 198 | 281 |

The Death-rate in each sub-district being:—

| | | | |
|---|---|---|---|
| Cardiff, North, | 0·98 | Cardiff, South, | 1·82 |
| Roath, ,, | 2·83 | Roath, ,, | 3·94 |
| Canton, ,, | 2·28 | Canton, ,, | 1·82 |

SCARLATINA.—The mortality from this disease, which, in 1884, was represented by 126 deaths, with a death-rate of 1·369, fell in 1885 to 26 deaths, and a rate of 0·267; this being the lowest rate observed in the town for many years.

Connected with the sanitary precautions applicable to meet this disease, there are two circumstances associated with its etiology it may be useful to bear in mind: 1st, the infection of the disease is communicable in a great degree by the contagia given off from the skin of the sick. The specific gravity of the germs thus given off is greater than the specific gravity of the atmosphere, so that these have a tendency to deposit. From this circumstance the contagia do

not so readily pass out of the sick chamber to be diffused throughout the house; hence it is that isolation of the sick is more effective in this than in the other infectious diseases of children. 2nd. This tendency to deposit of the contagia eventuates in the fact that any individuals entering the infected chamber may have these germs deposited on their clothes, and when leaving, thus carry with them the infection, and, although not suffering from the disease themselves, they may be the means of carrying it with them and communicating it to those with whom they come in contact and who are susceptible to the disease.

Bearing in mind these two facts, whenever a case of scarlatina is brought under my notice it is immediately visited and isolation enforced, and with it the proper use of disinfectants, not only as regards the sick chamber, but the disinfection of all linen and clothes that have been exposed to the infection. In order that this may be done effectively, every facility is afforded. The Inspectors, when permitted, remove these to your disenfecting chamber and carefully expose them to the action of dry air heated to a temperature exceeding 240° Fahrenhiet. This is done free of charge to those to whom cost is a consideration. After the termination of the illness, the chamber previously occupied by the sick is exposed to the action of sulphurous acid (sulphur fumes), and chlorine gases; the walls are scraped, and these, with the floor and ceilings, saturated with a strong solution of carbolate of lime and sulphide of calcium.

In 1884, it frequently came to my knowledge that (the evil I have already spoken of) children were sent to school from infected houses Whenever this circumstance was made known to me I immediately placed myself in communication with the parents of the children, as also the schoolmaster, warning them of the serious consequences that might result from it. In 1885 this practice did not obtain to the degree it did in 1884, still it was by no means uncommon. The only means by which this danger can be averted is by obtaining compulsory powers, that have been granted in other districts, requiring heads of families to notify any case of infectious disease to the Medical Officer of Health when such has occurred in their houses.

DIPHTHERIA.—The deaths registered from diphtheria during the year were 39 as against 32 in the previous year.

There has latterly been a gradual increase in the deaths registered from this disease. The Registrar-General, in alluding to this circumstance in a recent report, states, "The increase of mortality under the heading of 'Diphtheria,' may possibly be in some degree only apparent; the returns of mortality from this disease are very untrustworthy, there being apparently no general consensus among certifying medical men as to the precise use of this term. It is not uncommon, in going through the death

registers, to find all the fatal cases of throat disease in some one medical man's practce in a small area returned as cases of diphtheria, while all those in the same area in a second man's practice are returned as ulcerated throat or simply as sore throat."

This opinion is in accord with my own observation, as I have reason to believe that many cases that would formerly have been registered as cynanche maligna of or putrid sore throat, are now registered as diphtheria.

WHOOPING-COUGH.—After measles, whooping-cough produced the greatest mortality amongst the seven chief zymotic diseases; the total deaths registered from this disease during the year were 118, being at the rate of 1·216 as against 0·650. for the preceding year The disease prevailed more or less extensively throughout the entire year, but somewhat more severely during the colder months. Like measles this disease is very little amenable to sanitary precautions; it is communicable by the sick to the healthy by means of the secretions from the air passages These secretions continue through the whole course of the disease, and as the attack of whooping-cough lasts for many weeks isolation is impossible.

FEVER.—There were 39 deaths from fever, being at the rate of 0·400 against 0·286 the mean of the previous six years. The 39 deaths from fever, distinguished by their separate types, would be 21 from typhoid with a mean of 0·216; nine from typhus with a mean of 0·092; and nine from simple continued with a mean of 0·092; excluding the cases of typhus, the death-rate from fever would be less than that of the usual mean.

Typhus, for the first time for some years, occurred in 1885 as an epidemic, and, at its commencement, threatened to assume great proportions. It is a disease very infectious as I have stated in the earlier part of this report, and is communicable direct from the sick to the healthy, in this respect differing essentially from typhoid, the latter disease being transmissable by the excretions passing from the sick. It first came under my observation under the following circumstances:

On the 17th April, my attention was called to some cases of fever at No. 8, Carpenter's Arms Court. On visiting the house I found it was occupied by a family consisting of eight members; seven of them, at the time, were down with the disease in a severe form, the eighth had been ill but was becoming convalescent. I carefully examined them. In all, the temperature was very high, varying from 103° to 104°5; the characteristic petechial spots of typhus showed themselves on the skin. Some of them were very delirious and had brown sordes around the teeth and gums. There was an absence of the abdominal symptoms usually associated with typhus fever. The house consisted of two rooms, one on the basement and a bedroom above, and there was no through

ventilation. I directed a nurse immediately to be employed to take charge of the sick and instructed the Relieving Officer to supply them with everything prescribed by the Medical Attendant. The house was kept under constant supervision by one of your sanitary Inspectors, who supplied them with disinfectants, enforced ventilation, and prohibited the visitation of strangers. These eight cases recovered.

On May 8th, the poor woman who had been been employed to nurse the sick at Carpenter's Arms Court became ill, went to her home at 6, Garth Court, and died on the 13th.

On May 9th, two cases of typhus fever were reported to me at 12, Union Buildings. The patients were a man aged 28, who was supposed to have visited No. 8, Carpenter's Arms Court; also a lad aged 5 years. The lad recovered, but the father died on May 11th.

On the 14th, my Inspector on visiting Carpenter's Arms Court found three cases of typhus at No. 3, viz., a father, mother, and a child all lying in one bed in a small room, the space of which was 1,144 cubic feet. I immediately caused them to be removed to a larger room, and employed a nurse to take charge of them. These three persons recovered. When I visited the house I found the only other occupant, an adult male, sitting down-stairs suffering from premonitory symptoms that rapidily passed on to a fatal termination.

The same day (May 14th), the Inspector reported another case at No. 5, in the same court, viz., a young woman aged 25. I caused her to be isolated from the other inmates of the house. She had a severe attack but ultimately recovered. The disease did not extend further in this house.

On May 18th, the husband of the poor woman who died in Garth Court was taken ill, as also his son aged 15; these two recovered after passing through the disease in a severe form.

On June 1st, two female children aged 7 and 14 years respectively, were found suffering from this disease at 9, Union Buildings; both recovered.

On the 3rd June a lad aged 15 was found to be suffering from the premonitory symptoms of typhus at No. 4, Union Buildings; on the 18th, a child aged 5 years; on the 19th, another lad aged 11; on the 21st, the father; and on the 23rd, a boy aged 7 years. All recovered with the exception of the father.

On June 4th, a child aged 8 years was taken ill at No. 1, Garth Court; on the 6th, the father of this child; on the 11th, the mother; on the 27th, a lad aged 14; on the 28th, another lad aged 12; and on the 28th, the woman who had been placed to attend to the sick. The father and mother died, but the others recovered.

On June 8th, a man aged 32, who was residing at 12, Union Buildings, where some cases of typhus occurred, was taken ill with this disease, also his child aged 3 years. Both of them recovered.

On June 27th, my attention was called to a poor woman who had died the night previously at No. 8, Gough Street, Temperance Town. On visiting the house I ascertained that her death was due to typhus, and that she had contracted the disease by visiting one of the infected houses in Garth Court, she being related to the sick inmates. In this house I found two children at the time suffering from the disease but in a milder form. On July 8th, a lad aged 15 was taken ill; on the 11th a young woman aged 25; on the 14th, another young woman aged 24; on the 18th, a man aged 25; and on August 2nd, an old man aged 67, who died, but all the others ultimately recovered.

On August 3rd, my attention was called to a girl, aged 11 years, a resident in John Street, Roath, who was suffering from the disease; on the 15th, a girl aged 15, and on the 17th a lad aged 14; they all recovered, but on September 16th an old man with a very broken-down constitution was taken ill; on the 19th, a lad aged 7; on the 25th, a child aged 3, and on the 21st, a man aged 29. They all recovered with the exception of the old man.

On August 17th, a fresh case was reported at 4, Union Buildings. This was a girl aged 13 years, and on the 20th a young man, a brother, who had come from Dinas on a visit to his family was taken ill; these both recovered.

After this date no further cases of typhus were reported.

Diarrhœa. There were 99 deaths registered from this disease during the year, being at the rate of 1·02 as against 156 the previous year with a death-rate of 1·669.

In an earlier part of this report I have detailed the influences, direct and collateral, operating on infantile diarrhœa; it is therefore unnecessary again to allude to them; but for the purpose of enabling you to judge how far diarrhœa, as an epidemic, in 1885, was in accord with those observations the following tables are inserted.

# DEATHS FROM DIARRHŒA. TABLE 17.

| Months. | Deaths. | | | | Death Rate. | Temperature. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Districts. | | | | | Maximum. | Minimum. | Mean of Max. | Mean of Min. | Mean of Month. | No. of Wet Days. |
| | Cardiff. | Roath. | Canton. | Total. | | | | | | | |
| January ... | 2 | 1 | 2 | 5 | | 28th 51°·8 | 6th 28°·0 | 42°·0 | 35°·1 | 38°·5 | 20 |
| February ... | 2 | ... | 1 | 3 | | 27th 54°·8 | 19th 28°·3 | 48°·7 | 39°·5 | 44°·1 | 22 |
| March ... | ... | ... | 1 | 1 | | 20th 55°·4 | 8th 28°·3 | 48°·3 | 36°·5 | 42°·4 | 16 |
| April ... | ... | 2 | 2 | 4 | | 21st 69°·2 | 3rd 30°·9 | 54°·5 | 38°·2 | 46°·3 | 16 |
| May ... | 2 | 1 | ... | 3 | | 29th 65°·2 | 8th 33°·8 | 57°·0 | 42°·8 | 49°·9 | 27 |
| June ... | 1 | ... | 1 | 2 | | 14th 78°·3 | 2nd 42°·3 | 67°·6 | 50°·8 | 59°·2 | 13 |
| July ... | 4 | ... | ... | 4 | | 26th 86°·2 | 13th 45°·4 | 71°·7 | 54°·5 | 63°·1 | 6 |
| August ... | 16 | 7 | 9 | 32 | | 16th 75°·9 | 14th 43°·2 | 67°·4 | 50°·9 | 59°·1 | 12 |
| September ... | 14 | 8 | 9 | 31 | | 15th 70°·5 | 28th 32°·9 | 63°·1 | 49°·5 | 56°·3 | 23 |
| October ... | 6 | 3 | 1 | 10 | | 3rd 58°·4 | 25th 32°·0 | 49°·5 | 41°·4 | 45°·4 | 22 |
| November ... | ... | ... | 1 | 1 | | 29th 55°·9 | 18th 31°·1 | 47°·2 | 40°·8 | 44°·0 | 16 |
| December ... | ... | 2 | 1 | 3 | | 31st 52°·0 | 11th 21°·9 | 43°·7 | 33°·9 | 38°·8 | 17 |
| Total ... | 47 | 24 | 28 | 99 | 1·02 | | | | | | |

# TABLE. 17a.

## DIARRHŒA. DEATHS AT AGE.

| Months. | Months. | | | | | Years. | | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 3 | 6 | 9 | 1 | 2 | 3 | 4 | 5 | 10 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 95 | |
| January | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 5 |
| February | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 |
| March | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| April | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| May | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| June | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| July | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 4 |
| August | 3 | 1 | 11 | 8 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 32 |
| September | 2 | 6 | 6 | 3 | 5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 0 | 0 | 31 |
| October | 0 | 1 | 1 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| November | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| December | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Total | 5 | 12 | 24 | 17 | 11 | 11 | 1 | 0 | 0 | 1 | 0 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 0 | 0 | 99 |

| | | |
|---|---|---|
| Under 1 year | 69. | Rate=0·711=0·642 |
| „ 5 „ | 12. | Rate=0·123=0·111 |
| 5 yrs. & upwards | 18. | Rate=0·185=0·167 |

| | Cardiff. | Roath. | Canton. |
|---|---|---|---|
| North ... | 22=1·1 | 2=0·2 | 15=1·4 |
| South ... | 25=0·6 | 22=1·0 | 13=0·7 |
| | 47 | 24 | 28 |

From this table it will be seen that diarrhœa as an epidemic in 1885 was infantile, as out of the 99 deaths, 69 were under the age of one year, and 12 under the age of five years; only 18 being above that period of life.

The epidemic commenced in August, when there were 32 deaths: the mean temperature of the month being 59°·1. There were 12 days on which 0·01 inches or more rain fell.

In 1884, during the three months ending October, there was a total of 114 deaths, with 31 wet days, and a total rainfall of 5·18 inches. In 1885 the deaths of the three months fell to 73, there being 57 wet days with a rainfall of 14·84 inches, these figures conclusively show that temperature and rainfall exercise a great influence on infantile diarrhœa. Moreover, as regards temperature, not only was there a lesser mean in 1885, but the difference of temperature of day and night was very marked, and the nights throughout were exceptionally cold for summer nights.

Constitutional Diseases.—There is little here calling for any observation as regards this class of diseases, they simply have maintained in Cardiff the same mean observed in other districts.

Local Diseases.—The mortality from these diseases illustrates the effect of temperature as a cause of mortality. During the first quarter of the year the weather was very trying and marked by the prevalence of unusually cold winds and much moisture. The mortality from local diseases was then excessive, especially from acute inflammatory affections of the respiratory organs. The total deaths registered from this class of diseases being 309. In the quarter ending June, the weather being less severe, the mortality fell to 279, and in the quarter ending September it was only 213, but when the cold weather returned, as in the December quarter, they reached 259.

Developmental Diseases.—These were somewhat below the average and call for no observation.

Violent Deaths are always in excess in this district, this being due to the circumstance, that the commercial interests of the port are largely associated with occupations associating those employed to the chances of accidents, namely the shipping, the manufactures, and the three important railways connected with this district.

Subjoined is a summary of work done by your executive :— 27,987 day and 2,531 night visits were made by your Inspectors of Lodging-houses, and their condition duly reported to me every morning. Sixty-eight houses were found to be overcrowded; in each case notices were served upon the occupiers to reduce the number of inmates. It is satisfactory to note that it was only once necessary to take legal proceedings to enforce compliance; in this instance the defendant was cautioned.

The occupiers of 373 houses were served with notices to cleanse and limewash their premises. On application, brushes were lent 1669 times for this purpose.

Fifteen houses were certified as being unfit for habitation until necessary repairs were executed; the owners becoming aware that legal proceedings were about to be taken, complied with the notices served upon them.

116 houses were fumigated after cases of infection.

943 closets and surface drains in a defective condition were cleansed and repaired; in 98 instances defects could not be observed until tested either by essential oils or the "Asphyxiator."

65 cesspools were emptied and disinfected, of these 34 have been abolished and the house drains connected with main sewers.

118 bakehouses were inspected, and in 47 instances the occupiers were served with notices to lime-wash the premises.

116 Cowsheds and 53 Milk-shops were inspected, the Cow-sheds and Dairies were each lime-washed on two occasions throughout the year.

The Common Lodging and Boarding Houses have been kept under constant supervision, and cleansing and lime-washing thoroughly enforced.

1646 lbs. of Beef, 184 lbs. of Mutton, 301 lbs. of Pork, 2,356 lbs. of Fish, and 30 pads of Mackerel were destroyed by order of the Magistrates.

The other nuisances dealt with were detailed in daily reports.

The following is a list of clothing and bedding disinfected at your disinfecting chamber.

| Articles. | Disinfected. | Destroyed. |
|---|---|---|
| Beds ... ... | 43 | 9 |
| Mattresses ... | 47 | 8 |
| Blankets ... ... | 53 | 6 |
| Quilts ... | 41 | 5 |
| Sheets ... ... | 62 | 14 |
| Bolsters, Slips & Pillows | 104 | 11 |
| Carpets ... ... | 22 | ... |
| Other articles ... | 51 | 63 |
| TOTAL | 423 | 116 |

I have thus detailed in as consise a manner as possible, all incidents that have occurred, bearing on the past or present sanitary condition of this district.

Within the last two years the town has been threatened with most serious epidemic visitations, such as cholera, small-pox, and typhus fever. These occasioned much anxiety, and necessitated great vigilance and activity on the part of your officials to whom has been entrusted the execution of all measures necessary to protect the public health, and I can refer with great satisfaction to the zeal and activity evinced by your Chief Inspector Mr. GOVER and Inspectors LEYSHON, VAUGHAN and HELLERMAN.

I have the honour to be, Gentlemen,

Your obedient Servant,

H. J. PAINE, M.D.,

Medical Officer of Health, Cardiff Urban Sanitary Authority.

## Table 18.

| Description. | Total Solid Matter. | Albumonoid Ammonia. | Free Ammonia. | Nitrogen as Nitrates & Nitrites. | Total Nitrogen found. | Previous Sewage or Animal Contamination. | Chlorine. | Magnesia Salts. | Hardness. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Temporary. | Permanent. | Total. |
| Sample G, 114 ... ... | 51·2 | 0·015 | 0·004 | 1·543 | 1·558 | 15,100 | 4·10 | rather excessive. | 10·60 | 15·80 | 26·40 |
| ,, ,, 115 ... ... | 150·5 | 0·002 | 0·190 | 4·012 | 4·187 | 39,800 | 19·9 | ditto. | 19·04 | 29·96 | 49·00 |
| ,, ,, 116 ... ... | 52·4 | 0·009 | 0·003 | 1·614 | 1·624 | 15,800 | 5·00 | moderate | 9·40 | 12·74 | 22·14 |
| ,, ,, 117 ... ... | 89·60 | 0·022 | 0·707 | 0·949 | 1·549 | 9,100 | 14·80 | rather excessive. | 17·16 | 18·12 | 35·28 |
| ,, ,, 120 ... ... | 86·56 | 0·016 | 0·010 | 4·180 | 4·202 | 41,400 | 8·80 | moderate | 14·40 | 24·00 | 38·40 |
| ,, ,, 121 ... ... | 49·80 | 0·011 | 0·0013 | 1·5193 | 1·5294 | 14,800 | 3·90 | moderate | 5·0 | 23·6 | 28·6 |
| Water from Llanishen Reservoir (filtered) ... ... | 22·8 | .0085 | ·0026 | ·047 | ·056 | ... | 1·15 | | 9·0 | 9·4 | 18·4 |
| Water from Ely Pumping Works | 31·2 | ·006 | ... | ·059 | ·064 | slight | 1·50 | | 15·0 | 11·1 | 26·1 |
| Limit of Impurity Standard ... | 40·0 | ·015 | ·010 | ·100 | | 700 | 3·0 | | 5·0 | 24·0 | 29·0 |
| Recommended Standard of Purity | 20·0 | ·004 | ·002 | ·050 | | nil | 1·5 | | 14·0 | 3·0 | 17·0 |

## TABLE 19.

The following table gives the total deaths and death-rate of the seven chief zymotic diseases for each year during the six years ending 1884, with mean of same.

| Years. | 1879 | | 1880 | | 1881 | | 1882 | | 1883 | | 1884 | | Mean of six years | | 1885 | | Estimated population as per census of houses 107,393 death rate per 1000. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Estimated Population according to Registrar General. | 80,839 | | 83,427 | | 86,015 | | 88,603 | | 91,204 | | 93,468 | | 87,259 | | 97,034 | | |
| Seven Chief Zymotic Diseases. | Deaths | Death Rate | Deaths | Death Rate | Deaths | Death Rate | Deaths | Death Rate. | Deaths | Death Rate | Deaths | Death Rate | Deaths | Death Rate | Deaths | Death Rate | |
| Small Pox | ... | ... | 1 | 0·011 | 2 | 0·023 | 1 | 0·011 | 1 | 0·010 | 8 | 0·085 | 2·2 | 0·023 | 2 | 0·020 | 0·018 |
| Measles | 10 | 0·123 | 67 | 0·803 | 1 | 0·011 | 32 | 0·361 | 11 | 0·120 | 83 | 0·888 | 34·0 | 0·384 | 198 | 2·040 | 1·843 |
| Scarlatina | 44 | 0·544 | 29 | 0·347 | 20 | 0·232 | 67 | 0·756 | 42 | 0·460 | 128 | 1·369 | 55·0 | 0·618 | 26 | 0·267 | 0·242 |
| Diphtheria | 9 | 0·111 | 10 | 0·119 | 12 | 0·139 | 27 | 0·305 | 22 | 0·241 | 35 | 0·374 | 19·2 | 0·215 | 39 | 0·402 | 0·363 |
| Whooping Cough | 20 | 0·247 | 77 | 0·922 | 58 | 0·673 | 38 | 0·428 | 68 | 0·745 | 31 | 0·330 | 48·7 | 0·557 | 118 | 1·216 | 1·098 |
| Fever | 21 | 0·259 | 23 | 0·275 | 21 | 0·244 | 18 | 0·203 | 35 | 0·383 | 34 | 0·363 | 25·3 | 0·288 | 39 | 0·402 | 0·363 |
| Diarrhœa | 33 | 0·408 | 99 | 1·186 | 50 | 0·581 | 110 | 1·241 | 74 | 0·811 | 157 | 1·679 | 87·2 | 0·984 | 99 | 1·020 | 0·921 |
| TOTAL | 137 | 1·692 | 306 | 3·663 | 164 | 1·903 | 293 | 3·305 | 253 | 2·770 | 476 | 5·088 | 271·6 | 3·069 | 521 | 5·367 | 4·848 |

# APPENDIX No. 1.

## CARDIFF URBAN SANITARY DISTRICT.

**Deaths Registered at Ages from the several Causes during the Year 1885.**

| CAUSES OF DEATH. | AGES. Under 1 year | 1 and under 5 | 5 and under 15 | 15 and under 25 | 25 and under 60 | 60 and upwds | Total. | Estimated Population as per Registrar General 97,054 houses, 107,382 Death Rate per 1,000. | Estimated Population as per Census of 1881. Death Rate per 1,000. | Mean Death Rate per 1,000 Inhabitants of Kingdom for 30 years. |
|---|---|---|---|---|---|---|---|---|---|---|
| CLASSES. | | | | | | | | | | |
| I. **Zymotic Diseases** ... | 182 | 287 | 57 | 17 | 52 | 11 | 606 | 6.245 | 5·642 | 4·845 |
| II. **Constitutional** ... | 40 | 63 | 24 | 66 | 189 | 18 | 400 | 4·122 | 3·724 | 4·108 |
| III. **Local** ... | 267 | 142 | 36 | 47 | 387 | 161 | 1060 | 10·924 | 9·870 | 8·731 |
| IV. **Developmental** ... | 178 | 21 | 1 | 5 | 27 | 68 | 300 | 3·091 | 2·793 | 3·464 |
| V. **Violent Deaths** ... | 4 | 5 | 11 | 11 | 54 | 8 | 93 | 0·958 | 0·865 | 0·581 |
| **Sudden Deaths,** cause unascertained | 5 | 2 | 1 | | 12 | 2 | 22 | 0·226 | 0·205 | 1·154 |
| **Totals** ... | 696 | 520 | 130 | 146 | 721 | 268 | 2481 | 25·566 | 23·099 | 22.873 |
| CLASS I. ZYMOTIC. | | | | | | | | | | |
| Small Pox ... ... ... | | | | | 2 | | 2 | 0·020 | 0·018 | 0·221 |
| Measles ... ... ... | 30 | 138 | 30 | | | | 198 | 2·040 | 1·843 | 0·413 |
| Scarlet Fever ... ... | 3 | 17 | 5 | | 1 | | 26 | 0·267 | 0·242 | 0·717 |
| Diphtheria ... ... | 1 | 29 | 6 | 1 | 2 | | 39 | 0·402 | 0·363 | 0·128 |
| Croup ... ... ... | 10 | 24 | 6 | | | | 40 | 0·412 | 0·372 | 0·228 |
| Whooping Cough ... ... | 51 | 64 | 3 | | | | 118 | 1.216 | 1·098 | 0·519 |
| Typhus Fever ... ... | | | | | 8 | 1 | 9 | 0·092 | 0·083 | 0·036 |
| Enteric or Typhoid Fever ... | | | 2 | 10 | 9 | | 21 | 0·216 | 0·195 | 0·219 |
| Simple Continued Fever ... | | 1 | 1 | 1 | 5 | 1 | 9 | 0·092 | 0·083 | 0·038 |
| Erysipelas ... ... ... | 5 | | | 1 | 1 | | 7 | 0·072 | 0·065 | 0·096 |
| Dysentery ... ... ... | | | | | 1 | | 1 | 0·010 | 0·009 | 0·020 |
| Diarrhœa ... ... ... | 69 | 13 | 1 | 1 | 6 | 8 | 98 | 1·009 | 0·912 | 0·872 |
| Cholera ... ... ... | | | | | 1 | | 1 | 0·010 | 0·009 | 0·013 |
| Rheumatism ... ... | | | 1 | | 6 | | 7 | 0·072 | 0·065 | 0·115 |
| Other Zymotic Diseases ... | | | 2 | 1 | 2 | 5 | 0·051 | 0·046 | 0·018 | |
| Syphilis ... ... ... | 10 | | | 2 | 2 | 14 | 0·144 | 0·130 | 0·066 | |
| Want of Breast Milk ... | 2 | | | | | 2 | 0·020 | 0·018 | 0·053 | |
| Alcohol { *a.* Delirium Tremens | | | | | 2 | 2 | 0·020 | 0·018 | 0·022 | |
| { *b.* Intemperance ... | | | | | 4 | 1 | 5 | 0·051 | 0·046 | 0·018 |
| Thrush ... ... ... | 1 | | | | | | 1 | 0·010 | 0·009 | 0·028 |
| Worms, &c.... ... | | 1 | | | | | 1 | 0·010 | 0·009 | 0·010 |
| Totals ... | 182 | 287 | 57 | 17 | 52 | 11 | 606 | | | |
| CLASS II. CONSTITUTIONAL. | | | | | | | | | | |
| Gout ... ... ... | | | | | 1 | | 1 | 0·010 | 0·009 | 0·024 |
| Dropsy ... ... ... | | | | | | 1 | 1 | 0·010 | 0·009 | 0·344 |
| Cancer ... ... ... | | 2 | | | 37 | 11 | 50 | 0·515 | 0·465 | 3·869 |
| Scrofula ... ... ... | 8 | 12 | 10 | 4 | 5 | | 39 | 0·402 | 0·363 | 0·141 |
| Tabes Mesenterica ... ... | 5 | 5 | | | | | 10 | 0·103 | 0·093 | 0·250 |
| Phthisis ... ... ... | 10 | 12 | 7 | 60 | 146 | 6 | 241 | 2·483 | 2·244 | 2·491 |
| Hydrocephalus ... ... | 17 | 32 | 7 | 2 | | | 58 | 0·597 | 0·540 | 0·362 |
| Totals ... | 40 | 63 | 24 | 66 | 189 | 18 | 400 | | | |
| CLASS III. LOCAL. | | | | | | | | | | |
| Cephalitis ... ... ... | 1 | 2 | 3 | 2 | 8 | | 16 | 0·165 | 0·148 | 0·213 |
| Apoplexy ... ... ... | | | | 2 | 20 | 17 | 38 | 0·391 | 0·353 | 0·456 |
| Paralysis ... ... ... | | | | 3 | 24 | 17 | 44 | 0·453 | 0·409 | 0·488 |
| Epilepsy ... ... ... | | | 1 | 2 | 8 | 2 | 13 | 0·134 | 0·121 | 0·115 |
| Convulsions ... ... ... | 130 | 24 | 2 | | | | 156 | 1·607 | 1·452 | 1·222 |
| Brain Disease, &c. ... ... | 3 | 4 | 6 | 4 | 22 | 10 | 49 | 0·505 | 0·456 | 0·240 |
| Pericarditis ... ... ... | | | | | | 1 | 1 | 0.010 | 0·009 | 0·026 |
| Aneurism ... ... ... | | 1 | | | 6 | | 7 | 0·072 | 0·065 | 0·023 |
| Heart Disease, &c. ... ... | 4 | 1 | 8 | 7 | 86 | 35 | 141 | 1·453 | 1·312 | 0·971 |
| Laryngitis ... ... ... | 1 | 2 | 1 | | 1 | | 5 | 0·051 | 0·046 | 0·070 |
| Bronchitis ... ... ... | 86 | 53 | 2 | | 61 | 42 | 254 | 2·617 | 2·365 | 1·740 |
| Pleurisy ... ... ... | | 1 | | 2 | 7 | 1 | 11 | 0·113 | 0·102 | 0·047 |
| Pneumonia ... ... ... | 43 | 46 | 10 | 12 | 49 | 6 | 166 | 1·711 | 1·543 | 1·141 |
| Asthma ... ... ... | | | | | | 2 | 2 | 0·020 | 0·018 | 0·188 |
| Lung Disease, &c. ... ... | 3 | 2 | 1 | | 12 | 18 | 0·185 | 0·167 | 0·202 | |
| Gastritis ... ... ... | 2 | | | | | | 2 | 0·020 | 0·018 | 0·038 |
| Enteritis ... ... ... | 5 | 1 | | | 1 | 1 | 8 | 0·082 | 0·074 | 0·155 |
| Peritonitis ... ... ... | | | | 6 | 10 | | 16 | 0·165 | 0·148 | 0·078 |
| Ascites ... ... ... | | | | | 1 | | 1 | 0·010 | 0·009 | 0·028 |
| Hernia ... ... ... | 1 | | | 1 | 3 | 2 | 7 | 0·072 | 0·065 | 0·046 |
| Ileus ... ... ... | | | | 1 | 1 | | 2 | 0.020 | 0·018 | 0·043 |
| Intussusception ... ... | 1 | | | | | | 1 | 0·010 | 0·009 | 0·017 |
| Stricture of Intestines... ... | | | | 1 | 3 | 3 | 7 | 0·072 | 0·065 | 0·014 |
| Stomach Disease, &c.... ... | 2 | 2 | | 2 | 3 | 1 | 10 | 0·103 | 0·093 | 0·125 |
| Jaundice ... ... ... | 3 | | 1 | | 1 | 1 | 6 | 0·061 | 0·055 | 0·070 |
| Liver Disease, &c. ... ... | | 1 | | | 20 | 1 | 22 | 0·226 | 0·205 | 0·847 |
| Nephritis ... ... ... | | 1 | | | 3 | 1 | 4 | 0·041 | 0·037 | 0·022 |
| Bright's Disease (Nephria) ... | | 1 | 1 | 2 | 23 | 5 | 32 | 0·330 | 0·298 | 0·095 |
| Diabetes ... ... ... | | | | | 1 | | 1 | 0·010 | 0·009 | 0·030 |
| Cystitis ... ... ... | | | | 1 | 5 | 1 | 7 | 0·072 | 0·065 | 0·028 |
| Kidney Disease, &c. ... ... | | | | | 3 | | 3 | 0·030 | 0·028 | 0·114 |
| Ovarian Dropsy ... ... | | | | | 2 | 1 | 3 | 0·030 | 0·028 | 0·015 |
| Joint Disease, &c. ... ... | | | | | 1 | 1 | 2 | 0·020 | 0·018 | 0·075 |
| Phlegmon ... ... ... | 2 | | | | 1 | 3 | 0·030 | 0·028 | 0·025 | |
| Ulcer ... ... ... | | | | | 2 | | 2 | 0·020 | 0·018 | 0·017 |
| Totals ... | 287 | 142 | 36 | 47 | 387 | 161 | 1060 | | | |
| CLASS IV. DEVELOPMENTAL. | | | | | | | | | | |
| Premature Birth ... ... | 58 | | | | | | 58 | 0·597 | 0·540 | 0·583 |
| Other Malformations ... ... | 1 | 1 | | | | | 2 | 0·020 | 0·018 | 0·021 |
| Teething ... ... ... | 11 | 5 | | | | | 16 | 0·165 | 0·148 | 0·204 |
| Childbirth (*see* Metria) ... | | | | 5 | 15 | | 20 | 0·206 | 0·186 | 0·207 |
| Old Age ... ... ... | | | | | 6 | 68 | 74 | 0·762 | 0·689 | 1·330 |
| Atrophy and Debility... ... | 108 | 15 | 1 | | 6 | | 130 | 1·339 | 1·210 | 1·172 |
| Totals ... | 178 | 21 | 1 | 5 | 27 | 68 | 300 | | | |
| CLASS V. VIOLENT DEATHS | | | | | | | | | | |
| Fractures and Contusions ... | | 4 | 6 | 5 | 34 | 6 | 55 | 0·566 | 0·512 | 0·291 |
| Burns and Scalds ... ... | | 1 | 2 | 1 | 1 | | 5 | 0·051 | 0·046 | 0·101 |
| Drowning ... ... ... | | | 3 | 4 | 14 | 2 | 23 | 0·237 | 0·214 | 0·127 |
| Suffocation ... ... ... | 4 | | | | 1 | | 5 | 0·051 | 0·046 | 0·070 |
| Murder and Manslaughter ... | | | | | 2 | | 2 | 0·020 | 0·018 | 0·015 |
| Poison ... ... ... | | | | | 1 | | 1 | 0·010 | 0·009 | 0·009 |
| Drowning ... ... ... | | | | 1 | 1 | 2 | 0·020 | 0·018 | 0·025 | |
| Totals ... | 4 | 5 | 11 | 11 | 54 | 8 | 93 | | | |
| Sudden Deaths, (cause unascertained) | 5 | 2 | 1 | | 12 | 2 | 22 | 0·226 | 0·205 | 1·154 |

## Form A. Deaths during the year 1885, in the Urban Sanitary District of Cardiff.

Classified according to Diseases, Ages and Localities, and showing also the Population of such Localities, and the Births therein during the Year.

| Public Institutions | Names of Localities adopted for the purpose of these Statistics; public institutions being shown as separate localities. | Population at all Ages. Census 1881. | Population at all Ages. Estimated to middle of 1885. | Registered Births | Mortality from all causes, at subjoined Ages. At all ages. | Under 1 year. | 1 and under 5 | 5 and under 15. | 15 and under 25 | 25 and under 60. | 60 and upwards | | Mortality from subjoined causes, distinguishing Deaths of Children under Five Years of Age. Small-pox. | Measles. | Scarlatina. | Diphtheria. | Croup (not Spasmodic). | Whooping Cough. | Continued Fevers. Typhus. | Enteric or Typhoid. | Other Doubtful. | Diarrhœa Dysentery. | Cholera. | Rheumatic Fever. | Erysipelas. | Pyæmia. | Phthisis. | Bronchitis, Pneumonia and Pleurisy. | Heart Disease. | Injuries. | All Other Diseases. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11 | | 12. | 13. | 14. | 15. | 16. | 17. | 18. | 19. | 20. | 21. | 22. | 23. | 24. | 25. | 26. | 29. | 30. | 31. | 32. | 33. |
| | Cardiff U.S.A. ... | 85,378 | 97,034 | 4164 | 2204 | 685 | 518 | 116 | 112 | 578 | 195 | Under 5 | ... 168 | 20 | 30 | 34 | 114 | ... | ... | 1 | 81 | ... | ... | 4 | ... | 18 | 225 | 5 | 3 | 500 | |
| | | | | | | | | | | | | 5 upwds | ... 30 | 5 | 8 | 5 | 3 | 9 | 16 | 7 | 15 | 1 | 6 | ... | 2 | 159 | 171 | 120 | 17 | 427 | |
| | Union ... ... | ... | ... | ... | 177 | 10 | 2 | 2 | 20 | 78 | 65 | Under 5 | ... ... | ... | ... | ... | ... | ... | 1 | ... | ... | 1 | ... | ... | ... | 4 | 1 | ... | ... | 5 | |
| | | | | | | | | | | | | 5 upwds | ... ... | ... | ... | ... | ... | ... | 1 | 1 | 1 | ... | ... | 1 | ... | 49 | 28 | 4 | ... | 80 | |
| | Infirmary ... ... | ... | ... | ... | 74 | ... | ... | 12 | 10 | 44 | 8 | Under 5 | ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| | | | | | | | | | | | | 5 upwds | ... ... | ... | 1 | 1 | ... | ... | 1 | ... | ... | ... | ... | 1 | ... | 1 | 6 | 3 | 5 | 21 | 34 | |
| | Hamadryad Hospital Ship | ... | ... | ... | 26 | ... | ... | ... | 4 | 22 | ... | Under 5 | ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| | | | | | | | | | | | | 5 upwds | 2 ... | 1 | ... | ... | ... | 3 | ... | ... | ... | ... | ... | ... | ... | 5 | 3 | 7 | 4 | 1 | |
| | Totals ... | 85,378 | 97,034 | 4164 | 2481 | 695 | 520 | 130 | 146 | 722 | 268 | Under 5 | ... 168 | 20 | 30 | 34 | 115 | ... | ... | 1 | 82 | ... | ... | 4 | ... | 22 | 226 | 5 | 3 | 505 | |
| | | | | | | | | | | | | 5 upwds | 2 30 | 6 | 9 | 6 | 3 | 9 | 21 | 8 | 16 | 1 | 7 | 1 | 3 | 219 | 205 | 136 | 42 | 542 | |

## Form B. New Cases of Sickness coming to the knowledge of the Medical Officer of Health during the Year 1885. in the Urban Sanitary District of Cardiff.

(B)

Classified according to Localities and Diseases.

| Names of Localities. | | New Cases of Sickness in Persons belonging to the District, distinguishing those in Children, under Five years of Age. Small-pox. | Measles. | Scarlatina. | Diphtheria. | Croup (not Spasmodic). | Whooping Cough. | Continued Fevers. Typhus | Enteric or Typhoid. | Other Doubtful. | Diarrhœa and Dysentery. | Cholera. | Rheumatic Fever. | Erysipelas. | Pyæmia. | Ague. | Other Diseases, such as Chicken Pox, or Pneumonia, which the Medical Officer of Health thinks well to record. Phthisis. | Pn., Br., Pl. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | | 12. | 13. | 14. | 15. | 16. | 18. | 19. | 20. | 21. | 22. | 23. | 24. | 25. | 26. | 28. | | |
| Workhouse, In ... | 1527 | Under 5 | ... | 3 | 1 | ... | ... | 13 | ... | ... | ... | 9 | ... | ... | ... | ... | ... | 12 | 16 |
| | | 5 upwds | ... | ... | ... | ... | ... | ... | ... | 10 | ... | 20 | ... | 16 | 11 | ... | 10 | 59 | 59 |
| „ Out ... | 5716 | Under 5 | ... | 229 | 16 | 5 | ... | 67 | 9 | 2 | 1 | 36 | ... | ... | ... | ... | ... | 4 | 51 |
| | | 5 upwds | ... | 168 | 28 | 17 | ... | 41 | 58 | 13 | 12 | 74 | 1 | 43 | 33 | 1 | 4 | 112 | 382 |
| Infirmary, In ... ... | 825 | Under 5 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | | 5 upwds | ... | ... | ... | 1 | ... | ... | 7 | ... | ... | 28 | ... | ... | ... | ... | ... | 11 | 18 |
| „ Out ... | 8532 | Under 5 | * | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | | 5 upwds | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Hamadryad Seaman's Hospital, | | Under 5 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | In 830 | 5 upwds | 16 | 2 | 2 | ... | ... | 11 | 1 | 10 | 10 | 43 | 1 | ... | ... | ... | ... | 11 | 53 |
| „ „ | Out 7932 | Under 5 | * | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | | 5 upwds | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Totals ... | | Under 5 | ... | 242 | 17 | 5 | ... | 80 | 9 | 2 | 1 | 45 | ... | ... | ... | ... | ... | 16 | 67 |
| | | 5 upwds | 16 | 170 | 30 | 18 | 1 | 41 | 69 | 31 | 22 | 104 | 44 | 88 | 44 | 1 | 14 | 193 | 512 |

* No reliable Classification Register kept of Out-Patients of the Infirmary or Hospital Ship.