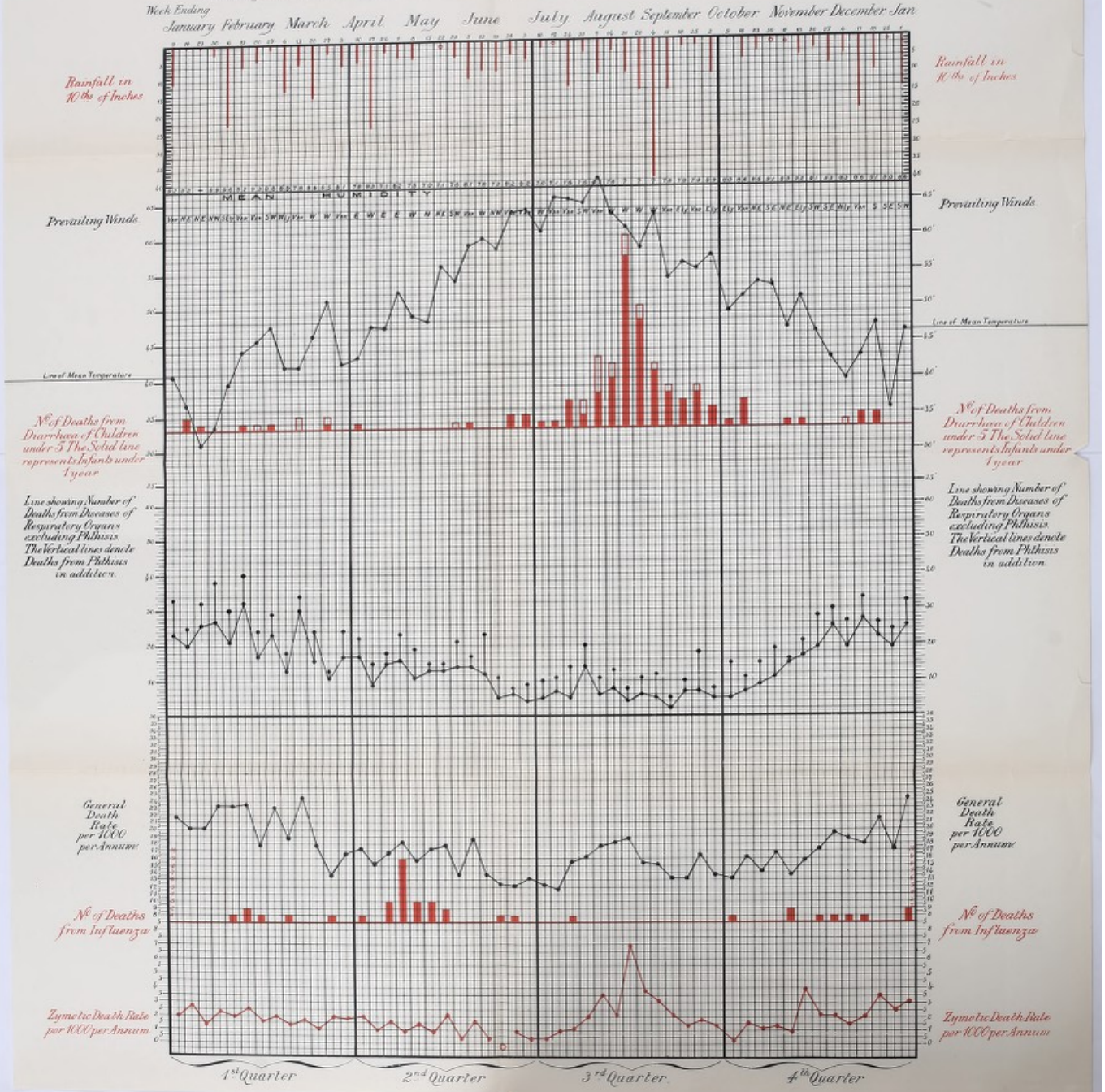
[Report 1897] / Medical Officer of Health, Bristol.

Chart

Showing Mean Temperature Rainfall, relative Humidity (saturation=100) prevailing Winds, also Number of Deaths returned from Diseases of Respiratory Organs excluding Phthisis, from Phthisis from Diarrhœa and from Influenza, the General Death Rate and the Zymotic Death Rate in the Bristol Sanitary District for each Week of the Year 1897.



1897.

CITY & COUNTY OF BRISTOL

ANNUAL REPORT

OF THE

Medical Officer of Health.

—:o:—

Printed by order of the Health Committee.

—:o:—

BRISTOL:
BENNETT BROTHERS, LD., PRINTERS, COUNTERSLIP

1898.

CITY OF BRISTOL.

Sanitary Committee.

— 1897 —

The Mayor:
Sir Robert Symes.

Chairman:
Alderman Cope-Proctor.

Vice-Chairman:
Councillor Pearson.

Alderman Dix.
Councillor Barnett.
" Bastow.
" Cave.
" Close.
" Wm. Cottrell.
" Godwin.
" Levy.
" Lloyd.
" Pembery
" Swaish.
" Todd.

Health Committee.

— 1897. —

The Mayor:
Sir Robert Symes.

Chairman:
Alderman Cope-Proctor.

Deputy-Chairman:
Counc. F. Gilmore Barnett

Alderman Fox.
" Thatcher.
" Wathen.
Councillor Henry Anstey.
" T. J. Coe.
" John Coole.
" H. F. Cotterell.
" A. T. Harris.
" Wm. Jennings.
" Frank Moore.
" Chas. Newth.
" Saml. Shirley.
" Colston Wintle.

The Health Committee was formed upon the Extension of the City Boundaries in November, and took over the control of the Medical Officer of Health's Department.

CITY OF BRISTOL.

MEDICAL OFFICER OF HEALTH'S DEPARTMENT, 1897.

MEDICAL STAFF.

Medical Officer of Health: D. S. DAVIES, M.D., D.P.H.

Deputy-Medical Officer of Health: J. C. HEAVEN, L.R.C.P., D.P.H.

Medical Attendant at Isolation Hospitals:
G. C. PAULI, M.R.C.S.

CLERICAL STAFF.

Chief Clerk: E. W. HARRIS.

Clerk: R. R. WARREN.

Junior Clerk: W. N. BROWN.

Laboratory Assistant: E. M. HORLER.

Chief Inspector: J. W. KIRLEY.

Superintendent Inspector: ‡*T. LOWTHER.

District Inspectors (11):

		District.			District.
H. CALCUTT	(Central)	5	*†F. R. SLADE	(St. Paul)	4
G. E. BUSH	(Bedminster)	7	*†A. E. KING	(Knowle)	8
*H. HASELL	(Horfield)	2	*†H. C. LEAT	(S. Geo. W.)	10
*S. WILKINSON	(Clifton)	1	*T. J. Crofts	(Easton)	6
*H. J. KIRLEY	(Cotham)	3	*F. Kirley	(S. George E.)	11
*J. T. LYONS	(Stapleton)	9			

Inspector of Common Lodging Houses and Bakehouses:
*S. O. DIMOND.

Inspector of Dairies, Cowsheds and Milkshops:
*†E. J. CASELY.

Inspectors of Slaughter Houses, Meat and Fish:
S. THOMAS. | *A. Gitsham.

Inspectors of Workshops:
*A. W. G. Griffiths. | *W. J. Wreford.

PORT OF BRISTOL.

Port Medical Officer of Health: D. S. DAVIES, M.D., D.P.H.

Assistant Port M.O.H.: J. C. HEAVEN, M.R.C.S., D.P.H.

Chief Inspector: S. DIMOND.

Port Inspector: A. DICKENS.

Assistant Port Inspector and Boatman: J. REX.

Master of "Luath": §G. JACKSON.

‡ Surveyor's Certificate Sanitary Institute.
* Inspector's Certificate Sanitary Institute.
+ Registered Plumbers.
§ Certificated Pilot for Bristol Channel.

The Inspectors whose names are in Italics were added upon Extension of the City Boundaries in November.

REPORT.

PART I.

General Sanitary Condition of the Urban Sanitary District of Bristol.

GENTLEMEN,—

The limits of this District were, until November, 1897 these of the City and County of Bristol as fixed at the last extension of the boundaries in 1835; but in that month the Bristol Extension Act, 1897, took effect.

The population of the City, before extension, was, at the middle of the year 1897, estimated at 232,242; and all the figures and rates given in this report are, following the rule of the Registrar-General, calculated upon these figures.

The following figures for the included area, are approximate only.

BRISTOL EXTENSION, 1897.

	Area in Acres.	Estimated Population.	Rateable Value.
			£
Horfield	463	10,700	41,000
Stapleton	2,573	18,000	59,743
St. George	1,846	46,000	106,786
Brislington (part) ..	500	1,600	7,000
Bedminster (part) ...	1,260	9,500	31,000
Long Ashton (part) ...	46	...	700
Easton-in-Gordano (part)	30	...	180
Portbury (part)	28	...	56
Portishead (part)... ...	10	...	350
Added Areas	6,756	85,800	246,815
Existing City	4,661	232,242	1,153,311
Extended City	11,417	318,042	1,400,126

The effect of the extension has thus been to increase the area of the City to nearly two and a half times its former size, and to add a population equal to more than one third of the existing population, or about eighty-five thousand persons. The added districts contain a large proportion of working-class dwellings, and consequently involve a considerable amount of extra work, and very great added responsibility. St. George, Stapleton and Horfield were urban districts in charge of separate Medical Officers of Health and Inspectors of Nuisances, while the parts of Brislington and Bedminster comprise the populous part of the Long Ashton rural district. The whole work of three, and the greater part of the work of a fourth Medical Officer are thus taken over. Five additional Inspectors have been appointed, equal to an addition of one-third the number of the former staff.

Site and Soil.

Bristol is situated in N. Lat. 51° 27′ 6·3″ and W. Long 2° 35′ 28·6″. The old City lies in great part on low ground in a broad valley lined by the alluvial deposit of the Avon and its tributary the Frome; parts of the City, *e.g.*, High Street and Redcliff, are upon higher ground on the new red sandstone (trias), through which rock the New Cut, or artificial course of the Avon, has been cut, and upon which Bedminster is built. The River Avon, which flows past the quays and streets of the City Harbour, joins the Severn at Avonmouth, at a point some five miles below the old City, to form the Bristol Channel.

The high table land of Clifton, Cotham, and Redland, to the north and west of the City, is situated upon the denuded edges of an anticlinal arch of carboniferous rocks, upon which, in certain limited areas, beds of newer formation (*e.g.*, lias) lie unconformably. On Clifton and Durdham Down the Carboniferous limestone is exposed over a large area; and here the gorge of the Avon, cut by the river as it turns to the north to join the Severn, forms the western boundary of the district. The steep ascents.

extending from Granby Hill, on the west, past Brandon Hill to St. Michael's Hill and Marlborough Hill on the east, are on the outcrop of the millstone grit. Considerable portions of the north-east and east parts of the City lie upon the new red-sandstone, while Totterdown, part of Cotham, and the slope towards Ashley are upon beds of lias limestone.

Water Supply.

The Water Supply is in the hands of a Private Company and is obtained by gravitation from springs in the triassic conglomerates, and in the carboniferous limestone on the sides of the Mendips, at points from 5 to 16 miles from the City. The water from two of these springs (Sherborne and Coldbath) is brought directly into the City; that from the other springs is intercepted by the storage reservoirs at Barrow Gurney, 310 feet above Ordnance datum, with a present holding capacity of 750,000,000 gallons, whence it is brought into the City, joining the direct supplies at Redcliff. The combined waters supply the lower parts of the City *en route*, and also rise by gravitation to the pumping Station and reservoir at Oakfield Road (200 feet above O.D.) from which they are pumped up to the Durdham Down service Reservoir (320 feet above O.D) for the supply of Clifton and the higher parts of the City.

A supplementary supply is obtained from deep wells at Chelvey, eight miles from Bristol, sunk in the new red sandstone (triassic).

The water is supplied to the City at constant service, and the average daily supply per head is calculated at about 22 gallons.

All water supplied from the Barrow Store reservoirs is filtered before delivery.

As to any risk of excremental contamination, the water appears to be above suspicion; and no case of disease has within our knowledge ever been traced to its use.

The Company has power to make an annual charge for each closet flush, in addition to the charges for other

domestic purposes (not now enforced in the case of a second W.C. cistern in houses of the gross value of £30 and under), hence very many out-door closets throughout the city are dependent upon hand flushing. After 25th March, 1896, the charge for flushing cisterns in dwelling houses of the gross value of £20 and under, was reduced to one shilling per quarter.

New Source of Supply.—In 1888 the Company obtained powers to take the Rickford Spring, near Blagdon, and the Langford Spring, at Langford, subject to reservation of prior claims of the district upon those springs ; and in 1889, they obtained powers to make a reservoir by impounding the river Yeo. This reservoir, to contain a maximum of 1,700,000,000 gallons, will receive the water from these combined sources, and from it the water will be lifted to join the storage at Barrow. The source of the Yeo is from deep springs similar to those furnishing the established supply.

During the last year 53 samples have been subjected to analysis, the closure of 14 polluted wells has been secured, and a pure supply of water has been laid on to 76 houses. Similarly in the past 7 years 141 polluted wells have been closed, and a total of 590 houses supplied with pure water, corresponding to a population of about 3,200 persons.

The Secretary has handed me the subjoined copy of a Report recently obtained by the Company from Sir William Crookes, F.R.S., and Professor James Dewar, F.R.S.

LABORATORIES,
14 COLVILLE ROAD,
LONDON, W.,
Feb. 12*th*, 1898.

The water supplied to the City of Bristol is of excellent quality for potable and dietetic purposes ; it contains very little organic matter, and is not too hard for culinary purposes.

In designing the Water Works, care has been taken to avoid contamination from outside sources ; and, except that portion from the Barrow Reservoir which is afterwards filtered, none of the water sees daylight from the time it is pumped from the deep wells, or issues from the rock, until it is drawn from the taps in the City.

As supplied to the City of Bristol the water contains comparatively few microbes, and of these none were found to be of a pathogenic character.

(Signed) WILLIAM CROOKES.
JAMES DEWAR.

Analysis of Water Supplied by the Bristol Water Works Company.

(Results stated in Grains per Imperial Gallon.)

	Gauge House Barrow. (Unfiltered Water.)	Cold Bath Spring	Deep Well, Chevley.
Colour in 2-ft. Tube...	Greenish Brown	Pale Green	Pale Green
Sediment	Sand, Algæ	None	None
Saline Ammonia	·001	·0007	·0002
Albuminoid Ammonia	·004	·0020	·0010
Nitrogen as Nitrates	·09	·12	·17
Nitrites.....	None	None	None
Chlorine as Chlorides	·97	·91	1·13
Oxygen absorbed in 4 hours.....	·039	·003	·014
Total dissolved Solids	19·70	23·50	22·54
Lime	9·06	11·05	9·88
Magnesia	·65	·92	1·18
Sulphuric Anhydride (SO_3).....	·86	·98	·83
Lead, Copper or Zinc	None	None	None
Total Hardness.....	16·0	20·5	20·0
Permanent do.	3·5	4·5	5·0

F. WALLIS STODDART, F.I.C., F.C.S.,
City Analyst.

Table Showing Particulars of the Principal Main Sewers.

	Course.	Size.	Mean Gradient.	Length of New Sewers.	Area Drained in Acres.	Point of Discharge.	Completed in
1. Clifton High Level.	Hampton Road, under College Grounds, and New Zigzag	3ft. 6in. by 3ft. oval, to 4ft. by 3ft. 6 in.	1 in 300 1 in 4 at outlet	11 miles	1,041	Tidal Avon below Zigzag.	1857
2. Bedminster 1	East Street,	4ft. 6in by 4ft.	.....	5¾ miles	607	Tidal Avon at Clift House.	1858
2	Parson's Street,	2ft. 6in by 2ft	1 in 300				
3	Avon Sewer District.	6ft. by 5ft. 6in.	1 in 300				
3. Clifton Low Level	Jacob's Wells, Hotwell Rd St. Vincent's Parade.	3ft. 6in. by 3ft. to 4ft. 6in. by 4ft.	1 in 600	3 miles	279	Joins High Level Outlet.	1859
4. St. Philip	Baptist Mills, Old Market Street, Bread Street. beneath Feeder Canal,	3ft. 6in. by 3ft.	1 in 500	7 miles	685	Tidal Avon at Totterdown Lock.	1861
5. Frome High Level	Stokes Croft (receives Horfield): Maudlin Street, Frogmore St., College St.	3ft. by 2ft. 6in.	1 in 201·5 (at Frogmore St. 1 in 19)	8 miles	1,288	Joins Low Level Main.	1866
Low Level	Baptist Mills, Ashley Road, Newfoundland Rd., Broadmead, under Froom (receives St. George & Stapleton).	3ft 6in. by 3ft. to 4ft. 6in. by 4ft.	1 in 600			Joins Avon Intercepting Sewer. (*a*)	
6. Avon Intercepting *a*	Stone Bridge, Marsh Street, Prince Street (beneath Floating Harbour).	5ft. by 4ft. 6in	1 in 890	8¼ miles	518	Tidal Avon near Old Gaol.	1874
b Main on South of Avon	Totterdown Lock, down Coronation Road	6ft. to 8ft. 3in.	1 in 2,310			Tidal Avon at Clift House.	

Sewerage, Drainage and Excrement Disposal.

Bristol is completely sewered, cesspools are not countenanced, and no dry systems of disposal are in use. The aggregate length of the main sewers is about 150 miles, and the cost of construction, commenced in 1851, amounted to about £161,000. The sewers take all storm water, which reaches them by way of trapped street gullies; they are without any external openings or special ventilating outlets, and the manholes are all closed down. Double tidal-valves are fixed at the outlet; these valves are of cast-iron, oval or circular, and self-acting, hung on chains, and bedded on indiarubber. In the low level sewers provision has been made for flushing from the Floating Harbour.

The sewers are so designed and constructed with regard to capacity, fall, and position, that they may be ultimately converged to one point, from which an outfall sewer may be continued to a suitable point lower down the river, or into the Bristol Channel. The sewage is discharged without treatment into the tidal Avon, and the rapid scour of the tide, which in this Channel is of exceptional force, generally results in the removal of the sewage without offence, although in remarkably dry summers, when fresh water is deficient in the river, some nuisance is complained of.

These complaints were especially frequent during the exceptionally dry summer of 1896, and were renewed in 1897. The nuisance is not only felt acutely at these points where the ferries cross, but is complained of in the houses by the residents on the river bank, and in three specific instances the occurrence of disease (one case of enteric fever, and two of septic mischief following parturition, but not notified in either case as puerperal fever) has been attributed to the effluvium from the river.

Although there is no general excess of disease in the districts bordering on the New Cut, and although the water of the river is muddy and brackish, and therefore not used for drinking or domestic supply by any town or

village within the tidal range: the persistent and increasing complaints of nuisance from this cause must be allowed considerable weight.

It is an elementary axiom that excremental matter should be removed as completely and as rapidly as possible from centres of population, and it would undoubtedly be more satisfactory to carry the sewage right away at once to the Bristol Channel than to allow it to discharge directly, as at present, into the river as it passes through the City.

This must, however, be carried out as a complete scheme, dealing with the entire area of larger Bristol, and with the sewage of up-river towns; and it must not be forgotten that, when completed, there will possibly occur, under certain conditions of temperature, some considerable smell from the mud banks, though freed of sewage; and that in very hot summers some occasional forms of illness may then, as now, be attributed to the condition of the river.

I see no reason to anticipate that the removal of sewage from the Avon will affect the healthiness of the City in any way, but it will stop a considerable annoyance, and remove some prejudice against Clifton as a health resort; and so must be considered as a measure in the public interest. If the river were dockised, I should consider the removal of sewage imperative.

Ventilation of the Sewers.

The question of ventilating the Public Sewers has lately been revived, on account of some complaints of nuisance in regard to sewer gullies requiring water during the past summer. Ventilation of the sewers can only be asked for on two grounds—1st, to prevent danger to health; 2nd, to prevent nuisance. The City records for many years past show there is no need on the first score; and the experience of many towns where the sewers are ventilated points to a serious preponderance of complaints of nuisance in the towns where ventilation is in vogue, and suggests inadvisability on the second score. Such towns are continually

trying expedient after expedient to lessen the nuisance they have themselves evoked. In any town, with ventilated or unventilated sewers, the "house" must be properly disconnected, and the house drain duly ventilated. The suggested danger of "fever" outbreaks from the unventilated condition of the sewers is purely chimerical; and attempts to interfere with the present system, which gives a maximum of safety with a minimum of complaint, will only lead to prolonged regret.

Cleansing, Ashing, and Street Watering.

This work, formerly carried out by contract, was in November, 1892, taken by the Sanitary Committee into their own hands, under the supervision of the City Engineer, who reports to the Committee. The erection of the Destructor at Albert Road, St. Philip, has led to the discontinuance of the old Refuse Tips, which caused some inconvenience and much complaint. About 650 tons of refuse are destroyed weekly. The present Destructor consumes about half the refuse of the city, the remainder is removed to selected tips outside the city. A second Destructor will need to be provided shortly, in order to deal with the whole of the material collected.

Slaughter Houses.

The condition of the City Slaughter Houses has received exhaustive consideration, and a special Report on the subject was presented to your Committee in June, 1895, and was subsequently printed.

The following were the conclusions arrived at in the Report :—

1.—That the condition of more than half the 85 City Slaughter Houses is unsatisfactory.

2.—That this unsatisfactory condition is due chiefly to structural defects, which are incapable of remedy.

3.—That the scattered situation of the slaughter houses prohibits effectual supervision, and lends opportunity to the introduction and sale of unsound meat. The Medical Officers of Towns where Public Slaughter Houses are provided agree that they are invaluable in respect of securing proper control of the meat supply.*

4.—That many of the occupiers of unfit slaughter houses would be glad to avail themselves of a convenient and accessible public slaughter house, as it would be to their greater convenience, and as there they could more readily comply with the stringent enforcement of the bye-laws, which would follow the provision of a public slaughter house.

5—That it is advisible to erect such public slaughter house or houses on an area sufficiently large to permit of the erection of slaughter houses to deal with 50,000 head of oxen, sheep and pigs annually, part to be at first erected, to be duplicated as required.

6.—That the erection of such a public slaughter house, would be of financial benefit to the town, for where public slaughter houses are established they are found to be sucessful. From returns published it appears that the one at Bradford pays 6 per cent., the Manchester one not less than 4 per cent., and the Birkenhead one not less than 5 per cent.†

* The Report of the Royal Commission on Tuberculosis has been issued while these pages are in the press. *Inter alia* the Commissioners express the strongest opinion in favour of Public over Private Slaughter Houses, and in order to encourage their erection, recommend that Local Authorities should have power, when once a Public Slaughter House has been established, to declare that no other place shall be used for slaughtering purposes. "The use of public slaughter houses in populous places to the exclusion of all private ones," they say, "is a necessary preliminary to an uniform and equitable system of meat inspection." In Scotland, Burgh Authorities have for over thirty years had powers for compelling all animals to be slaughtered in a public slaughter house as soon as one has been erected."

†See Dr. Gornall's Annual Report for 1894 on "The Health of Warrington."

On the 24th October, 1895, your Committee considered the Report upon slaughter houses presented by the Medical Officer of Health on 27th June, and on the motion of the Chairman it was resolved:—"That in the opinion of this "Committee it is desirable to provide public slaughter "houses, and that the City Engineer be requested to obtain "particulars as to the cost of erecting such structures in "other Towns and the extent to which they are made use "of, and to report on sites in the City of Bristol suitable "for the erection thereof." Certain sites have consequently been submitted for the consideration of the Committee, but have not been approved, and the matter has not advanced further.

There are now 126 private slaughter houses in the extended city, and 2 belonging to the Docks Committee—one at Hotwells the other at Avonmouth: there is also one knacker's yard in St. Philip.

ISOLATION HOSPITALS.

Full isolation accommodation for the extended City of 318,000 persons, reckoned at one bed per thousand persons would amount to 300 beds; this number would provide for *all* cases of communicable disease requiring isolation, including pauper cases, who would be taken by arrangement with the Guardians and be paid for by them. The Council has secured two distinct sites, one for Fever the other for Small-pox.

Fever Hospital.

HAM GREEN SITE, purchased in September, 1894.

Acreage, about 100 acres in hands of the Health Committee. About 20½ acres at present devoted to Hospital purposes. For all cases of "Fever" requiring isolation, except Small-pox.

Present accommodation, nearly completed. 76 beds in permanent buildings.

Full intended complement of Fever beds, 185.

Distance from centre of City, 4½ miles.

Access by good roads and by river.

Cost of Estate, Mansion and Stables, £8,695.

Estimated Cost of Buildings (76 beds, administration Laundry, &c.), £27,592 including Water Supply £650, Electric Light £1,500, Sewage Disposal Works £1,300, Roads and Paths £500, Fencing £600, Furniture and Fittings £2,900). Cost of Mansion and Stables not included, only alterations and repairs to adapt for use.

Cost per bed (76), £363.

Cost of Wards only per bed, £159.

WARDS.—The Ward Pavilions are four in number, placed 60 feet apart. Each Pavilion containing two large wards 48 feet long, 26 feet wide, and 14 feet in height; one single-bed Ward, Nurse's Room, Bath-room, and Offices. In front of each Ward is a Verandah with a west aspect, 10 feet wide, and running the entire length of the Ward, affording facility for patients' beds to be moved out in the summer time. The wards are plastered in Keen's cement and painted. The floors laid with pitch pine polished blocks laid on concrete.

Walls—Cattybrook brick, 9-inch exterior wall, 3-inch cavity, and 9-inch interior wall.

Cubic space, per Ward—17,472 cubic feet.
„ *per Patient*—2,184 „

Floor space, per Ward—1,248 square feet.
„ *per Patient*—156 „

Windows—Double hung, sliding sashes.

Window space per cubic contents—About 1 foot super. to every 70 cubic feet.

Ventilation.—Sliding ventilator beneath each bed. Deep bottom rail to window, to allow of ventilation at centre rail. Top windows to fall in on side flaps; also two ceiling exhaust ventilators to each ward.

Warming.—By ventilating double-fronted Manchester open fire grates, back to back in centre of ward.

Drainage.—Glazed pipes ventilated throughout, and each block disconnected from main drain. Inspection manholes at each bend. Disconnection manholes to each ward. Flushing tanks at head of each block, main drain carried to sewage disposal works, where sewage will be treated, and effluent will discharge to River Avon.

Laundry.—Steam laundry with latest improvements in machinery.

Disinfection.—Washington Lyon's steam disinfector.

Small Pox Hospital.

Novers Hill Site, bought in 1892.

Acreage.—13 acres. For all cases of Small-pox.

Present accommodation in temporary buildings.—53 beds (allowing 1,000 cubic feet per head).

A permanent administration block, a laundry block, and an isolation block for 8 beds (allowing 2,000 cubic feet per bed) just completed.

Distance from centre of City, 2½ miles.

Access by good roads.

Cost of site, £2,650. Bedminster Guardians' Hospital, £625.

Cost of Permanent Buildings, total, £6,365 (exclusive of water supply £1,150, sewers £2,000, gas £610, and fencing £1,000.)

Isolation Block, £2,000.

Administration Buildings, £2,025.

Laundry, £1,140
Machinery, £670 } £1,810.

Mortuary, £90.

Stables, £440.

Wards.—Four wards in Isolation block, each 24 feet by 18 feet by 13 feet high, each ward to contain 2 beds.

Walls, Cattybrook brick, built hollow with 3-inch cavity.

Cubic space, 2,808 cubic feet per patient.

Floor space, 216 square feet per patient.

Windows.—Double hung sliding sashes, with deep rail to ventilate at centre rail and hinged sash at top of window to fall inwards with hopper wings.

Window space per cubic contents, about 1 foot super. to every 70 cubic feet.

Ventilation.—By means of windows and fresh air inlets beneath each bed.

Warming.—Open fires.

Drainage.—Glazed pipes ventilated throughout, and each block syphoned off from main drain.

Laundry.—Steam laundry.

Disinfection.—Washington Lyon's steam disinfector.

As the full complement of beds for the extended City may be taken at 300, of which 230 should be for "Fever" and 70 for Small-pox, it is evident that considerable additions will be needed to both Hospitals before the accommodation is fully adequate.

At Novers Hill, the temporary buildings, if calculated on the advisable basis of 2,000 cubic feet per bed, provide accommodation not for 53, but only for 27 beds, making with the 8 new isolation beds, 35.

The accommodation here, therefore, requires doubling to fully serve the extended City at epidemic times.

At Ham Green the nearly completed accommodation amounts to 76 beds on the full scale of 2,000 cubic feet, this, if doubled, would amount to 152 beds, and, with the 70 Small-pox beds, would raise the entire City accommodation to 222.

Although this is smaller than the theoretical requirements, the full cubic space provision would allow of some elasticity in regulating admissions without fear of overcrowding.

Care will have to be taken, however, at Ham Green that in increasing the ward accommodation, we do not outrun the administration building, which is limited by the size and possibilities of adaptation of the purchased mansion.

On extension, we took over from Stapleton a 12-bedded temporary wood and galvanized iron Hospital in good order; and from St. George a Hospital obtained by the fusion and adaptation of two small houses. These will for the present be retained for emergency use. The St. George building is well situated for a Refuge under section 15, Infectious Disease (Prevention) Act, 1890, which enacts, "The Local Authority shall from time to time provide, "free of charge, temporary shelter or house accommoda- "tion with any necessary attendants for the members of "any family in which any infectious disease has appeared, "who have been compelled to leave their dwellings for the "purpose of enabling such dwellings to be disinfected by "the Local Authority."

The need for a Refuge is frequently felt during the pressure of an epidemic.

Laboratory Work in Diphtheria and Enteric Fever.

In 1895 the Bacteriological Examination of Cultures from infected throats was undertaken by your Committee, following the lead of the New York authorities, and the provision of such facilities for the Medical profession, first undertaken in England by your Authority, is being generally adopted now that the advantages are well recognised.

In February, 1897, Dr. George Parker called my attention to the recently established serum reaction in Typhoid Fever (Widal); and in October of the same year this reaction, which is a remarkably reliable one, proved most

serviceable in rapidly defining the exact nature and distribution of an obscure outbreak of Typhoid Fever (a disease which often presents considerable difficulty in diagnosis at the outset), thus leading to an expeditious discovery of the cause and speedy arrest of the outbreak (see page 71 on the Milk outbreak of Enteric Fever). Another point of almost equal importance is that the rapid dealing with what at first sight seemed an inexplicable outbreak, helped to prevent any necessity for closure of schools, to restore confidence, and to avert panic; thus representing an incalculable monetary saving to the City. I believe this to be the first occasion upon which systematic laboratory observation on a large scale has come to the assistance of the clinical observer, so as to be the actual means of determining the nature of an obscure outbreak.

In the case of Diphtheria, the systematic examination of cultures has again proved of very great service, an increasing proportion of cases are submitted for examination, and, a point of equal importance, have their period of infectivity determined by control examinations.

During 1897, 379 Bacteriological Examinations of Diphtheria Cultures were made, and 254 examinations of Blood for the Widal Serum test (Enteric Fever), besides examinations for Tubercle.

This work has proved so useful that it is obviously to the advantage of the City that it should be continued. The work is not part of the statutory work of a Medical Officer of Health, and makes constant and exacting demands upon his time on Sundays and week-days, as well as giving much added responsibility. Whether its continuance will be possible with the more than doubled area of supervision, remains to be seen.

At Aberdeen, which is about one-third the size of Bristol, this work is arranged for with an outside Bacteriologist, at a yearly cost of £120; and the Glamorganshire County Council are now erecting a County

Bacteriological Laboratory, to be worked at an estimated annual cost of £390, including the Bacteriologist's salary of £250.

Central Disinfecting Station.

The growth of disinfecting work has, in consequence of the strict control over infectious cases exercised since the adoption of the Notification Act of 1889, increased from a total of 3,319 articles dealt with in 1884 to an average for the past five years of over 38,125 articles annually.

Plans for an improved Disinfecting Station, suitable to present needs, have been approved by the Council and are awaiting enquiry by the Local Government Board.

VITAL AND MORTAL STATISTICS.

The estimated population of the Bristol Urban Sanitary District, for the middle of 1897, based upon the Census enumeration of April, 1891 (221,578) is 232,242, the Acreage is 4,538 (Ordnance Calculation), with a density of 51·18 persons per acre.

All figures in this report, both for the current year and for previous years, have been revised upon the 1891 Census enumeration.

This table shows the acreage and number of persons per acre for each of the Registration Sub-Districts :—

Table A.

Showing Population, Acreage, and Number of Persons per Acre (Density) in each of the Registration Sub-Districts of the Bristol Urban Sanitary District, at the Census of 1881, and for the middle of 1891 and 1897.

Registration Sub-Districts.	Acreage.	Population.					
		Census, 1881.	1881, Density.	†Estimated to middle of 1891 on Census	1891 Density.	Estimated to middle of 1897.	1897 Density.
St. Mary Redcliff ...	170	9,602	56·4	9,287	54·6	9,107	53·5
Castle Precincts ...	119	6,768	56·8	5,558	46·7	5,005	42·0
St. Paul	148	18,643	125·9	19,046	128·6	19,286	130·3
St. James	68	8,420	123·8	7,817	114·9	7,484	110·1
St. Augustine ...	250	14,066	56·2	13,788	55·1	13,626	54·4
Bedminster	992	37,741	38·0	45,812	46 1	50,336	50·7
‡Clifton	1613	42,049	26·0	44,901	27·8	47,553	29·2
Ashley	434	19,106	44·0	24,190	55·7	27,312	62·9
St. Philip	744	50,108	67·3	51,650	69·6	52,533	70·6
Bristol Urban Sanitary District TOTAL	4,538	206,503	45·5	222,049	48·93	232,242	51·18

* Ordnance Calculation.

† The Census Enumeration is made at the end of the first quarter of the year, whereas the statistical returns are calculated on the increased population estimated to the middle of the year.

‡ During 1897 that part of the Registration Sub-District of Westbury that was within the Municipal area was added to the Registration Sub-District of Clifton.

It will be noticed that in the old in-parishes of St. Mary Redcliff, Castle Precincts, St. James and St. Augustine, the population is steadily decreasing, partly through absence of room for building extension, and partly through conversion of dwellings into business premises, or demolition for street or other improvements. The most densely populated districts are those of St. Paul and St. James, while the districts of St. Philip, Ashley, St. Augustine and Redcliff also show high density figures.

The constitution of the Registration Sub-Districts will be considerably altered as a result of the recent extension of the Borough.

DIAGRAM I

Births.

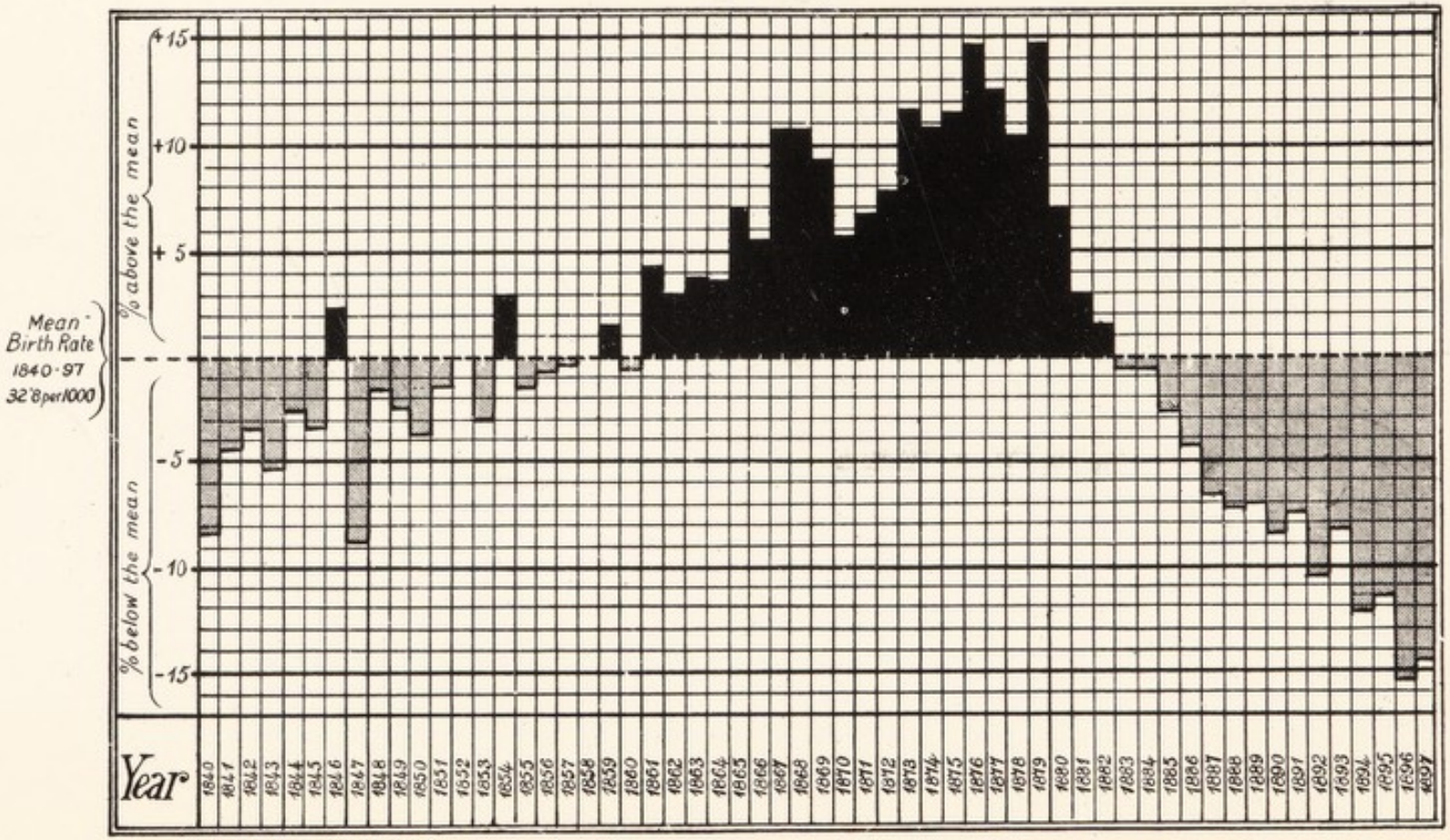
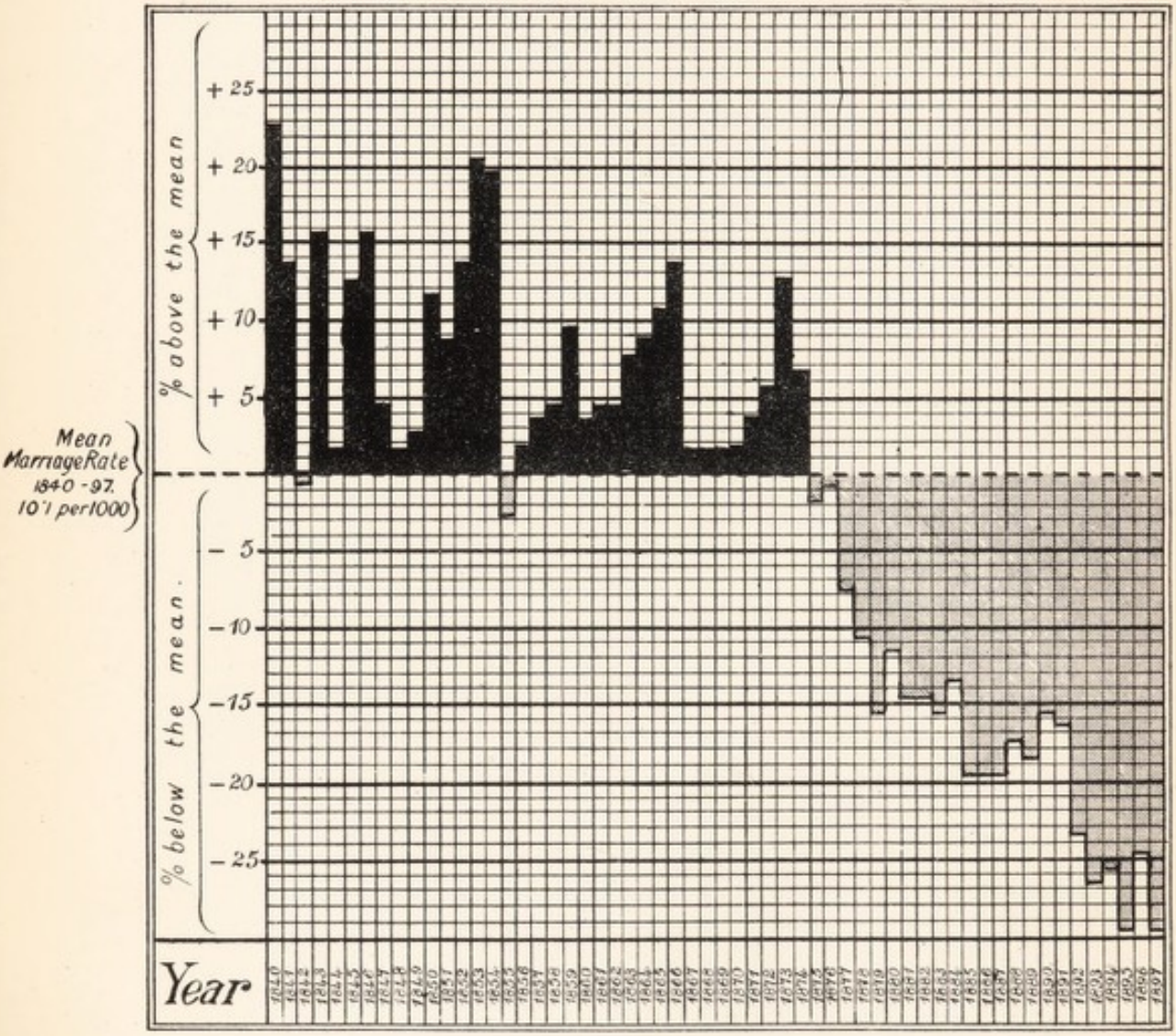


DIAGRAM 2

Marriages.



Births.

The births registered in Bristol in 1897 were 6,514, of which 188 were returned as illegitimate, a percentage of 2·8.

The birth rate for the year was 28·0, a slight increase on the rate of last year, which was 27·8; the rate has since 1881 shown an almost continuous decrease, interrupted by a slight rise in 1889, and again in 1891, 1893, and 1897 (Table B). The rate for the 33 great towns in 1897 was 30·7.

The excess of births over deaths during the year 1897 *(natural increase of population)* is 2,526. The estimated *actual increase* from 1896 amounts to 1,619.

Marriages.

2,706 Marriages took place within the Borough of Bristol during 1895, viz., 814 in the Bristol Union, 1,455 in the Barton Regis Union,* and 367 in the Bedminster Union divisions of the Borough. The annual marriage rate per 1,000 living is thus 11·6, compared with 11·4 in 1896, 10·8 in 1895, 11·5 in 1894, 11·3 in 1893, and 11·6 in 1892.

Deaths.

3,988 Deaths were registered in the District during the 52 weeks ending 1st January, 1898, of which 66 or 1·6 per cent. were returned as deaths of illegitimate children. The general death rate for the year, uncorrected for age and sex distribution, is 17·17 per 1,000 living,†

*The Barton Regis Returns include the extra Municipal portion of that Union, this makes the rate slightly in excess of the truth.

†As various towns differ much in the sex and age distribution of their population, it is obvious that a town containing a too large proportion of very young or of very old persons, or of males, amongst which classes the death-rate is almost invariably in excess, will compare unfavourably with another town in which the distribution of the population is nearer the average, although the death-rates of each successive age period might be precisely similar in the two towns. A correction factor is supplied by the Registrar-General, by which the disparity of age and sex distribution is equalised for the great towns. The factor for Bristol is 1·0447, and multiplying the observed death-rate by this factor, the corrected rate, which is now comparable with the corrected rates for other towns, is 17·59.

Infant Mortality

Of the 3,988 Deaths, 949 were of infants under one year. The proportion of these deaths to every 1,000 births (Infant death rate) was 145·69.

This rate varied thus:—

174·4 in Castle Precincts.
166·1 in St. Philip.
158·3 in St. Paul.
151·5 in St. James.
150·3 in Bedminster.
112·1 in Clifton.
104·4 in Redcliff.
96·7 in Ashley.
92·0 in St. Augustine.

In Table B will be seen the annual infant rates in Bristol for the past 21 years. During 1897 the infant mortality ranged in the 33 large towns from 131 in Huddersfield to 262 in Preston.

Mortality at Ages between 1 and 60.

1,844 Deaths were returned, corresponding to an annual rate of mortality per 1,000 living between these ages of 8·8. The rate for the 33 great towns between these ages was 12·0 in 1893, 10·5 in 1894, 11·1 in 1895, 10·6 in 1896 and 10·3 in 1897.

Mortality amongst Aged People.

1,195 Deaths of persons aged 60 and upwards were registered, whose ages averaged 72 years and 7 months. This number is somewhat more than last year (1,130), and the average age at death is 7 months higher. The rate of mortality amongst persons living at these ages was in Bristol 71·4, and for the 33 great towns was 79·5 in 1893, 64·6 in 1894, 79·4 in 1895, 67·7 in 1896, and 70·3 in 1897.

DIAGRAM 3

Deaths, (*All Causes.*)

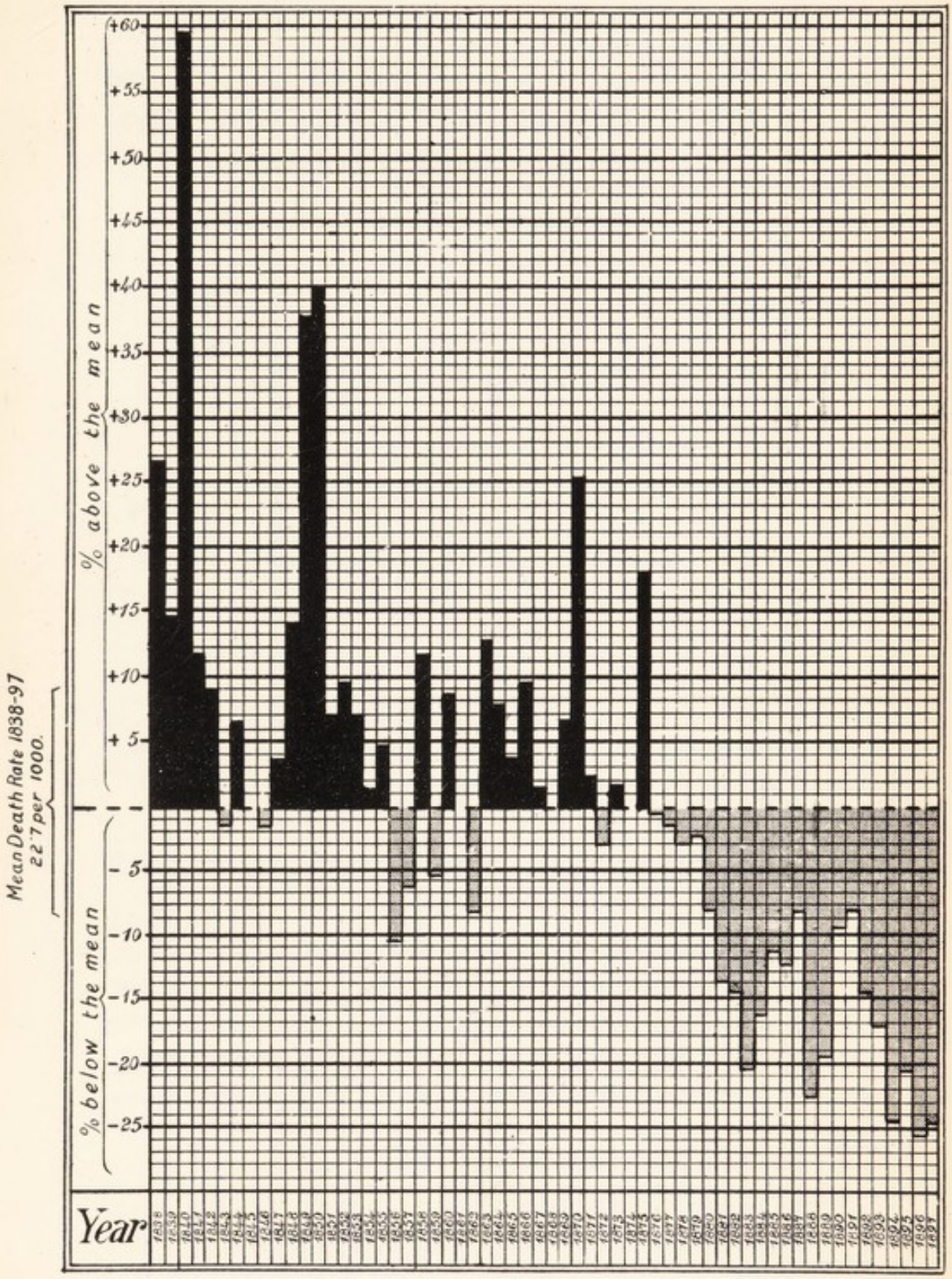


Table showing Diminution or Excess of Deaths in 1897, compared with Annual Deaths in 1887-96.

The corresponding figures for 1896 and the preceding decennium are also shown for comparison.)

CORRECTED FOR INCREASE OF POPULATION.

Diminution in 1896	Excess in 1896	Cause of Death.	Diminution in 1897	Excess in 1897
3	—	Small Pox	6	—
—	31	Measles	59	—
—	—	Scarlet Fever	38	—
—	—	*Typhus	—	—
21	—	Influenza	2	—
48	—	Whooping Cough	—	10
—	7	Diphtheria	—	4
7	—	Enteric Fever	—	21
—	—	Diarrhœal Diseases	—	49
—	35	Cancer	—	38
52	—	Phthisis	61	—
—	21	Premature Birth...	—	13
—	6	Diseases of Nervous System ...	—	7
—	31	Do. Circulatory System ...	—	14
136	—	Do. Respiratory System ...	148	—
10	—	Do. Urinary System ...	—	3
5	—	Childbirth and Puerperal Fever	13	—
—	8	Violence	7	—
312	—	All Other Causes	211	—
594	139		545	159
455		Balance of Diminution	386	

* This disease has caused only 1 death in the 10 years, 1888-97, viz., in 1890. The deaths annually due to this cause for these 10 years, are, therefore, represented by the minute figure 0·1, which is too small to affect the balance of diminution and excess.

This table shows, in summary form, the amount of life saved and the amount lost in the year 1897, as compared with the preceding decennium, under each of the more important headings in the list of causes.

The net gain in the year amounted to 386 lives, that is to say, had the death-rate in the year been equal to the average in the preceding decennium, 386 more persons would have died in Bristol than was actually the case.

The Registrar-General has pointed out in the case of London, that the excess shown under certain headings, such as Cancer, and Diseases of the Circulatory System, appears to be part of a general tendency to increase under these headings, which has been noticed for some years past. In Bristol, the increase in Cancer is maintained, but Diseases of the Circulatory System show some improvement although still above the yearly decennial average. The diminution in fatality from diseases of the Respiratory System is also more favourable than that noticed last year, and Phthisis continues to show a decrease on the decennial average.

Of the principal Zymotic Diseases, excess is noticed in the case of Whooping Cough and Diphtheria, but the Diphtheria excess has fallen to 4 from 7 in 1896. Diarrhœal Diseases show an excess of 49; these diseases were unusually fatal in many towns during the autumn of 1897. Enteric Fever shows an excess of 21, entirely due to the Milk outbreak in Clifton.

The fatality from Diseases of the Nervous System remains much as it was last year, while Influenza stands at a trifle below the average for 10 years.

Altogether, the figures of the year reflect a very considerable saving of life as compared with those for the preceding decennium.

VACCINATION—PAUPERISM.

The 1896 returns are the last complete ones available. I am indebted to the Clerks of the respective Unions for the following information.

	Bristol Union, 1896.	Barton Regis Union, 1896.
Vaccination.		
Number successfully vaccinated	1,021	4,000
Insusceptible	1	17
Died unvaccinated	207	601
Postponed by Medical Certificate	2	475
Removed to Districts, the Vaccination Officer of which has been duly apprised	2	196
Cases left and not traceable	158	376
In abeyance	59	207
	1,450	5,872
Percentage of successful vaccinations to births, 1896	70·41	68·1
Ditto ditto 1895	73·06	—
Ditto England & Wales, 1894	70·4	78·4
Pauperism.		
Increased cost in maintaining Indoor Poor	£576	£1,378
Increased cost in maintaining Outdoor Poor	£167	£264

STATISTICS OF THE ADDED DISTRICTS, 1897.

The following particulars are supplied with the aid of returns kindly given by Dr. Young, Dr. Brown and Dr. Parry, the late Medical Officers of Health for these districts :—

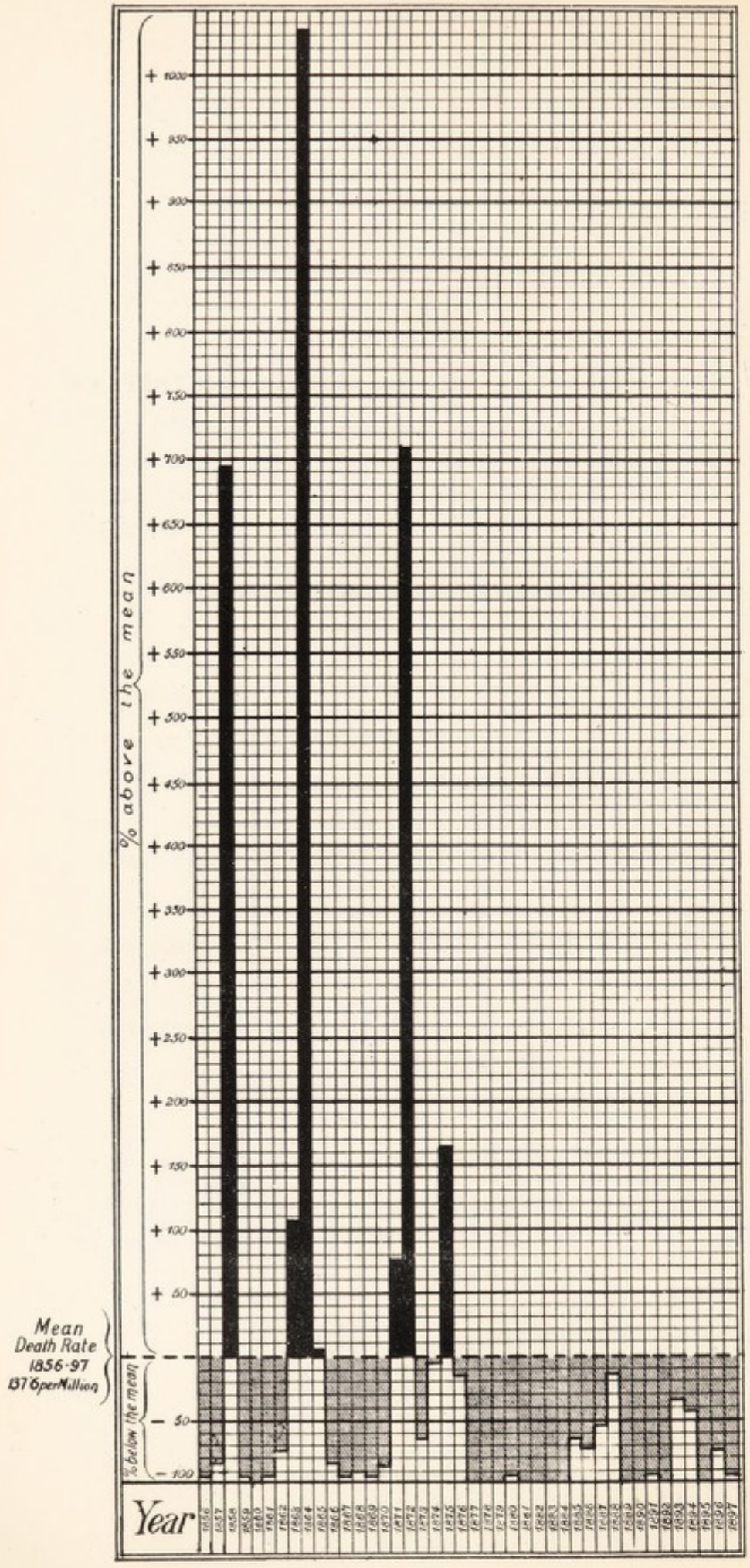
1897.	St. George.	Stapleton.	Horfield.
Population	45,000	18,000*	10,000
Birth rate.....	37·2	26·5	38·3
Death rate	13·7	10·1	10·3
Zymotic rate	1·8	0·8	0·5
Infant mortality.....	142·1	96·2	67·8

* Including Barton Regis Workhouse 1,100, City Workhouse 1,000, and City Lunatic Asylum 900.

No approximate estimate for January to November can be obtained for that portion of Long Ashton Rural District recently joined to the City, and including the populous district of Totterdown.

DIAGRAM 4

Small Pox.



PREVALENCE OF SICKNESS—1897.

(In the Old City.)

Small Pox.

In March a localised outbreak of seven cases, promptly suppressed, arose in the following way. A sailor, *ex* s.s. "Ancona," on which Small Pox had occurred, came home on 23rd February to Bedminster from Swansea; we had been forewarned of his arrival, and so kept the premises under supervision during his stay.

On 23rd March he left, having been perfectly well in the meantime, to join his ship at Barry, nor did he subsequently develop any illness.

On March 30th, however, seven days after this man's departure, a boy who had occupied the same bedroom, sickened of Small Pox; and from this case six other persons became directly infected. Domiciliary vaccination and watching, isolation and disinfection, at once stopped this commencing outbreak, which had already shown a sixfold power of multiplication; a single case was also reported on May 1st in a barmaid who may have become infected from this source. In April and May two other cases were also reported as Small Pox, but did not appear to be cases of that disease.

On 24th October a sailor *ex* s.s. "Twilight" from the Black Sea, *viâ* Constantinople, Algiers, and Gibraltar, developed Small Pox after arrival and was removed to Hospital; he infected a fellow lodger, but early removal, disinfection, and vaccination of the entire household, prevented any further spread of the disease.

Small Pox in Bristol—1856-1897.

Diagram 4.

The yearly fluctuations in the death rate from Small Pox are here shown as a percentage above or below the mean of the series of years, and a graphic idea is at once obtained of the fatality and extent of former epidemics.

The recent epidemics of 1887-88, and of 1893-94, amounting in each instance to some 360 cases and 30 deaths, can still be traced, but they appear insignificant in comparison with the immense figures of 1858, 1864, and 1872. In these years 214, 335, and 209 deaths respectively occurred from Small Pox, which would correspond (on a fatality of 10 per cent.) to two or three thousand cases in each of these years. The decline in Small Pox since 1875, is due in part to the more stringent enforcement of vaccination since the pandemic of 1870-71 : and in part to the more effectual dealing with cases by means of isolation and disinfection which has become possible of late years, and the more systematic tracing out of clues and searching for fresh cases which has become part of the general routine. But, whereas, under present circumstances, about 100 hospital beds have sufficed in recent epidemics, it is the generally well-vaccinated condition of the town that renders possible the use of isolation as a controlling factor, were Bristol an unvaccinated town, a thousand beds for isolation would soon be full ; and indeed the higher function of hospital removal, disease control, would soon become impossible, while its far less worthy function of providing relief during preventable disaster, would alone remain.

Cholera—Choleraic Diarrhœa.

Two deaths were returned as due to "English Cholera," one in August, the other, certified by the Coroner, in October. On enquiry the cases appeared to be "Acute Diarrhœa," without suspicion of true "Cholera."

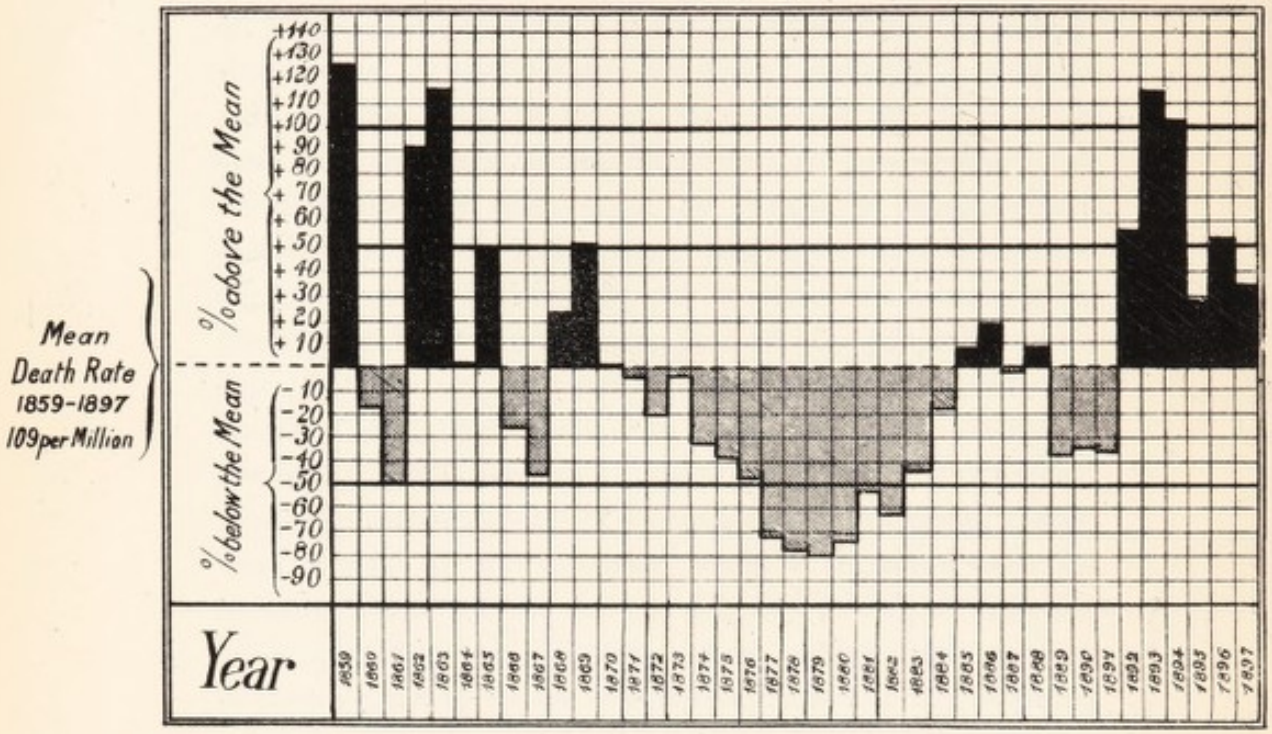
Diarrhœa—Infantile Diarrhœa.

The number of deaths returned as due to Diarrhœal Diseases during the year was 151, of which 109 were of infants under 1 year, 26 of children between 1 and 5, 1 between 5 and 25, 4 of persons between 25 and 60, and 11 of persons aged 60 and upwards.

These deaths give a diarrhœal death-rate of 0·65 per 1000 living, compared with an average rate for the past 10 years of 0·45, and with a rate for the 33 Great Towns of England of 1·24.

DIAGRAM 5

Diphtheria



Since 1859, the annual death-rate has been below the mean of these 39 years on 22 occasions, and above the mean on the remaining 17. Since 1892, the Diphtheria death-rate has shown a persistent tendency to remain above the mean, and this tendency of late years is shared by the town districts of England and Wales, and is especially marked in the case of London.

As will have been seen above, the Diphtheria death-rates for Bristol compare favourably with those of other large towns, and this Diagram merely shows a rise in recent rates compared with previous rates in the same City. (See Newsholme, "Epidemic Diphtheria" Swan, Sonnenschein, 1898, pp. 35, 36.)

The deaths by quarters occurred thus :—

1st Quarter	...	...	...	.. 15
2nd „	...	..	...	.. 9
3rd „	...	...	..	... 111
4th „	...	...	...	.. 16

Diphtheria—Membranous Croup.

During the 52 weeks of 1897, 186 cases were notified as Diphtheria and 8 as Membranous Croup, a total of 194 under these two headings, as compared with 258 during the previous year.

The number of deaths returned from both causes was 36, compared with 38, 34, 50, 53, 38 and 16 during the six previous years.

The following Table shows the average yearly notifications and fatality for the past seven years in each of the Sub-Districts and the City :—

DIPHTHERIA, MEMBRANOUS CROUP.

Sub-Districts	Redcliff.	CastlePrecincts	St. Paul.	St. James.	St. Augustine	Bedminster.	Clifton.	Ashley.	St. Philip.	Public Inst.	Bristol—City.
Population ... 1897	9,107	5,005	19,286	7,484	13,623	50,336	47,553	27,312	52,523		232,242
Cases Notified	9.0	2·5	9·0	4·0	7·0	36·1	33·1	19·7	26·7	5·2	152·5
Incidence rate of attacks per 1000 population	0·9	0·4	0·4	0·5	0·5	0·7	0·7	0·7	0·5		0·6
Deaths ...	1·4	0·2	3·2	1·5	1·1	12·1	3·7	3·4	8·1	2·7	37·8
Percentage of deaths to cases (case mortality).	15 5	8·0	35·5	37·4	15·7	33·5	11·1	17·2	30·3	...	24·7

During the year 1897, 36 deaths occurred from Diphtheria and Membranous Croup amongst 194 notified cases in the whole City, giving a case mortality of 18·5 per cent., and a death rate from these causes of 0·15 per 1,000 living. The number of deaths this year shows a slight decrease in the Diphtheria mortality compared with that of last year, which corresponded to a rate of 0·16, but is in excess of the average rate for the past 10 years, which was 0·14.

It compares, however, favourably with the rate in the 33 great towns for 1897, which was 0·31, or just twice as much as the Bristol rate.

Bacteriological Examination in Diphtheria.

The table which follows shows particulars of the cases in which a Bacteriological Examination was made of Cultures supplied by the medical attendants, through whose kindness I have also been able to trace the subsequent clinical history of many of the cases.

Of those 106 cases, in which the examination gave a positive result, 12 died, giving a case mortality of 11·3 per cent.; 14 others passed through severe attacks, 5 with marked paralytic symptoms, and 9 in which tracheotomy or intubation became necessary. Thus, in 26 out of 106 such cases, (24·5 per cent.) death or severe illness resulted.

Of the 160 other cases in which the examination gave a negative result (60 of which were notified on the clinical symptoms, and 100 were examined only on suspicion) 1 died of Diphtheria, giving a case mortality of 0·6 per cent., while all the other cases of which we have information, enjoyed with one exception, an uninterrupted recovery, or were withdrawn as not suffering from Diphtheria.

These results are much more satisfactory than last year, and the accuracy of the bacteriological test appears in a much better light.

Cases Bacteriologically Examined.

266 (166 notified, 100 not notified).

	Notified Cases. 219 (25 withdrawn.)			Not Notified.
	Bacteriologically Examined		Not Examined	Examined on suspicion.
	Positive Result	Negative Result		Negative Result
Total	106	60	53	100
Withdrawn	—	18	7	—
Clinical progress of case showed not to be Diphtheria	—	8	—	24
Recovery Uncomplicated	37	18	—	18
Recovery after severe attack	14	1	—	0
No further information as to progress of case	43	14	23	58
Died of Diphtheria	12	1	23	0

Examination of Secondary Cultures. In 60 instances where a positive certificate had been given, the management of the patient as regards isolation was regulated by the bacteriological reports, an improvement upon last year, when only 42 cases were so regulated, and upon 1895 when only 19 were. In 30 cases 2 examinations were made, in 18 cases 3, in 9 cases 4, in 1 case 9, and in one case 13 examinations, extending over a period of 18 weeks, before the affected nose was found to be free from the Bacillus of Diphtheria. Of those cases receiving a negative certificate and entered as not clinically Diphtheria, the subsequent progress showed 16 to be Tonsillitis, 5 to be Scarlet Fever, 2 to be Syphilis, and 1 Acute Laryngitis.

Nasal Diphtheria.

Amongst the many and complex conditions directly associated with the spread of Diphtheria, the invasion of the Nasal Cavity by the specific bacillus, which may continue to grow therein without the production of definite symptoms, and therefore in many cases without leading to suspicion of its presence, appears to be of considerable importance, and to deserve more consideration than it has hitherto received. In Diphtheria, no less than in Scarlet Fever and in Small Pox, the mildest and least recognisable form is that most apt to contribute to the extension of the disease.

During 1897 an interesting series of cases occurred in a Public Institution, and bacterioscopic examination was able to point out unsuspected Nasal Diphtheria as the scource of infection, and thus to secure the immediate suppression of a troublesome outbreak.

The cases of *Throat* Diphtheria began to be noticed in the Children's Ward at the end of May (27th), when (1) Ethel C—— (5), f. (483), who had been in the ward for some weeks, sickened, and in three days died of Diphtheria. Then (2) Louisa C—— (30), (479), a night nurse, developed Diphtheria about June 6th.

At this point the ward was closed (June 7th) for cleansing and disinfection, and the inmates were removed to a distant ward; while serious thoughts were entertained of interfering with the drains.

(3) Florence B—— (2), f. (523), who had been in hospital for some time, developed Diphtheria in the Isolation Ward on 19th June.

On 21st July the inmates returned to the Children's Ward, where, about 23rd July (4) Frederick J —— (3), m. (601), who was admitted on 15th July, developed Diphtheria.

(5) About 25th July, Dorothy W—— (6), f. (605), who had been some weeks in hospital, developed Diphtheria; and

(6) Early in August Gertrude N—— (27), f. (621), a nurse, also developed Diphtheria.

It was now suggested that cultures from the Throat *and Nose* of every other inmate in the ward should be sent to the laboratory for examination, and accordingly 14 cultures were examined on 8th August, with the result that while no Diphtheria was found in the throats, luxuriant growth of the bacillus were found in the nasal cavities of two children, one of whom, Joseph T—— (2), m. (642), had been admitted on May 3rd, and had therefore been in the ward for some time before the occurrence of the first case of recognised Diphtheria; the other child, Lucy W—— (9), f. (641), had only been admitted on July 14th.

The nasal discharge from both cases was slight, and had attracted no attention until the microscope demonstrated the actual conditions, when isolation of these cases resulted in an immediate cessation of the outbreak.

The nasal infection was probably introduced into the Institution and communicated to Joseph T—— by a child of 7 months, Edwin B—— (539), who was an inmate of the ward from April 10th to June 4th, but the actual origin of the outbreak is somewhat uncertain.

A second interesting case came under notice in the person of a Medical Practitioner, who contracted the infection during attendance on a protracted case of Pharyngeal Diphtheria (826), not, as he believes, from any direct infection, but through the towel nominally reserved for his use, thence to hands, handkerchief, and nose. For some days he suffered only from slight nasal discomfort and discharge, which he attributed to simple catarrh. As this did not improve, local medication by injection was resorted to, with the apparent effect of dislodging the bacilli from the nasal cavity, and implanting them upon the pharynx. With the development of the pharyngeal affection serious symptoms appeared, and a prolonged illness, followed by typical paralyses, resulted.

A third interesting series of cases occurred at another institution, where, in consequence of the constant re-appearance of Diphtheria, 10 examinations of throat and nose cultures were made, and Diphtheria was discovered in one nose only: isolation of this child resulted in cessation of the cases, and no fresh ones have been notified for four months.

In a Special Report on the Bacteriological Examination of Diphtheria Cultures for the six months, January to June, 1895*, attention was called to a series of cases in which Diphtheria persisted in the nasal cavities of two children in a family for six months, without producing any symptoms of illness, but leading to the infection of their mother with true faucial Diphtheria. In the autumn of the same year a case of obstinate nasal discharge preceded two cases of true faucial Diphtheria, and another of nasal discharge in the same family, from all of which, cultures of Löffler (Diphtheria) bacilli were obtained.

Dr. Heaven dealt exhaustively,† in a paper read before the Incorporated Society of Medical Officers of Health, in London, on March 19th, 1896, with the question of Nasal Disease associated with the presence of the Löffler Bacillus and the spread of Diphtheria, and made evident the importance of this apparently trivial ailment in the spread of disease. He also showed that the confusion between Fibrinous Rhinitis and Nasal Diphtheria was beginning, with the aid of bacteriology, to be cleared up, as that between Membranous Croup and Diphtheria had previously been removed.‡

Dr. Heaven concluded: "From a Public Health point of "view these cases are important. Here were two children, "in absolutely perfect and robust health, with not even a "noticeable nasal discharge, yet carrying the diphtheritic "poison, and capable of infecting others with diphtheria. "Suppose they had been attending a public elementary

* Bristol Health Reports. Special Report by D. S. Davies, M.D., and Walter Dowson, M.D.

† Fibrinous Rhinitis or Diphtheria? "Public Health," April, 1896.

‡Cf. City of Boston Medical and Surgical Journal. Dr. C. W. Townsend. Vol. cxxx., No. 21, p. 517 (1894), quoted in Dr. Heaven's paper.

"school, the result would not improbably have been an "outbreak of Diphtheria among the Scholars, the origin of "which would have been wrapped in mystery, and possibly "have been attributed to some, perhaps trivial, drain defect, "the real origin remaining unsuspected. Not only so, but "seeing that the bacillus persisted in these noses for three "months, unsuspected even by a person who knew it had "once been present, and who was in daily contact with "the children, it would not have been surprising had the "school been subject to recurring outbreaks. The moral "seems to be that not only should attention be paid to all "throats of school children on the outbreak of diphtheria or "during its prevalence, but also to the condition of their "noses. Four instances of such infectious nasal discharge "having been recognised in the same City within twelve "months, it appears probable that these cases are not un-"common, and, forming instances of the 'ambulatory' "unsuspected form of diphtheria, may be the cause of many "of those cases, the origin of which is, for want of a more "obvious cause, attributed to drain or sewer influence. "They may too, possibly, through school agency or other-"wise be to some extent answerable for that increase of "diphtheria which has been so noticeable of late years, or "for recurrent outbreaks in certain households or schools."

"The persistence of the bacilli for such long periods "without causing symptoms, points to the necessity (and "this applies equally to throat diphtheria) for great care in "declaring a diphtheritic patient free from infection, and "to the desirability of obtaining negative results from "more than one culture bacteriologically examined before "isolation is discontinued. Further, it is of prime import-"ance that such inoculations should be made only after the "lapse of some hours (say twelve) after any antiseptic "application has been made to the nose or throat."

In December a somewhat serious outbreak of Diphtheria arose at Knowle, a district recently included in the City. For some time the disease seems to have been in excess in this district.

The December outbreak appeared certainly to be connected with the schools, in which considerable overcrowding, especially in the Infants' Department, had been permitted to occur. We have not previously found it necessary to close schools in the City on account of Diphtheria, but in this district, possibly owing to the want of strict supervision in the past, the usual methods of exclusion of infected scholars proved insufficient, and closure of the schools fortunately gave opportunity for some general correction of the drainage and lavatory arrangements, which, though probably not causally connected with the spread of Diphtheria, were sufficiently serious. The overcrowding has, at the same time been considerably abated but I am not yet satisfied with the conditions for ventilation. One or two hopper panes cannot adequately represent the proper means for room ventilation obtainable by properly hung double sash windows, and this defect is, I feel, common to many schools. Light and air, and the absence of overcrowding are in school life as essential as, or more essential than good drainage, in relation to the spread of the ordinary school communicable disease.

The deaths returned as due to Diphtheria, in Bristol during the 16 years—1881-97—are here shown, together with the death-rate from this cause for the same series of years in Bristol and in the 33 great towns.

	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897
No. of Deaths	10	8	13	19	25	28	23	26	15	16	16	38	53	50	34	38	36
Population	207,229	208,007	209,522	211,048	212,586	214,134	215,694	217,266	218,848	220,442	222,049	224,592	225,146	226,578	228,139	2 0,623	232,242
Annual death rate per 1,000 living–Bristol	0·04	0·03	0·06	0·09	0·11	0·13	0·10	0·11	0·06	0·07	0·07	0·16	0·23	0·22	0 14	0·16	0·15
33 Great Towns	0·14	0·10	0·16	0·17	0·17	0·16	0·18	0·21	0·26	0·24	0·21	0·27	0·43	0·38	0·35	0 38	0·31

In 18 houses multiple cases of Diphtheria occurred; 13 houses had 2 cases. 4 houses had 3, and 1 house had 4.

Thirty-two houses, in which Diphtheria was notified, were found to have foul or defective closets or drains, or other insanitary conditions, and these conditions were duly rectified. Cases were distributed through the months thus:—

	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cases	14	26	15	16	14	27	7	20	17	17	14	18
Deaths	5	4	3	2	1	4	2	2	6	1	2	4

Erysipelas.

During the year 203 cases of Erysipelas were notified, and 5 deaths were returned, compared with 246 cases and 10 deaths in 1896.

The enquiries made into these cases resulted in the discovery of 26 houses where various sanitary defects required attention. Notification of this disease is, however, of no great value.

Scarlet Fever or Scarlatina.

The number of cases of this disease notified and confirmed during the 52 weeks of 1897 was 511, compared with 1,352 in 1896, 562 in 1895, 485 in 1894, 1,245 in 1893, with 1,442 in 1892, and with 888 cases in 1891; and the number of deaths returned was 18, compared with 59 in 1896, 16 in 1895, 16 in 1894, 35 in 1893, 47 in 1892, and 37 in 1891.

The percentage of deaths to cases in the whole City was 3·5, compared with a case mortality of 4·3 in 1896, 2·8 in 1895, of 3·2 in 1894, of 2·8 in 1893, of 3·2 in 1882, and of 4·1 in 1891. The distribution of attacks by age is shown below:—

Under 5 years	160
5-10 „	195
10-15 „	87
15 upwards	69
Total	511

This table shows the average incidence rate of the disease upon the registration sub-districts, and the percentage of deaths to cases for each sub-district and for the whole City for the past 7 years.

SCARLET FEVER.

Sub-Districts	Redcliff.	Castle Precincts	St. Paul.	St. James.	St. Augustine	Bedminster.	Clifton.	Ashley.	St. Philip.	Public Inst.	City.
Population ...	9,107	5,005	19,286	7,484	13,626	50,336	47,553	27,312	52,533		232,242
Cases notified	28·1	13·4	68·4	27·1	46·5	202·5	186·2	126·5	220·4	6·8	926·4
Incidence rate of attacks per 1,000 population	3·0	2·5	3·5	3·5	3·3	4·1	4·0	4·9	4·2	—	4·0
Deaths ...	1·0	·2	2·4	1·4	2·0	7·1	4·2	2·8	8·7	1·7	32·5
Percentage of deaths to cases (case mortality.)	3·5	1·4	3·5	5·1	4·3	3·5	2·2	2·2	3·9	—	3·5

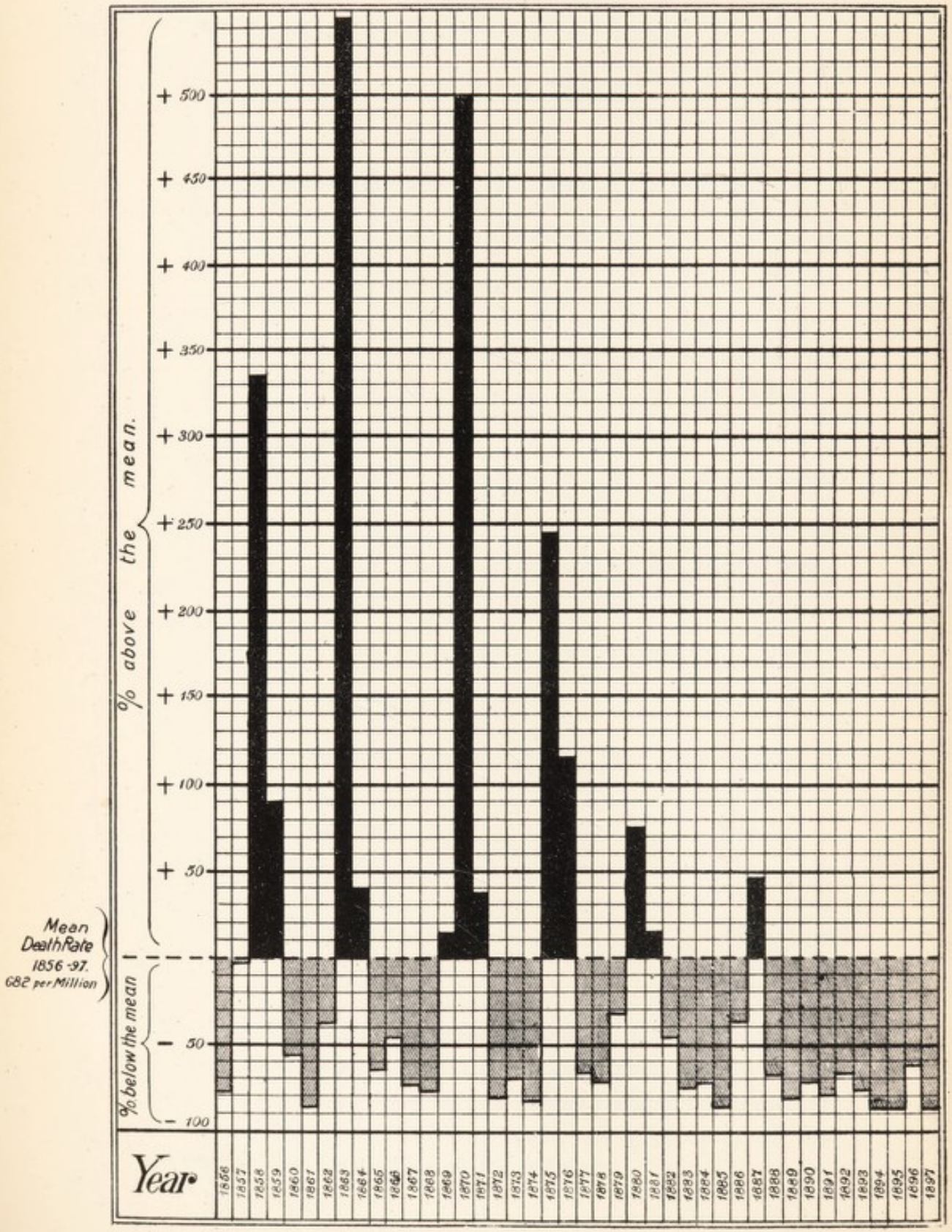
The notification figures for the four quarters are as follow :—

1st quarter		166
2nd „		111
3rd „		97
4th „		137
Total		511

No widespread extension has been traced during the year to schools, or to milk contamination; but in every case notified, the attendance of school children from infected houses has been controlled until after recovery of the patient and disinfection of the premises.

DIAGRAM 6

Scarlet Fever.



The number of cases of Scarlet Fever isolated in the Sanitary Authority's Hospitals during the year has been 262: 3 were removed by the Guardians, and 11 were admitted into the Children's Hospital isolation wards.

Scarlet Fever in Bristol—1856-97.

Diagram 6.

This diagram shows the fluctuation of the death-rate from Scarlet Fever over a long series of years: the *rate* for each year being shown as a percentage above or below the average rate for the series. This gives a ready and accurate means of comparison, and the results may be seen at a glance.

Since 1887 it will be noticed that the Scarlet Fever rate has consistently remained below the mean, and it is at least suggestive that during this period, and especially since 1889, when the Notification Act first gave us accurate information as to the location of disease, systematic isolation of Scarlet Fever has been commenced and extended so far as possible with the insufficient Hospitals at our command.

It is now difficult to realise the frightful mortality from Scarlet Fever in former epidemic years, a mortality chiefly incident upon children. Thus in 1863 no less than 925 deaths occurred from Scarlet Fever alone, and again in 1870 this disease killed 746, and epidemics recurred with fair regularity every 5 to 7 years. The fatality of individual epidemics has decreased of late years, and in 1887 the deaths numbered 217. For the past ten years (1888-1897 inclusive) the yearly number of deaths from this disease has averaged 34.

Typhus Fever.

No case of Typhus Fever was reported in the City during the year. The last known cases of this disease occurred in the winter of 1889-90, the disease was strictly localised to a small group of houses, and resulted in 5 cases and 1 death. *(See Report for 1889).*

Enteric Fever.

During the year 343 cases were notified as Enteric Fever compared with 110 cases in 1896, 89 cases in 1895, 90 cases in 1894, and 122 cases in 1893.

This table shows the Notifications and deaths for the past eight years.

Years.	Cases Notified.	Deaths.
1890	122	33
1891	116	23
1892	135	18
1893	122	26
1894	90	21
1895	89	22
1896	110	20
1897	343	47

The excess in 1897 was entirely due to the Milk-borne outbreak in Clifton of September-November, which gave rise to 244 cases and 30 deaths: excluding these cases, the figures would have remained at or below the average.

The prevalence and fatality of the disease in each quarter of the year is shown here.

	Cases.		Deaths.	
	1896	1897	1896	1897
1st Quarter ...	34	20	3	3
2nd Quarter ...	34	17	8	5
3rd Quarter ...	21	38	2	5
4th Quarter ...	21	268	7	34
	110	343	20	47

The following table shows the average yearly cases of Enteric Fever notified in each sub-district, as well as the attack rate per 1,000 population, and the case mortality for the past seven years:—

Enteric Fever.

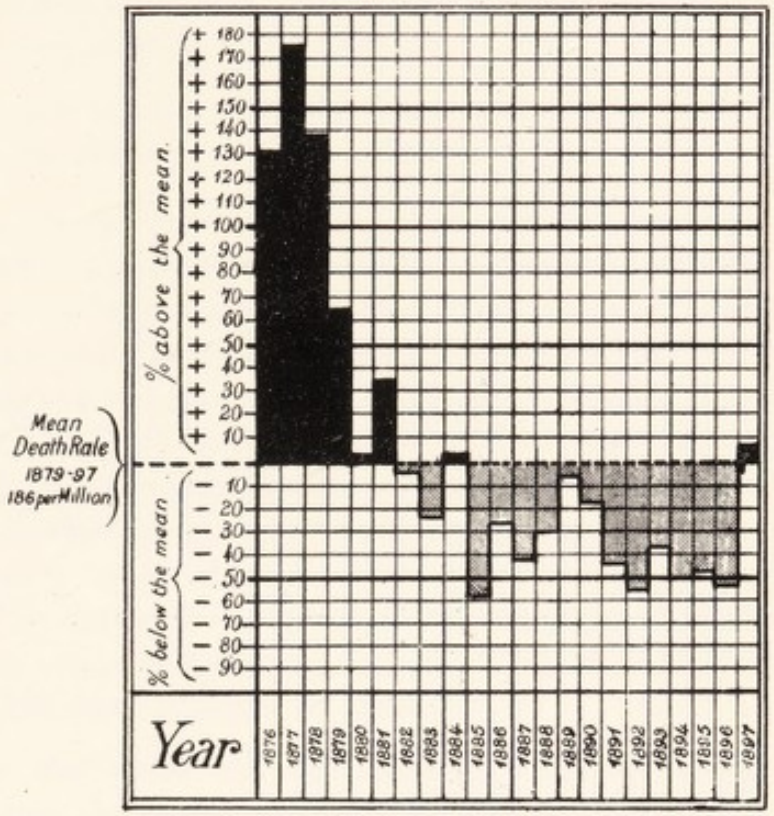
Sub-Districts	Redcliff.	Castle Precincts.	St. Paul.	St. James.	St. Augustine	Bedminster.	Clifton.	Ashley.	St. Philip.	Publ. Inst.	Bristol City.
Population ...	9,107	5,005	19,286	7,484	13,626	50,336	47,553	27,312	52,533		232,242
Cases notified	4·8	1·2	7·8	3·1	5·1	29·2	51·4	8·2	26·4	6·8	144 5
Incidence rate of attacks per 1000 population ..	·52	·22	·40	·40	·37	·59	1·1	·31	·50	...	·63
Deaths ..	1·1	0·2	1	0·5	0·5	5·2	6·1	1·2	4·8	2·8	25·2
Percentage of deaths to cases (case mortality.)	22·9	16·6	12·8	16·1	9·8	17·8	11 8	14·6	18·1	...	17·4

Enteric Fever is admitted into the Public Institutions and into the Guardians' Hospitals for treatment, and 110 cases (6 from outside the city) were nursed in the Royal Infirmary, General Hospital and Children's Hospital during the year, 13 cases were nursed at Clift House, and 4 were treated by the Guardians.

A Special Report is appended on the Enteric Fever outbreak in Clifton.

DIAGRAM 7

Enteric Fever.



The figures for Enteric Fever can only be given separately from 1876, in which year they were first dissociated from Typhus Fever. The death-rate from Enteric Fever has, since 1885, remained continuously below the mean rate, except in 1897, when the Milk-borne outbreak caused it to rise to 8 per cent. above the mean. The figures of recent years show, however, a satisfactory contrast with the figures of the period from 1876 to 1881, in which years the death-rate was persistently in excess.

Measles.

The deaths from Measles numbered 57, compared with 143 in 1896, 8 in 1895, 116 in 1894, 25 in 1893, 105 in 1892 and 239 in 1891.

Of the 57 deaths, 55 were of children under 5.

Towards the end of the year the disease showed signs of becoming epidemic in the City.

Measles is not a notifiable disease, and opinion is divided as to the advisability of its inclusion.

On the one hand its early infectivity and rapid spread appear to preclude the possibility of effectually controlling its epidemic prevalence by the usual means of Hospital isolation and disinfection, while the enormous bulk of cases during any wide prevalence would render complete Hospital isolation of all cases impossible without extraordinarily ample ward accommodation. On the other hand Measles is undoubtedly a regularly recurring cause of immense mortality, much of which might be prevented by careful nursing during the stage of convalescence; and if many deaths are in this way preventable, it would appear to be a public duty to strive to do so.

On the whole, and with present available means of Isolation, the control of school attendance would appear to be the most hopeful method of procedure, and in this way heads of schools can most effectually further the efforts of your Authority by giving information of cases, and of families known to be affected. The time for Notification does not seem to be ripe in this City until our Hospital accommodation is actually more commensurate with our requirements.

Whooping Cough.

The deaths from Whooping Cough numbered 118, compared with 64 in 1896, 45 in 1895, 177 in 1894, 80 in 1893, with 154 in 1892, 53 in 1891, and 201 in 1890.

Of the 118 deaths, 116 were of children under 5,

The heaviest mortality (77) occurred during the first quarter of the year; 34 deaths occurred during the second, 4 during the third, and 3 during the fourth quarter.

The disease was most fatal in Bedminster (30), St. Phillip (33), St. Paul (14) and Ashley (12).

The mortality in this disease is largely due, as in the case of Measles, to the want of care exercised during the course of the disease, to avoid exposure to inclement wind and weather.

Influenza.

This disease caused 40 deaths during the year, compared with 19 in 1896, 95 in 1895, 26 in 1894, 68 in 1893, and 45 deaths during 1892.

The disease was chiefly prevalent during the second quarter of the year, and the figures for the four quarters are 6, 23, 1, and 10 respectively.

Phthisis (Pulmonary Consumption).

The deaths from this disease form no inconsiderable proportion of the total deaths, and from year to year nearly approach and occasionally exceeds the fatality of the seven principal Zymotics grouped together :—

	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Phthisis... ...	332	333	326	413	382	372	363	332	317	320	302
Seven Principal Zymotics	664	292	500	482	426	461	363	457	268	435	430

I have in previous reports pointed out that there appears to be no valid reason for the continued existence of this fatal scourge in anything like its present proportions, if to the medical treatment of its symptoms and results, were added some intelligent preventive treatment on the part of the patient.

Isolation in Hospital, with the precautions as to exposure and disinfection, are certainly not applicable in the circumstances of Pulmonary Consumption, but *Notification* of the disease might reasonably tend towards the universal adoption of simple precautions, and would ensure the periodical, and thorough disinfection of infected rooms and houses, especially after death, a point of no little importance in the social history of the disease.

I am, Gentlemen,

Your Obedient Servant,

D. S. DAVIES, M.D.,
Medical Officer of Health.

Table B. Showing population, Births, Marriages, and Deaths, and Birth and Death Rates, in Bristol, for the 21 Years, 1877-1897. (All figures revised on 1891 Census.)

	Estimated Population.	Registered Births.	*Marriages in the District of the Bristol Union.	Deaths.					Annual Rates.			
				Total Deaths at all Ages.	Under 1 Year.	Over 1 and under 5.	Over 60.	In Public Institutions.	Birth Rate per 1000.	Death Rate per 1000.	Infantile Mortality to 1000 Births.	Zymotic Rate.
1877	197,395	7,295	1,199	4,415	1,120	785	990	653	36·9	22·3	153·5	3·3
1878	199,879	7,236	1,159	4,409	1,145	605	1,121	631	36·2	22·0	158·2	2·0
1879	202,400	7,644	1,115	4,496	1,112	715	1,163	607	37·7	22·2	145·4	2·2
1880	204,942	7,193	1,195	4,276	1,040	759	1,036	661	35·1	20·8	144·5	3·0
1881	207,229	7,121	1,103	4,050	900	608	1,084	650	33·8	19·5	126·3	2·2
1882	208,007	6,935	1,107	4,019	988	589	1,045	624	33·3	19·3	142·0	2·3
1883	209,522	6,844	1,073	3,795	917	405	1,057	608	32·6	18·1	133·9	1·1
1884	211,048	6,888	1,090	4,023	1,001	538	1,061	653	32·6	19·0	145·3	1·8
1885	212,586	6,786	974	4,281	1,052	639	1,134	629	31·9	20·1	155·0	2·2
1886	214,134	6,724	949	4,253	1,002	619	1,132	694	31·4	19·8	149·1	2·2
1887	215,694	6,619	956	4,542	996	796	1,244	680	30·6	21·0	150 4	3·0
1888	217,266	6,608	981	3,816	824	432	1,138	710	30·4	17·5	124·6	1·3
1889	218,848	6,694	932	4,021	976	595	1,062	660	30·5	18·3	145·8	2·2
1890	220,442	6,634	1,033	4,532	991	597	1,265	730	30·0	20·5	149·4	2·1
1891	222,049	6,725	937	4,631	972	603	1,371	815	30·3	20·8	144·5	1·7
1892	223,592	6,563	973	4,331	953	634	1,197	776	29·3	19·3	145·2	2·0
1893	225,028	6,788	955	4,241	959	411	1,283	851	30·1	18·8	141·2	1·6
1894	226,578	6,393	920	3,888	848	524	1,077	769	28·8	17·1	148·3	2·0
1895	228,139	6,622	846	4,108	935	414	1,321	837	29·0	18·0	141·1	1·1
1896	230,626	6,537	863	3,960	908	476	1,130	793	27·8	16·8	138·9	1·8
1897	**232,242**	**6,514**	**884**	**3,988**	**949**	**434**	**1,195**	**821**	**28·0**	**17·1**	**145·6**	**1·8**

* This includes the Registration Sub-Districts of St. Mary Redcliff, Castle Precincts, St. Paul, St. James, and St. Augustine only.

Table C. Showing Number of Deaths from Zymotic Diseases in Bristol, during the 22 years, 1876—1897.

	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897.
Small Pox ...	23	...	...	...	1	...	...	...	...	10	8	13	26	...	...	1†	...	20‡	16×	...	5	1
Diphtheria ...	11	4	5	4	6	10	8	13	19	25	28	23	26	15	16	16	38	53	50	34	38	36
Erysipelas ..	14	17	12	13	10	18	14	10	11	10	11	10	21	16	9	12	21	11	8	16	10	5
Scarlet Fever ...	286	45	36	92	244	153	75	33	37	21	89	217	45	26	40	37	47	35	16	16	59	18
Typhus	5	31	2	...	...	7	10	1	2	...	...	...	...	...	1	...	...	...	...	...	...	...
Enteric Fever ...	84	101	89	42	39	52	38	29	40	16	29	23	28	38	33	23	18	26	21	22	20	47
Puerperal Fever* ...	..	...	...	...	...	...	...	..	18	12	8	9	17	11	12	7	25	16	11	8	8	6
Measles	77	133	53	74	73	120	54	33	46	159	101	147	61	185	92	239	105	25	116	8	143	57
Whooping Cough ...	47	239	66	174	95	38	196	38	99	149	101	124	38	105	201	53	154	80	177	45	64	118
Diarrhœa... ...	209	117	171	70	184	82	104	83	132	89	119	117	68	131	96	58	99	125	65	143	106	153

* Previous to 1884, Puerperal Fever was not separated in the Local returns from Puerperal Diseases generally.
† This death occurred in the Nover's Hill Hospital outside the City, and so did not appear in the General Returns.
‡ Of these deaths one occurred in the Nover's Hill Hospital, outside the City, and so did not appear in the General Returns.
× Of these deaths five occurred in the Nover's Hill Hospital, outside the City, and so did not appear in the General Returns.

D. City of Bristol.

TABLE SHOWING DEATHS FROM SPECIFIED CAUSES AT ALL AGES AND AT SIX GROUPS OF AGES, DURING THE YEAR 1897.

Classes.	Causes of Death	Deaths at certain Age Groups. 0 to 1	1 to 5	5 to 15	15 to 25	25 to 60	60 upwards.	All Ages. M.	F.	Total.	Rate per 1000 Living.
	ALL CAUSES	949	434	190	218	1002	1195	1958	2030	3988	17·17
I.	Small Pox — Vaccinated	...	...	...	...	1	...	1	...	1	0·004
	Small Pox — Un-Vaccinated ...	...	...	...	...	...	...	...	...	...	
	Small Pox — No Statement ...	...	...	...	...	...	...	...	...	...	
	Scarlet Fever	1	9	6	2	...	...	6	12	18	0·07
	Diphtheria	4	17	12	1	...	...	17	17	34	0·14
	Membranous Croup	1		1	...	...	...		2	2	0·008
	Enteric or Typhoid Fever	...	1	9	16	17	4	16	31	47	0·20
	Continued Fever, Ill-defined Fever	...	...	...	...	...	...	...	...	...	
	Relapsing Fever	...	...	...	...	...	...	...	...	...	
	Puerperal Fever	...	...	...	1	5	...	...	6	6	0·02
	Cholera (Asiatic)	...	...	...	...	...	...	...	...	...	
	Erysipelas	1	..	...	..	1	3	3	2	5	0·02
	Measles	11	44	2	...	...	...	34	23	57	0·24
	Whooping Cough	68	49	2	...	..	...	65	54	119	0·51
	Influenza	2	1	...	...	9	28	15	25	40	0·17
	Simple Cholera, Chol: Diarrhœa	..	1	...	...	1	...	2		2	0·008
	Diarrhœa, Dysentery	109	26	1	...	4	11	76	75	151	0·65
	Anthrax		...	...	...	1	...	1	...	1	0·004
	Venereal Affections	18	...	..	...	2	..	14	6	20	0·08
	Pyæmia	..	..	...	2	1	1	3	1	4	0·01
	Cow Pox, Effects of Vaccination ..	1	...	...	...	...	...	1	...	1	0·004
	Tetanus	1	..	..	...	1	1	3	...	3	0·01
	Other Spec: Feb. or Zymotic Dis.	2	1	1	..	1	...	3	2	5	0·02
II.	Parasitic Diseases	...	...	...	...	...	...	...	...	...	
III.	Dietic Diseases, Alcoholism . .	...	...	..	...	2	1	3	...	3	0·01
IV.	Rheumatic Fever	...	..	2	2	2	1	1	6	7	
	Rickets	...	9	...	...	...	...	5	4	9	
	Cancer, Malignant Disease ...	..	...	1	2	100	109	84	128	212	0·91
	Tabes Mesenterica	11	6	2	...	1	...	13	7	20	
	Tubercular Meningitis, Hydrocephalus	16	31	10	2	4	...	38	25	63	
	Phthisis Pulmonalis	4	7	21	52	203	15	166	136	302	1·30
	Scrofula, Tuberculosis	5	14	10	12	15	2	34	24	58	
	Other Constitutional Diseases ...		3	1	6	18	12	18	22	40	
V.	Premature Birth	126	...	...		...	...	79	47	126	
	Congenital Malformations	19	...	...	...	...	...	8	11	19	
	Old Age	...	...	...	...	1	169	64	106	170	0·73
VI.	Inflam: of Brain and Membranes	11	13	1	6	7	1	24	15	39	
	Apoplexy, Paralysis	2	1	2	3	72	173	105	148	253	2·28
	Epilepsy	1		5	3	11	1	8	13	21	
	Convulsions	141	14	1	...	...	...	87	69	156	
	Other Diseases of Nervous System	4	5	2	7	17	27	26	36	62	
	Diseases of Heart and Circulation	8	4	17	19	138	225	117	294	411	1·77
	Croup		2	...	...	...	...	...	2	2	
	Bronchitis	108	72	4	2	59	189	220	214	434	3·07
	Pneumonia	139	55	13	8	71	52	132	106	238	
	Other Respiratory Diseases ...	7	6	2	3	15	17	31	19	50	
	Dentition	11	5	...	...	...	...	9	7	16	
	Dis: of Stomach and Intestines, Peritonitis	55	11	11	13	33	30	89	64	153	1·11
	Cirrhosis and other Dis: of Liver	6	2	...	1	28	16	24	29	53	
	Other Diseases of Digestive System	15	2	2	2	8	8	18	19	37	
	Diseases of Urinary Organs ...	...	5	5	10	60	49	82	47	129	0·55
	Diseases of Reproductive Organs...	...	...	...		9	6	2	13	15	
	Other Local Diseases	12	..	9	9	23	14	25	42	67	
VII.	Accident, Negligence	4	14	18	20	45	15	89	33	122	
	Suffocation	2	...	...	...	...	...	...	2	2	
	Homicide	...	...	...	1	3	..	1	3	4	0·61
	Suicide	...	...	...	1	12	3	12	4	16	
	Execution	...	...	...	...	...	...	...	...	...	
VIII.	Marasmus, Atrophy, Debility ...	115	4	3	1	...	3	64	62	126	0·70
	Other Ill-defined Causes	9	...	14	11	1	9	20	17	37	

Infectious Disease (Notification Act,) 1889.

1897 Notifications received during each Quarter of 1897.

Table *a.* (UNCORRECTED, AS RECEIVED)

NOTIFIABLE DISEASE	First Quarter	Second Quarter.	Third Quarter	Fourth Quarter.	Totals of each disease
Small Pox	...	8	...	2	**10**
Cholera	...	...	...	...	...
Diphtheria	57	58	43	51	**209**
Membranous Croup ...	3	1	2	5	**11**
Erysipelas	54	47	47	55	**203**
Scarlet Fever or Scarlatina	172	114	99	142	**527**
Typhus Fever ...	...	...	...	...	...
Enteric or Typhoid Fever	20	17	38	275	**350**
Relapsing Fever ...	...	...	...	...	...
Continued Fever ...	...	...	...	...	...
Puerperal Fever ...	1	3	3	3	**10**
Totals in each Quarter	**307**	**248**	**232**	**533**	**1,320**

Table β. Notification and Deaths registered by Sub-Districts during the year 1897.

(CORRECTED.)

	Small Pox.		Diphtheria.		Membranous Croup.		Erysipelas.		Scarlet Fever		TYPHUS.	ENTERIC TYPHOID		Relapsing.	Continued		PUERPERAL.		Total cases in each Sub-District.
	Cases	Deaths.	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths		Cases	Deaths		Cases	Deaths	Cases	Deaths	
St. Mary Redcliff ..			19	1			16		17			4							56
Castle Precincts ..	1	1	3				3		4			1							12
St. Paul			7	2			14		23	1		6					1	1	51
St. James			9	3	2		15		14	1		4	1				1	1	45
St. Augustine ..			19	2			4		15			7	2				1	1	46
Bedminster ..	7		38	8	1		52	1	155	3		30	4				3	1	286
Clifton			41	3	2		28		92	3		237	28				3	1	403
Ashley ..			20	4	1	1	11		77	3		11	1						120
St. Philip	1		31	8	2	1	56		100	5		42	10				1	1	233
Admitted to Public Insts from outside of Borough	1		10	3			2	1	12			6							31
Extra Municipal Insts. ..							2	3	2	2		2	1						6
Total cases of each disease	10		197		8		203		511			350					10		1289
Total deaths from each disease		1		34		2		5		18			47					6	
Percentage of deaths to known cases	10·0		17·2		25·0		2·4		3·5			13·4					0·6		

This Table has been corrected as follows:—

Twelve cases notified as Diphtheria, three notified as Membranous Croup, and sixteen notified as Scarlet Fever proved subsequently not to be cases of those diseases, and have been deducted.

Table γ.

NOTIFICATION.

Particulars as to removal and Disinfection in all Cases Notified during the Year 1897.

	Small Pox.	Choleraic Diarrhœa.	Diphtheria.	Membranous Croup.	Erysipelas.	Scarlatina or Scarlet Fever.	The Fevers known by the following names:—					TOTALS
							Typhus.	Typhoid Enteric.	Relapsing	Continued	Puerperal	
Cases treated in General Hospital, Infirmary, or Children's Hospital ...	...	...	62†	3	28‡	11	...	110‖	...	...	2	**216**
Cases treated in Sanitary Authority's Hospitals	10*	...	...	...	...	§262	..	13	...	..	...	**285**
Cases treated in Guardians Hospital...	...	...	1	...	9	3	..	4	...	..	...	**17**
Total treated at Home...	...	...	134	5	166	235	..	223	...	...	8	**771**
Total cases known or notified ...	**10**	...	**197**	**8**	**203**	**511**	**0**	**350**	**0**	**0**	**10**	**1289**
Cases in which disinfection of bedding, clothing, and rooms has been carried out, and necessary precautions taken under the supervision of District Inspector	10	..	186	8	6	510	...	327	...	...	9	**1056**
Cases in which disinfection was carried out to the satisfaction of Medical Attendant or in which Disinfection was unnecessary	...	...	11	...	197	1	..	23	...	...	1	**233**

* One case was admitted from outside the Borough.
† Ten cases admitted from outside the Borough.
‡ Two cases admitted from outside the Borough.
§ Ten Cases admitted from outside Borough.
‖ Six Cases admitted from outside Borough.

NOTIFICATION.

Table 8.— **Showing the number of cases of Infectious Disease notified under the Infectious Disease Notification, 1889, since its adoption in 1890.**

	1890	1891	1892	1893	1894	1895	1896	1897
Small Pox	0	16	0	165	201	4	42	10
Diphtheria and Membranous Croup	56	70	106	141	128	165	258	205
Erysipelas	105	135	196	230	154	195	246	203
Scarlet Fever ...	559	888	1442	1245	485	562	1352	511
Typhus	1	0	0	0	0	0	0	0
Enteric Fever ...	122	117	135	122	90	89	110	350
Continued or Doubtful Fever ...	6	8	3	6	1	1	2	0
Puerperal Fever ...	11	11	34	30	18	16	21	10

BRISTOL SANITARY AUTHORITY'S HOSPITALS

REPORT FOR THE YEAR 1897 ENDING JANUARY 1ST, 1898.

Nover's Hill Hospital—Scarlet Fever.

Remaining from 1896	56	208
*Admitted	152	
Discharged Cured	142	208
Transferred Convalescent to Avonmouth	16	
Ditto to Clift House	4	
Died	2	
Remaining	44	

Causes of Death of the 4 Patients—

2 died of Convulsions following Albuminuria.

1 „ Scarlatina Hæmorrhagica, complicated with Pneumonia.

1 died of Asthenia.

G. C. PAULI, M.R.C.S., L.R.C.P.,

Medical Attendant.

* Of the patients admitted 7 proved not to have Scarlet Fever, and of these 4 contracted the disease at the Hospital, 1 proved to be Measles, 2 proved to be German Measles, of which 1 contracted Scarlet Fever in Hospital.

Clift House—Scarlet Fever.

Remaining from 1896	41	187
Admitted	145	
Re-admitted	1	
Discharged Cured	143	187
Transferred to Nover's Hill ..	18	
„ to Avonmouth	19	
Died	7	
Remaining	0	

The case re-admitted was on account of a nasal discharge coming on 3 or 4 days after the return home, when it was considered expedient to return the case to Hospital.

Causes of Death of the 8 Patients—

1 died of a complication of Whooping Cough, Pneumonia and Pyæmia.

4 died of Diphtheritic Scarlet Fever.

1 „ Convulsions and Pyæmia.

1 „ Severe Hœmaturia with Convulsions.

1 „ Asthenia.

Only one case admitted proved not to be Scarlet Fever.

G. C. PAULI, M.R.C.S., L.R.C.P.,

Medical Attendant.

Clift House—Typhoid and Measles.

Admitted 13 cases of Typhoid.

Discharged Cured	11	13
Remaining in Hospital	2	

All recovered.

The Medical Attendants are grateful to Mrs. Williams the Matron, and great credit is due to her for the assiduous care and indefatigable trouble she took in supervising the carrying out of treatment. It is felt that owing to her care all the Typhoid cases recovered.

Nover's Hill—Small-Pox.

Admitted 9, of which 1 proved not to be Small-Pox. All recovered.

St. Philip's Observation Hospital.

Admitted—Small-Pox	9	13
„ Measles	1	
„ Scarlet Fever	1	
„ Probationary cases ...	2	
Transferred to Nover's Hill	8	13
„ Clift House	1	
„ Hospital Ship... ...	1	
Discharged after disinfection... ..	2	
Died	1	

G. C. PAULI, M.R.C.S., L.R.C.P.,

Medical Attendant.

NOTE.—The numbers given above will be found to vary slightly from the totals given in the other tables owing to transfers from one Hospital to another, and also to the admission of some patients not belonging to the City.

COMPARATIVE TABLE—Showing the Estimated Population, Density, Birth-rate, Death-rate, Zymotic-rate, Fever Death Rate, Diarrhœa Death Rate, and Infantile Death Rate of the 13 LARGEST TOWNS OF ENGLAND AND WALES (those having a population of over 200,000); also of EDINBURGH, GLASGOW, DUBLIN, and CARDIFF, for the Year 1897, compared with the same particulars and rates for the group of 33 large towns. *From the Registrar General's Return.*

	Estimated Population, middle of 1897.*	Persons to an acre.	Birth-rate.	Death-rate.	Zymotic rate.	Fever Death-rate.	Diarrhœa Death-rate.	Deaths under 1 year to 1000 Births.
33 Large Towns	10,992,524	35·5	30·7	19·1	2·87	0·18	1·24	177
London	4,463,169	59·8	30·0	18·2	2·58	0·13	0·92	159
Liverpool ...	633,078	47·8	35·3	24·4	3·83	0·27	1·93	200
Manchester ...	534,299	41·4	33·2	23·1	3·81	0·19	1·56	195
Birmingham ...	505,772	39·8	33·3	21·6	3·88	0·18	2·00	214
Leeds	409,472	19·0	31·6	19·9	2·80	0·20	1·57	190
Sheffield... ...	351,848	17·9	34·4	21·2	3·49	0·31	1·83	198
West Ham ...	273,682	58·2	32·2	15·7	2·61	0·18	1·08	172
Nottingham ..	232,934	21·2	28·9	18·8	2·81	0·21	1·66	206
Bristol ...	**232,242**	**49·7**	**27·8**	**17·2**	**1·83**	**0·20**	**0·65**	**149**
Bradford ...	231,260	21·4	24·6	17·4	2·22	0·13	1·44	179
Hull	225,045	27·4	33·4	18·6	3·25	0·25	2·23	181
Newcastle ...	217,555	40 5	31·3	19·1	2·09	0·16	1·00	178
Salford	213,190	41·2	35·1	23·9	5·50	0·31	2·00	219
Edinburgh ...	292,364	46·9	27·4	21·3	3·25	0·11	0·62	164
Glasgow... ...	714,919	60·1	33·5	22·0	3·60	0·25	1·05	160
Dublin	349,594	14·2	29·3	29·0	4·64	0·58	0·98	169†
Cardiff	170,063	28·1	31·1	14·9	2·19	0·12	0·80	151

* These Populations are based on the 1891 Census returns. † Average of 5 years.

COMPARATIVE MORTALITY.

1897.—The 33 Great Towns.

(From the Registrar-General's Annual Summary.)

The estimated population of the 33 great towns of England and Wales was 10,992,524 The annual *Birth-rate* was 30·7 per 1,000; and the *Death-rate* 19·1 per 1,000 of the estimated population. This rate was 1·5 per 1,000 below the mean rate for the preceding 10 years.

The Comparative Mortality figure, compared with 1,000 for England and Wales, was 1,185 for the 33 towns, and varied from 781 in Croydon and 874 in Brighton, to 1,535 in Liverpool, 1,536 in Preston, and 1,542 in Salford. The comparative mortality figure for **Bristol** was **1,031**.

Infantile Mortality was equal to 177 per 1,000 births in the 33 towns, and was 10 per 1,000 above the average rate in the 10 preceding years. The rate varied from 131 in Huddersfield and 135 in Croydon, to 217 in Wolverhampton, 219 in Salford, 220 in Burnley, and 262 in Preston. The infant mortality rate in **Bristol** was **149**.

Amongst *Zymotic Diseases*, the mortality in the 33 towns from Diphtheria and from Diarrhœa showed an excess in the year 1897 as compared with the mean rate in the preceding decennium: whilst the mortality from Small-pox, Measles, Scarlet Fever, Whooping Cough, and "Fever" was in each case below the average.

Small Pox.—There were in the 33 towns 18 deaths from *Small-pox*, as compared with 732, 450, 120 and 25 respectively in the four preceding years. Of these 18 deaths 16 occurred in London, or in the Metropolitan Asylum Hospitals outside London, **1** in **Bristol,** and 1 in Hull.

Scarlet Fever caused a mortality equal to 0·18 per 1,000, as compared with a decennial average of 0·27. The rates ranged from 0·04 in Preston and in Bradford, and 0·05 in Plymouth, Burnley and Blackburn, to 0·29 in Salford, 0·32 in Huddersfield, 0·33 in Liverpool, and 0·35 in Leicester. The rate in **Bristol** was **0·08.**

Diphtheria gave a mortality rate of 0·31 per 1,000, against a decennial average of 0·29. The rate in 1897 was below that recorded in any of the four preceding years. Excluding London, where the rate was equal to 0·51 per 1,000, that for the great English towns did not exceed 0·18 per 1,000: it ranged from 0·03 in Preston and in Sunderland, 0·05 in Bolton, and 0·06 in Blackburn, to 0·37 in West Ham, 0·53 in Cardiff, 0·57 in Burnley, and 0·62 in Wolverhampton. The rate in **Bristol** was **0·15.**

Continued Fevers, mainly *Enteric Fever*, gave rise to a mortality equal to a rate of 0·18 per 1,000, or 0·02 below the average. The lowest rates were 0·07 in Croydon and in Swansea, 0·08 in Plymouth, and 0·12 in Cardiff; the highest were 0·29 in Norwich and in Blackburn, 0·30 in Preston, and 0·31 in Salford and in Sheffield. The rate in **Bristol** was **0·20.**

Diarrhœa gave a rate of 1·24 per 1,000, which was 0·40 above the decennial average, and higher than in any of the 10 preceding years. The lowest rates were 0·21 in Swansea, 0·32 in Halifax, and 0·35 in Huddersfield: the highest were 1·93 in Liverpool, 2·00 in Birmingham and in Salford, 2·11 in Wolverhampton, and 2·23 in Preston and in Hull. The rate in **Bristol** was **0·65.**

Measles gave a rate of 0·55 per 1,000, against a decennial average of 0·62. The lowest rates were 0·03 in Norwich, 0·07 in Leicester, and 0·11 in Hull; the highest rates were 1·33 in Burnley, 1·78 in Bolton, 2·22 in Salford, and 2·77 in Preston. The rate in **Bristol** was **0·25.**

Whooping Cough gave a rate of 0·41, or 0·14 below the average. The lowest rates were 0·09 in Halifax, 0·19 in Bradford, and 0·20 in Cardiff; the highest were 0·56 in Liverpool and in Manchester, 0·60 in Burnley, and 0·63 in Blackburn. The rate in **Bristol** was **0·50**.

Zymotic Diseases gave the lowest aggregate rates in Swansea 1·36, Halifax 1·39, Croydon 1·43, Huddersfield 150, Brighton 1·64, **Bristol 1·83**, and Derby 1·92; while the highest recorded rates were 4·02 in Bolton, 4·22 in Wolverhampton, 5·50 in Salford, and 5·63 in Preston.

The Sixty-seven other Large Towns.

In these towns, with an aggregate population of 3,812,631, the *Birth-rate* was 30·1, and the *Death-rate* 17·2 per 1,000 living.

The Death-rates ranged from 8·2 in Eastbourne to 25·6 in Longton.

The *Scarlet Fever* rate averaged 0·15 per 1,000, the highest rates were 0·31 in Gloucester, 0·33 in West Bromwich, 0·37 in Walsall, 0·52 in St. Helen's, 0·56 in Burnley, and 0·68 in Northampton.

The *Diphtheria* rate averaged 0·24 per 1,000, the highest rates were 0·62 in Rhondda and in Merthyr Tydfil, 0·63 in Great Yarmouth, 0·64 in Willesden, 0·76 in Worcester, 0·82 in Aberdare, 0·87 in Gloucester, and 2·62 in Longton.

The "Fever" rate averaged 0·16. The highest rates were 0·35 in Great Yarmouth, 0·37 in St. Helen's, 0·38 in Rotherham, 0·40 in Bootle and in Ashton-under-Lyne, and 0·45 in Exeter.

The *Diarrhœa* rate averaged 1·05 per 1,000. The highest rates were 2·01 in Grimsby, 2·22 in Stockport, 2·24 in Walsall, 2·25 in Bootle, 2·28 in Aston Manor, and 2·58 in Barnsley.

The general *Zymotic rate* averaged 2·41 in the 67 towns, and ranged from 0·78 in Hastings, 0·86 in Eastbourne, 0·87 in Cambridge, 0·93 in Bournemouth, and 1·01 in Darlington, to 4·10 in Stockport, 4·13 in Aberdare, 4·20 in Aston Manor and in Ashton-under-Lyne, 4·33 in St. Helen's, and 5·35 in Longton.

Colonial and Foreign Cities.

In returns from 35 of the principal Colonial and Foreign Cities, containing an estimated aggregate population of over 23 millions, the Deaths were collectively equal to a rate of 22·2 per 1,000 living.

In 30 European and American Cities with an aggregate population of over 20½ millions, the rate was 19·8 per 1,000. Amongst these the lowest rates were 13·7 in Cincinnatti, 15·8 in Amsterdam and in The Hague, 15·9 in St. Louis, 16·3 in Christiania 16·6 in Brussels, and 16·7 in Stockholm; amongst the other Cities the rates ranged upwards to 23·8 in Prague, 24·3 in Munich, 24·5 in Breslau and in New Orleans, 25·6 in Trieste, 28·7 in Moscow, and 29·0 in St. Petersburg.

In Paris the rate was 18·6, in Berlin 17·7, and in Vienna 20·9, against 18·2 in London.

Small-Pox caused 119 deaths in St. Petersburg, 32 in Moscow, 24 in New York, 12 in Paris, 11 in Trieste, and 8 in Berlin.

Measles was proportionately most fatal in St. Petersburg, Moscow and Vienna.

Scarlet Fever in St. Petersburg, Moscow and Prague.

Diphtheria in St. Petersburg, Moscow, Munich, Vienna Trieste, and in most of the American Cities from which returns were received.

"*Fever*" in St. Petersburg, Moscow, Prague, Rome Philadelphia and New Orleans; and

Diarrhœal Diseases (including Cholera) in St. Petersburg Moscow, Breslau and Munich.

Among the three Indian Cities the general Death-rate was equal to 32·3 in Calcutta, 35·5 in Madras, and 57·5 in Bombay.

Small-Pox caused 108 deaths in Madras, 82 in Calcutta and 58 in Bombay.

Measles caused 410 deaths in Madras, and 348 in Bombay.

"*Fever*" caused 18,395 deaths in Bombay, of which 10,146 were attributed to "Bubonic" fever.

Diarrhœal Diseases (including Cholera) was excessive in each of the three Indian Cities

In Cairo and Alexandria the Death-rates were respectively 32·4 and 31·8 per 1,000, these high rates were mainly attributable to excessive mortality from *Diarrhœal Disease*. *Small-Pox* caused 111 deaths in Cairo, and 67 in Alexandria.

Enteric Fever.

The Clifton Outbreak in 1897.

During the year 350 cases were notified as Enteric Fever, compared with 110 in 1896, 89 in 1895,.90 in 1894, and 122 cases in 1893.

The excess is entirely due to the Milk-borne outbreak in October, which followed three Milk rounds in Clifton, and affected this sub-district only.

The records of the ten previous years show that during this period the Fever rates for Clifton and Bristol have not been in excess; those for Clifton show, as would be expected in a small district, a wider annual fluctuation than those derived from the much larger population of Bristol, but the rates for both Bristol and Clifton are, year by year, considerably below those for the 33 large towns, and for England and Wales.

ANALYSIS OF DEATHS REGISTERED IN THE CITY AND COUNTY OF BRISTOL.

DURING THE YEAR 1897, ENDING SATURDAY, JANUARY, 1st, 1898.

Registration Districts.	Registration Sub-Districts.	Births.	Deaths.	Under 1 year of age	Over 1 and under 5 years of age	Aged 60 years and upwards	Principal Zymotic Diseases: Small Pox.	Measles.	Whooping Cough.	Diphtheria.	Membranous Croup.	Scarlet Fever.	Enteric Fever.	Typhus.	Others or Doubtful.	Diarrhœa and Dysentery.	Asiatic Cholera.	Total Deaths from Zymotic Diseases.	Influenza.	Erysipelas.	Syphilis.	Rheumatism.	Malignant Disease, Cancer.	General Tubercular Diseases.	Phthisis.	Pneumonia.	Respiratory. Bronchitis & other Diseases of Respiratory Organs.	Nervous System. Diseases of the Brain and Membranes.	Diseases of other parts of the Nervous System.	Circulatory. Diseases of the Heart.	Diseases of other Organs of the Circulation.	Digestive. Diseases of the Liver.	Diseases of other Digestive Organs.	Urinary. Diseases of the Urinary Organs.	Puerperal. Puerperal Fever Puerperal Septicæmia.	Puerperal Diseases (not infectious).	Premature Birth. Congenital Malformations.	Senile Decay.	Violence.	Other Causes.	Inquest Cases.	Unverified Deaths.	Rates per 1000 per annum. Birth Rate	Death Rate	Zymotic Rate	Phthisis Rate	Infantile Death Rate per 1,000 Births.
Bristol	St. Mary Redcliff	249	152	36	15	40		1		1								2				1	1	5	5	10	7	21	6	9	20	1	12	10	9			3	4	8	16	19	12	27·33	16·68	1·53	1·09	104·41
	Castle Precincts	86	108	15	5	27	1	1										2						1	1	8	7	15	8	3	15		1	12	6			1	12	6	33	1	17·20	21·59	1·99	1·59	174·41
	St. Paul	524	296	83	36	68			12	14	2							28					1	1	2	3	7	13	4	20		3	4	4	1	1	13	9	6	21	23	3	27·17	15·34	1·81	1·19	158·39
	St. James	198	152	30	20	37				4	3							7					1	1		4	6	12	1	20		1	10	6			3	6	9	17		23·93	11·67	1·24	0·73	92·02
	St. Augustine	326	159	30	17	63			1	2		1	1					4								3	1	5	9	5	20	1	1	10	4	1	1					25	1	26·45	20·31	1·73	2·00	151·51
Bedminster	Bedminster	1882	840	283	118	180			38	30	8							76					3	3	15	14	23	13	4	29		3	4	4	1	1	3	5	13	25	1	37·37	16·67	2·56	0·97	150·36
	St. Augustine	785	630	88	37	262				9	3							12					3	4	28			9	5	20	1	1	10	6	1	1					27	1	24·60	11·97	1·02	1·46	96·72
Barton Regis	Clifton	672	327	65	26	111				12	4	1						5					1	1	1			34	13	36	3	5	15	12		1	8	23	4	22	16						
	Ashley	1745	853	290	154	180		15	35	8	1	5	10					49	1				1	1	12	5		54	46	59	4	13	49	20	1	1	44	17	27	23	72	19	33·21	16·23	2·32	1·18	166·18
	St. Philip	47	349	14	7	216				2								2					1	1	3			24	3	44	16	37	74	7	25	1	2	4	14			1	43	9	21	16				
	Extra-Municipal Institutions		5			5																						15	8	4	3	11	2	2	7			20	5			2		24	12	25				
	Not belonging to Borough		122	15	19	17			3									3																														
	Totals	6514	3988	949	434	1195	1	57	118	34	2	18	47			151	2	430	40	5	20	13	212	136	302	238	486	332	199	386	25	57	202	129	6	13	145	170	144	298	359	33	28·05	17·17	1·85	1·30	145·69

NOTIFICATIONS RECEIVED DURING THE YEAR BY SUB-DISTRICTS AND AGE GROUPS.

Sanitary Authority's Deaths in Public Institutions.		Extra Municipal Deaths in Public Institutions.		Registration Sub-Districts.	Small Pox. Under 5	5 to 10	10 to 15	15 upwards	Total.	Cholera. Under 5	5 upwards	Total.	Diphtheria. Under 5	5 to 10	10 to 15	15 upwards	Total.	Membranous Croup. Under 5	5 to 10	10 to 15	15 upwards	Total.	Erysipelas. Under 5	5 upwards	Total.	Scarlet Fever. Under 5	5 to 10	10 to 15	15 upwards	Total.	The Fevers known as. Typhus. Under 5	5 to 10	10 upwards	Total.	Typhoid, Enteric. Under 5	5 to 10	10 upwards	Total.	Relapsing. Under 5	5 upwards	Total.	Continued or Doubtful. Under 5	5 upwards	Total.	Puerperal.	Total Cases in each Sub-District.
	General Hospital	166		St. Mary Redcliff									3	8	3	7	21						1	15	16	5	5	5	2	17							4	4							58
	St. Peter's Hospital			Castle Precincts									1	12	2		15						2	3	5												1	1							12
	Royal Infirmary	231		St. Paul									1	4	12	2	19						2	13	15	7	12	3	1	23							1	4					1		51
	Children's Hospital	64		St. James									4	3			7							4	4	4	4	5	2	15							4	6					1		46
	Home for Crippled Children			St. Augustine									2	3	1		6							13	13	5	5	6	1	14							1	4					1		48
				Bedminster									9	7	5	1	22							4	4	5	5	2	3	15							4	4					1		289
	Small Pox Hospital	1		Clifton		1	2	4	7				12	8	5	13	38	1	2		1	4	42	50	92	51	74	18	12	155							13	7					3	3	403
	Fever Hospital	10		Bedminster									10	7	6	18	41		1		1			78	78	24	29	22	17	92							10	29	198	237					1		124
				Ashley				1	1				12	6	3	11	32						1	10	11	19	26	7	3	55							4	3	35	42					1		234
				St. Philip																			3	53	56	43	36	12	9	100																
	Bristol Union Workhouse	110		Admitted to Public				1	1				9	...	1	1	11																					6	6							32
	Barton Regis Union Workhouse	129		Institutions from Out-																					2	2	2	3	5	12																
	Long Ashton Union Whouse, Bedm	38		side of Borough																					2	2											2	2	...	...	...	...			6	
	Lunatic Asylum	72		Extra Municipal Inst'ns																					2	2																				
	Total	821		Total Cases of each Disease		1	2	7	10				66	56	22	65	209	5	3		2	10	10	193	203	160	195	87	69	511							16	36	298	350					10	1303

The average age at Death of Persons aged 60 years and upwards was 72 years and 7 months. Births of Illegitimate Children 188. Deaths of Illegitimate Children 66.

Average Death Rate for 10 Years, 18·8. Death Rate for the corresponding week of last year, 16·84.

FEVER.*

Death-rate per 100,000 living.

	England and Walfs.	Bristol.	Clifton.	33 Large Towns
1887	18	12	7	22
1888	17	13	3	20
1889	17	16	17	20
1890	17	15	10	19
1891	16	10	3	20
1892	13	8	6	15
1893	22	11	20	24
1894	15	10	3	19
1895	18	9	0	20
1896	17	8	16	19
Average of 10 years	17	11·2	8·5	19·8

* Only one death from Typhus Fever has been registered in Bristol for the past 13 years.

Previous outbreak of Milk-borne Enteric Fever :—

In 1878, in July and August, an outbreak of Enteric Fever occurred in Redland, strictly confined to persons who drank milk from a particular farm, but distributed by several retailers, all of whom, without exception, were supplied either directly or indirectly from this farm, which was situated outside the City limits.

This outbreak resulted in 131 cases and 12 deaths. Examination at the farm showed that the closets used by the dairy farmer's family discharged by a common drain into a cesspool, situated 25 feet from the well. The cesspool was overflowing in all directions, and its contents were traced by a recurrent course distinctly into the well. Manure of all kinds, and in every stage of decomposition, lay about everywhere.

In June, a young lady, convalescing of Typhoid Fever, spent some time at the farm for change of air. Her evacuations (no doubt still infectious) passed into the common privy.

The well water was the only water for domestic use on the farm, and was, therefore, used for dairy operations.*

For nearly twenty years the City has remained free from any but sporadic cases of Typhoid, many of which, in Clifton especially, are developed on return from the autumn holidays. The conditions of drainage and water supply in Clifton are not favourable to the spread of Enteric Fever, and it was not until the autumn of 1897 that the recurrence of somewhat similar conditions at another farm, also outside the City limits, promoted the occurrence of a second milk outbreak, this time in Clifton, resulting in 244 cases and 31 deaths.

The excess in Enteric Fever notifications was first noticed for the week ending 23rd October, when 18 cases were returned, of which 2 were in St. Philip, and 16 in Clifton.

* Cf. Water-borne Typhoid, Ernest Hart: Smith, Elder & Co.—"British Medical Journal," vol. ii., 1878, p. 226.—"Sanitary Record," vol. ii., 1878, pp. 100 and 166, and M.O.H.'s Annual Report for Bristol.

During the year 1897, the notifications of Enteric Fever in Clifton had not exceeded 4 in any one month, and in September the only 2 cases notified had contracted the disease during the autumn holidays, one in France, the other in Devonshire. A visitor from Maidstone was also notified on 11th October; and, as these were the only known cases in Clifton, there was no ground for alarm, or even for suspicion.

On the 15th October, however, two cases were reported in Clifton as probable enteric, subsequently confirmed by bacteriological examination and by their clinical development Early in the following week, on the 19th, a group of obscure cases of fever in one house was submitted to examination (Widal) in the laboratory, and gave distinct positive reactions; shortly afterwards I learnt that a considerable number of obscure cases of fever, many of which were considered to be "Influenza," were under observation in several other houses, but, noting that the selective incidence upon certain of these houses was not characteristic of "Influenza," and bearing in mind the doubtful symptoms of early enteric fever,* and the actual cases which had come to light, I at once sent a warning circular to the medical practitioners, and made arrangements for extended laboratory observation, so as to assist in establishing an early diagnosis. The offer was willingly responded to, and the definite existence of Typhoid Fever in many of these obscure cases was proved. Some of the more doubtful cases were submitted to Dr. Klein for control examination, and he confirmed the results. The post mortem examination of a fatal case gave further confirmation, and we were then in a position to accurately define certain of the infected houses, and to prosecute inquiries as to causation.

* As Newsholme points out:—During 1896, in Brighton, 23 per cent. of the notifications of Typhoid arrived on or before the seventh day of the disease, 49 per cent. during the second week, 18 per cent. during the third week, and 10 per cent later still. As the Widal reaction will give positive indications as early as the fourth day, its advantage as an aid to early diagnosis is obvious. Frequently, however, no doctor is called in till the second week of the illness.

Channels of diffusion of Enteric Fever by Milk.

One farm only supplied infected milk, but it found its way on to three milkmen's rounds in the following manner:—

1st. The milk from the infected farm (X) was consigned for delivery to the Distributor (A) in Bristol, by whose man (B) it was met at the Suspension Bridge, and distributed directly from the churn to the customers, without first going to any local dairy. Any milk not used on the round was returned, however, to the branch dairy and sold to casual customers. This supply served during the holiday month of August and up to 26th of September (when the large Schools re-opened) *two* districts, viz.:—

(a.) The High Level District, bounded on the east by College Road and on the south by Gloucester Row; and

(b.) The Low Level District, extending from the Mall to Granville Place (Cumberland Basin) on the south, and as far as to Bellevue on the east.

On the re-assembling of the schools at the end of September, however, the supply was confined to the High Level District.

This dual distribution is shown on the chart by the red lines X (Low and High).

Some of the earliest cases, developing at the beginning of October, showed themselves on the Low Level round; and many early cases also occurred on the high level round, but the incidence here was mainly in the second week of October.

Allowing for the incubation period of the fever, which may vary from 5 days to 3 weeks, the poison would, in many of these cases, appear to have been taken into the system during the latter half of September.

On the Low Level round :—

	Ratio of Attacks to Houses.
27 houses were supplied 12 were attacked	44·4 per cent.
31 cases resulted	

On the High Level round :—

29 houses were supplied 19 were attacked	65·5 per cent.
83 cases resulted	

or, taken together :—

56 houses were supplied 31 were attacked	55·3 per cent.
114 cases resulted, or more than 2 cases per house.	

The inmates of these houses numbered 453, so that 25·1 per cent. were attacked, or just a quarter of the whole number.

2. A milkman (Y) started with a pure supply from Ashton, in the County of Somerset, but at Bower Ashton he met the (X) cart and occasionally took a supplementary supply from the churn consigned to Clifton, after receiving which he supplied milk, yielding 2 cases of Typhoid at Bower Ashton, proceeded to Leigh Woods, where 6 more cases appeared in 2 houses supplied, and then entered Clifton.

On his round in Clifton :—

	Ratio of Attacks to Houses.
40 houses were supplied 18 were attacked	45·0 per cent.
48 cases resulted, or more than 1 case per house.	

The inmates of these houses numbered 308, so that 15·5 per cent. were attacked, or about one-sixth.

In this case a large quantity of good milk was polluted with a comparatively small quantity of infected milk, and it will be noted that the attack rate upon houses supplied was smaller and the number of cases per house less. In one school, however, no less than 14 cases resulted, and 4 were fatal.

3. The third and last supply known to be implicated (Z) came from a farm at Westbury, and entered the City at a point remote from the entry of the supplies (X) and (Y). The milk from this farm is distributed in Clifton on three rounds. Two of these rounds were entirely innocent of cases, and the third round was (with one exception, a servant who lived close to the Branch Dairy to which unused X milk was returned, and who admits to frequently obtaining casual supplies therefrom) also innocent of cases up to a certain point, but beyond this point cases began to occur with marked frequency.

On comparing the routes of the three dairymen, which we had plotted upon a map, it became evident that, at the very corner where this change from freedom to infection occurred, Z's round met that of the X supply, in charge of the man B, and Z admitted that he was in the habit, when running short, of obtaining supplementary supplies from B. After this, cases commenced at the very next house he supplied, and continued with considerable frequency along his route.

Before adding the X milk :—

	Ratio of Attacks to Houses.
11 houses were supplied 1 house attacked	9·0 per cent.
1 case resulted (obtaining casual supplies from X shop.)	

After adding the milk :—

	Ratio of Attacks to Houses.
16 houses were supplied 8 were attacked	50·0 per cent.
22 cases resulted.	

This accidental variation in round Z serves the purpose of a carefully designed experiment, and completes the demonstration of causation.

The percentage of houses attacked on each infected service is very heavy. In a well marked Milk Epidemic at Melbourne in 1879, 23 houses were attacked out of 93 supplied, or only 24·7 per cent.

In the aggregate we find—up to Dec. 18th—the close of the outbreak :—

	Houses Attacked.	Cases.	
On regular Milk rounds	57	184	
On regular round (after 17th Oct.)	1	2	
Obtaining casual supplies from shops to which X milk was returned.....	21	35	
Obtaining milk from a shop on low level round supplied with X milk	6	9	
		——	230
Houses attacked obtaining milk from dairymen not known to obtain infected supplies	13	14	
	98	244	

In the 14 cases where access to the infected milk was not definitely shown, the circumstances were these :—

Case 1. (1222) a Nurse engaged in nursing Typhoid, who admitted neglecting to follow out regularly her instructions for disinfecting her hands.

Case 2. (1113) a Medical Student in charge of Typhoid cases.

Cases 3 and 4. (1098, 1279) the wife and child of a butler at a house where multiple attacks occurred, nothing definite could be ascertained as to their access to the infected milk at this house (these were the only multiple cases in any house not on an infected supply.)

Case 5. (1091) a young lady who was much in the habit of drinking cold milk at various restaurants, shops, etc. One such place was supplied with X milk.

Cases 6, 7 and 8. (932, 1036, 1084) were all customers of the same retailer, whose store was in the street adjacent to one infected shop-supply, but no admission as to any purchase of milk could be obtained.

Cases 9 and 10. (104, 1119) were withdrawn by the medical attendants. No Widal examination was made.

Cases 11 and 12. (1155, 1169) were ill-defined cases No Widal examination was made.

Cases 13 and 14. (1013, 1120) were both marked cases of Typhoid, gave an immediate Widal reaction, and were on apparently pure milk rounds. The milk round X passed one door, supplying the next house, but beyond this we have no clue to the causation.

The last four cases were, indeed, the only ones of the 244 in which a reasonable connection with the milk cannot be suggested; but if we eliminate only cases 1, 2, 9 and 10, 234 out of 244 cases are definitely accounted for, or 95·9 per cent.

The conclusion that this Clifton outbreak was exclusively due to milk, has, curiously enough, been questioned in spite of the remarkable confirmatory evidence which has come to hand.

The question may be looked at from another point of view :—

In three roads in Clifton (Clifton Park, Clifton Park Road and College Road) there are 89 houses, of which 21 received their milk supply from an infected source (X, Y or Z), the remaining 68 houses received milk from other sources.

Seventeen of these 21 houses were invaded by fever within 23 days; no cases occurred in the remaining 68 houses. Supposing that we eliminate milk as a possible

source of infection, so that the 21 houses differ in no known respect from the other 68 houses, and supposing one case of fever alone had occurred in the 89 houses.

The probability that this one cases would occur in one of this group of 21 houses would be $= \frac{21}{89}$; and the probability that a second case should occur (independently of the first case) in the same group would be $= \frac{20}{88}$. But the probability that *both* cases would occur amongst this group would be $= \frac{21 \times 20}{89 \times 88}$; and the probability that 17 cases occurring amongst these 89 houses would all be in the group of 21 houses (as they were) would be

$$= \frac{21 \times 20 \times 19 \times \ . \ . \ . \ . \ . \ 7 \times 6 \times 5}{89 \times 88 \times 87 \times \ . \ . \ . \ . \ . \ 75 \times 74 \times 73}*$$

$$= \frac{1}{126,\ 638,\ 200,\ 257,\ 597}$$

That is, there would be only one chance in 126 billions, of this happening as it did, unless we allow the infected milk to be a true cause.

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* Prof. Barrell, of University College, has kindly suggested a neater statement, by the method of Combinations :—

$$\text{No. of groups of 17 houses selected out of 89} = \frac{\lfloor 89}{\lfloor 17 \ \lfloor 72}$$

$$\text{No. of groups of 17 houses selected out of 21} = \frac{\lfloor 21}{\lfloor 17 \ \lfloor 4}$$

$$\therefore \text{Chance of selection being one of the latter groups} = \frac{\lfloor 21 \ \lfloor 72}{\lfloor 4 \ \lfloor 89}$$

This works out to the same result.

Incidence upon the College Houses, and some special instances.

Of the 8 College "Houses," containing many boys at susceptible ages, 5 were attacked, every one of which received, mixed or unmixed, the infected milk. Three Houses received the Z supply, but two were situated *above* the point at which the mixing occurred, and both these escaped entirely, the third was the first house served below this point, and 4 cases resulted.

In one "house" receiving the unmixed infection X during September, and containing 55 persons, 33 were definitely attacked with typhoid, and 6 others were attacked with temporary illness of an indefinite nature, probably typhoid. In a second, a Master's house, with 10 inmates, receiving the same supply, 6 cases occurred; in a third, containing 43 inmates, which had apparently escaped up to the 24th October, it was found that it had not been put upon this supply until the 17th October, and in due course 2 cases only followed, on 24th and 27th October respectively. Of 8 houses supplied after this date (17th Oct.), only this one was attacked, and only these 2 cases resulted; this result furnished an indication of diminution in the amount or intensity of the poison; in a fourth "house" on the Z supply 4 cases only resulted, and in a fifth, 2 cases followed a single delivery of the X milk on one Sunday when the boy delivering this milk relieved another boy who was taking a holiday. In no College house receiving other supplies did a single case occur.

In two instances a single exposure to infection has enabled the duration of the incubation period to be determined. In one of these a girl of 9, on a visit to Clifton, drank some of the unboiled infected milk, and developed Enteric Fever at the end of a week; in another, a child from another part of Bristol visited an aunt who was servant at a house supplied with infected milk, where 5 other cases occurred: she drank milk and sickened in seven days.

In one girls' school of 30 girls on the Y round, 20 persons drank milk at supper, of these 5 drank only boiled milk, and they have remained well. Of the 15 who drank unboiled milk, 12 have had Typhoid, and 3 only escaped; one of those who escaped had Typhoid Fever severely in 1895, and was thus, possibly, immune. Unboiled milk was also used at lunch, but the main incidence seems to have been upon the drinkers at supper.

The remarkable immunity of the many schools in Clifton, none of which have been attacked, except those few which happened to be supplied from an infected source, is very significant. In one large girls' day school in Clifton, with over 230 pupils, 10 girls living in 5 houses were attacked by Typhoid, every one of them in houses supplied with milk known to be infected. In the Grammar School, with over 200 boys, one only was attacked by Typhoid, and he lived within a few doors of the X store, and obtained his milk therefrom. The last house supplied on the Z round after infection was an institution containing 63 persons, not one of whom was attacked; here a system of scalding the milk is in use.

The conditions at the Farm X.

The cows upon the farm were inspected by a Veterinary Surgeon, and declared to be perfectly healthy. An analysis of the milk, taken on the 26th and 28th October, showed no evidence of added water. No illness amongst any persons at the farm could be traced.

A stream known as the Ashton Brook flows through X Farm, and runs close to the farm buildings. By the side of this stream, at a distance of only a few feet from it was a pump drawing water from a shallow well, and used for all purposes of domestic or dairy use.

Samples of the water from this pump and from the adjacent stream were submitted to the City Analyst (Mr. Stoddart), who reported :—

"There is a remarkable closeness of agreement between these waters, which "suggests that the pump is not supplied from a spring but from the stream. Your "inspection of the locality will have determined whether this is possible.

"The analytical results prove these samples to be highly charged with putrescent "organic matter, whilst a direct microscopic examination, without the assistance of "culture processes, shows them to be swarming with micro-organisms in great "variety. Here also it is not possible to state with certainty whether part of the "organic filth contained in these waters is or is not of sewage origin. From a "careful consideration of the data, and from a knowledge of the water of the locality, "I think there are distinct indications of sewage pollution, but the evidence, as is "generally the case with stream waters, is not conclusive. However this may be, "I have no hesitation in saying that these waters are not fit to be used for dairy "work.

"Water for this purpose should unquestionably be judged by as high a standard "as that used for drinking. For not only is the danger of direct transmission of "infective matter as real as when the water is itself consumed, but the stimulus "afforded to pathogenic and other organisms by the presence of abundant food "material tends to ensure their prolonged vitality, and frequently their abundant "multiplication."

	X Farm Pump.	Stream at X Farm.
Saline Ammonia	·0030	·0032
Albuminoid Ammonia.	·0078	·0083
Nitrogen as Nitrates and Nitrites	·06	·23
Nitrites.....	Trace	Strong trace
Chlorine as Chlorides..	1·40	1·40
Oxygen absorbed in 15 min. at 80° F.....	·045	·088
Oxygen absorbed in 4 hours at 80° F. ...	·072	·101
Total dissolved solids..	37·0	37·0
Appearance.....	Persistently turbid	Turbid
Deposit	Filmy deposit consisting almost entirely of micro-organisms	Much organic debris. Mycelium, infusoria, and bacteria

On December 4th Mr. Stoddart furnished me with the following report :—

"I have now completed the bacteriological examination of the samples of water "received from you on October 26th.

"This branch of analysis may take, as you are aware, two directions, either an "inquiry into the number and kind of the micro-organisms present, or the detection "of a given species. In the present instance the character of the samples was so "clearly indicated by the results of the chemical examination already communicated "to you, as to render any general inquiry into their bacterial contents quite "superfluous; by direct microscopic observations they were seen to be thickly "populated by schizomycetes. My attention therefore was strictly confined to the "detection of the typhoid bacillus.

"The most approved method of carrying out this research is to distribute the "water under examination through culture media, treated in such a manner as to "inhibit the growth of the majority of the commonly occurring forms, so that the "typhoid bacillus, if present, may be the more readily revealed. Individual colonies "arising from the multiplication of single organisms or groups of organisms are "then examined in pure culture, and subjected to certain distinctive tests.

"Without entering into technical details, I may say, briefly, that by this process, "which is very tedious and laborious, I was not able to detect any bacillus capable of "identification as that of typhoid fever; but that all the samples were found to "contain large numbers of micro-organisms belonging to the group known as "Bacillus Coli, thus confirming the opinion as to their polluted character, based "upon a consideration of the results of chemical analysis.

"Whilst I did not feel justified in neglecting to employ a method which is in "general use, I also applied a process which I have lately devised, and which "readily detects the typhoid bacillus under conditions which do not allow of its "isolation by the usual method. By this procedure, instead of mechanically "separating the individual bacteria in a water and allowing them to develop apart "from one another, the typhoid bacillus, if present, is encouraged to grow away from "the complex mixture of non-specific forms with which it is associated.

"On applying this test to the suspended matter collected from a portion of each "of the samples by centrifugal action I obtained from the X Farm water a growth "exactly resembling that of the typhoid bacillus, whilst nothing similar was "obtained from either of the other samples. It was noteworthy also that on again "examining a sample of water from the same well after an interval of five days, this "suspicious organism was absent.

"Pure sub-cultures were prepared from the original growth, and the bacillus so "obtained has been kept under observation now for some weeks, and has been "subjected to every known test. After a very careful consideration of the results of "these tests, I concluded that the bacillus under examination was not that of "typhoid fever, as it presented well marked and constant differences, both cultural "and morphological.

"It has frequently been suggested that the typhoid bacillus under some circum-"stances, such for instance as prolonged immersion in water, may lose some of its "distinctive features, resuming its normal character after re-introduction into the "system. As it appeared to be of great importance in connection with this inquiry "to clear up any doubt of this kind, it became necessary to test the behaviour of the "bacillus upon a living animal, I therefore placed a pure culture in the hands of "Dr. Allan Macfadyen, Director of the British Institute of Preventive Medicine, for "this purpose.

"Dr. Macfadyen reports that this bacillus has no pathogenic action upon guinea-"pigs; and that this result, in conjunction with those of the culture tests referred "to above, shows that it has no relation with the bacillus of typhoid fever.

"I have, therefore, to report that I have been unable to obtain evidence of the "presence of the typhoid bacillus in the samples of water submitted to me.

"As to the general bearing of this negative result upon the causation of the "Clifton epidemic, I may point out that in similar inquiries the attempt to isolate "the typhoid bacillus has been successful, if at all, only in one or two cases of "recent infection of water; that in experiments by numerous investigators, where "the bacillus has been purposely added to polluted waters, all attempts to recover "it have proved unsuccessful after an interval of about three weeks, generally much "less; and that in the present instance probably a month elapsed after the convey-"ance of the infection by the milk before samples of the suspected water were "obtained for analysis.

"In drawing any conclusions therefore from the non-detection of the typhoid "bacillus in these waters, it will be necessary to bear in mind that, assuming the "initial infection, the probability of obtaining positive results was extremely "slight."

Signed) "F. WALLIS STODDART."

While the chemical examination was in progress, personal inspection of the course of the Ashton Brook, shewed that it formed practically the main sewer of the straggling village of Long Ashton, which extends for a distance of a mile or more along the main road. The road here runs parallel to and at a higher level than the brook, at a mean distance of some 200 yards from it. The land rises abruptly from the brook towards the village, and the natural drainage of the village is toward the brook. The Farm X is situated on this brook and immediately below the village. We found at one spot that 37 houses had been connected to a 6-inch sewer which discharged directly into the brook, at a second that 22 houses had been connected to a cesspool, the overflow from which passed directly down a ditch into the same brook, at a third that 40 to 50 houses, including one large laundry, had been connected to a cesspool, the overflow from which was led through pipes to the brook, and one cottage at least on the brook discharges its sewage directly into it. These conditions amply confirm the chemical indications as to sewage contamination of stream and pump.

On the side of the brook remote from the village the land rises more or less abruptly toward the railway embankment of the Great Western main line, and again for some distance beyond this; so that the natural drainage of the whole valley is toward the Ashton Brook.

The source of pollution of the X Farm Milk.

It will be evident that while the X milk has been shown to have carried with it and distributed Enteric Fever along its own route, and to have conferred similar properties on the Milks to which it was added, and that the power for distribution of disease clung to it in its progress from Bower Ashton up to and through Clifton, it is still necessary to enquire how the poisonous germ of Enteric Fever became introduced into this X milk. This might have happened: 1, at Bower Ashton; 2, on the road from the Farm to Bower Ashton; 3, at the X Farm. At Bower Ashton I can learn

of no history of illness of a Typhoid nature antecedent to the two cases which occurred concurrently with those in Clifton as a result of drinking some of the infected milk, nor do the conditions there appear to favour chance pollution of the water supply.

Between this point and the Farm an examination of the route shows no possibility of the addition of impure water *except from the Ashton Brook.* All drinking water supplies along the route have been analysed.

The conditions at the farm were such that, given specific pollution of the brook, similar infection of the pump water is practically certain; and if the pollution of the brook were occasional only, the pollution of the pump water would be similarly occasional. In any case, as the brook was persistently polluted with excremental matters, the pump water would at all times be contingently dangerous as a domestic or dairy supply.

In addition to what we may call the intentional pollution of the brook by drains and overflows from cesspools constructed to this end, it will be remembered that the slope of the ground on both sides trends toward the brook, so that surface drainage would naturally find its way into the brook, especially during times of heavy rainfall.

Now the earliest cases of illness in Clifton seem to date their onset to the first week in October, while a very large second group of cases date their onset from the 10th or 12th October; this would indicate, allowing an average period of 14 days for incubation of the disease, that the pollution was introduced into the water, and thence found its way into the milk, somewhere between the middle and end of September. Dr. Fuller of Long Ashton assures me that no Typhoid Fever had to his knowledge existed in Ashton for many months before the outbreak.

There was no history of illness at X Farm, nor could we learn from an examination of the list of customers, that the clothes of typhoid patients had, previously to this outbreak, been washed at any of the local laundries. The chance of the infection of the stream by tramps suffering from mild or "ambulant" Typhoid, must always be kept in mind, but on enquiry we were informed that no cases of such illness had been detected passing through the Bourton Union.

We are unwilling at the present day to lightly accept the theory of the generation of a specific germ from excremental matters of a non-specific kind; and a failure to find any disease of a Typhoid nature on the Ashton Brook watershed, while not affecting in any degree the evidence as to the transmission of the Typhoid poison through milk would necessarily make the history of the outbreak an incomplete one.

In the course of our enquiries we learnt that a farm labourer (B. P., æt. 47) had suffered, according to his wife's account, from an illness of two weeks' duration, commencing about the middle of September. His wife and daughter, a young child, were also ill, the symptoms in each case comprising "sickness," pains in the head and "stomach," and "diarrhœa." Now the cottage where these people live is situated at such a distance from the brook, above the Railway embankment, and the disposal of the drainage from the cottage is so arranged, that it is difficult to see how persons confined to this house by illness could by any chance contaminate the brook. The man, however, works as labourer upon a farm, the fields of which extend below the Railway embankment towards the brook, and are at no great distance from it; and as he himself insisted, he "did not stop at home half an hour out of work," but worked on these fields all the time, and being ill while thus at work he had, *more rustico*, to make the hedgeside serve his needs; it became then of the first importance to determine if possible the nature of the man's illness.

On November 20th Dr. Heaven secured a specimen of his blood, which was forwarded directly to Dr. Klein for examination by the Widal reaction. I met Dr. Klein in his laboratory in London on November 24th, and saw the reaction, which was well marked: indeed, Dr. Klein remarked to me, "it is one of the most distinctive I have "ever seen."

The condition necessary to induce pollution of the brook from infective material thus deposited upon these fields, which gradually slope towards the brook, is sufficient rainfall; especially in the form of heavy storms during the period when the man thus suffering from "ambulant" Typhoid was using the fields.

Through the kindness of Mr. H. H. Harding, F.R. Met. Soc. of Fishponds, I have been able to ascertain the character of the daily rainfall during the month of September, and I find that between the 1st and the 8th September rain in excess of $\frac{1}{2}$-inch fell on the 1st, 5th and 8th, then followed a period of dry weather till the 17th, when heavy showers occurred during the afternoon. On the 19th, 22nd, 23rd, and 24th slight showers with drizzly rain occurred, chiefly in the evening, the 28th was also showery, and on the 29th over $\frac{1}{2}$-inch of rain fell, the morning being showery, and heavy rain falling during the afternoon. There was thus ample opportunity for the washing down of infective material by the hedgeside or roadside ditches into the brook at a point no very great distance above X Farm.

The Diagnostic use of the Widal Blood Reaction.

Between the dates 19th and 21st October, 1897, I found myself in this position:—I knew definitely of 5 cases of undoubted Typhoid, all apparently in the second week, if not later, of their illness; at the same time I had heard of a very wide prevalence of reputed "Influenza," the distribution of which in "selected" houses struck me as but little characteristic of this disease, the habits of which I had studied with interest in the epidemic of 1890, and

some following years. For example, one college house was seriously affected, whereas immediately adjacent houses of the same class were absolutely untouched. In addition, the habitual exemption of Clifton from prevalence of Enteric Fever (owing, no doubt, in part to the purity of the water supply and in part to the excellence of the sewerage arrangements) was, I felt sure, liable to mislead the clinical observer in dealing with the early stages of a widespread prevalence of a disease accompanied by obscure feverish symptoms. I was also aware of the indeterminate nature of the onset of "Typhoid Fever," in which disease, as Newsholme has pointed out, nearly 80 per cent. of the cases are not notified till the second week or later.

At the same time it had become most essential in the public interest to clear up, in as short a time as possible, any doubts as to the actuality of a "Typhoid" outbreak, so that the cause might be ascertained and removed. Now the Widal reaction will give reliable results as early as the 4th or 5th day in cases of Typhoid, and I at once determined upon the wide application of this test.

The use of the Widal reaction in this outbreak is, I think, deserving of some attention, for, so far as I am aware, this is the first occasion upon which it has been used on a large scale and has proved successful, not only in the confirmation of selected doubtful cases, but in actually establishing a diagnosis amongst diverse obscure cases with feverish symptoms, where clinical observation was as yet at fault.

Most important issues hung upon the success or failure of my attempt, for, had the outbreak not been promptly defined and explained, panic, which some irresponsibles seem always anxious to invoke, might have been established, and irreparable damage to the business of Clifton and the City might have ensued.

My reliance upon the test has been very fully justified by the results:—In the case of 192 examinations made during the course of the outbreak between October 19th and

December 20th, I have been able to compare the Widal and clinical results, and I find that (using a dilution of in most cases 1 in 10 or 1 in 15, but in no case exceeding 1 in 20), that 121 gave a *complete* reaction, *i.e.*, characteristic clumping as well as loss or marked impairment of motility, within half an hour, while 17 more gave the *complete* reaction within the hour.

Of these 121 positive results, 119 agreed with the subsequent clinical development of the illness: 2 only, or less than 2 per cent., did not agree.

In the case of 15 other specimens examined, some definite clumping was observed in the above dilution only after a period extending much over an hour, and considerable motility persisted. Of these doubtful cases 6 developed as clinical typhoid, and 9 proved not to be cases of this disease.

Negative results were obtained in the case of 39 other specimens examined, of which four developed clinical typhoid; in two of these an opportunity of a second examination was afforded, and gave then a positive result, $(\frac{10}{19})$ $(\frac{7}{12})$ In the other two a second examination was not made. The remaining cases all proved to be not typhoid fever, thus agreeing with the Widal re-action.

I think I am justified in considering these results satisfactory, especially as the examinations were made under great pressure.

Of the Widal examinations, 36 were of cases admitted to the Royal Infirmary, Bristol, and I have been able, through the courtesy of Dr. Stack, the House Physician, to compare the clinical course of the cases with the Widal result. Of the 36 cases, 26 gave a positive result, of these 14 acted almost immediately, clumping and loss of motility being established in a few minutes; nine acted not quite so rapidly, the re-action being complete within 15 minutes, the remaining three showed a complete re-action within 30 minutes.

The dilution varied from 1 in 10 to 1 in 20, but did not exceed this. The clinical course of every one of these 26 cases determined them to be Typhoid; in 1 case (927) F. 55; the symptoms were indefinite, the case being complicated with considerable bronchial mischief, but a post-mortem confirmed the Widal reaction, which was complete within 5 minutes; in two other (895, 929) cases, extensive and destructive ulceration of the large intestine was noticed, and in one of these the small intestine seemed to have escaped altogether, and Peyer's patches were normal in appearance.

Another fatal case (1235) in a boy of 11, which gave on the 16th day of illness a very definite Widal reaction complete in 10 minutes, did not present during life any definite symptoms of Enteric Fever, but the boy was believed to be suffering from Acute Lobar Pneumonia. The diagnosis of Enteric Fever was only accepted provisionally on the Widal result, but the post-mortem examination showed characteristic though partial ulceration of Peyer's patches, and the pneumonia was seen to be septic. Suppurative otitis media was also found to exist, and the bacillus coli was recovered both from the ear and from the lung.

Three cases gave indefinite results, much exceeding the time limits:—

1. (906) Clumping did not begin for 30 minutes and proceeded slowly, was well marked in 1 hour 10 minutes: motile forms persisting (1 in 10).
2. (W. 163) No reaction in 1 hour 45 minutes, some clumping in $2\frac{1}{2}$ hours (1 in 10).
3. Some clumping in 2 hours, but still considerable motility after $2\frac{3}{4}$ hours (1 in 10.)
4. Clumping marked in 1 hour 20 minutes (1 in 15).

In none of these cases would a positive certificate be given. They all proved not to be Enteric Fever: the first was a case of Gastric Ulcer, the last of general Tuberculosis.

Five cases gave quite negative results (1 in 10 to 1 in 20) over periods from $1\frac{1}{4}$ to 6 hours, and clinically were determined not to be Enteric Fever; one was a case of Phthisis.

Of 12 examinations made for Dr. T. M. Carter, on the Low Level round, 6 gave positive results, commencing within 5 to 20 minutes, and fully marked within the hour, while 6 gave definitely negative results.

All the results agreed with the clinical development of the cases, except one of the positive results (991), a girl of 6, who had no history of previous Typhoid, but presented a history of malaise and loss of appetite 10 days, diarrhœa 2 days, milk from a source not known to be infected; she lived next door to a case of Enteric Fever. The blood from this case gave complete positive results on 28th October within 15 minutes, on 4th November within 30 minutes, and on 24th November within 20 minutes, but the symptoms subsided with no rise of temperature or other indication to retard convalescence. The father of this child suffered at the same time from an attack of intestinal catarrh, with slight rise of temperature, subsiding on the second day. His blood gave a negative result over 3 hours on 20th November.

* *Occupation in relation to attacks.*

Murchison† in his treatise on "The Continued Fevers of Great Britain" (3rd ed., p. 456) mentions that of 1,457 persons admitted into the London Fever Hospital suffering from Enteric Fever, nearly one-third of the patients were female servants, most of whom had been in comfortable situations. A similar heavy incidence upon domestic servants was noticed in the present outbreak, and more than one quarter of the total attacks fell upon this class.

* From a paper read before the Epidemiological Society, March 18th, 1898.

† The comparisons instituted with Dr. Murchison's figures are intended to bring out some salient features of Milk Epidemics, and are not in any way a criticism upon his figures. The small figures of the Clifton outbreak invalidate conclusions based on its results.

The distribution of the infected milk was amongst persons practically all of the same class, private families, well-to-do lodging-houses and school boarding-houses: only one milk round (X low level) touched a working class district, through the medium of a small shop supplied with X milk, from which as a centre 9 of the casual cases and 1 death ensued.

The class of district in which the milk was distributed is well shown by the fact that in 120 houses of which I have particulars, there were 1,012 inmates, of whom, 302 were domestic servants.

Under these circumstances the only influence of occupation upon attack will be in regard to the greater or less incidence of the disease upon persons habitually consuming much or little milk; and I have accordingly grouped the cases under the following occupational headings:—

OCCUPATIONS.	ATTACKS.			Fatality in each class %	DEATHS.		
	M.	F.	Total attacks.		Total deaths.	M.	F.
Householders and Families	13	37	50	16·0	8	4	4
Masters & Governesses	4	4	8	25·0	2	1	1
Boys & Girls attending School: ages, (3-20).	58	52	110	4·5	5	1	4
Domestic Servants.	3	62	65	21·5	14	2	12
Medical Student, Nurses.	1	3	4	25·0	1	0	1
Others: Shop Assistants.	1	6	7	14·2	1	0	1
Totals	80	164	244	12·7	31	8	23

In this classification, we at once notice the significantly heavier incidence upon women, not only upon the domestic servants, but also amongst members of families, so that in the aggregate we find 164, or two-thirds of the total number of attacks, in females. Murchison (op. cit. p. 437) points out that, in general, Enteric Fever attacks one sex as readily as the other, and that of 5,988 cases admitted into the London Fever Hospital during the twenty-three years (1848—70), 3,001 were males and 2,987 were females; or the males exceeded the females by 14. The excess upon females in Clifton is by itself suggestive of a milk carried infection.

Attacks and deaths by Age.

In the following table the attacks and deaths are shown in relation to age-groups:—

	ATTACKS.				DEATHS.		
Ages.	M.	F.	Total attacks.	Fatality per cent.	Total deaths.	M.	F.
0—5	3	7	10	10	1	1	0
5—10	10	18	28	7	2	2	0
10—15	14	22	36	5·5	2	0	2
15—20	38	28	66	6	4	2	2
20—25	2	27	29	31	9	0	9
25—30	2	22	24	16	4	0	4
30—35	5	14	19	10·5	2	0	2
35—40	2	7	9	11 1	1	1	0
40—45	0	9	9	22·2	2	0	2
45—50	2	3	5	20	1	1	0
50+	2	7	9	33·3	3	1	2
All Ages.	80	164	244	12·7	31	8	23

The incidence of the attacks by age is in this outbreak controlled by the special circumstances of the case, and especially by the fact of milk having been distributed and used amongst large school boarding houses. As the school age here extends up to 20 years, there is a notably large number of attacks at ages 15—20. But at all school ages from 5 upwards the attacks are significantly high.

Murchison especially points out the influence of age on the pre-disposition to Enteric Fever, and quotes the mean age of 1,772 admissions into the London Fever Hospital during ten years (1848—57) as 21·2. Of the cases admitted during a further period of 23 years (1848—70) he found nearly one-half were between 15 and 25 years of age, and more than one-fourth were under 15. Less than one-seventh were above 30, and only 1 in 71 exceeded 50. He concludes that persons under 30 are more than four times as liable to Enteric Fever as persons over 30.

In this outbreak the attacks upon children below the age of 15 were in excess, being nearer a third than a quarter of the total attacks, while the attacks at ages 15—25 are somewhat less than is shown in Murchison's figures: the excess in attacks upon younger children is significant, in conjunction with the heavy incidence upon females and upon domestic servants, of the communication of the infection by milk. The attacks at ages above 30 are likewise in excess of Murchison's figures, for whereas he found less than one-seventh above this age, in the Clifton outbreak more than one-fifth of the total attacks occurred at ages above 30; and while he found only 1 in 71 of the attacks at ages above 50, in this outbreak 1 in 27 were above this age. The preponderance of attacks on females also continues to be noticeable at all ages above 30, as it was at every age period below 30, with the single exception of the 15—20 period.

The general attack rate upon the 1,012 inmates of the enumerated houses amounted to 18·3 per cent., while that upon the 302 domestic servants amounted to 17·8, and

that upon the 299 boys and girls of school ages amounted to 31·4 per cent. The small fatality amongst schoolboys and schoolgirls is in favourable contrast to the severe fatality amongst domestic servants.

The fatality or percentage case-mortality of this outbreak deserves some notice, and especially the small fatality at ages 5—20. Murchison (p. 606 op. cit) points out that the death rate of Enteric Fever is not influenced by age to the same extent as that of typhus, and that there is a greater uniformity in the rate of mortality at different periods of life in Enteric Fever. I have condensed my table to conform to the age-periods selected by Murchison, and here give the results side by side for comparison :—

AGE PERIODS.	CASE MORTALITY per cent.	
	MURCHISON.	CLIFTON.
Under 10	11·36	7·89
10 – 15	12·86	5·5
15 - 20	15·48	6·0
20 – 30	20·46	24·5
30 – 40	25·90	10·7
40 – 50	25·0	21·4
50 +	34·94	33·3

In this outbreak not only is the general fatality lower than Murchison found, but it is lower at every age period with the exception of the 20—30 period.

This may be partly accounted for by the error to be expected in dealing with a small number of cases (244) in comparison with Murchison's figures, which are based upon 5,911 cases ; it may also partly be due to the general rule

in milk-carried disease that the cases are usually of a mild type, a result probably indicative of the high normal resistance of many who yield only to the effect of repeated and large direct doses of the poison, and who under ordinary circumstances of infection would remain immune. The excess of mortality at ages 20-30 is notable in connection with the incidence upon domestic servants to which I have alluded above. Of the 13 deaths at these ages, 9 were of domestic servants.

The influence of sex upon mortality from Enteric Fever was shown in the records of the London Fever Hospital by an excess of mortality amongst females amounting to 1 per cent. In this outbreak 23 deaths occurred amongst females to 8 amongst males, or nearly three times as many.

In the next table the houses on the regular milk rounds alone have been taken into consideration to the exclusion of the casual supplies, as to which we can only know the number of those that happened to be attacked.

The attack rate at all ages is seen to be heaviest upon the X supply, as was the house incidence rate, but the mortality was proportionately heavier upon the Y supply. The heavy attack rate at ages 15-20 on the X supply is noteworthy, as connected with a big school-house containing many boys at these ages, of whom 23 were attacked, but none died.

The measures taken to deal with the outbreak were simple but successful. As soon as the diagnosis was established, the supply of milk to consumers was at once stopped, the milk being bought by the city and destroyed under supervision, while the public was urged to boil all milk or cream before use. As a result, the notification figures fell in successive weeks from 100 to 60, 19, 9, 2, 2, 2, 3 and 0, and the outbreak was at an end.

ATTACK RATES IN SUPPLIED HOUSES AT VARIOUS AGE PERIODS.

A census of the houses supplied in Clifton by the two infected rounds X and Y, and by the third round Z after infection has enabled me to show the attack-rate at various age periods upon persons living in these houses.

(Rates per 100 living at each age group.)

Milk Round.		0-5	Rate %	5-10	Rate %	10-15	Rate %	15-20	Rate %	20-30	Rate %	30-40	Rate %	40 ×	Rate %	Total all ages.	Rate %	DEATHS. All ages.	DEATHS. Rate %
X	Persons	7	42·8	21	47·6	29	41·3	76	47·3	175	13·1	55	32·7	90	13·3	453	25·1	13	2·8
	Attacks	3		10		12		36		23		18		12		114			
Y	Persons	7	28·5	8	37·5	16	62·5	70	18·5	102	11·7	26	19·2	79	3·8	308	15·5	10	3·2
	Attacks	2		3		10		13		12		5		3		48			
Z	Persons	0	—	4	50·0	8	62·5	56	14·1	32	15·6	18	—	36	5·5	154	14·2	2	1·2
	Attacks	0		2		5		8		5		0		2		22			
Totals	Persons	14	35·7	33	45·4	53	50·9	202	28·2	309	12·9	99	23·2	205	8·2	915	20·1	25	2·7
	Attacks	5		15		27		57		40		23		17		184			
Total Deaths.		0	—	1	3·3	2	3·7	4	1·9	10	3·2	3	3·0	5	2·4	25	2·7	—	—

PART II.

Report of the Chief Inspector of Nuisances.

1897. PUBLIC HEALTH DEPARTMENT,
40 PRINCE STREET,
January, 1898.

To the BRISTOL URBAN SANITARY AUTHORITY,

GENTLEMEN,—

I have the honour of submitting the following brief Report, with Summary, showing the amount of work effected in this Department during the past year, which will, I trust, receive your approbation.

1,197 complaints and applications were received and recorded at this Office (this being 240 less than last year), all of which were promptly investigated, when it was found that no nuisance existed at 412, or 37·2 per cent. of the premises to which attention had been drawn.

1,380 cases of Infectious Disease were notified to the Medical Officer of Health, and duly enquired into by the Inspectors in their respective districts, these enquiries, necessitating 2,412 visits, were as usual conducted in such a manner that no friction was caused. 855 infected houses were disinfected, and 33,608 articles of infected clothing, bedding, etc., removed therefrom, disinfected by steam, and returned to the houses, 239 articles of bedding, etc., similarly infected, were also removed and destroyed at the request of the various owners.

I again desire to draw attention to the want of adequate space for receiving, sorting, storing and sending off such a large number of articles, which will, without doubt, be much larger now that Greater Bristol is an accomplished fact.

The Informal Notices served by the District and Special Inspectors have been more successful than usual, as will be seen from the fact that, whilst 2,246 Informal Notices were served, these were so promptly complied with that only 55 Formal or Statutory Notices were required, this, to me, is a very pleasing matter, as it clearly indicates that the District and Special Inspectors employ a considerable amount of tact in dealing with the various matters coming under their notice.

The Prosecutions also for non-compliance with Notices, were less than usual, see full particulars appended.

Houses Let in Lodgings number 414, as against 411 last year, and have been kept well in accord with the Bye-Laws, only one owner having been prosecuted for non-compliance therewith. These houses will in future be placed under the direct supervision of the Inspectors of the Districts in which they are situate, instead of having a Special Inspector as heretofore. I sincerely trust the sanitary conditions of the houses will not suffer in consequence of the change, of this however I am rather sceptical, as the occupants of such houses get used to the visits of one Inspector, and such Inspector calling regularly, and by using ordinary tact, soon understands the habits of these occupants, and his advice, judiciously given, has more weight than that of any one else.

Dairies, Cowsheds, and Milkshops.—Those now number 1,273, and have been kept well up to the mark during the year. The Typhoid outbreak at Clifton, which occurred in October, has however drawn increased attention to outlying Dairy Farms (the condition of one such no doubt being the cause of the outbreak alluded to), and doubtless the enlargement of the City boundaries, with the increased supervision consequent thereon will materially induce to the betterment of the sanitary arrangements at these Farms, and the experience gained during the said outbreak and since the enlargement of the City boundaries, proves conclusively that such supervision is not given before it was wanted.

Slaughter Houses have as usual been visited as regularly as their scattered situations rendered possible, and were found to be kept in as good order as their structural conditions and general surroundings will permit. During the year three old licenses have lapsed, the sites being required for other purposes, and one new license granted for one year only, which may, however, be renewed annually, in accordance with the provisions of the Public Health Acts (Amendment Act), 1890. The number of Slaughter Houses in the whole City is now 126—viz., 84 in the old City, 29 at St. George's, 9 at Stapleton, 2 at Horfield, and 2 at Totterdown. My recent visit to several towns in Belgium has more than ever convinced me that Public Abattoirs would be a great boon in our City, and do much towards, if not entirely prevent, the sale of diseased or unwholesome meat, as every animal slaughtered would be under the immediate supervision of the Inspector.

It would doubtless be too much to expect such rigid regulations as in Belgium, where every part of every animal slaughtered is, after being dressed, stamped in such a manner that until the carcase is cut up into very small joints, the stamp can be readily seen, and it is unlawful to expose for sale the carcase of any animal less than three months old.

The following is the number of Cattle, Meat, Fish, Fruit and Vegetables destroyed during the year as unfit for food, viz.:—

The carcases of 16 Beasts
" 11 Sheep
" 16 Pigs
" 3 Calves
1,622 lbs. of Meat of various kinds from Butchers' shops.

207 Packages of Fish
229 " Vegetables
25 " Fruit
and 137 Rabbits.

Factory and Workshops Acts.—In connection with this work I can only repeat what I have said annually for the last few years, that it has been carried on in conjunction with H.M. Inspectors of Factories without causing friction on either side. The enlargement of the City boundaries has necessitated the employment of an additional Inspector for this work. It is, however, as yet too soon to say anything more of this additional work, which I shall do my utmost to conduct on the same lines as heretofore, and with, I trust, the same good results.

Housing of the Working Classes Act, 1890.—Although very little has been done during the past year in connection with this Act—viz., 4 houses reported unfit for human habitation, 2 of which were closed by the owners under the Notice, and without a Magistrates' order. One was made habitable, and 1 purchased for Street Improvements. Several Courts and such like places in the older parts of the City, numbering some 70 houses, have however been demolished for business purposes by private enterprise.

House Drains—I again desire to draw attention to the large number of house drains laid directly under the houses. 614 such drains were found to be more or less defective during the year, chiefly in houses of the artizan class. When the houses are continuous all through a street, the drains run beneath each house from the W.C. behind to the sewer in front, and, as I have said before, when such drains go wrong there is not only the inconvenience of having floors taken up and ground excavated, but the danger of inhaling foul and drain-polluted air, and it would be a much desired improvement, from a sanitary point of view, to insist that no drain should be allowed to pass under a dwelling-house.

JAMES W. KIRLEY,

Chief Inspector of Nuisances.

Summary of Nuisances abated and work done by, and under the Supervision of the Inspectors in the Health Department during the year 1897.

Prepared by the Chief Inspector of Nuisances.

NATURE OF WORK.	By District Inspectors.	By Inspector of Dairies, &c.	By Inspector of Workshops &c.	By Inspector of Tenement Houses.	By Inspector of Slaughter Houses, &c.	By Inspector of Common Lodging Houses.	By Inspector of Bake Houses.	Totals.
Visits and Re-visits	23334	2063	2674	2952	10839	266	833	42961
Drains entirely relaid, &c	394	12	59	15			6	486
Do. partially relaid	710	12	56		2	1	14	795
W.C.'s fitted with new pans, &c. ...	934	25	104	16	3		12	1094
Do. cleansed and amended	84	15	22	39				160
Do. fitted with flushing appliances ..	146	9	74	5				234
Dilapidated Houses repaired, &c. ..	226						31	257
Yards paved by Owners	620	19	76	101		1	4	821
Offensive Deposits removed	148	26	11	21	16	1	1	224
Sinks and Yard Gullies trapped ...	1324	55	167	32			11	1589
Defective Roofs repaired	156	4	16	47				223
Cesspools abolished	10							10
Keeping of Pigs, &c., prohibited ...	177							177
Smoke Nuisances abated	2						1	3
Offensive Trade do.	20							20
Polluted Wells closed	11	3						14
Company's Water provided to houses ..	69	5	1	1				76
Additional W.C. accommodation provided			16					16
Nuisances from overcrowding abated ..	32		2	19				53
Dairies, &c., Cleansed and Improved ...		37						37
Workrooms, Passages, &c., limewashed, &c. ... —			52					52
Do. better ventilation secured			4				4	8
Rooms at Tenement Houses limewashed, &c.				933				933
Passages and Stairs at do. do.				190				190
Slaughter Houses limewashed					31			31
Do. Paving repaired ...					26			26
Half-yearly Cleansing Notices						114		114
Dilapidations						4		4
Dirty Rooms						3		3
Limewashing and Cleansing							40	40
Other Nuisances abated	317	30				4	8	359
Totals	**5380**	**252**	**660**	**1419**	**78**	**128**	**132**	**8049**

No. of Complaints received and attended to	1107	
,, Offensive trades visited	120	
,, Smoke observations taken	158	
,, Times smoke test applied to drains	1127	
,, Visits to houses *re* infectious disease	2412	
,, Houses disinfected after such disease	855	
,, Articles of Bedding, &c., removed and disinfected ...	33608	
,, Do. Do. and burnt	239	
Total number of Articles dealt with	33847	
Notices served, Informal, letters, and verbal	2246	2897
,, Formal	55	
,, Systematic—limewashing, cleansing, &c. ...	596	
No. of Slaughter-houses on Register	126	
,, Common Lodging Houses (containing 219 rooms, certified to accommodate 1067. The rooms contain 893 single beds for men, 24 single beds for women, and 67 double beds separated)		
,, Dairies, Cowsheds and Milkshops ... —	1273	
,, Houses let in Lodgings	414	
,, Workshops	1042	
,, Bakehouses	290	

J. W. KIRLEY,
Chief Inspector of Nuisances.

Summary of Work effected in the Health Department during Twelve Years—1886-97.

Prepared by the Chief Inspector of Nuisances.

TABLE SHOWING THE NUMBER OF NUISANCES ABATED AND OTHER WORK DONE IN EACH YEAR SINCE 1886.

	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897
Number of Nuisances abated	2424	3101	3139	3672	5600	5101	7485	8403	7564	7366	8800	8049
Polluted Wells closed	16	17	18	48	35	14	14	26	27	32	14	14
Houses supplied with Co.'s Water ...	27	29	36	113	68	24	37	223	79	85	68	76
Houses disinfected ...	215	541	403	264	558	879	1351	1815	931	651	1389	855
Articles of bedding, &c., disinfected ...	7727	19563	23233	14462	20523	31112	36722	46959	36274	24320	49226	33847

Factory and Workshops Acts, 1878, 1883, 1895.

Inspection of Bakehouses & Premises, &c.

These places have received the usual attention, with the result that during the year rather more sanitary defects or contraventions of the Regulations were noted than in the previous year.

This arose mostly from want of attention to the half-yearly lime-washing rule, and from an increased number of defective drains and dilapidations of floors, premises, etc., coming under notice.

This result does not mean that the general condition of these places has deteriorated, but that a higher standard has been obtained; and that old but questionable conditions considered sufficiently good in the past, have been replaced by better materials and conditions, there is, therefore, a gain to that extent.

By the extension of the City boundaries, 115 Bakehouses have been added to the City Register, which, with the 295 that existed within the old boundary, bring the total to 409, and there are several others in course of construction.

Respecting the sanitary conditions of the 115 added Bakehouses, some of them were found in excellent condition and many in a very fair state, on the other hand others were in a very bad condition, and to a considerable extent the latter were the cause of the increased number of insanitary conditions found during the year.

Considerable improvements have been secured in the worst cases, and others are now being considered and dealt with.

Table 1. **Table of Bakehouse Inspection for the Year.**

1897. With particulars of Condition, Contraventions, Action taken, and Result.

Total number of visits and inspections	...	833
Number of visits to Bakehouses, at which they were found in very good or passable order and condition	587	
Ditto ditto ditto not in satisfactory condition from one or more of the undermentioned 140 defects	140	
Number of visits made in connection with Notices given, and seeing to proper compliance with same ...	106	
About 290 Bakehouses were in operation during the year	833	833

PARTICULARS OF DEFECTS.

Contraventions of lime-washing regulations	53	Informal Notices given for the removal of defects, limewashing, cleansing, &c.	114
Bakehouse premises with defective drains found thereon	25	Written Notices served and complied with ...	20
Repairs of floors and roofs	40	Formal Notices now running	6
Ventilation	4		
Accumulation of dung in yards	2		
Place used as bakehouse with W.C. directly connected	0		
Requiring to be cleaned	16		
	140		140

S. O. DIMOND,
Inspector.

TABLE II.

Showing Defects found and remedied in each year since Bakehouse Inspection was instituted.

YEAR.	PARTICULARS.	TOTALS.
1884	Total contraventions in respect of cleansing, lime-washing, defective drains, repairs, and defective ventilation.	342
1885	Ditto	244
1886	Ditto	96
1887	Ditto	132
1888	Ditto	69
1889	Ditto	65
1890	Ditto	89
1891	Ditto	80
1892	Ditto	71
1893	Ditto	36
1894	Ditto	57
1895	Ditto	74
1896	Ditto	51
1897	Ditto	140

Particulars of Cases taken before the Justices during the year.

1897.

DATE.	NAME.	OFFENCE.	RESULT.
May 27th	S. Harding	Slaughtering a Bullock on unlicensed premises.	Fined £5 and 3 Guineas costs.
Oct. 15th	E. L. Grigg	Nuisance from three Dilapidated Houses at Grafton Street.	Adjourned for a month, work then done, cases withdrawn on payment of costs
Oct. 15th	H. G. Courtenay	Ditto from 4 Dilapidated Houses at Margaret Place, Bedminster.	Ditto
Oct. 15th	Mrs. Bowden	Nuisance from a defective W.C. at Union Terrace.	Ditto
Oct. 20th	J. Yates	Nuisance from keeping Fowls in a Cellar at 7 Crown Terrace.	Ordered to abate the Nuisance and to pay costs.
Oct. 20th	Mrs. E. Hall	A breach of the Bye-laws relating to tenement houses.	Ordered to pay the costs. Work done after service of Summons.
Nov. 17th	H. G. Selman	For exposing the carcase of a Diseased Bullock for sale at Lawford Street.	Fined 40/- and costs.

1897.

Baths and Wash-houses.

The four establishments at
The Weir,
The Mayor's Paddock, New Cut,
Jacob's Wells,
Rennison's,
return the following figures for the year's work :—

	No. of Bathers. Swimming Baths.	Private Baths.	Women Washing Clothes.
The Weir	29,762	43,977	29,968
The Mayor's Paddock, New Cut	35,834	29,501	22,582
Jacob's Wells (Baths only)	41,258	22,440	...
Rennison's (Swimming Bath only)	27,551	...	...
Total ...	124,407	95,918	52,550

Particulars supplied by Mr. KANE,

Baths Superintendent.

The City Analyst, Mr. F. Wallis Stoddart, F.I.C., F.C.S. has kindly supplied the following returns:—

"FOOD AND DRUGS ACT."

SUMMARY OF RETURNS FOR 1897.

Articles.	Analysed.	Condemned.
Milk	162	11
Skimmed Milk ...	1	0
Butter	48	2
Pepper	11	...
Lard	5	0
Sugar	4	...
Coffee	11	1
Vinegar	6	2
Confectionery ...	1	0
Flour	3	...
Cheese	14	...
Cider	4	1
Miscellaneous ...	10	1*
	280	18

* An Ice-cream contaminated with zinc.

The working of this Act in the City of Bristol is now entrusted to an Inspector acting under the Watch Committee, and is not administered by the Health Committee.

PART III.

Meteorological Observations taken at Clifton College.

1897. *(230 feet above mean Sea Level.)*

January.—The mean temperature for this month was 35·68 degrees, the average for the last 17 years being 38·32 degrees, so that on the whole the month was colder than usual by 2·64 degrees. For the first fortnight the weather was fairly mild, the mean temperature being about 40 degrees; but during the last fortnight cold weather prevailed, the minimum thermometer on the ground being below freezing point for 14 days, and the thermometer in the screen falling below freezing point on 13 days consecutively.

The highest temperature recorded was 47·4 degrees on the 7th, and the lowest on the ground—22·2 degrees—on the 24th.

There were 14 days on which rain or snow fell, the total amount being 1·805 inches, and the greater part of the rainfall occurring between the 3rd and 10th. There were small quantities of snow on the 16th, 19th, 22nd, 25th and 26th.

Pressure was high in the beginning of the month, and there was a period of high barometer from the 13th till the 21st, and no deep depression until the 30th, when the barometer fell to 29·22 inches.

February.—The average temperature for the month was 44·61 degrees, the average for 17 years being 40 degrees. Thus the month was considerably warmer than usual. The variations in temperature were inconsiderable, and there was no frost in the air and only once on the ground—namely, on the 1st, when the minimum reading was 30·8 degrees. The highest temperature recorded was 54·2 degrees on the 26th, and from the 19th till the 26th the weather was much warmer than usual.

The rainfall amounted to 3·465 inches, the average being 2·008 inches. During the first 13 days there was only one day (the 7th) without rain, and out of the whole month there were only 9 days without a measurable quantity.

The barometer was low during the first week, but during the remainder of the month it remained high, the readings from the 22nd till the 24th being above 30·6 inches.

March.—This month, like February, was warmer than usual, the mean temperature being 45·17 degrees, as against the average value of 42·37. This excess was mostly due to a period of unusually warm weather from the 15th till the 28th.

The highest temperature noted was 59·2 degrees on the 23rd. There was frost on the 8th and on the 30th, but on no other days. The lowest air temperature recorded was 30·2 degrees on the 30th.

The total rainfall was 4·085 inches, as against a normal value of 2·28 inches. There were falls of half an inch and upwards on the 3rd, 14th and 17th, and there was a measurable quantity of rain on 21 days.

The atmospheric pressure was generally low, especially so about the 3rd, the 15th, and the 31st. There was thunder on the 17th.

April.—The mean temperature for this month was 46·59 degrees, being slightly below the average of the last 17 Aprils. The beginning of the month was cold, but from the 10th onwards the temperature was on the whole practically normal. There was frost on the ground on the 1st and 5th, the lowest temperature reached being 30·2 degrees on the latter date. From the 26th till the 29th the temperature was unusually high, the maximum recorded being 66 degrees on the 28th.

This month, like the preceding, was a wet one, with a total rainfall of 3·871 inches, being nearly an inch (·88) above the average. There were 20 rainy days, the heaviest fall measured being ·880 inches on the 17th.

Pressure was very variable during the month, there being no period of high barometer, the prevailing feature of the weather being cyclonic.

May.—The mean temperature was 51·87 degrees, as compared with 52·74 degrees, the average value. During the first 10 days the temperature was nearly normal, and varied slightly from day to day, and the differences between day and night temperatures were moderate. From the 15th till the 25th, however, the range of temperature between day and night was very large, and the mean temperature on the whole was above the average. The highest temperature recorded was 71·6 degrees on the 18th, and the lowest (34·7 degrees) on the 13th.

The rainfall was 1·690 inches—slightly under the average—and it was confined to the first and last weeks of the month, there being altogether only 12 rainy days *(i.e.*, days on which one hundredth of an inch or more was measured).

The barometer was high during the first three weeks, but on the 27th it fell to 29·388 inches. The conditions were generally of an anticyclonic type from the 15th till the 25th.

June.—The weather of this month was exceedingly changeable in all respects. The mean temperature (60·76 degrees) was 1·35 degrees above the average, but the variations from day to day were very great; thus in four days (from the 9th to the 13th) the *mean* temperature rose from 52·3 degrees to 69·6 degrees, and the maximum temperature rose in the same time from 53·8 degrees to 79·0 degrees, and there was a similar rise from the 19th to the 23rd. The highest temperature recorded was 81·2 degrees on the 23rd, and the lowest (45·9 degrees) on the 2nd.

The total rainfall (3·215 inches) was about an inch more than the average, and yet there were only 9 rainy days. The heaviest fall was ·855 inches on the 8th. On the 24th, when a remarkable and most destructive hailstorm passed over part of Essex, there was no fall of rain in Clifton, but the weather was very warm, the mean temperature being 69·8 degrees.

The atmospheric pressure was very variable, but was on the whole slightly higher than usual.

July.—This month was warmer than usual, the mean temperature (64·17 degrees) being nearly 3 degrees higher than the average. The highest temperature recorded was 81·4 degrees on the 16th, and the lowest (47·9 degrees) on the 8th. From the 11th till the 16th there was a great difference (about 25 degs.) between day and night temperatures, but the temperature presented no other features of special interest.

The rainfall was 1·918 inches, as compared with an average of 3·465 inches, and there were only 8 days with rain, the greatest fall being 1·290 inches on the 19th and 20th.

The pressure was generally normal, the highest reading of the barometer being 30·637 inches on the 11th.

August.—The temperature during this month was higher than usual, the mean for the month being 62·30 degrees, or 2 degrees higher than the average. This excess was due mainly to a period of very hot weather in the beginning of the month, culminating in a maximum temperature in the screen of 84·9 degrees on the 4th. From the 12th onwards, however, the temperature was nearly normal, with very slight variations from day to day, and comparatively small diurnal range. This condition of temperature was accompanied by almost daily rain for the last three weeks of the month.

The total rainfall was 6·894 inches, or nearly 4 inches more than the average rainfall for the month, and on the 30th there was the extraordinary rainfall of 2·4 inches measured. There was rain on 22 days out of the 31, and between the 6th and the end of the month there were only 4 days without rain.

Pressure was low throughout the month, but there were no very deep depressions—in fact, the lowest readings was as high as 29·531 inches. The depressions were unusually numerous for this period of the year, as might be gathered from the rainfall, most of them moving northwards and north-eastwards along the western coasts.

September.—The mean temperature for this month was 55·54 degrees, as compared with the average value of 56·81 degrees. This defect was most pronounced during the first half of the month, the mean temperature during the last ten days being above the average. The highest temperature recorded was 69·6 degrees on the 27th, and the lowest (40·8 degrees) on the 10th.

The total rainfall was 3·877 inches, or about half an inch greater than usual, though the number of rainy days was not large, there being only 11 days on which a measurable quantity of rain fell. The heaviest fall was ·878 inches on the 5th, and the middle of the month was dry.

The atmospheric pressure was on the whole higher than usual, a clearly marked anticyclone prevailing from the 9th till the 16th; for the rest of the month it was variable, but never very low, the depressions which affected these islands appearing to pass considerably to the northward.

October.—The mean temperature for this month was 51·93 degrees, or more than 3 degrees higher than the average—48·75 degrees. This was mainly due to the latter part of the month being warmer than usual, the mean temperature being above the average on every day after the 13th. The warmest period was from the 14th till the 19th, the maximum reading being 64·9 degrees on the 17th. There was no frost, the lowest temperature on the ground being 36·3 degrees on the 7th.

The total rainfall was 1·211 inches, as compared with an average of 3·778 inches; in fact, it was the driest October in this part of the country since 1888. Rain fell on 9 days only, the heaviest fall being ·46 inches on the 15th.

The barometer was generally higher throughout the month, the only period of low barometer being from the 13th to the 17th, and it was during this period that practically all the rain fell. The barometer did not fall below 30 inches throughout the whole month, except on the days just mentioned.

November.—This month was again somewhat warmer than usual, the mean temperature being 46·23 degrees, as compared with the average value of 44·45 degrees. The variations from day to day were considerable, but the diurnal range was never very great, except on the 16th and 17th. The highest temperature recorded was 58·3 degrees on the 13th, the lowest being 32·3 degrees on the 16th.

The rainfall for the month was about an inch smaller than usual (2·273 inches as against an average of 3·324 inches), the heaviest fall being ·735 inches on the 27th.

The barometer was generally high, being below 30 inches on only six days; it reached as high as 30·7 inches on 3 days (20th to 22nd), and the general conditions were throughout anticyclonic..

December.—The mean temperature was 42·37 degrees the average for 17 years being 39·94 degrees. The temperature varied considerably during the month. There were two periods of cold weather—the first during the first four days of the month, and the second extending from the 20th to the 26th. There was a rapid fall in temperature from the 16th to the 22nd, and as rapid a rise from the 23rd to the 30th. The highest temperature was actually 60·3 degrees on the 30th, while a maximum of 57·6 was recorded on the 16th. On the other hand, a temperature of 25·0 degrees on the ground, and 27·6 degrees in the screen was observed on the 23rd. There was frost on the ground on ten days.

There were 18 rainy days, the total fall amounting to 4·610 inches, as compared with an average for December of 3·191. There were two well marked rainy periods with low barometer, the first extending from the 5th to the 16th, and the second from the 27th to the 31st. The exceptionally heavy fall of an inch and a quarter was measured on the 7th. The month, as a whole, was mild and changeable.

Rainfall, 1897.

Month.	Rainfall in Inches.	Average of 16 Years.	Departure from Average.	No. of days on which ·01 inches or more rain fell
January	1·805	2·441	+ - ·636	14
February	3·465	2·008	+ 1·457	19
March	4·085	2·279	+ 1·806	21
April	3·871	1·998	+ 1·873	20
May	1·690	1·873	- ·183	12
June	3.215	2·184	+ 1·031	9
July	1·918	3·465	- 1·547	8
August	6·894	3·182	+ 3·712	22
September ...	3·877	3·247	+ ·630	11
October	1·211	3·778	- 2·567	9
November	2·273	3·324	- 1·051	13
December	4·610	3·191	+ 1·419	18
	38·914	32·970	+ 5·944	176

DAVID RINTOUL.

Rainfall of 1897.

Week Ending.	Rain Inches.	Week Ending.	Rain Inches.
January 9	1·109	July 10	·215
,, 16	·060	,, 17	nil
,, 23	·036	,, 24	1·313
,, 30	·290	,, 31	·390
February 6	2·384	August 7	1·025
,, 13	·606	,, 14	·388
,, 20	·495	,, 21	1·029
,, 27	·125	,, 28	1·472
March 6	1·380	Sept. 4	3·956
,, 13	·610	,, 11	1·493
,, 20	1·525	,, 18	·265
,, 27	·210	,, 25	·215
April 3	·637	October 2	1·075
,, 10	·592	,, 9	·010
,, 17	2·442	,, 16	·630
,, 24	·300	,, 23	·426
May 1	·425	,, 30	nil
,, 8	·455	Nov. 6	nil
,, 15	·010	,, 13	·590
,, 22	nil	,, 20	·345
,, 29	·525	,, 27	·805
June 5	1·170	Dec. 4	·555
,, 12	·895	,, 11	2·110
,, 19	·885	,, 18	1·095
,, 26	·400	,, 25	nil
July 3	·565	1898. Jan. 1	1·465

D. RINTOUL.

Meteorology for the 52 Weeks of 1897 ending January 1st, 1898.

Height above Mean Sea Level—250 *feet.*

1897. Week Ending	BAROMETRIC PRESSURE at 32° and Sea Level: Mean	Highest	Lowest	Mean Temperature	Highest Mean Daily Temperature	Lowest Mean Daily Temperature	Max. Temperature in Shade	Min. Temperature at 1ft above ground	Min. Temperature on ground	Mean Daily Range of Thermometer	Greatest Daily Range of Thermometer	Smallest Daily Range of Thermometer	Mean Humidity	Grains of Vapour in a cubic ft. of air	Prevalent Wind.
	Inches	Inches	Inches												
Jan. 9	29·88	30·28	29·66	40·57	44·25	38·45	47·4	32·1	29·5	6·17	12·9	0·9	92	2·76	Wly.
,, 16	29·96	30·30	29·62	36·88	40·45	31·25	42·2	30·2	29·1	3·5	7·7	1·6	92	2·44	N.E.
,, 23	30·02	30·20	29·56	31·03	34·05	27·85	36·2	23·1	23·4	6·1	11·0	2·1	—	—	N.E.
,, 30	29·87	30·24	29·23	33·59	36·60	30·50	40·2	22·6	22·2	10·4	17·0	3·2	89	2·12	N.W.
Feb. 6	29·52	29·86	29·22	39·68	45·90	35·35	48·2	32·5	30·7	6·4	11·2	2·9	96	2·71	S.E'ly.
,, 13	30·12	30·28	29·96	44·09	46·70	41·60	50·2	36·4	33·0	7·1	10·5	3·2	92	3·07	Variable.
,, 20	30·36	30·65	30·07	45·64	49·40	42·35	52·3	35·6	33·0	8·4	15·6	4·7	93	3·23	Variable.
,, 27	30·47	30·67	30·21	47·71	51·40	44·05	53·7	39·1	37·8	7·5	9·9	4·8	88	3·23	S.W.
March 6	29·67	30·00	28·90	41.60	44·45	39·50	50·2	33·8	32·5	10·1	11·8	7·2	89	2.72	Wly.
,, 13	29·95	30·14	29·60	41·77	43·65	39·50	48·4	31·9	29·4	9·74	15·3	5·4	78	2·37	Variable.
,, 20	29·59	30·18	29·28	46·23	49·50	41·85	55·4	36·0	35·1	11·2	14·0	8·0	86	3·06	W.
,, 27	29·96	30·17	29·77	51·26	52·50	50·15	59·2	45·8	43·0	8·3	13·4	4·5	85	3·51	W.
April 3	29·53	29·77	29·11	42·24	49·70	37·60	55·2	30·2	29·8	11·9	19·0	6·3	81	2·56	Variable.
,, 10	29·92	30·10	29·55	43·06	47·70	38·15	53·3	31·9	30·2	12·1	17·3	7·5	78	2·46	E.
,, 17	29·94	30·23	29·65	47·25	49·25	44·35	52·3	37·8	35·2	8·0	13·1	3·5	83	3·16	W.
,, 24	29·93	30·17	29·72	47·06	49·5	44·8	59·3	37·1	35·6	13·0	19·6	7·0	71	2·81	E.
May 1	29·97	30·14	29·83	52·52	57·85	48·15	65·9	40·0	38·0	13·6	19·8	3·2	82	3·61	E.
,, 8	30·09	30·24	29·92	48·91	51·75	46·65	57·8	40·1	37·1	11·7	16·4	8·1	75	2·97	W.
,, 15	30·25	30·46	30·02	48·06	54·25	42·90	61·3	34·7	35·0	14·2	18·5	11·4	70	2·71	N.
,, 22	30·15	30·43	29·90	55·92	61·90	52·75	71·6	39·0	—	22·6	27·5	19·4	71	3·25	N.E.
,, 29	29·69	30·20	29·35	53·65	57·80	50·50	67·2	41·7	—	16·8	25·5	9·2	76	3·44	S.W.
June 5	29·98	30·20	29·41	58·80	65·10	52·70	75·3	45·9	—	15·8	23·2	5·0	81	4·92	Variable.
,, 12	30·13	30·33	29·76	59·86	64·40	52·3	73·2	48·6	—	12·3	18·9	1·7	79	4·73	W.
,, 19	29·99	30·26	29·52	58·31	69·60	53·05	79·0	47·2	—	11·3	18·8	5·2	73	4·09	N.W.
,, 26	30·06	30·27	29·80	63·49	69·90	55.90	81·2	49·4	—	14·1	22·6	4·1	82	5·11	Variable.

Meteorology for the 52 Weeks—Continued.

Height above Mean Sea Level—250 feet.

1897. Week Ending	BAROMETRIC PRESSURE at 32° and Sea Level			Mean Temperature	Highest Mean Daily Temperature	Lowest Mean Daily Temperature	Max. Temperature in Shade	Min. Temperature at 4ft above ground	Min. Temperature on ground	Mean Daily Range of Thermometer	Greatest Daily Range of Thermometer	Smallest Daily Range of Thermometer	Mean Humidity	Grains of Vapour in a cubic ft. of air	Prevalent Wind.
	Mean	Highest	Lowest												
	Inches	Inches	Inches												
July 3	30·04	30·20	29·93	63·81	67·65	60·05	76.9	55·2	—	12·9	18·5	5·4	82	4·54	Variable.
,, 10	30·02	30·26	29·80	60·93	67·50	57·15	75·8	47·9	—	12·5	18·5	8·5	70	4·23	W.
,, 17	30·20	30·63	29·96	65·63	68·80	61·65	81·4	51·0	—	22·3	25·9	14·3	71	4·89	Variable.
,, 24	29·93	30·19	29·62	65·19	68·35	61·85	79·8	54·0	—	12·8	25·8	6·4	76	5·29	Variable.
,, 31	30·11	30·36	29·91	64·77	69·85	61·25	80·7	54·8	—	13·3	21·7	7·3	73	5·44	S.W.
August 7	30·02	30·25	29·76	68·18	73·90	63·25	84·9	51·3	—	18·0	28·1	7·1	67	5·22	Variable.
,, 14	29·92	30·09	29·53	63·21	66·15	60·55	72·3	55·0	—	10·7	12·3	7·4	76	4·92	W.
,, 21	29·78	29·97	29·60	61·32	64·90	54·4	70·8	54·2	—	10·10	11·8	7·3	—	—	W.
,, 28	29·78	29·95	29·62	58·40	59·45	56·95	65·3	50·0	—	—	15·3	8·1	—	—	W.
Sept. 4	29·85	30·08	29·61	63·1	60·1	52·9	65·5	44·6	—	9·6	11·7	6·5	—	—	W.
,, 11	30·12	30·49	29·90	54·09	57·70	50·40	62·3	40·8	—	11·84	20·2	7·6	79	3·86	Variable.
,, 18	30·25	30·57	29·70	56·05	58·70	49·90	66·1	43·8	—	12·8	19·6	7·4	79	4·16	Ely & Wly.
,, 25	29·93	30·21	29·85	55·14	60·45	49·80	65·5	42·3	—	11·3	15·2	4·9	79	3·86	Variable.
October 2	30·11	30·31	29·76	57·01	60·15	53·75	69·6	48·0	—	11·2	18·9	5·2	89	4·55	Ely.
,, 9	30·36	30·44	30·22	49·29	54·65	46·05	59·3	38·6	36·3	12·0	16·4	7·8	80	3·08	Ely.
,, 16	29·85	30·27	29·42	51·56	58·40	45·45	62·3	39·4	37·1	9·6	15·4	5·1	84	3·72	Variable.
,, 23	30·33	30·64	29·90	53·22	60·85	48·10	64·9	42·6	42·5	8·5	14·3	4·2	86	3·75	N.E.
,, 30	30·23	30·33	30·11	52·84	55·00	49·95	61·3	46·1	44·2	9·1	13·2	5·9	91	3·84	S.E.
Nov. 6	30·31	30·41	30·21	46·77	52·40	42·45	58·8	40·6	38·9	7·2	18·8	3·7	83	2·91	N.E.
,, 13	30·12	30·33	29·61	51·06	56·45	46·15	58·3	41·0	37·3	8·3	14·4	3·6	92	3·97	Ely.
,, 20	30·24	30·70	29·59	46·29	53·85	41·35	56·8	34·2	32·3	10·5	19·6	1·9	91	3·30	S.W.
,, 27	30·47	30·74	30·12	42·82	46·50	40·60	52·2	32·4	32·4	10·4	19·2	2·2	93	3·04	S.E.
Dec. 4	29·88	30·27	29·51	39·84	46·15	33·65	50·3	29·8	27·8	9·0	14·3	5.2	83	2·59	Wly.
,, 11	29·72	30·20	29·42	43·02	45·25	40·50	53·3	35·7	30·0	8·73	16·1	1·9	86	2·38	Variable.
,, 18	29·77	30·33	29·45	47·29	52·05	42·58	57·6	35·0	30·8	9·8	19·0	1·4	91	3·49	S.
,, 25	30·47	30·66	30·34	35·80	42·70	31·40	45·5	27·6	25·0	7·4	11·6	4·0	90(?)	2·31(?)	S.E.
Jan. 1–98	29·67	30·39	29·25	46·31	52·95	41·75	60.3	31·8	26·6	10·7	20·5	4·5	86	3·15	S.W.

ANALYSIS OF DEATHS REGISTERED IN THE CITY AND COUNTY OF BRISTOL.

DURING THE YEAR 1897, ENDING SATURDAY, JANUARY, 1st, 1898.

Registration Districts.	Registration Sub-Districts.	Births.	Deaths.	Under 1 year of age.	Over 1 and under 5 years of age.	Aged 60 years and upwards.	Principal Zymotic Diseases: Small Pox.	Measles.	Whooping Cough.	Diphtheria.	Membranous Croup.	Scarlet Fever.	Enteric Fever.	Typhus.	Others or Doubtful.	Diarrhœa and Dysentery.	Asiatic Cholera.	Total Deaths from Zymotic Diseases.	Influenza.	Erysipelas.	Syphilis.	Rheumatism.	Malignant Disease. Cancer.	General Tubercular Disease.	Phthisis.	Respiratory. Pneumonia.	Bronchitis & other Diseases of Respiratory Organs.	Nervous System. Disease of the Brain & Membranes.	Disease of other parts of the Nervous System.	Circulatory. Diseases of the Heart.	Diseases of other Organs of the Circulation.	Digestive. Diseases of the Liver.	Diseases of other Digestive Organs.	Urinary. Diseases of the Urinary Organs.	Puerperal. Puerperal Fever. Puerperal Septicæmia.	Puerperal Diseases (not infectious).	Premature Birth. Congenital Malformations.	Senile Decay.	Violence.	Other Causes.	Ingnest Caste.	Uncertified Deaths.	Rates per 1000 per annum: Birth Rate	Death Rate	Zymotic Rate	Phthisis Rate	Infantile Death Rate per 1,000 Births.
Bristol	St. Mary Redcliff	249	152	36	15	40		1	5	1								7		1	1	5	5	10		21	6	9	20	1	2	10	9			3	4	8	16	19	2	27·43	16·68	1·53	1·09	104·41
	Castle Precincts	86	108	15	5	25	1											1				1	1	3		5	3	4	7			2				1	2	6	3	1	17·20	21·59	1·99	1·39	174·41
	St. Paul	324	296	83	36	68												16	1			1	1	8		15	8	34	15			12	6			3	1	12	6	1	27·17	15·34	1·81	1·19	158·29
	St. James	198	152	30	19	37												16				4	2	17		23	9	5	29	1		5	5			5	5	4	13	2	26·45	20·31	1·73	2·00	151·51
	St. Augustine	326	159	30	17	63												4				3	3	13		14	13	4	29	1		6	9			6	6	9	21	3	27·17	15·34	1·81	1·19	158·29
Bedminster	Bedminster	1882	840	283	118	180		38	20	8								6				17		4		41	23	9	5	29	1	2	4	1		2	5	5	13	1	26·45	20·31	1·73	2·00	151·51
	Clifton	785	630	88	37	262			9	3								46				17		10		41	23	9	5	29	1	5	10	6		1	6	6	9	17		23·93	11·67	1·74	0·73	92·02
Barton Regis	Ashley	672	327	65	26	111			12	4	1							129	13	1	4	2	36	24	49		89	48	72	73	8	14	46	21	1	5	40	40	25	59	27	2	37·37	16·67	2·56	0·97	150·36
	St. Philip	1745	853	290	134	180		15	33	8	1							49	9		3	4	52	19	37		68	69	15	82	6	11	32	23	1	2	32	32	12	44	36	5	16·40	13·24	1·03	0·77	112·10
	Extra-Municipal Institutions	47	349	14	7	210			2									28					14	21	40	17	31	34	13	36	3	5	15	12			8	23	4	122	16		24·60	11·97	1·02	1·46	98·72
	Not belonging to Borough	...	122	15	19	17				3			1					3					39	29	62	68	112	34	46	59	4	13	49	20	1	1	44	17	27	75	72	19	33·21	16·23	2·32	1·18	166·18
																		8	12	3	1		24	3	44	16	37	24	7	25	1	2	4	14			1	43	9	21	16						
																		5		1	1		15	8	4	3	11	2	2	7			20	5			2		24	12	25						
	Totals	6514	3988	949	434	1195	1	57	118	34	2	18	47			151	2	430	40	5	20	13	212	136	302	238	486	332	199	386	25	57	202	129	6	13	145	179	144	298	359	33	28·95	17·17	1·85	1·30	145·69

NOTIFICATIONS RECEIVED DURING THE YEAR BY SUB-DISTRICTS AND AGE GROUPS.

	Deaths in Public Institutions.		Registration Sub-Districts.	Small Pox: Under 5	5 to 10	10 to 15	15 upwards	Total	Cholera: Under 5	5 upwards	Total	Diphtheria: Under 5	5 to 10	10 to 15	15 upwards	Total	Membranous Croup: Under 5	5 to 10	10 to 15	15 upwards	Total	Erysipelas: Under 5	5 upwards	Total	Scarlet Fever: Under 5	5 to 10	10 to 15	15 upwards	Total	The Fevers known as: Typhus: Under 5	5 to 10	10 upwards	Total	Typhoid, Enteric: Under 5	5 to 10	10 upwards	Total	Relapsing: Under 5	5 upwards	Total	Continued or Doubtful: Under 5	5 upwards	Total	Puerperal	Total Cases in each Sub-District
Sanitary Authority's	General Hospital	166	St. Mary Redcliff									3	8	3	7	21						1	15	16	5	5	5	2	17							4	4								58
	St. Peter's Hospital		Castle Precincts									1				1						1	3	4		1			1							1	1								12
	Royal Infirmary	231	St. Paul				1	1					2	2		4						1	13	14		12	3		15							4	4								4
	Children's Hospital	64	St. James									4	3			7							13	13	3	6	1	4	14							4	4								51
	Home for Crippled Children		St. Augustine									2				2						2	13	15	3	6	1	4	14							4	4						1		46
			Bedminster									2	1	2		5							4	4		4		1	5							1	1						1		48
	Small Pox Hospital	1	Clifton		1	2	4	7				12	8	5	13	38	1	2		1	4	2	50	52	51	74	18	12	155														289
	Fever Hospital	10	Ashley									10	7	6	18	41		1		1	2		28	28	24	29	8	12	92					12	1	27	40						3	403
			St. Philip									12	11	4	24							1	10	11	19	26	7	5	57					10	29	198	237							124
Extra Municipal	Bristol Union Workhouse	110	Admitted to Public				1	1				12	6	3	11	32						3	53	56	43	36	12	9	100							1	10	11							234
	Barton Regis Union Workhouse	129	Institutions from Out-									9		1	1	11							2	2	2	2	3	5	12							4	5	35	42					1		32
	Long Ashton Union Whouse, Bedm	38	side of Borough																																										
	Lunatic Asylum	72	Extra Municipal Inst'ns																				2	2	2				2							6	6								32
																							2	2												2	2								6
	Total	821	Total Cases of each Disease		1	2	7	10				66	56	22	65	209	5	3		2	10	10	193	203	169	195	87	69	511					16	36	298	350						10	1363

The average age at Death of Persons aged 60 years and upwards was 72 years and 7 months. Births of Illegitimate Children 188. Deaths of Illegitimate Children 66.
Average Death Rate for 10 Years, 18·8. Death Rate for the corresponding week of last year, 16·84.

K² 3.

(A) TABLE OF DEATHS during the Year 1897, in the Urban Sanitary District of Bristol, classified according to DISEASES, AGES, and LOCALITIES.

Names of Localities adopted for the purpose of these Statistics; public institutions being shown as separate localities. (Columns for Population and Births are in Table B.)	Mortality from all causes, at subjoined ages.								Mortality from subjoined causes, distinguishing Deaths of Children under 5 years of Age.																		
									1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
													Fevers.																
	At all ages.	Under 1 year.	1 and under 5	5 and under 15	15 and under 25	25 and under 65	65 and upwards		Smallpox.	Scarlatina.	Diphtheria	Membranous Croup.	Typhus.	Enteric or Typhoid	Continued	Relapsing	Puerperal	Cholera.	Erysipelas.	Measles.	Whooping Cough.	Diarrhœa and Dysentery.	Rheumatic Fever	Phthisis.	Bronchitis, Pneumonia, and Pleurisy.	Heart Disease.	Epilepsy, Cholera.	Injuries.	All other Diseases.	TOTAL
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)																					
Saint Mary Redcliff ...	136	35	10	10	6	43	32	Under 5												1	5	5			9				25	45
								5 upwds.																10	12	19		6	44	91
Castle Precincts ...	96	15	4	4	15	42	16	Under 5												1	2	5			5			1	5	19
								5 upwds.														1		7	11	12		20	26	77
Saint Paul	263	77	29	10	7	92	48	Under 5												2	14	4		2	24			1	59	106
								5 upwds.		1	1											1		18	42	23		1	70	157
Saint James	115	29	9	4	6	41	26	Under 5		1	1										4	2			8				22	38
								5 upwds.																12	17	10		3	35	77
Saint Augustine ...	138	27	12	6	6	41	46	Under 5													7	4			7	1		2	18	39
								5 upwds.			1			1			1					1		9	19	16		2	49	99
Bedminster	784	280	116	28	39	177	144	Under 5		1	5									35	29	42			63	4		1	216	396
								5 upwds.		2	3			4			1		1	2		2	1	49	46	59		13	205	388
Clifton	582	87	28	15	23	198	231	Under 5		1	4										9	4			22	4		1	70	115
								5 upwds.						17			1					2	1	36	66	72		8	264	467
Ashley	309	60	25	3	23	90	80	Under 5		1	1	1									11	6			16				49	85
								5 upwds.			2										1			38	29	34	1	1	118	224
Saint Philip	746	266	119	30	31	170	130	Under 5		2	1									15	32	43		7	96	2		3	184	385
								5 upwds.			3	1		2			1				1	4		49	75	47	1	14	163	361
Royal Infirmary ...	231	23	29	17	26	120	16	Under 5			5								1			5		1	5			5	30	52
								5 upwds.			2			9			2							16	16	17		26	91	179
General Hospital ...	166	12	11	18	24	87	14	Under 5												1		4			7			1	10	23
								5 upwds.			1			10								2		3	13	13		23	78	143
Children's Hospital ...	63	23	31	8			1	Under 5			4			1								1		1	9			4	34	54
								5 upwds.						2									1		1				5	9
Small Pox Hospital ...	1					1		Under 5																						
								5 upwds.	1																					1
Fever Hospital... ...	8		3	4	1			Under 5		2											1								3
								5 upwds.		5																				5
Bristol Union Workhouse...	109	2	2	2	3	33	67	Under 5		2															1				1	4
								5 upwds.						1					1					6	11	8		5	73	105
Barton Regis do do	129	11	6	1	7	50	54	Under 5																	2				15	17
								5 upwds.											2			1		20	11	8		1	69	112
Long Ashton do do	40	2		2		14	22	Under 5													2								2
								5 upwds.														2		4	9	2		1	20	38
Lunatic Asylum ...	72				1	42	29	Under 5																						
								5 upwds.																14	8	5		1	44	72
TOTALS	3988	949	434	190	218	1241	956	Under 5		10	21	1		1					1	55	116	125		11	274	11		19	738	1383
								5 upwds.	1	8	13	1		46			6		4	2	2	16	3	290	386	345	2	125	1354	2005

K²11

(B). Table of **Population, Births, and of New CASES of Infectious Sickness,** coming to the knowledge of the Medical Officer of Health, during the year 1897, in the Urban Sanitary District of Bristol; classified according to DISEASES, AGES, and LOCALITIES.

Names of Localities adopted for the purpose of these Statistics; Public Institutions being shown as separate localities. (a)	Population at all Ages. Census, 1891. (b)	Population at all Ages. Estimated to middle of 1897.	(c) Registered Births	Aged under 5 or over 5. (d)	New Cases of Sickness in each locality coming to the knowledge of the Medical Officer of Health. 1 Small Pox.	2 Scarlatina.	3 Diphtheria.	4 Membranous Croup.	5 Fevers. Typhus.	6 Fevers. Enteric or Typhoid.	7 Fevers. Continued.	8 Fevers. Relapsing.	9 Fevers. Puerperal.	10 Cholera.	11 Erysipelas.	12	13
St. Mary Redcliff H H ...	9,292	9,107	249	Under 5		5	3								1		
				5 upwds	1	12	18			4					15		
Castle Precincts	5,595	5,005	86	Under 5			1										
				5 upwds.		4	2			1					3		
St. Paul	19,036	19,286	524	Under 5		7									1		
				5 upwds.		17	7			6			1		13		
St. James H	7,831	7,484	198	Under 5		3	4								2		
				5 upwds.		11	8			4			1		13		
St. Augustine H	13,795	13,626	326	Under 5		4	9										
				5 upwds.		11	12			6			1		a4		
Bedminster H	45,627	50,336	1882	Under 5		56	12	1		2					2		
				5 upwds.	7	106	26	3		28			3		50		
Clifton	29,345	47,553	785	Under 5		24	10			10							
				5 upwds.		69	31	2		221			3		28		
Ashley	24,042	27,312	672	Under 5		19	6	2							1		
				5 upwds.		59	17			11					10		
St. Philip H	51,624	52,533	1745	Under 5		43	12	2		4					3		
				5 upwds	1	57	20			38			1		53		
Bristol General Hospital ..	Admitted from outside of Borough.			Under 5													
				5 upwds.						6					1		
Bristol Royal Infirmary ...				Under 5			5										
				5 upwds.			1								1		
Children's Hospital				Under 5		1	4										
				5 upwds.		1	1										
St. Peter's Hospital ...				Under 5													
				5 upwds.													
Small Pox Hospital... ...	Admitted from outside of Borough.			Under 5													
				5 upwds.	1												
Fever Hospital				Under 5		1											
				5 upwds.		9											
Bristol Union Workhouse...				Under 5		1											
				5 upwds.						2							
Barton Regis Workhouse...			47	Under 5		1											
				5 upwds.											2		
Long Ashton Workhouse ..				Under 5													
				5 upwds.													
Lunatic Asylum				Under 5													
				5 upwds.													
Totals ..	221,578	232,242	6514	Under 5		165	66	5		16					10		
				5 upwds.	10	336	143	5		327			10		193		

Names of Localities adopted for the purpose of these Statistics; Public Institutions being shown as separate localities. (a)	Number of such Cases Removed from their Homes in the several localities for treatment in Isolation Hospital. 1 Small Pox.	2 Scarlatina.	3 Diphtheria.	4 Membranous Croup.	5 Fevers. Typhus.	6 Fevers. Enteric or Typhoid.	7 Fevers. Continued.	8 Fevers. Relapsing.	9 Fevers. Puerperal.	10 Cholera.	11 Erysipelas.	12	13
St. Mary Redcliff H H ...		1	3										
	1	3	7			2					2		
Castle Precincts													
		2				1					2		
St. Paul		2											
		9	3			3			1		5		
St. James H		4	2								3		
		3	5			3			1		6		
St. Augustine H			6										
		9	8			3							
Bedminster H		16	2								1		
	7	36		1		15					2		
Clifton		13	3			1							
		44	4			61					1		
Ashley		10	2										
		43	2			3					5		
St. Philip H		21	5			3							
	1	26				26					6		
Bristol General Hospital ..													
						6					1		
Bristol Royal Infirmary ...			5										
			1								1		
Children's Hospital		1	4										
		1	1										
St. Peter's Hospital ...													
Small Pox Hospital... ...													
	1												
Fever Hospital		1											
		9											
Bristol Union Workhouse...		1											
						2							
Barton Regis Workhouse...		1											
											2		
Long Ashton Workhouse ..													
Lunatic Asylum													
Totals ..		71	32			4					4		
	10	205	31	1		123			2		33		

Notification of Infectious Disease has been compulsory in Bristol since February 12th, 1890. Only those Diseases Scheduled in the Act are at present Notifiable. The Isolation Hospitals used by the Sick of the District are :—

NAME OF HOSPITAL.	DISEASES ISOLATED.	DISTRICT WHERE SITUATED.
1.—Sanitary Authority's Hospital	Small Pox or Scarlet Fever	*Novers Hill, Bedminster, outside City.
2.—Bristol Guardians' Hospital	Small Pox, Fever, Erysipelas	*Stapleton, outside City.
3.—Barton Regis Guardians' Hospital	Small Pox and Fever (now closed, except for cases arising in the House)	*Eastville, Stapleton, outside City.
4.—Bedminster Guardians' Hospital		Absorbed by the Novers Hill Hospital (1).
5.—Children's Hospital	Scarlet Fever, Erysipelas	St. Augustine, Bristol.
6.—Bristol General Hospital	Enteric Fever	Partly in St. Mary Redcliff, and partly in Bedminster.
7.—Royal Infirmary	Ditto	St. James, Bristol.
8.—Clift House (temporary)	Scarlet Fever, Diphtheria, Fever	Bedminster, Bristol.

Diphtheria is, as a rule, only admitted into Public Institutions in cases where operation is necessary. * Now included in City.

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PART I.

PART III.