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DIGEST  
OF THE  
ANNUAL REPORTS  
for the Year 1902,  
OF THE  
MEDICAL OFFICERS OF HEALTH  
AND  
SANITARY INSPECTORS  
IN THE  
ADMINISTRATIVE  
COUNTY OF WORCESTER.  
BY  
G. H. FOSBROKE D.P.H., CAMB.

County Medical Officer for Worcestershire,  
Member of Sanitary Inspectors Examination Board, &c., &c.

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DIGEST

MINUTES

OF THE

BOARD OF

EDUCATION

OF THE

COUNTY OF

NEW YORK

1880

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*To the Sanitary Committee of the  
Worcestershire County Council.*

MY LORDS AND GENTLEMEN,

I have the honour to present my Fourteenth Annual Report, which refers to the year 1902.

No alteration has been made in the area of the Sanitary Districts during the year; there still being 13 Urban and 17 Rural Districts.

The following changes in the Sanitary Staff occurred in 1902, viz.—

Dr. Miles succeeded the late Dr. Webster as M.O.H. for Borough of Bewdley.		
Dr. R. Green „	Dr. F. Hollinshead	„ for King's Norton and Northfield Urban District.
Dr. Stevenson „	Dr. Rutter	„ for Redditch Urban District.
Dr. Coaker „	Dr. Wood	„ for Bromsgrove Rural District.
Dr. Wilkinson „	Dr. Swete	„ for Droitwich Rural District.
Dr. Moore „	Dr. Corke	„ for Stow-on-Wold Rural District.
Mr. Smith „	Mr. Mallard as Sanitary Inspector for Bromsgrove Urban District.	
Mr. Jones, Jun. „	Mr. Milton „	„ for North Bromsgrove Urban District.



Table I. shows the dates when the Reports of Medical Officers of Health were received, and whether or not they were printed.

TABLE I.

Date when Report received.	District.	Report printed or unprinted.
1903.		
February 7	Halesowen Rural - - - -	Printed.
March 3-	Shipston-on-Stour Rural - - - -	"
" 7-	Kidderminster Rural - - - -	"
" 18-	Winchcombe Rural - - - -	Unprinted
" 20-	Malvern Urban - - - -	Printed.
" 20-	Upton-on-Severn Rural - - - -	"
" 26-	North Bromsgrove Urban - - - -	"
" 26-	Oldbury Urban - - - -	"
" 28-	Redditch Urban - - - -	"
" 28-	Yardley Rural - - - -	"
" 28-	Stow-on-the-Wold Rural - - - -	Unprinted.
" 29-	Kidderminster Borough - - - -	Printed.
" 30-	Martley Rural - - - -	"
" 31-	Evesham Borough - - - -	"
" 31-	Stourbridge Urban - - - -	"
" 31-	Evesham Rural - - - -	"
" 31-	Feckenham Rural - - - -	"
" 31-	Newent Rural - - - -	Unprinted.
" 31-	Pershore Rural - - - -	Printed.
April 6-	Bewdley Borough - - - -	"
" 7-	Stourport Urban - - - -	"
" 21-	Bromsgrove Urban - - - -	"
" 21-	Droitwich Borough - - - -	"
" 22-	Lye and Wollescote Urban - - - -	"
" 23-	Bromsgrove Rural - - - -	"
" 25-	Droitwich Rural - - - -	"
May 8-	Rock Rural - - - -	Unprinted.
" 12-	King's Norton and Northfield Urban - - - -	Printed.
" 21 (a)	Tenbury Rural (a) - - - -	—
" 22-	Tewkesbury Rural - - - -	Unprinted.

(a) Statistics only. Report not received at date of going to press.

In 1901 three reports were received in June, but with the exception of that for Tenbury District, not yet to hand, none were so late this year. The Local Government Board have declared that these Reports should be sent in "within at least three months from "the end of the year," but Table I. shows that 11 Medical Officers did not comply with this suggestion.

## AREA AND POPULATION.

The area and population of the Administrative County are set forth in Table II.

TABLE II.

Districts.	Area in Statute Acres in 1901.	Population.			
		1891.	1901.	Increase 1891-1901.	Estimated by M.Os.H. for 1902.
Urban (13) - -	54,769	157,184	197,017	39,833	201,280
Rural (17) - -	418,559	140,205	161,360	21,155	163,398
Totals (30) - -	473,328	297,389	358,377	60,988	364,678

This Table shows that the population in the "Urban Districts" has increased by 25·3 per cent., and that in the "Rural Districts" by 15·1 per cent.

The following Extracts from the revised Census Returns of Worcestershire for 1901 are of interest.

"Where comparative figures are quoted, those for 1891 relate to areas as constituted in 1901, unless otherwise stated."

"The Administrative County contains a population of 358,377, and the two County Boroughs contain a population of 95,357, the aggregate population thus amounting to 453,734. The increase in the Administrative County since 1891, apart from the County Boroughs, is 60,988, or 20·5 per cent.; in the County Boroughs 6,725, or 7·6 per cent.; and in the total population 67,713, or 17·5 per cent.

On reference to Table XV. the changes of population of each District in the Administrative County during the decade 1891-1901 is given, from which it will be seen that there was an increase in the King's Norton and Northfield Urban District of 101·8 per cent., and in Oldbury Urban District of 11·0 per cent.

Table XV. also shows that 11 of the 17 Rural Districts decreased in population, viz. :

	Rural District.
Droitwich	
Feckenham	" "
Martley	" "
Newent	" "
Pershore	" "
Rock	" "
Shipston-on-Stour	" "
Stow-on-the-Wold	" "
Tenbury	" "
Tewkesbury	" "
Winchcombe	" "



On the other hand six of them *increased*, viz. :—

Bromsgrove	Rural District.
Evesham	” ”
Halesowen	” ”
Kidderminster	” ”
Upton-on-Severn	” ”
Yardley	” ”

The principal increases were in Halesowen and Yardley Rural Districts, where these respectively amounted to 5,105 (27·6 per cent.) and 16,805 (98 per cent.)

The increase of population in the King's Norton Urban (101·8 per cent.) and Yardley Rural Districts (98 per cent.) is remarkable.

The Census Return furthers states that :—

“The total number of separate Tenements in the Administrative County, together with the County Boroughs, which had been 81,441 in 1891, rose to 98,229 in 1901, the increase being equal to 20·6 per cent. Of this total, the Tenements containing five or more rooms increased from 37,457 to 55,972, equal to 49·4 per cent., while those with fewer than five rooms decreased from 43,984 to 42,257, equal to 3·9 per cent. Stated in another way, the Tenements with five or more rooms were equal to 46·0 per cent. of the total Tenements in 1891, and increased to 57·0 per cent. at the recent Census; while the percentage of the Tenements with fewer than five rooms declined from 54·0 to 43·0. A marked decrease is, moreover, shown since 1891 in the number of one, two, three, and four-roomed Tenements in which more than two persons per room were enumerated. Thus the number of one-roomed Tenements each containing more than two persons decreased from 76 to 53; the number of two-roomed Tenements each containing more than four persons, from 1,416 to 881; the number of three-roomed Tenements each containing more than six persons, from 2,285 to 1,777; and the number of four-roomed Tenements each containing more than eight persons, from 1,383 to 1,188.

“In the aggregate of Urban Districts the proportion of Tenements with fewer than five rooms to the total number of Tenements is 43·8 per cent., and in the aggregate of Rural Districts it is 41·7 per cent.

“The proportion of Tenements with fewer than five rooms, which averages 43·0 per cent. in the entire County, shows considerable variations in the larger Urban Communities, and ranges from 15·6



"in Kings Norton and Northfield, 36.0 in the City of Worcester, and 39.1 in Kidderminster, to 62.4 in Oldbury, and 71.4 in Dudley.

"The Females enumerated in the Administrative County and County Boroughs exceed the Males by 20,374; there are thus 1,094 Females to every 1,000 Males. The number of children of school age (three and under fourteen years) is 109,270, of whom 54,308 are boys and 54,962 girls. It is to be observed, however, that the attendance at school of children under five is not compulsory. The number of children aged five and under fourteen years is 88,304, of whom 43,885 are boys and 44,419 girls.

"The number of persons 65 years of age and upwards is 24,038, and of these 10,527 are Males and 13,511 Females; two Males and two Females claim to be 100 years or upwards. The proportion of persons aged 65 years and upwards enumerated in Rural Districts is 6.2 per cent. of the total Rural population, while in the Urban Districts the proportion is 4.8 per cent. of the total Urban population.

"Of the Males enumerated in the Administrative County (together with County Boroughs), 130,252 are Unmarried, 79,190 are Married, and 7,238 are Widowed. Of the Females, 139,638 are Unmarried, 80,573 are Married, and 16,843 are Widowed.

"The following Table shows the percentages for the Registration County in 1891 and in 1901:—

Condition as to Marriage.	MALES.				FEMALES.			
	To 100 at All Ages.		To 100 at Twenty years and upwards.		To 100 at All Ages.		To 100 at Twenty years and upwards.	
	1891.	1901.	1891.	1901.	1891.	1901.	1891.	1901.
Unmarried -	61.4	60.2	26.9	28.6	60.6	59.5	30.1	31.5
Married -	35.3	36.5	66.9	65.4	32.2	33.4	57.1	56.5
Widowed -	3.3	3.3	6.2	6.0	7.2	7.1	12.8	12.0

"It may be noted from the figures that the proportions of the Married to the population at all ages is now higher than it was in 1891, owing to the decrease in the proportion of children through the decline in the Birth-rate. The proportion of the Married, however, if calculated on the population aged upwards of twenty years, is distinctly lower than it was ten years ago, among both Males and Females."



## VITAL STATISTICS.

## Births.

Table III. compares the County Birth-rates and those of England and Wales during 1893-1902 inclusive.

TABLE III.

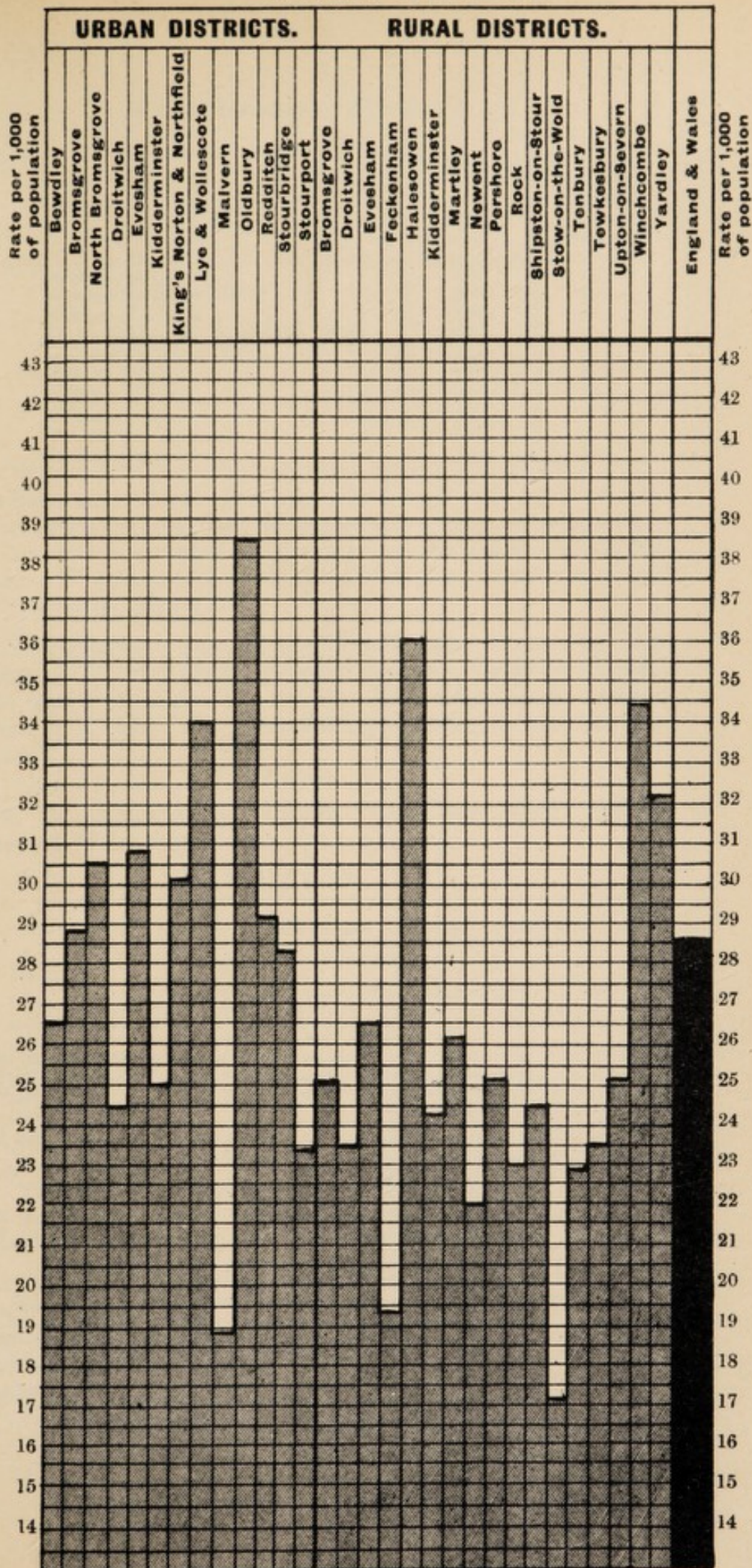
Districts.	Rates per 1,000 of population.									
	1902	1901	1900	1899	1898	1897	1896	1895	1894	1893
Administrative County -	28.6	28.9	28.0	27.2	27.9	27.7	27.3	28.1	28.4	29.9
Urban Districts (13) -	28.8	29.7	28.6	27.8	28.4	28.4	28.1	29.2	29.0	31.4
Rural Districts (17) -	27.7	27.9	27.1	26.5	27.2	27.2	26.3	27.4	28.1	29.1
England and Wales -	28.6	28.5	28.9	29.3	29.4	29.7	29.7	30.3	29.6	30.8

The County Birth-rate for 1902 is precisely the same as the corresponding one for England and Wales, and the Registrar-General states "that the latter is 0.1 per 1,000 higher than the rate for 1901, but lower than in any other year on record. Compared with the average in the ten years 1892-1901 the Birth-rate in 1902 shows a decrease of 1.0 per 1,000." From Table III. it would appear that the County Birth-rate for 1902 (28.6) is—with the exception of those for 1901 (28.9) and 1893 (29.9)—the highest of the 10 years recorded. This, however, is, I believe, more apparent than real, for I would remind you that I reported last year that the 1901 Census showed that the majority of the Medical Officers had over-estimated their populations, and that consequently the Birth-rates appeared to be lower than they really were. The Extracts from the Registrar-General's Census returns, which I have already quoted, state that "The proportion of the Married to the population at all ages (for the Registration County of Worcester) is now higher than it was in 1891, owing to the decrease in the proportion of children through the decline in the Birth-rate. The proportion of the Married, however, if calculated on the population aged upwards of twenty years, is distinctly lower than it was ten years ago among both Males and Females." This latter fact naturally, to some extent, accounts for the decline in the Birth-rate, but evidence accumulates from year to year in support of Dr. Newsholme's (an eminent Statistician) opinion, that "The reduced Birth-rate is caused by a diminished number of children to each marriage, not by a diminished number of marriages."

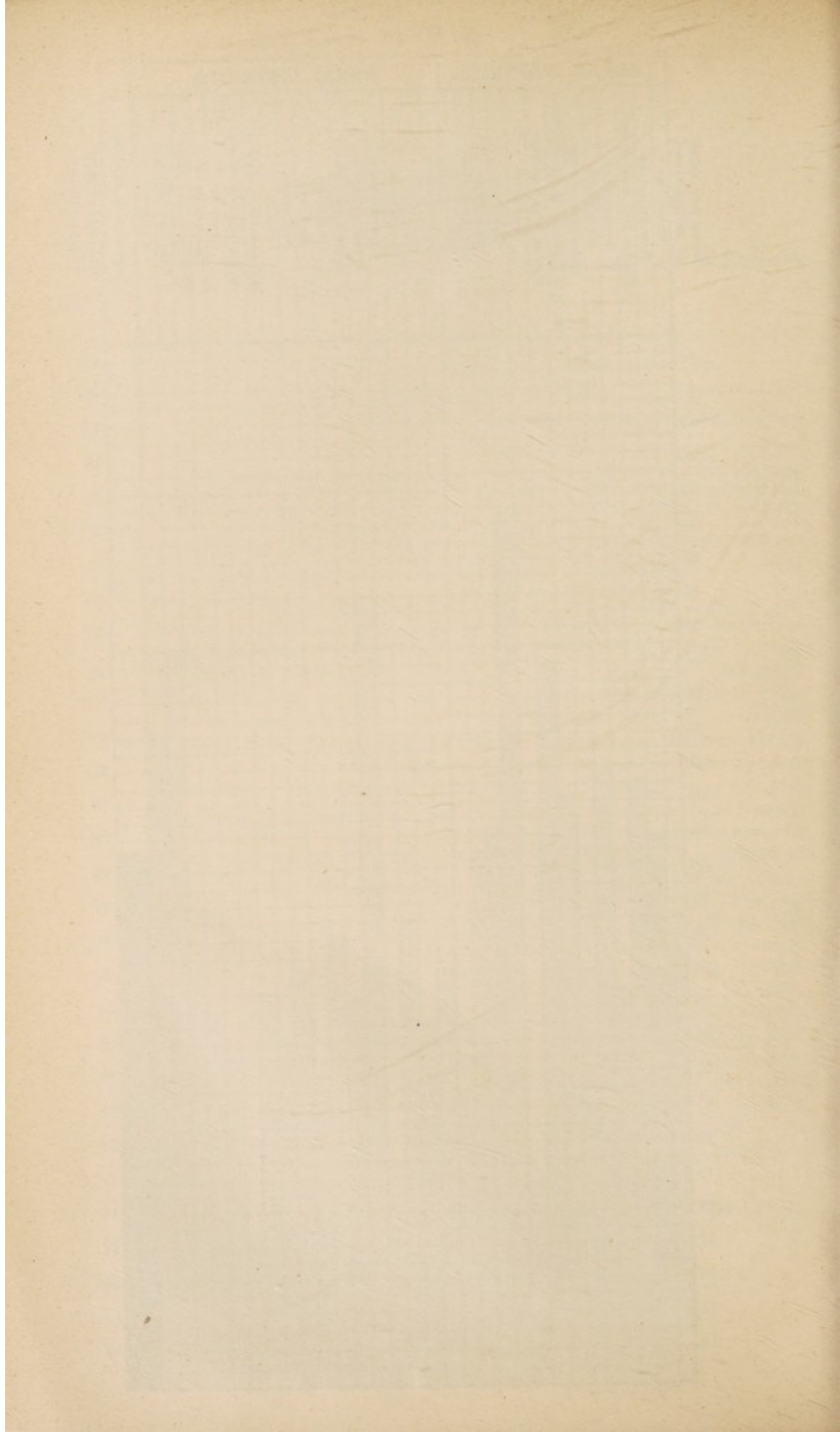
The Birth-rates of the following Districts exceed that of the County (28.6).



1902.  
BIRTH-RATES.







District.	Per 1,000 population.	
	1902.	Average of years 1892-1901.
Bromsgrove Urban - - - -	28.9	29.2
Bromsgrove North Urban - - -	30.6	29.2
Evesham Borough - - - -	30.8	30.9
King's Norton and Northfield Urban -	30.1	27.9
Lye and Wollescote Urban - - -	34.0	35.5
Oldbury Urban - - - -	38.4	38.0
Redditch Urban - - - -	29.2	29.4
Halesowen Rural - - - -	36.0	36.6
Winchcombe Rural - - - -	34.4	40.2
Yardley Rural - - - -	32.2	28.3

This Statement shows that the Birth-rates for 1902 of the Districts named are apparently about normal, as they are very similar to the respective averages of the previous 10 years. With the exception of Winchcombe Rural District the highest Birth-rates prevail in the "industrial centres."

The Worcestershire part of the Winchcombe District includes the Parish of Cutsdean alone, and even in such a purely agricultural District, with a population of 116 only, the average yearly number of Births is 5, and the corresponding Birth-rate for the ten years 40.2.

## Deaths.

Table IV. compares the County Death-rates with those of England and Wales during 1893-1902 inclusive.

TABLE IV.

Districts.	* Rates per 1,000 of population.									
	1902	1901	1900	1899	1898	1897	1896	1895	1894	1893
Administrative County -	14.19	15.0	15.8	14.4	15.0	15.1	14.6	15.6	14.22	16.1
Urban Districts (13) -	14.2	15.7	16.8	15.3	15.8	16.0	16.6	17.6	15.0	18.3
Rural Districts (17) -	14.1	14.2	14.4	13.4	13.9	14.5	13.3	14.4	13.8	14.9
England and Wales -	16.3	16.9	18.3	18.3	17.6	17.4	17.1	18.7	16.6	19.2

\* Calculated on the total deaths registered in the County.

The Registrar-General reports that the Death-rate of England and Wales for 1902 (16.3) was "the lowest on record."

The gradual decline of the Death-rate of England and Wales from 22.7 in 1875 to 16.3 in 1902, is a most satisfactory feature of that sanitary era; and the fact that the Death-rate of the Administrative County in 1902 (14.19) was the lowest on record is equally satisfactory.



I should here explain that the County Death-rate for 1902 is calculated upon 5,178 deaths; which are the "Total Deaths" registered in the Administrative County, inclusive of the 103 which occurred in the County Asylum, among persons belonging to the Administrative County, *i.e.*, after deducting 9 of the 112 deaths which occurred in that Institution among persons usually resident in the City of Worcester.

On the other hand, Death-rates calculated on the "Total Deaths" registered in particular Districts would not be reliable; otherwise in those localities where there are large Public Institutions into which people from outside such Districts are received, the rate would be unfairly high.

To prevent such an anomaly the Local Government Board have specially issued Table IV., which has reference to "Nett Death-rates," *i.e.*, Death-rates which are arrived at by excluding deaths of Non-residents, and including deaths of persons properly belonging to the Districts, but who died in Public Institutions outside. In my future allusions to District Death-rates I shall, as far as possible, deal with "Nett Deaths."

Table XV. should give details of the Deaths which collectively form these "Nett Death-rates," but it does not do so in every instance, as the Medical Officers whose Districts are marked with an asterisk give details of "Total Deaths," not "Nett Deaths." As a similar state of things occurred in 1901, I called particularly attention to the "Notes attached to Tables I. and IV., issued by the Local Government Board, in my Annual Report for last year (P. 50<sup>R</sup>)."

The annexed Diagram and Table XV. show that the Death-rates for 1902 of the following Districts exceeded the corresponding one of the Administrative County (14.1), *viz.* :

Districts.	Per 1,000 population.	
	1902.	Average for years 1892-1901.
Bewdley Borough - - - -	18.1	16.3
Evesham Borough - - - -	14.5	15.5
Kidderminster Borough - - -	16.6	17.8
Lye and Wollescote Urban District -	14.7	17.5
Oldbury Urban District - - -	16.7	20.3
Stourbridge Urban District - - -	14.7	16.3
Bromsgrove Rural District - - -	14.4	12.4
Droitwich Rural District - - -	14.4	12.0
Martley Rural District - - - -	14.4	14.3
Pershore Rural District - - - -	14.8	15.9
Rock Rural District - - - -	15.3	13.5
Shipston-on-Stour Rural District -	17.6	18.1
Stow-on-Wold Rural District - - -	17.1	11.9
Tewkesbury Rural District - - -	17.4	16.2
Winchcombe Rural District - - -	25.8	14.3

**DIAGRAM**  
SHOWING THE AVERAGE GENERAL DEATH RATES OF DISTRICTS.  
FOR THE FIVE YEARS 1898-1902 INCLUSIVE.



DEATH RATE.		
Urban Districts.	Average for Years.	per 1,000
Bewdley	1898-1902	15.6
Bromsgrove	1898-1902	16.6
Bromsgrove, North	1898-1902	11.7
Droitwich	1898-1902	13.9
Evesham	1898-1902	14.3
Kidderminster	1898-1902	18.4
King's Norton	1898-1902	11.7
Lye and Wollescote	1898-1902	17.0
Malvern	1898-1902	12.4
Oldbury	1898-1902	19.3
Redditch	1898-1902	15.3
Stourbridge	1898-1902	15.6
Stourport	1898-1902	13.1
Rural Districts.		
Bromsgrove	1898-1902	12.7
Droitwich	1898-1902	13.3
Evesham	1898-1902	14.7
Feckenham	1898-1902	12.3
Halesowen	1898-1902	14.5
Kidderminster	1898-1902	12.8
Martley	1898-1902	14.6
Newent	1898-1902	13.8
Pershore	1898-1902	15.3
Rock	1898-1902	13.8
Shipston-on-Stour	1898-1902	16.7
Stow-on-the-Wold	1898-1902	12.6
Tenbury	1898-1902	13.6
Tewkesbury	1898-1902	13.0
Upton-on-Severn	1898-1902	14.9
Winchcombe	1898-1902	16.1
Yardley	1898-1902	13.2

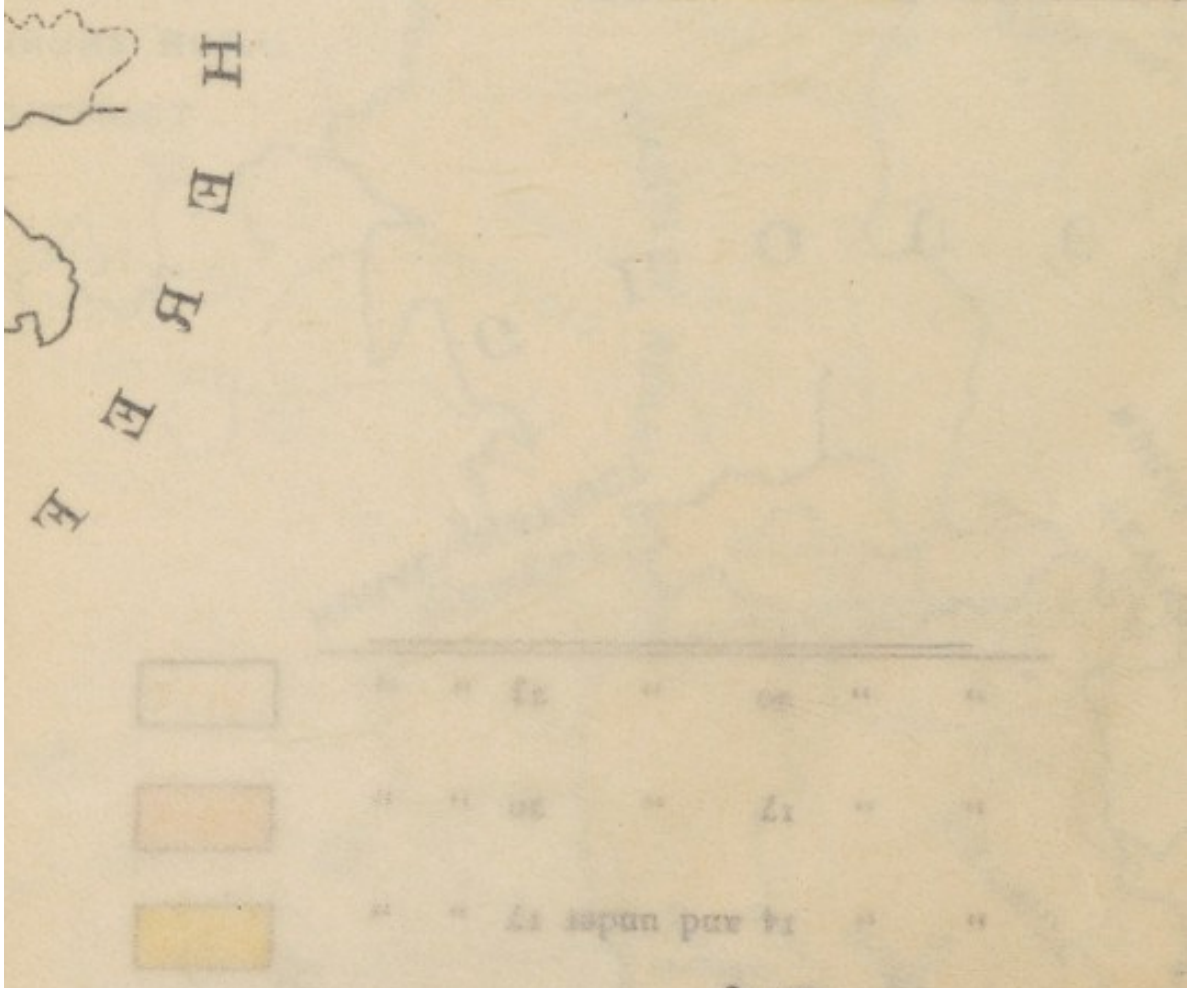
**References.**

Death Rates	...	under 14 per 1,000	
"	"	14 and under 17 "	
"	"	17 " 20 "	
"	"	20 " 23 "	



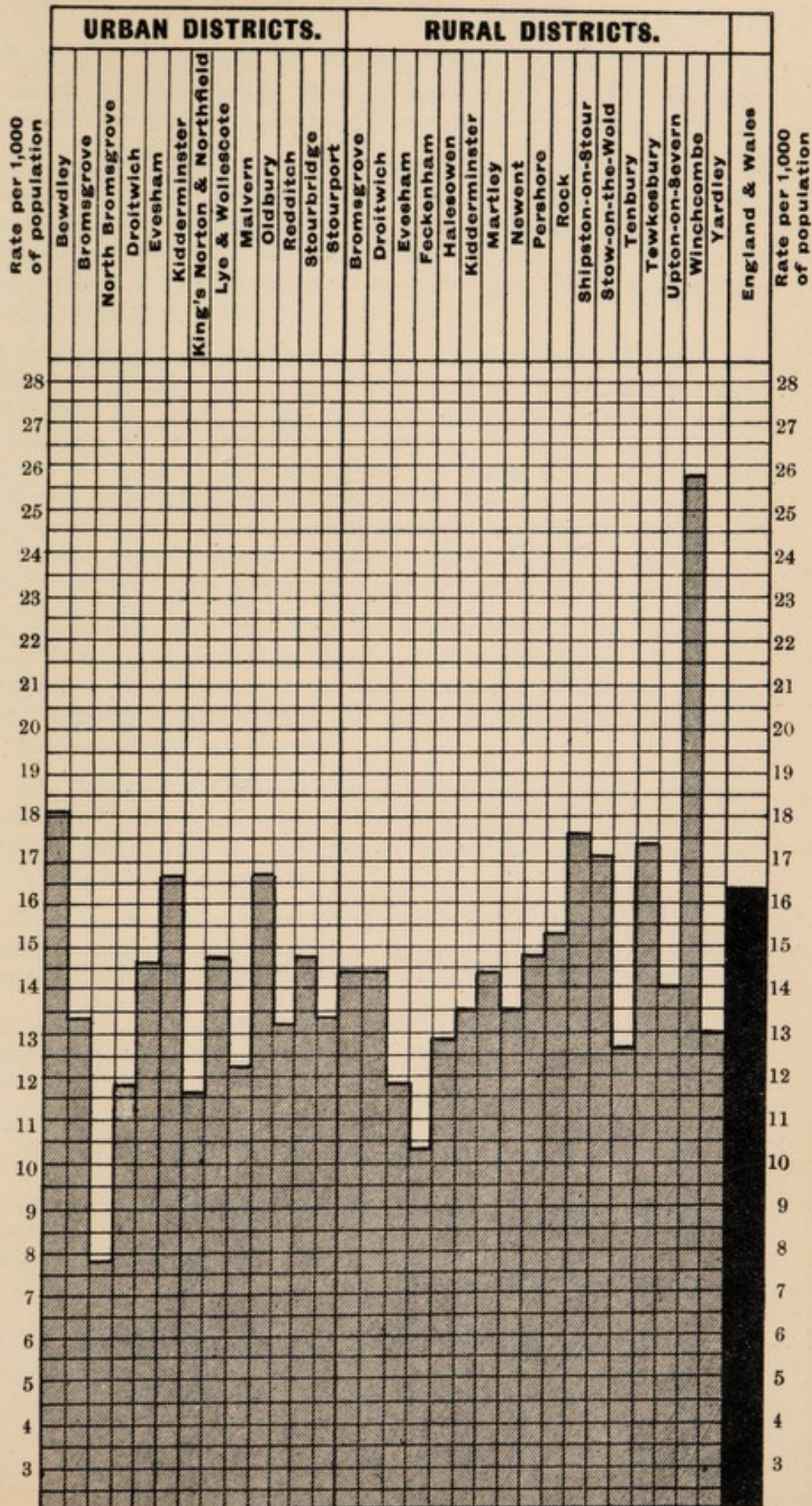
# DIAGRA

SHOWING THE AVERAGE GENERAL DE  
FOR THE FIVE YEARS 1898





1902.  
DEATH-RATES.







The 1902 Death-rates of Bewdley Borough, and Bromsgrove, Droitwich, Martley, Rock, Stow, Tewkesbury, and Winchcombe Rural Districts seem to have been above the corresponding averages.

The higher Death-rates in Rock and Winchcombe Districts are accidental, and Dr. Whitaker's explanation of that of the former District also applies to the latter, viz., "The District being so small "the numbers on which all (their) rates are calculated are small; "and hence 2 or 3 deaths more in any one year make a considerable difference in the rates."

A noteworthy point in the above list of comparative Death-rates is that the Oldbury 1902 rate (16·7) is much below the average (20·3); and Dr. Buttery says it "may again be considered fairly "satisfactory, for in spite of the fact that the Town has been visited "by a severe epidemic of Scarlet Fever in 1902, and also by a mild "outbreak of measles, the Death-rate is lower even than that of "the previous year . . . (this) has doubtless been also influenced "by the absence of the usual number of deaths from Diarrhœa . . . "and also by the improved sanitary condition of the Town generally."

In connection with this Oldbury mortality I should, however, explain that it is not a "Nett Death-rate," and does not include the 35 deaths which took place in the West Bromwich Workhouse among paupers belonging to Oldbury. If these 35 had been so included the 1902 rate would have been 18·2.

Of the Shipston Death-rate (17·6) Dr. Findlay writes:—"That "while a little over 5 per cent. of the population in the County are "over 65 years of age, in this District nearly 10 per cent. of the "whole population is over that age."

"These figures show that the Death-rate of this District will "generally appear rather high on account of the great number, "comparatively of persons advanced in years."

Table XV. shows that the 1902 Death-rate of the North Bromsgrove Urban District (7·8) is, as Dr. Kidd remarks, "unprecedentedly low."

It is, in fact, but slightly more than half of the average of the years 1892-1901 (14·0).

He also says:—"It is difficult to account for these remarkable "figures. All small Districts are, of course, liable to extreme "fluctuations in the Vital Statistics."

#### ZYMOTIC DISEASES.

Table V. shows the total numbers of notifiable cases and deaths and Hospital cases and Hospital deaths in each District during 1902.



TABLE V.

District.	Estimated Population 1902.	Smallpox.			Scarlatina.			Diphtheria.			Fever.			Erysipelas.			Puerperal Fever.		
		Cases.	Deaths.	Hospital Cases.	Hospital Deaths.	Cases.	Deaths.	Hospital Cases.	Hospital Deaths.	Cases.	Deaths.	Hospital Cases.	Hospital Deaths.	Cases.	Deaths.	Hospital Cases.	Hospital Deaths.	Cases.	Deaths.
<i>Urban.</i>																			
Bewdley Borough	2,866					20		5			6	2		3					
Bromsgrove	8,460					114	4	106	4	3	1			5					
North Bromsgrove	5,740					18		13				1		3					
Droitwich Borough	4,163	2	2			4		4			3	1		10					
Evesham Borough	7,101					80		75		24	4	18							
Kidderminster Borough	24,700					189	1	159		30	1			30					
King's Norton & N'thfield	60,358	6	6			524	16	461	15	72	13			61				7	5
Lye and Wollescote	11,082					81	7	51	2	5	1			5				1	
Malvern	16,448					42		41		10	10			7					
Oldbury	25,600					518	31	1		4	1			28				3	3
Redditch	13,784					79	1	75		14	4	1		23	2			4	
Stourbridge	16,490					96	6	65	3	4	4			4					
Stourport	4,488					22		18		8	1			4				1	
Totals	201,280	8	8			1787	66	1074	24	174	26	32	1	183	2			16	8





## SMALLPOX.—VACCINATION.

Twenty cases of Smallpox occurred in the County last year, as compared with 17 in 1901. Of the former, 2 occurred in Droitwich Borough, 6 in King's Norton Urban, 1 in Bromsgrove, 1 in Evesham, 1 in Martley, 2 in Pershore, 1 in Tewkesbury, and 6 in Yardley Rural Districts.

Between 1st January and 30th June, 1903, 25 cases have been notified.

Since 1888 (the longest period for which I have records) the previous outbreaks of Smallpox in the County have been as under :—

1893	-	192 cases	-	3 deaths
1894	-	138 "	-	13 "
1895	-	20 "	-	1 death.
1896	-	7 "	-	None.
1897	-	4 "	-	"
1901	-	17 "	-	"

Of the 20 cases notified in 1902, 4 were tramps, and 4 others "were associated with members of the tramp class, although "not themselves tramps."

The Medical Officer of Health for the King's Norton District says :—"Two Contacts (persons who had been exposed to infection) "who refused to be re-vaccinated, developed the disease outside the "District," viz., in Bromsgrove and Tewkesbury Rural Districts. One of the Droitwich Borough cases contracted the disease in London, and the 6 in Yardley and 1 in Pershore Districts were probably associated with Birmingham.

The Annual Reports and "Special Reports" received do not enable me to state to what extent Vaccination and re-Vaccination had been carried out in all these cases, with the exception of those in the Evesham and Pershore outbreaks—with regard to which I have the following information, viz. :—

District.	Age.	Vaccination.	Re-vaccination.
1 case in Evesham District	57	In Infancy, 2 small marks	Not carried out
1 " Pershore "	34	No marks	" "
1 " " "	28	In Infancy, no marks	" "



I am pleased to be able to record that the whole of the outbreaks in 1902 were quickly stamped out, as each of the Authorities in whose Districts the cases occurred were provided with Smallpox Hospital accommodation.

The precise provision made in the County for isolating Smallpox patients is described in my Annual Report for 1901 (pp. 31 to 37), and the additional accommodation since made will be mentioned in a subsequent paragraph on "Isolation Hospital Accommodation" (p. 34).

### VACCINATION.

Several Reports contain references to Vaccination—for instance, the Medical Officer of Health for Tewkesbury Rural District writes that "A new Vaccination Officer has been appointed and . . . under his supervision the Act will be more stringently carried out than has hitherto been the case;" and in King's Norton it is reported that:—"Notwithstanding the fact that the voice of the Anti-Vaccinator is not unheard in the District, there are only 25 out of 1,789 births, or 1·39 per cent., unaccounted for or outstanding for the year ending June 30th, 1902."

The Medical Officers for Stourport Urban, and Martley, Newent and Upton-on-Severn Rural, Districts report that Vaccination is efficiently carried out, and in the Martley District "the conscientious objector (is) almost unknown."

The Medical Officer for Stourbridge says (Vaccination) "is not as satisfactory as (he) would wish, owing to the fact that many parents take their children outside the District in order to have only one vesicle produced. This affords very imperfect protection against Smallpox."

The Medical Officer for Bromsgrove Rural District reports:—

"The points at which (Smallpox) may be expected to appear are at what may be termed 'tramp routes,' and also along the Canal. The measure to prevent an attack of the disease is efficient Vaccination and Re-vaccination. I mean by efficient Vaccination that amount that comes up to the Local Government Board standard, viz., good vesicles extending over half a square inch. 'One mark' Vaccination is a delusion, and affords very little protection. Re-vaccination of the same degree should be practised, as the protective power of the first operation wears off after 7-10 years."



In connection with the above remarks, I may remind you that in the "leaflet," dated 9th February, 1902, which was by your direction left at every house in the County (see Annual Report, 1902, p. 9) it was stated that "One Vaccination mark gives much less protection than three or four, and a large mark (half a square inch) is better than a small one." And that "As the protective power of Vaccination may wear out in time, the operation should be repeated at intervals of 10 years."

The Medical Officer for the Lye and Wollescote District stated in his Annual Report for 1897 that :—

"Many people in this District absolutely refuse to have more than one vesicle put upon a child ;" and I have good reason for stating that "one vesicle vaccination" is still practised in that locality, and that large numbers of persons from Stourbridge are unwise enough to avail themselves of it. Furthermore, a list of cases has been handed to me, from which it appears that arm-to-arm vaccination is not uncommonly carried out by a Practitioner there, who, I need scarcely add, is not a Public Vaccinator, since the Rules of the Local Government Board preclude such a state of things.

The following are Extracts from a Report of the Smallpox Hospital Committee approved by the County Council at their Meeting, held on the 9th March, 1903 :—

"As the Vaccination Act 1898 (61 & 62 Vict. c. 49) will expire on the 1st day of January 1904, some legislation this Year is absolutely necessary. Your Committee recommend the Council to press on His Majesty's Government the necessity for more stringent regulations for dealing with tramps infected with Smallpox or who there is reasonable ground to suspect are so infected. A very large percentage of the cases of Smallpox in this County are caused by tramps who wander from one place to another spreading infection. There is no sufficient power at present to legally detain such tramps and place them in quarantine until all danger is removed.

"Your Committee further recommend the Council to press on His Majesty's Government the following recommendations with respect to Vaccination and to communicate the same to the Local Government Board, the County Councils Association and the County Members of Parliament, with a view to the amendment of the law as therein suggested : namely—



- " i. That primary Vaccination be made compulsory (as under  
" the present Act).
- ii. That re-vaccination at about the age of 12 be made  
" compulsory in the same way.
- " iii. That no Certificate of Vaccination be recognized which  
" does not comply with the requirements of the Local  
" Government Board as to the number, area and size of  
" the Vaccination cicatrices.
- " iv. That sufficient facilities should be provided by obtain-  
" ing a ready supply of glycerinated calf lymph.
- " v. That the carrying out of the Vaccination laws should be  
" transferred to County Councils."

### MEASLES.

Table VI. gives the number of deaths, and the Death-rate in the County during each of the years 1893-1902 inclusive, and compares the latter with the corresponding rates of England and Wales.

TABLE VI.

		1902	1901	1900	1899	1898	1897	1896	1895	1894	1893
Administrative County	No. of Deaths -	72	65	179	16	170	112	132	18	135	49
	Rate per 1,000 of population	0.19	.17	.40	.04	.40	.3	.40	.05	.40	.10
England & Wales-	Rate per 1,000										
	of population	0.38	.27	.39	.31	.40	.40	.50	.36	.30	.30

Measles was slightly more fatal last year than in 1901.

The principal outbreaks are reported to have occurred in Bewdley, Droitwich and Kidderminster Boroughs, in Oldbury Urban, and Droitwich, Evesham, Halesowen, Kidderminster, Martley and Yardley Rural Districts; in consequence of which 30 different Schools had to be closed.

### SCARLATINA.

Table VII. shows the number of cases and deaths, and Hospital cases and Hospital deaths from Scarlatina, and Death-rate per 1,000 of population in the Urban and Rural Districts collectively and Administrative County during each of the years 1893-1902 inclusive, and also the corresponding rates for England and Wales.



TABLE VII.

Districts.		1902	1901	1900	1899	1898	1897	1896	1895	1894	1893
Urban (13)	Death Rate*	0.32	0.09	.10	.07	.11	.12	.06	.06	.05	.10
	Cases -	1787	683	550	431	747	673	623	464	581	548
	Deaths -	66	19	21	13	22	17	8	8	6	11
	Hospital Cases -	1074	376	279	252	269	155	161	105	241	183
	" Deaths -	24	3	4	5	9	4	-	-	4	12
Rural (17)	Death Rate*	0.16	0.10	.01	.08	.11	.13	.14	.17	.10	.10
	Cases -	850	598	299	579	1022	1074	1470	1460	957	1148
	Deaths -	27	17	2	14	17	26	28	34	23	17
	Hospital Cases -	572	335	153	298	468	561	714	357	303	462
	" Deaths -	17	3	1	6	3	12	8	6	6	3
Administrative County (30)	Death Rate*	0.25	0.10	.06	.07	.11	.12	.11	.13	.10	.10
	Cases -	2637	1281	849	1010	1769	1747	2093	1924	1538	1696
	Deaths -	93	37	24	27	39	43	36	42	29	28
	Hospital Cases -	1646	711	432	550	737	716	875	462	544	645
	" Deaths -	41	6	5	11	12	16	8	6	10	15
England and Wales -	Death Rate*	0.15	0.13	.12	.12	.11	.14	.18	.14	.10	.20

\* Per 1,000 of population.

From this it is obvious that more cases of Scarlatina were notified in 1902 than in either of the 9 preceding years. Table V. shows that of the 2,637 cases reported last year rather less than half (1,042) appeared in King's Norton and Oldbury Urban Districts. The mortality last year was also higher than usual, and considerably exceeded that of England and Wales. The Death-rate in the Urban Districts collectively (0.32) was double that of the Rural Districts collectively (0.16).

Table V. shows that the disease was prevalent in Bromsgrove, Evesham, Kidderminster, King's Norton, Lye, Oldbury, Redditch and Stourbridge Urban, and in Bromsgrove, Droitwich, Halesowen, Kidderminster, Martley, Pershore, Tenbury, Upton, and Yardley Rural Districts.

Discussing the Bromsgrove Urban outbreak Dr. Kidd observes :—

"We have experienced during the year an epidemic of Scarlet  
 "Fever, exceeding in extent anything of which I can find a  
 "record. . . . We had not had an epidemic since  
 "1897. . . . So that a new generation of susceptible  
 "children had grown up, and there was every material for an  
 "extensive outbreak. . . . One cause of the continued



“spread of infection undoubtedly lay in the existence of  
“unsuspected or concealed cases.”

Of the King's Norton District outbreak Dr. Green says :—  
“Schools of various sorts, and similar gatherings of children,  
“account to a great extent for the spreading of infection  
“ . . . however, the chief cause of spread was the large  
“number of cases that have either been discovered late in the  
“disease, or not at all. . . All recent investigations point  
“to the fact that so-called ‘return cases’ have no connection  
“with *the time* in Hospital, so that there is the slightest in-  
“fection from late peeling of the skin, especially on the feet.  
“The usual causes of ‘return’ cases are :—(1) Crowded  
“Hospitals, where acute and convalescents are kept together ;  
“(2) The bringing out on a patient's return of clothing or  
“other articles overlooked in the primary disinfection. At  
“present there is no absolute standard of freedom from  
“infection . . and until bacteriology comes to our aid it  
“is difficult to see where one will come from.”

Of the 518 cases (31 deaths) which occurred in Oldbury, Dr.  
Buttery reports :—

“The disease was distinctly traced to children attending Schools  
“outside the area where the disease was prevalent at the  
“time. Every possible precaution was taken to prevent the  
“spread of the disease as far as lay in our power.” These  
precautionary measures did not include isolation in Hospital,  
but Dr. Buttery says “the children attacked were isolated  
at home.”

I cannot, however, understand how children can be isolated in the  
small cottages which abound in Oldbury. In connection with this  
subject Dr. Buttery says :—

“There were 71 instances of houses having 2 cases in each  
“family, 26 had 3 cases, and 12 with 4 cases in each  
“house ;” and he adds that he is “fully convinced that by  
“(the closing of certain schools he) did curtail the spread of  
“the disease to a very considerable extent.”

Dr. Freer says of the Stourbridge outbreak (96 cases, 6 deaths),  
that :—

“The Schools have been mainly instrumental in disseminating  
“the disease . . and that the decrease in the number  
“of cases compared with last year may be attributed to  
“greater facilities for removal of patients to the Isolation



“Hospital, and also to the efficient disinfection of infected homes and clothing.”

Several Medical Officers express the opinion that mild cases of Scarlatina are now common causes of Scarlatina outbreaks, and so confirm what I said in my last Annual Report (p. 13) “That too often (these) are due to the fact that some cases being so mild are not recognised.”

Twenty-three cases of Scarlatina in 18 houses in Kidderminster Borough, and 8 cases in Kidderminster Rural District were traced to milk, supplied by a Dairyman, one of whose children was “desquamating freely” before the nature of the illness was detected. The Medical Officer for Kidderminster Rural District reports that “The children were said to have had measles, (but) from enquiries (he) made . . . he formed the opinion that all had Measles in the first instance, and that the child who was ‘peeling’ had taken Scarlet Fever concurrently with, or immediately after, Measles.”

The clue to this outbreak was, it would appear, first obtained by the Sanitary Officials of the Kidderminster Borough, and subsequently the Medical Officer of Health for the Rural District “ordered the cows to be at once removed to sheds half a mile away from the house, and that no milk, or anyone having anything to do with the milk, should come to the house, and that no one from the house should go to the cowsheds or interfere with the milk business in any way.”

It would appear that no extension of the disease “occurred after six days . . . from the time the source of infection was discovered and dealt with.” The Medical Officer of Health for Kidderminster Borough says :—“The three weeks or a month . . . (the) child must have been suffering from Scarlet Fever fairly covers the time of (the) great increase of cases (and that he) should have liked to have been in a position to advise (his) Committee to have prohibited the sale of the Comberton Dairy milk in the Borough for a time, but as the Town Council had not adopted the Act, of which they have now given notice, we were powerless.”

I presume the “Act” referred to is “The Infectious Disease (Prevention) Act, 1890,” and which extends Sect. 3 (b) “to any Urban or Rural District after the adoption thereof.” No doubt by this time the Corporation have strengthened their sanitary powers by “adopting” an important Act passed as long ago as 1890.

Table VIII. compares the percentage of Scarlet Fever cases removed to Hospital from each District during the past three years.



TABLE VIII.

District.	1902.			1901.			1900.		
	Total No. of cases notified.	Hospital cases.	Per- centage of Persons treated in Hospital.	Total No. of cases notified.	Hospi- tal cases.	Per- centage of Persons treated in Hospital.	Total No. of cases notified.	Hospital cases.	Per- centage of Persons treated in Hospital.
<i>Urban—</i>									
Bewdley Borough . . .	20	5	25	17	9	52	11	—	—
Bromsgrove . . .	114	106	92	19	15	76	11	4	36
Bromsgrove North . . .	18	13	72	7	5	63	22	13	59
Droitwich Borough . . .	4	4	100	4	1	25	8	6	74
Evesham Borough . . .	80	75	93	11	11	100	2	2	100
Kidderminster Borough . . .	189	159	84	59	49	83	40	37	92
King's Norton and Northfield . . .	524	461	87	186	63	87	126	119	94
Lye and Wollescote . . .	81	51	62	51	4	7	68	8	11
Malvern . . .	42	41	97	56	54	96	19	16	84
Oldbury . . .	518	1	0.1	104	—	—	88	—	—
Redditch . . .	79	75	94	24	21	86	73	52	63
Stourbridge . . .	96	65	67	120	22	18	74	11	14
Stourport . . .	22	18	81	25	22	88	17	11	64
<i>Rural—</i>									
Bromsgrove . . .	59	36	61	32	16	50	46	24	52
Droitwich . . .	40	28	70	66	28	42	41	15	36
Evesham . . .	32	29	90	11	11	100	7	7	100
Feckenham . . .	19	19	100	—	—	—	4	4	100
Halesowen . . .	103	80	77	131	40	30	26	15	57
Kidderminster . . .	97	71	73	65	34	52	23	9	39
Martley . . .	73	32	43	24	7	29	10	5	50
Newent . . .	—	—	—	—	—	—	—	—	—
Pershore . . .	59	58	98	53	53	100	14	11	78
Rock . . .	7	—	—	7	—	—	6	—	—
Shipston-on-Stour . . .	2	2	100	4	1	25	1	—	—
Stow-on-Wold . . .	—	—	—	—	—	—	—	—	—
Tenbury . . .	37	—	—	5	—	—	23	—	—
Tewkesbury . . .	1	—	—	—	—	—	3	—	—
Upton-on-Severn . . .	31	29	93	10	8	80	14	8	100
Winchcombe . . .	—	—	—	3	—	—	—	—	—
Yardley . . .	290	188	64	187	137	73	81	52	64

This Table shows that in 13 of the 30 Sanitary Districts in the Administrative County more than 80 per cent. of the Scarlatina cases notified respectively were treated in Isolation Hospitals. One of the most noticeable points is that of the 518 cases notified in Oldbury, only 0.4 per cent. were treated in Hospital; in other words, but one case was removed to Hospital.



Many Medical Officers give examples of the advantage of promptly isolating cases of Scarlatina, which subject was discussed at some length in my last Annual Report (p. 14). Dr. Wilson (Yardley) in his Report for 1902, says that "Hospital accommodation is quite as necessary for the isolation and treatment of cases of Enteric Fever and Diphtheria as for cases of Scarlet Fever, while last year only cases of Scarlet Fever could be received (into Hospital), and for a time only the most urgent cases could be admitted."

I do not now propose to allude further to the cause of "return cases" of Scarlatina—*i.e.*, cases associated with the discharge of patients from Hospital, as I did so last year (pp. 13 to 15); although I am glad to observe that Dr. Green's (King's Norton) experience confirms my own, that over-taxing of Hospital accommodation leads to such cases, and that consequently crowding of such Institutions is to be deprecated; in addition to which acute and convalescent patients should never be treated in the same wards.

Judging by the Annual and Special Reports sent in, 14 Schools were closed in 1902 on account of Scarlatina.

### DIPHTHERIA.

Table IX. shows the number of cases and deaths, and Hospital cases and Hospital deaths, from Diphtheria, and Death-rate per 1,000 of population, in the Urban and Rural Districts collectively, and Administrative County during the years 1893-1902 inclusive, and also the corresponding rates for England and Wales.

TABLE IX.

Districts.		1902	1901	1900	1899	1898	1897	1896	1895	1894	1893
Urban (13)	Death Rate*	0.12	0.19	.20	.19	.11	.09	.14	.05	.10	.10
	Cases -	174	250	248	245	128	87	137	57	51	56
	Deaths -	26	36	51	39	21	13	18	6	9	11
	Hospital Cases -	32	-	-	2	5	2	2	1	5	-
	" Deaths -	1	-	-	-	3	-	-	-	-	-
Rural (17)	Death Rate*	0.19	0.13	.14	.08	.11	.12	.20	.20	.04	.10
	Cases -	195	154	101	119	112	233	228	143	118	152
	Deaths -	28	21	20	14	17	25	42	40	9	26
	Hospital Cases -	13	24	3	7	14	12	-	-	1	1
	" Deaths -	-	1	-	-	-	1	-	-	-	-
Administrative County (30)	Death Rate*	0.16	0.16	.20	.14	.11	.11	.10	.14	.06	.10
	Cases -	369	404	349	364	240	320	365	200	169	208
	Deaths -	54	57	71	53	38	38	60	46	18	37
	Hospital Cases -	45	24	3	9	19	14	2	1	6	1
	" Deaths -	1	1	-	-	3	1	-	-	-	-
England and Wales -	Death Rate*	0.23	0.27	.29	.29	.20	.24	.20	.25	.20	.20

\* Per 1,000 of population.



This Table shows that the number of cases of Diphtheria reported in each of the last 8 years (with the exception of 1898) has not differed very much; and considering that the population of the Administrative County is now estimated to be 364,678, it cannot be said to be very large, particularly when the infectious nature of the malady, and its liability to be spread by Schools, is borne in mind.

In 1902, 174 cases (26 deaths) occurred in the Urban Districts collectively, as compared with 195 cases (28 deaths) in the Rural Districts collectively—whereas in 1901 there were 250 cases in the former, and 154 in the latter. The Death-rate of the Rural Districts last year (0·19) was rather higher than in the Urban (0·12), but apparently this is due to 17 deaths in Yardley District, which is “rural” in name, although largely “urban” in character.

Table V. indicates that the principal outbreaks of 1902 were in Evesham (24 cases, 4 deaths), Kidderminster (30 cases, 1 death), and King's Norton (72 cases, 13 deaths) Urban, and in Yardley (117 cases, 17 deaths) Rural Districts.

These outbreaks are reported to have been due to personal infection, mainly conveyed from child to child at School. Mild and unsuspected cases are said to have frequently led to extension of the disease. Once more, therefore, I would repeat that in Districts where Diphtheria has broken out, all cases of “Sore Throat” should be regarded with suspicion, and that if it occurs among the pupils of any particular School, speedy closure and disinfection of the School Buildings is a preventative measure which should not be delayed until the disease has become epidemic.

The free use of Bacteriological Tests, and frequent enquiries at the Schools, with the view of excluding all children with “Sore Throat,” are precautions which should not be disregarded; and I am glad to note that the Local Authorities are gradually appreciating the importance of providing Hospital accommodation for Diphtheria.

As regards Bacteriological Tests some persons are inclined to form too hasty conclusions, that because the Diphtheria bacillus is not found in a particular swab, therefore the case is not Diphtheria. I would, therefore, point out that single negative results do not necessarily imply absence of Diphtheria. Conversely it does not follow that because Diphtheria Bacilli are detected in a person's throat that such an one will develop characteristic symptoms of the complaint, but persons exposed to insanitary surroundings are much more likely to do so than those who lead healthy lives.



Bacteriological Tests should be considered as aids to diagnosis, and clinical symptoms should be duly considered before a definite opinion is declared. It is now generally believed that at least three negative results should be obtained when clinical symptoms seem to indicate Diphtheria, before a decided view is expressed. On the other hand, if the symptoms point to Diphtheria, and the characteristic bacillus is detected, then a definite diagnosis should be made. The Serum treatment of persons suffering with Diphtheria is now so well established that I need not plead for its adoption, as years ago I did in my Annual Reports. Indeed it is not a little gratifying to be able to report that many Local Authorities in the County afford facilities for carrying it out, by paying for serum in those instances where persons are unable to do so themselves. Not only is "Anti-toxin" a valuable curative agent—especially when used in the early stages of the ailment—but evidence seems to be accumulating in support of the view that it has also prophylactic power. The period for which it acts as a preventative is, however, a short one. But even so, it seems to me that those exposed to Diphtheritic infection should be "injected," inasmuch as good may result, and no ill effects of importance are likely to ensue.

The distribution of "Anti-toxin" to all medical men in the County who apply to me for it, at cost price, which was commenced in 1894, has been continued, no less than 310 bottles have been sent out from my office last year.

Dr. Green (King's Norton) reports :—

"That with the approval of the Council (he) fitted out a small "Bacteriological Laboratory at the Hospital, similar to the "one he worked for four years in the North. The chief "objects are the Bacterial Diagnosis of Diphtheria, and the "Serum re-action for Typhoid Fever."



FEVER.  
TABLE X.

Districts.		1902	1901	1900	1899	1898	1897	1896	1895	1894	1893
Urban (13)	Death Rate*	0·12	0·07	·12	·14	·20	·14	·15	·10	·08	·10
	Cases -	124	125	172	214	347	101	93	75	39	66
	Deaths -	26	16	25	28	42	20	20	12	9	14
	Hospital Cases -	33	17	16	39	29	4	-	1	-	-
	" Deaths -	1	2	5	2	4	-	-	-	-	-
Rural (17)	Death Rate*	0·05	0·05	·07	·10	·20	·05	·07	·05	·04	·09
	Cases -	61	60	60	95	131	67	73	97	93	144
	Deaths -	9	8	12	17	15	11	14	9	8	17
	Hospital Cases -	4	5	4	29	30	3	17	18	15	15
	" Deaths -	-	1	-	4	6	-	-	2	2	-
Administrative County (30)	Death Rate*	0·09	0·06	·10	·12	·20	·09	·11	·07	·05	·10
	Cases -	185	185	230	309	478	168	166	172	132	210
	Deaths -	35	24	37	45	57	31	34	21	17	31
	Hospital Cases -	37	22	20	68	59	7	17	19	15	15
	" Deaths -	1	3	5	6	10	-	-	2	2	-
England and Wales -	Death Rate*	0·13	0·16	·17	·20	·30	·16	·17	·17	·10	·60

\* Rate per 1,000 of population.

The compulsory notification of disease for the whole County became complete in January, 1898, and since then, of course, all cases of Typhoid Fever have been reported. Table X. shows that since that time the outbreaks in the "Administrative County" have gradually declined, and curiously the numbers of cases notified in 1901 and 1902 were identical (185).

This decline of Typhoid Fever is not confined to Worcestershire, but applies to England and Wales, and is an undoubted index of the value of Sanitation.

Table V. shows that the local incidence of Typhoid Fever was greatest in King's Norton (26 cases, 7 deaths), Oldbury (32 cases, 6 deaths), and Redditch (19 cases, 4 deaths) Urban, and in Yardley (30 cases, 3 deaths) Rural, Districts. Eleven of the 26 cases, in King's Norton District, occurred in Selly Oak Infirmary and Rubery Asylum, and 6 of the 11 deaths took place in the Union Infirmary. Of these deaths Dr. Green says there was "A very high per centage of 42·3 (and) the percentage "Death-rates increased in direct ratio to the ages of the patients. It "has always been (his) opinion from a very large experience of



"Enteric Fever that it is as infectious as the other Zymotic diseases, although the infection is spread in a different manner to some of them. This doctrine has gradually been gaining ground during recent years, and it has been brought to a climax by the recent utterances of Professor Koch. In his opinion practically all cases, with a few exceptions, are due to infection from a previous one insufficiently isolated, and the disease can be exterminated if early diagnosis and universal isolation in Hospital are adopted."

Dr. Green adds :—"This statement is strongly supported by (his) experience in Gateshead, where by this means Typhoid Fever was reduced to very small numbers. . . . The excessive Death-rate, which should not be more than 15 to 20 per cent., demonstrates most plainly that it is absolutely imperative to isolate cases of this disease in our Fever Hospital."

Dr. Buttery writes that Typhoid Fever was "more prevalent (in Oldbury in 1902) than in the previous year, when there were only 11 cases . . . (but) it was almost too much to hope that we should continue to have so small a number of Typhoid cases in consecutive years. Still we do hope that now that the sewers of the Town have been re-arranged that the disease will be gradually lessened, and that the labours of the Sanitary Department will be rewarded by the abolition of this dreaded complaint. Nine of the cases were treated at the Newbury Lane Hospital, and they all made good recovery."

The Sanitary Inspector of the Oldbury District (Mr. Robbins) mentions in his Annual Report that the Council "are still following the cleansing and disinfection of Courts and Yards, and where possible causing them to be partly or wholly paved."

It is to persistence in this branch of local sanitation, together with the abolition of the middens, that I look in no small degree (as explained in Report upon Typhoid Fever in Oldbury) for the diminution of this disease.

Dr. Stevenson explains that 7 of the "Fever" cases in Redditch were "Continued Fever." Of the 12 Typhoid cases he says "three were undoubtedly infected by a previous case in the same house. The water was in each case excupated, and there was no association with any particular milk supply. Food infection is probably the cause of most of these sporadic cases of Enteric." The particular food alluded to is not named.

Of the Yardley cases, Dr. Wilson remarks :—"They were all scattered cases, and mostly of a comparatively mild type. In only



"one instance did a second case occur in any single household, so that, with this exception, there was no further spread of the disease from any of the other cases." Dr. Wilson also says.—  
 "Hospital accommodation is quite as necessary for the isolation and treatment of cases of Enteric Fever and Diphtheria, as for cases of  
 "Scarlet Fever . . . ."

An inference to be drawn from the foregoing remarks is that Typhoid Fever patients should, where isolation at home is impracticable, be removed to the District Isolation Hospitals.

With that opinion I entirely concur, and I commend it to the consideration of the Local Authorities in the County.

As ulceration of the bowels is a symptom of Typhoid Fever, and some of the attacks are severe, by the time the true nature of the disease is recognised, removal of patients for long distances is often impossible; but as "good nursing" is an all-important matter, not only for the welfare of the sufferer, but also as a means of checking the spread of the disease, the provision of Nurses to treat patients in their own homes who cannot defray the cost of acquiring such service, should certainly be a "precautionary measure" to be adopted by Public Health Authorities.

Early diagnosis of Typhoid Fever is now possible by means of the "Widal Test" (referred to in my Annual Report for 1897, p. 26), the application of which is readily available now that your County Laboratory is in full working order, consequently the removal of Typhoid Fever patients to Isolation Hospitals is at the present time more easily accomplished without risk than formerly; hence, in my opinion, Local Authorities would be well advised to give their Medical Officers complete discretionary power in the matter.

#### INFANTILE MORTALITY.

Table XI. compares the Rates of Infantile Mortality in the Urban and Rural Districts collectively and the Administrative County, with those of England and Wales for the years 1894-1902 inclusive.

TABLE XI.

Districts.	Deaths of children under 1 year per 1,000 registered Births.								
	1902	1901	1900	1899	1898	1897	1896	1895	1894
Urban (13) . . . .	117	145	153	151	156	164	168	161	131
Rural (17) . . . .	106	116	115	117	115	127	122	112	117
Administrative County (30)	112	134	136	136	138	143	140	131	122
England and Wales . .	133	151	154	163	161	156	148	161	143
County death-rate per 1,000 of population	18	4	3	8	4	4	2	3	16



The rate of mortality in England and Wales in 1902 among Infants under one year of age, to 1,000 Registered Births, was 133, which is, with the single exception of a rate of 130 per 1,000 births in 1881, the lowest rate on record, and is 21 per 1,000 below the mean for the 10 years 1892-1901. The Registrar-General's Tables for 1902 are not yet issued, and therefore this low Infantile Mortality is unexplained; but as sudden fluctuations in infantile rates are usually influenced by the prevalence, or otherwise, of Epidemic Diarrhoea, Whooping Cough and Measles, I anticipate that the Registrar-General, in his Annual Report for last year, will record low rates from these diseases.

Perhaps it would be well to mention here, that Epidemic Diarrhoea is a "filth disease," associated to a large extent with meteorological conditions, and that with spells of hot dry weather the mortality increases, and *vice versa*. The cold damp Summer of 1902 therefore, to some extent, induced the low infantile mortality. But while the above influences account for yearly fluctuations in infantile mortality, it must not be forgotten that such potent causes as want of knowledge and carelessness in the feeding, clothing, and rearing of infants, the employment of mothers in factories, in addition to over-crowding and other insanitary conditions, are constantly at work; and while meteorological conditions are uncontrollable, the other factors are capable of being grappled with, and I am glad to say are being grappled in the County.

Turning to Table XI. once more, it will be observed that the Infantile Mortality of the County in 1902 (112) was the lowest in the nine years 1894-1902, and that for 1894 (122) is the next lowest.

So far as I can ascertain, the meteorological conditions in 1894 and 1902 were much alike. I mention this because, although without doubt the Health Missioners' work is greatly tending to reduce local infantile mortality, it is not to be expected that it *alone accounts* for the low rate of 1902, nor indeed must one be disappointed if such a state of things does not recur next year. If you will compare the Diarrhoea Death-rates given in Table XII. with the Infantile Rates of Table XI., you will find that the County Diarrhoea rates for 1902 (0.18) and 1894 (0.19) are also the lowest recorded.

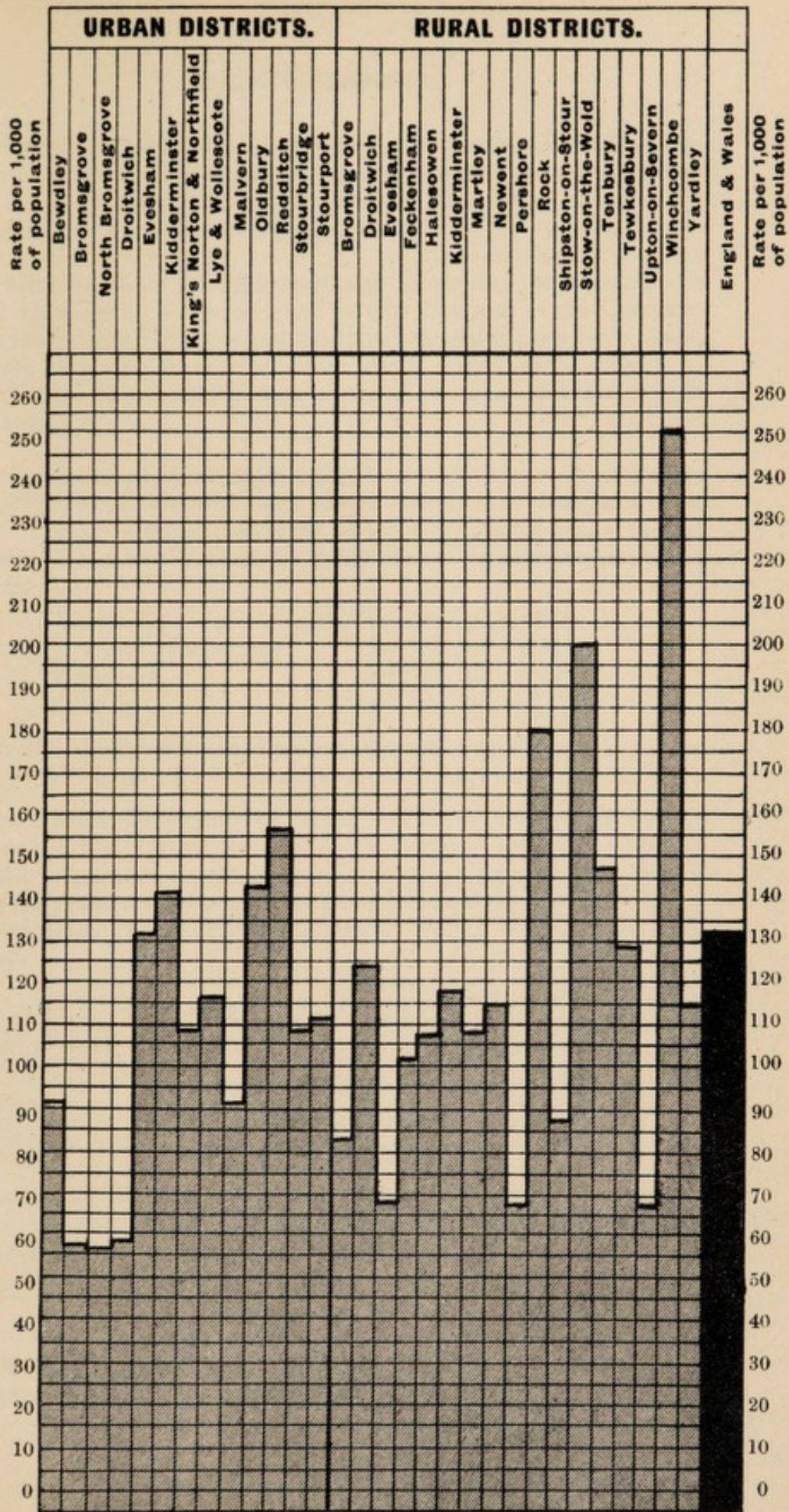
From a Report of the Registrar-General for 1899 it appears that of the Infantile Mortalities of the 43 Counties referred to, Worcestershire equals Bedfordshire, and has a higher rate than 18 of them and a lower rate of 23 of them.

It is said, too, "That the distribution of Infantile Mortality "shows that it is much greater in Counties in which urban



1902.

INFANT MORTALITY RATE PER 1000 BIRTHS.









“populations predominate, being especially great in the Counties  
“in which mining and manufacturing industries are chiefly found  
“ . . . (and that) the Town Infantile Death-rate is . . . in  
“excess of the Rural Death-rate . . . ”

“Under the head of Diarrhœa and Enteritis, the mortality is  
“more than seven times as great in the Town as in the Country.  
“The mortality of Measles and Scarlatina is more than three times,  
“and the mortality from Premature Birth nearly twice as high in  
“the Town as in the Country,” (“Brit. Med. Journal,” 30th  
May, 1903.)

As a means of grappling with what I have named as the “potent  
causes” of local infantile mortalities, which are “constantly at  
work,” I may remind you that by aid of grants made by the  
Technical Education Committee, Lady Health Missioners have been  
established—

At Stourbridge	since 1st October, 1897.
„ Lye and Wollescote	„ 23rd June, 1900.
„ Halesowen	„ 1st March, 1899.
„ Oldbury	„ 1st January, 1903.

I should, however, add, that of the 35/- paid weekly to the  
Oldbury Missioner, the Oldbury Urban Council contribute 15/-.

These Health Missioners are doing excellent work (and this is  
confirmed in the Annual Reports of the District Medical Officers)  
and their labours are much appreciated by the class for whose benefit  
they were established—to such an extent, indeed, that it is an every  
day occurrence for mothers (especially young mothers) to seek  
their advice.

I am glad to report, also, that as an increased “grant” has been  
approved by the County Council for the coming year, that a fifth  
Health Missioner will shortly be appointed for Redditch, where the  
average Infantile Mortality for the years 1892-1902 is 173, and the  
Medical Officer mentions “that 43·3 per cent. of the married and  
“widowed women . . . were engaged in daily occupations.”

The Annual Reports show, that “leaflets” instructing Mothers  
how to treat their babies were freely circulated in the Kidderminster  
and Redditch Urban Districts. The following observations of  
District Medical Officers are deserving of special note, viz. :—

*King's Norton Urban District.*

“The proper education of our girls in Cooking and Domestic  
“Economy in the Public Elementary Schools, seems to be a step in



"the right direction. A further advance might be made by including "Infant Feeding and Domestic Hygiene. Now-a-days, when such "a large number of girls are employed in Factories, it is difficult for "them to acquire any knowledge of matters connected with home "management."

*Rock Rural District.*

"Even at the best, however (the Infantile Mortality, which "averages 144 for the past six years) is far from satisfactory, and a "glance at the causes of death will show that by proper knowledge "and care most of them might have been avoided. They are as "follows :—

Improper feeding.	Overlain.	Want of care at Birth.	Tuberulosis.	Unavoidable.
4	1	1	1	2

"I am afraid that as regards adults in these matters not very much "improvement can be looked for, though District Visitors, if tactful, "could in some cases impress and teach the mothers. I think more "permanent good would result from attempts made to teach the older "girls in Elementary Schools. I should like to see practical lessons "given in such matters as the preparation and keeping of food, the "necessity of perfect cleanliness and order in houses, and the care "and management of infants."

I do not think there can be two opinions as to the advantage of teaching Elementary Hygiene in Schools, and, consequently, I suggest that you urge the County Education Committee to support such an idea, and to cause Elementary Hygiene to be included in the ordinary curriculum much more generally and completely than is now the case.

The Medical Officer of the Lye Urban District has for some time past been anxious to establish a "Creche," to which mothers employed daily from home might take their Infants to be cared for. No doubt such a place would be of great service, and, if properly equipped and managed, not only be a convenience to female operatives, but also tend to lower infantile mortality.

Unfortunately, lack of funds has hitherto prevented the idea being carried out. The first cost of providing a suitable building seems one of the chief obstacles, and I would express the hope that since the County Council defray the whole cost of maintaining a Health Missioner at The Lye, the local Urban Council will, by giving



pecuniary assistance, as well as moral support, to the scheme, further the establishment of such a desirable Institution.

By aid of a Creche mothers would earn wages, a small part of which they could hand over towards the cost of maintaining the Creche; but they should bear in mind that by sending their babies to such a place no inducement for early weaning of Infants is to be held out; but quite the reverse.

I need scarcely say that should such a Creche be established, particular care would have to be taken that the congregation of the Infants did not lead to dissemination of infectious disease.

In the manufacturing Town of Redditch, where "43·3 per cent. of the married and widowed women are engaged in daily occupations," it seems to me that the maintenance of such an Institution would do much good.

#### DIARRHŒA.

Table XII. gives the numbers of Deaths and Death-rates from Diarrhœa during the years 1893-1902 inclusive.

TABLE XII.

Districts.	1902	1901	1900	1899	1898	1897	1896	1895	1894	1893
Urban (13) - . . . .	51	124	90	218	102	96	49	48	30	89
Rural (17) - . . . .	15	44	51	93	69	72	32	56	27	122
Administrative County (30) -	66	168	141	311	171	168	81	104	57	211
County death-rate per 1,000 of population . . . .	0·18	0·4	0·3	0·8	0·4	0·4	0·2	0·3	0·19	0·7

The nomenclature of this disease having been changed at the instigation of the Registrar-General, comparison of the Diarrhœa Statistics for the past year are not entirely reliable.

The connection of Epidemic Diarrhœa with Death-rates of children under one year, and its dependence upon meteorological conditions, have already been alluded to in the paragraph on "Infantile Mortality."

A common cause of Summer Diarrhœa is milk, which has been infected by intestinal bacilli, either at the Cow-shed or Dairy, or even on its way to, or at, the house of the consumer. The immunity of breast-fed infants from the disorder is forcible evidence in favour of such a view. Of course, the hotter the weather the



greater the risk of milk contamination. I mention this now in order to show how necessary it is that Dairies, Cowsheds, and places where milk is stored, should be managed with scrupulous care; a subject to which I shall briefly return in the paragraph upon "Dairies and Cowsheds." (P. 48).

### PHTHISIS.

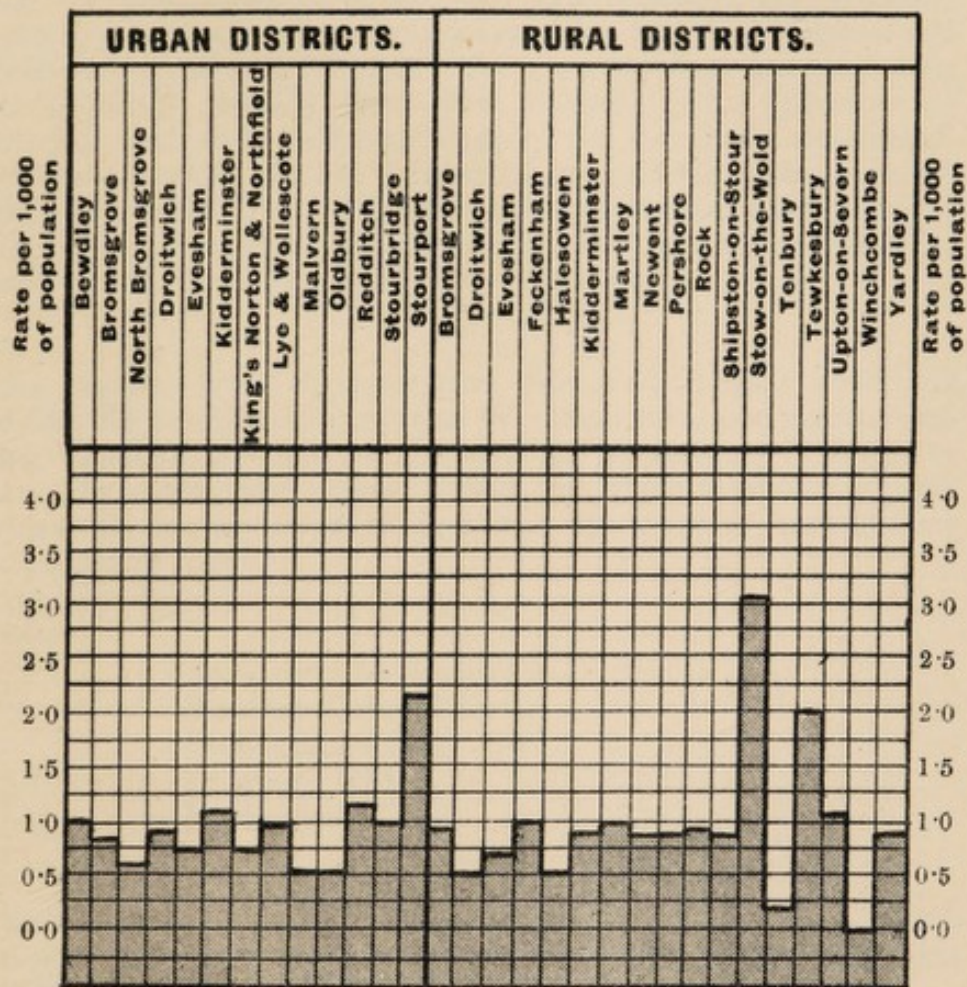
Table XIII. and Diagram show the "Phthisis" Death-rates of the County and of the respective Districts during the years 1893-1902 inclusive.

TABLE XIII.

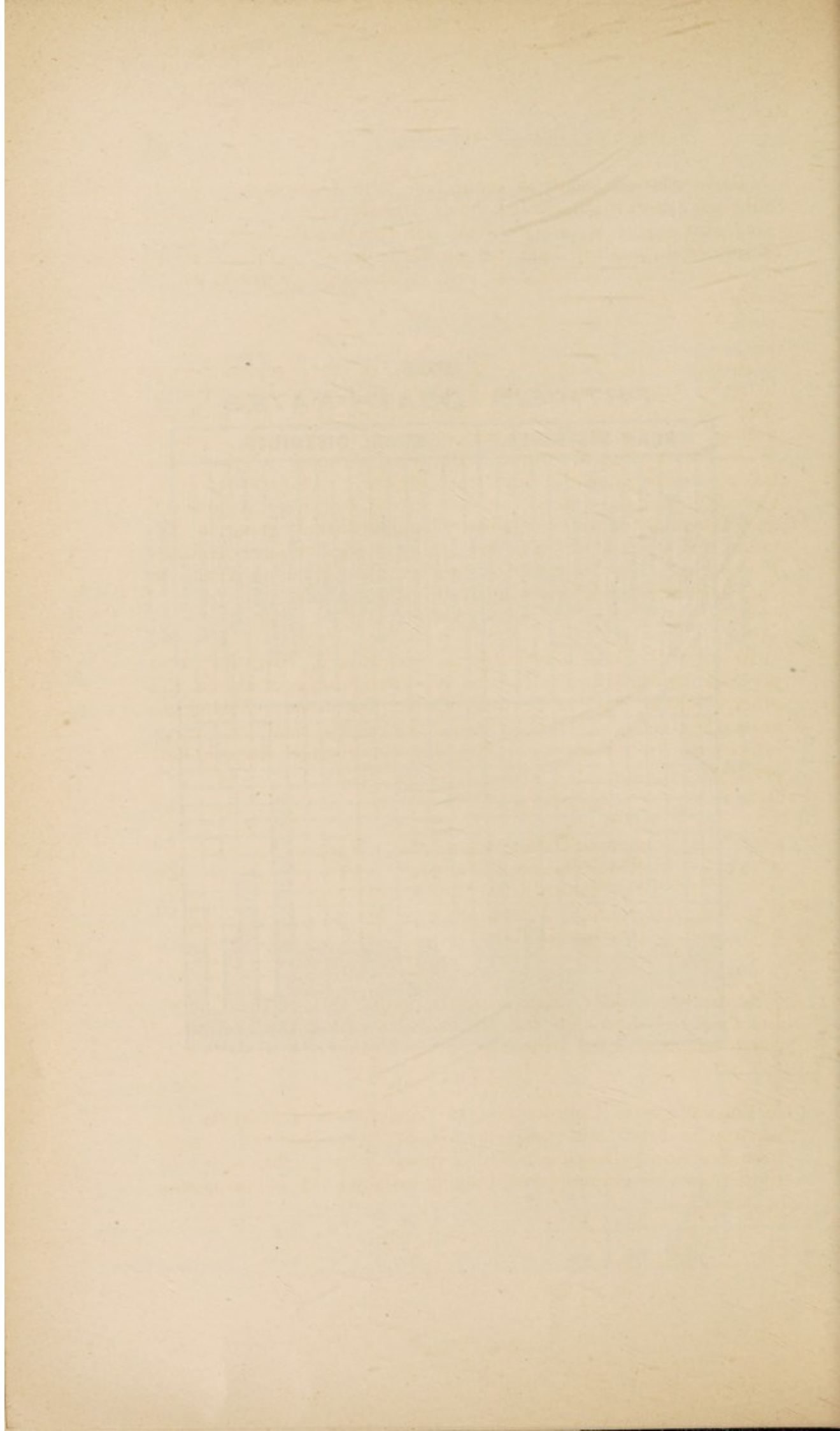
Districts.	Average for years 1893 to 1902.	Rate per 1,000 of Population.								
		1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.
<i>Urban.</i>										
Bewdley Borough	0.6	1.0	0.0	0.3	0.3	0.6	.6	.6	1.3	1.0
Bromsgrove	1.0	0.8	1.5	1.0	0.6	0.8	1.2	1.3	1.5	.1
Bromsgrove North	0.6	0.6	0.8	0.3	0.5	0.3	.3	.3	1.3	1.3
Droitwich Borough	1.1	0.9	2.1	0.6	0.9	0.7	1.4	1.6	.9	.5
Evesham Borough	0.7	0.7	0.5	0.9	0.9	0.2	.6	.5	1.3	.6
Kidderminster Borough	1.0	1.0	1.1	1.2	1.1	0.8	1.3	.9	1.5	.8
King's Norton and Northfield	1.0	0.7	1.2	0.9	0.8	1.0	1.1	1.1	1.1	1.7
Lye and Wollescote	0.8	0.9	0.6	0.2	0.6	0.7	1.2	.5	.8	.8
Malvern	0.9	0.5	0.8	0.5	0.7	1.0	.9	.9	1.8	.8
Oldbury	0.6	0.5	0.5	0.7	0.4	0.9	.6	.8	1.2	.6
Redditch	1.4	1.2	1.3	1.7	0.9	1.5	1.6	1.4	1.7	1.6
Stourbridge	0.8	0.9	1.0	0.7	0.5	0.4	1.0	.9	.7	.8
Stourport	1.1	2.2	0.4	0.7	0.9	0.9	1.0	1.1	1.4	.8
Urban death rate	0.8	0.85	0.9	0.7	0.7	0.7	0.9	0.8	1.2	0.8
<i>Rural.</i>										
Bromsgrove	0.9	0.9	1.2	0.8	1.1	1.3	1.0	.7	.8	.8
Droitwich	0.7	0.5	0.7	0.5	0.7	1.1	.8	.9	.9	.4
Evesham	0.7	0.7	0.6	1.2	0.8	0.4	.4	.9	.7	.5
Feckenham	1.1	1.0	0.7	1.7	0.6	0.6	.6	1.0	1.7	1.9
Halesowen	0.5	0.5	0.8	0.5	0.5	0.5	.09	.4	.6	.5
Kidderminster	0.7	0.8	0.7	1.0	0.7	0.7	.5	.4	.4	.8
Martley	0.6	0.9	0.4	0.6	0.6	1.2	.3	.7	.6	.6
Newent (part)	0.7	0.8	0.9	0.8	0.7	1.5	1.5	0.0	.7	0.0
Pershore	0.9	0.8	1.3	1.2	1.1	0.7	.7	.9	1.5	.6
Rock	0.3	0.9	0.4	0.4	0.4	0.0	.4	0.0	0.0	.7
Shipston-on-Stour	0.8	0.8	0.2	0.6	1.4	0.9	.8	.5	.5	1.0
Stow-on-the-Wold (part)	2.0	3.0	0.0	0.0	2.9	0.0	0.0	8.9	0.0	5.9
Tenbury	0.5	0.2	0.8	0.4	0.2	0.6	0.0	.8	.8	.7
Tewkesbury (part)	1.3	2.0	0.8	0.4	1.2	2.0	.8	1.2	2.4	1.2
Upton-on-Severn	0.9	1.1	0.4	1.0	1.2	0.7	.6	1.1	1.5	1.3
Winchcombe (part)	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yardley	0.8	0.8	0.7	1.1	0.6	0.8	.8	.6	.8	1.1
Rural death rate	0.8	0.83	0.6	0.7	0.8	0.8	0.5	1.1	0.7	1.0
County death rate	0.8	0.84	0.7	0.7	0.79	0.7	0.7	1.0	.9	0.9



1902.  
**PHTHISIS DEATH-RATES.**



E. BAYLIS & SON, WORCESTER.





There are three points in connection with Consumption which, although generally admitted, I should once more like to emphasize, viz., that (1) It is an infectious and preventable disease; (2) It is very fatal; and (3) That it is curable in many instances provided the patients are submitted to *proper "open-air" treatment in the early stage of their illness.*"

As regards the fatality of the disease, of every 10,000 persons living in England and Wales in 1838, 38 died of Consumption. Year by year, however, since then this mortality has gradually declined; so that in 1899 of 10,000 persons living in England and Wales only 13 died of Phthisis. But even so, there are now some 60,000 deaths annually from that disease. This reduction of mortality came about before the days of the "open-air treatment," and, without doubt, was due to better houses, generally improved sanitation, and better food. The most eminent Medical Authorities on this subject, are, however, of opinion that if the decline is to continue additional efforts will have to be made.

As regards Local Consumption Statistics, I have shown in previous Reports (1900, p. 24) that Worcestershire, as compared with other Counties, has not an unfavourable Death-rate. Taking the years 1893-1902, the longest period for which complete County returns are in my hands, I find that the average Annual Rate per 10,000 in the

Administrative County is	8.5.
Redditch Urban District	15.1.
Feckenham Rural	11.7.
Stourport Urban	11.3.
Bromsgrove Rural	11.0.

So that the Redditch Rate is nearly double that of the County, and about one-third more than the excessive rates of the Feckenham and Bromsgrove Rural Districts.

The ravages of Consumption in these particular Districts will, perhaps, be better appreciated by comparing the number of deaths from Scarlatina, Diphtheria and Typhoid Fever collectively with those from Consumption, and in doing so I find the following state of things :—



Name of District.	Average number of annual Deaths during 1892-01.	
	Scarlatina, Diphtheria, Typhoid Fever, collectively.	Consumption.
Administrative County - - - -	111	299
Redditch Urban District - - - -	5	19
Stourport Urban District - - - -	1.3	4
Feckenham Rural District - - - -	0.8	6
Bromsgrove Rural District - - - -	1.5	11

The Redditch Urban District is essentially a "needle manufacturing" centre, and in Feckenham and Bromsgrove Rural Districts similar works exist.

The excessive Death-rates are, I have no doubt, due to Factory influences. Now, however, that the disease is known to be infectious, and that the dried expectorations of consumptive persons so readily convey it, this is scarcely to be wondered at. For we all know that as yet public knowledge is not so advanced as to induce factory hands to take precautionary measures with regard to such infectious expectorations. So long ago as 1877 I was called upon to report upon Consumption in the Feckenham District, and I then noted such factory influences, and pleaded for more general use of "fresh air," although at that time I did not recognise that Consumption was infectious.

The Medical Officers of each of these Districts call particular attention to the excessive rates of Consumption, and recommend that the Worcestershire Consumption Sanatorium, at Knightwick, established by voluntary contributions, for the cure of persons of the poorer classes in the early stages of the disease (Annual Report, 1901, pp. 24 and 25) should be supported.

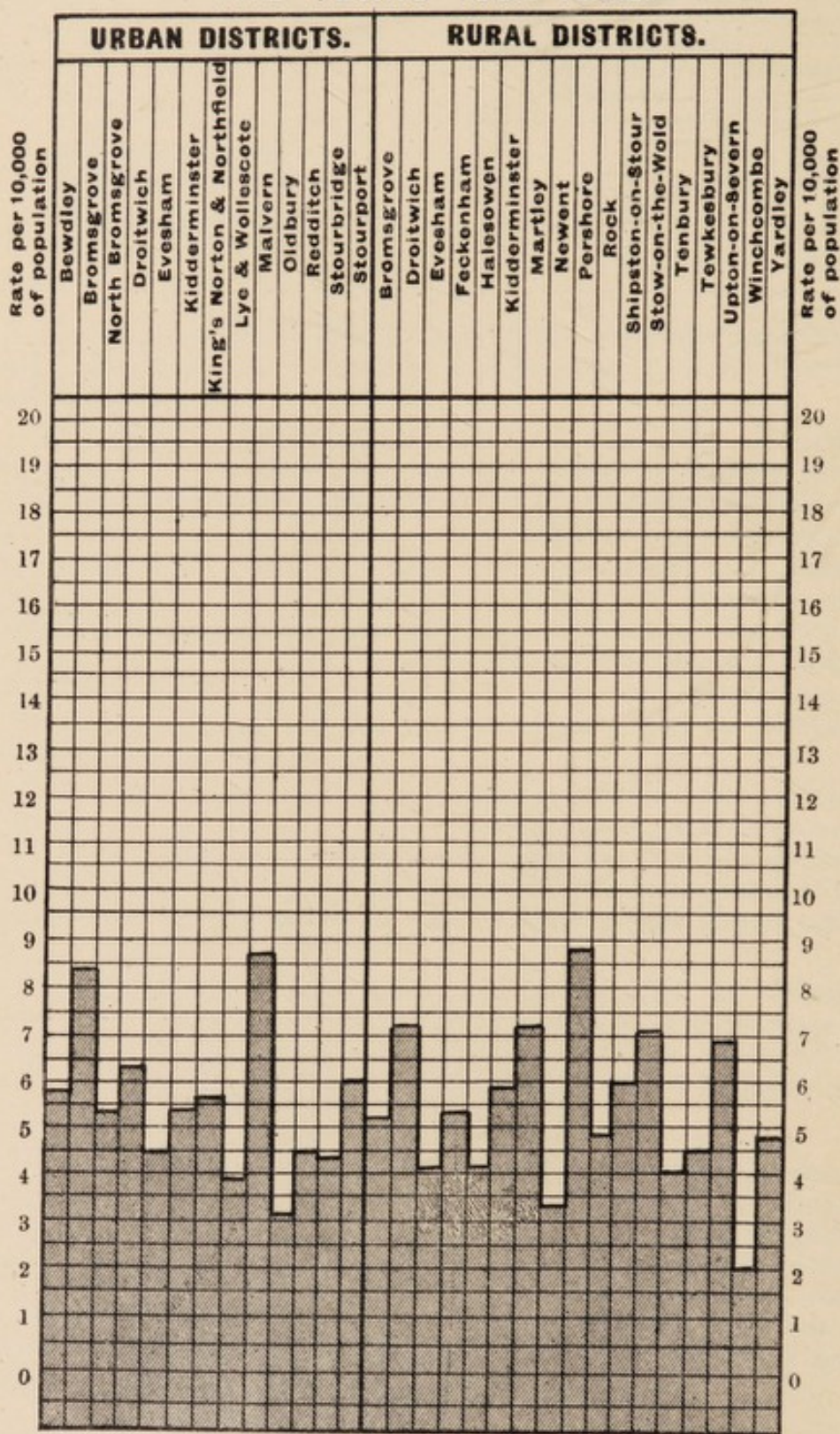
Dr. Robinson says of the Stourport rate, that as defective ventilation, damp and general insanitary conditions in the houses of the working classes, "are so prevalent in the District," it is not difficult to understand why Consumption is so frequent, and why the mortality (for 1902) is so high.

The Knightwick Sanatorium Committee (of which I am a Member) only opened their Institution in November, 1902, and, consequently their first Annual Report has not yet been prepared; but I am in a position to say that the results obtained are most encouraging, and will, I trust, convince the Subscribers—some of whom are Local Authorities, Local Committees, Members of Friendly Societies—that the money they have so generously contributed will not be thrown away, but quite the reverse.





**AVERAGE CANCER DEATH RATES PER  
10,000 OF THE POPULATION, FOR  
THE YEARS 1894-1902.**



E. BAYLIS & SON, WORCESTER.



## CANCER.

Table XIV. and Diagram show the Cancer Death-rates of the County and respective Districts during the years 1894-1902 inclusive.

TABLE XIV.

Urban Districts.	Average for years 1894 to 1902 per 10,000 of popula- tion.	Rate per 10,000.								
		1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.
City Borough - - -	5.8	3.4	6.0	10.4	6.8	10.0	0.0	6.9	6.0	3.4
Grove - - - - -	8.4	10.6	10.7	10.5	7.0	9.0	6.0	7.0	6.0	9.0
Grove North - - -	5.3	3.4	5.0	1.8	5.5	1.8	7.0	7.0	9.0	7.5
Rich Borough - - -	6.3	0.0	7.0	9.0	2.3	9.0	4.0	11.0	4.5	10.0
Stam - - - - -	4.5	2.0	2.0	7.0	7.0	11.0	5.0	5.0	1.6	1.7
Minster - - - - -	5.4	11.0	8.0	10.0	10.8	0.0	4.0	0.0	0.0	7.0
Norton & Northfield -	5.6	4.0	8.9	7.0	6.8	5.0	4.0	4.0	7.0	7.4
Wollescote - - -	3.9	7.2	4.0	7.0	7.0	3.0	4.8	0.9	0.9	1.0
Widnall - - - - -	8.7	10.0	12.0	11.0	10.0	10.7	9.0	3.0	12.0	8.0
Widnall - - - - -	3.1	6.0	4.0	4.0	4.0	0.3	1.0	3.0	3.7	3.0
Widnall - - - - -	4.5	8.0	8.0	6.0	0.0	4.0	0.8	3.0	6.7	4.0
Widnall - - - - -	4.3	7.2	6.0	6.0	4.0	0.6	4.0	7.0	0.6	3.0
Widnall - - - - -	6.0	6.0	11.0	3.6	1.0	7.0	7.0	8.3	2.8	8.4
Urban Death-rate -	6.3	6.6	7.1	7.1	6.6	4.4	5.9	5.8	6.2	7.8
Rural Districts.										
Grove - - - - -	5.2	9.0	7.0	5.0	4.0	7.0	2.0	4.0	6.0	3.0
Rich - - - - -	7.2	9.0	7.0	8.3	3.6	7.0	9.0	7.0	9.0	5.6
Stam - - - - -	4.1	6.0	6.0	7.0	0.0	5.0	5.0	1.4	4.0	2.8
Tham - - - - -	5.4	3.0	16.0	11.0	1.7	3.0	1.7	8.0	1.7	3.4
Wen - - - - -	4.1	4.6	7.0	3.0	2.0	4.0	5.0	4.0	3.0	4.0
Minster - - - - -	5.9	10.9	5.9	7.0	5.0	7.0	4.0	3.8	6.2	3.9
Widnall - - - - -	7.3	7.0	13.0	8.0	7.0	4.6	8.0	7.6	4.6	6.6
Widnall (part) - - -	3.3	16.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0
Widnall - - - - -	8.8	10.0	8.0	6.0	8.0	12.0	10.0	9.0	8.0	6.0
Widnall - - - - -	4.8	14.0	0.0	4.0	13.0	0.0	13.0	0.0	0.0	0.0
Widnall - - - - -	6.0	4.0	12.0	6.0	6.0	9.0	11.0	6.0	4.0	0.0
Widnall - - - - -	7.1	0.0	0.0	0.0	0.0	5.9.0	5.9	0.0	0.0	0.0
Widnall - - - - -	4.0	4.0	6.0	8.0	12.0	0.0	6.0	0.0	0.0	0.0
Widnall (part) - - -	4.5	8.0	4.0	0.0	4.0	0.0	8.0	0.0	12.0	4.0
Widnall - - - - -	6.9	1.0	4.0	7.0	11.0	7.3	13.0	6.0	6.0	9.0
Widnall (part) - - -	2.0	8.6	0.0	0.0	0.0	0.0	7.8	0.0	0.0	0.0
Widnall - - - - -	4.7	5.0	7.0	6.0	4.0	3.0	8.0	6.0	0.0	0.0
Rural Death-rate -	5.2	7.6	6.1	5.0	5.3	5.8	6.0	4.3	3.8	3.6
County Death-rate -	5.7	7.1	6.6	6.0	6.4	5.0	6.0	4.8	4.9	5.1

Many observers are working at the etiology of Cancer; as yet however no definite conclusions have been arrived at.



## ISOLATION HOSPITALS (OTHER THAN SMALL-POX).

In my Annual Report for 1901 (pages 27 to 37), I fully described the accommodation that has been provided in each District for isolating cases of infectious disease, consequently it is unnecessary for me to repeat what I then said.

Further improvements were made last year, and fully justify my remark made :—“That there are few Counties so well equipped “with Isolation Hospitals as Worcestershire.”

The following statement shows the additions carried out during 1902 :—

*Evesham Borough and Evesham Rural District.*

Owing to the epidemic of Scarlatina, the Joint Board found it necessary to erect an iron Pavilion, (50 ft. by 20 ft.), to be used as a Convalescent Block, in which patients are to be treated during the last week or two of their residence at the Sanatorium.

A bath room and entrance porch were added to the Eastern Block; and the Administration Buildings and out offices were also enlarged.

The drainage was thoroughly overhauled and some minor defects remedied.

The question of lighting the buildings by Gas instead of by lamps is under consideration; and it is to be hoped this will be carried out, as Gas is certainly preferable where children are congregated. Furthermore Gas would be most useful for cooking.

*King's Norton and Northfield Urban District.*

Dr. Green says :—

“The Council have every reason to be well satisfied with their “Hospital, as one of the best equipped (he) knows.”

“On the strong recommendations of the County Council it has “been decided to erect a new Pavilion at West Heath “Hospital for the isolation of Diphtheria, and a loan is now “being applied for for that purpose.

“ . . . this is a very necessary step, as many cases occur with “totally inadequate home isolation, allowing the disease to “attack other members of the family, and also interfering “materially with the employment of the adults of the house- “hold.”



*Oldbury Urban District.*

I have previously mentioned that only one of the 518 cases of Scarlet Fever which occurred in this District last year was isolated in an Infectious Hospital, because the Urban Council have no buildings for doing so; nor have they any Agreement with any other Authority to treat such patients.

In reply to a communication from your Committee, as to providing a suitable Isolation Hospital, the Clerk of the Oldbury Council wrote, 13th May, 1903, that "Negotiations are still in progress with Smethwick Corporation as to a Joint Scheme between them and Oldbury."

*Pershore and Upton-on-Severn Rural Districts.*

The Upton-on-Severn and Pershore Joint Hospital Board, established under a "Provisional Order" of the Local Government Board, dated 6th July, 1895, was dissolved on 30th September, 1901, as the Joint Board were unable to obtain a Site which the Local Government Board would approve.

The condition upon which the Local Government Board sanctioned the dissolution, was that each District Council would undertake to provide a suitable Hospital, and these undertakings were duly given.

I have, at the request of the Upton-on-Severn and Pershore Councils, had several interviews with their respective Representatives and Architects, and on 2nd December last, attended in London to confer with the Officials of the Local Government Board with regard to the plans submitted by the Upton-on-Severn District Council.

The present position is :-

*I. Upton-on-Severn Rural District.*

That the Council have purchased a suitable Site near to Upton-on-Severn,  $1\frac{1}{2}$  acres in extent, exclusive of land for sewage disposal filters, and ascertained that an adequate supply of water can be obtained upon it.

The plans prepared by Messrs. Lewis Sheppard & Son, Worcester, include :--

- (a) An Administrative Block (including Dining Room, Surgery, Kitchen, Scullery, Larder, Stores, Bath, W.C.'s, and six Bedrooms).



- (b) Ward Pavilion A. (including 10 Beds Duty Room, Bath Room, W.C.'s, etc.)
- (c) Ward Pavilion B., (4 Beds ditto.)
- (d) Out-offices (including Laundry, Wash-house, Disinfector, Mortuary, Ambulance Shed, Coal House, W.C.'s, etc.).

A Loan of £5,000 has been applied for, and a Local Government Board Inquiry (which I attended) was held at Upton-on-Severn, on 17th April, 1903. The Loan, however, does not include the cost of the Site, with fencing, and of the water supply.

In connection with this, I would say that apparently the Local Government Board have now modified their requirements as to the accommodation to be provided in the Administration Block, and with regard to a closed fence; consequently the cost of erecting Isolation Hospitals will now be comparatively less than in recent years. This course, I scarcely need say, you urged the Local Government Board to adopt when other Hospital schemes in the County were under consideration, but without effect.

## II. *Pershore Rural District.*

The Council have purchased a suitable Site near Pershore ( $1\frac{1}{2}$  acres in extent), and ascertained that an adequate supply of water can be obtained.

The Plans prepared by Messrs. Rowe & Son, Worcester, include :—

- (a) An Administrative Block (Matron's Room, Dining Room, Kitchen, Scullery, Larder, Coals, Linen Store, Doctor's Room, 2 W.C.'s, and 6 Bedrooms.)
- (b) Ward Pavilion A., (12 Beds, Duty Room, Bath Room, W.C.s, etc.)
- (c) Ward Pavilion B., (8 Beds, Duty Room, Bath Room, etc.)
- (d) Out-offices, (Laundry, Wash-house, Disinfector, Mortuary.)
- (e) Discharging Block.

As the Pershore Council thought, when they approved their Architect's scheme, that the requirements of the Local Government Board with regard to the Administrative Block and Boundary Fence would probably be greater than the Council deemed necessary, they decided to erect their Hospital without a Loan, and to build from year to year until their scheme was complete.



At the present time the Ward Pavilion A. has been erected (the contract for which was £1,195), and is practically fit for occupation.

The requirements of the Local Government Board with respect to such Pavilion has been carried out in detail.

The Pershore Council possess some wood and iron buildings, which they have used as a temporary Hospital for some years past, and it is proposed to at once erect these on the new Site to serve as an Administrative Block until the permanent Hospital is complete.

*Martley Rural District.*

Dr. Greensill says :—

“Malvern and Kidderminster Isolation Hospitals have continued  
“to take cases of Scarlet Fever from certain Parishes as  
“heretofore, but your arrangement with the Worcester  
“Isolation Hospital for the reception of Scarlet Fever and  
“Diphtheria cases, which has hitherto worked so well, has  
“this year failed; as, owing to the prevalence of Scarlet  
“Fever in Worcester, cases from this District have since  
“October, been refused, and some cases which, without  
“doubt, became infected in the City, have been left  
“insufficiently isolated in their cottages in this District. In  
“practice your arrangement with Worcester works out in  
“this way: When there is not much infectious disease in  
“Worcester you have the privilege of sending any cases  
“which occur in Parishes of your District adjoining the  
“City to the City Isolation Hospital, at the extravagant  
“charge of £3 3s. per week, plus the expenses of removal,  
“but when an epidemic occurs in Worcester, and these  
“Parishes are in constant danger of infection, all isolation  
“accommodation is refused.

“I am convinced that you will be better and more economically  
“served by a centrally situated Isolation Hospital of your  
“own.”

“Your provision for the Isolation of Smallpox is ample. It  
“consists of :—

“1st. Power under an Order of the County Council to send cases  
“to the present Smallpox Hospital at Malvern, or any other  
“Smallpox Hospital provided by the Malvern Urban District  
“Council.



“2nd. An Agreement under which cases from 12 Parishes can  
“be sent to the Worcester Smallpox Hospital.

“3rd. A well isolated Cottage, with room for erecting Tents if  
“necessary, at Abberley.

“4th. A similar Cottage at Suckley.

“My instructions from you are to send all cases to the Malvern  
“Isolation Hospital situated at Halfkey, and in the event of  
“the removal of this Hospital to such other Smallpox Hospital  
“as shall be provided by the Malvern Council.

*Shipston-on-Stour Rural District.*

Dr. Findlay writes :—

“The Joint Isolation Hospital has been useful in at once being  
“able to receive the Scarlet Fever cases which have occurred  
“in the District, and has been open the greater part of the  
“year with cases from the Brailes District. Fortunately in  
“neither of the Districts has there been any case of  
“Diphtheria, so that the accommodation has been so far  
“sufficient, but had any case of Diphtheria occurred in this  
“District, requiring removal, we could not have done so,  
“having only one Ward Pavilion.”

*Yardley Rural District.*

Dr. Wilson says :—

“As regards Hospital accommodation for other cases of infectious  
“disease, the old Joint Isolation Hospital for Yardley and  
“Solihull, which has done such excellent service for years back  
“can no longer meet the requirements of both Districts, nor,  
“indeed, of Yardley alone. It has therefore been resolved to  
“erect a separate Hospital for Yardley, but even with a due  
“amount of expedition, I am afraid that it will take very  
“probably two years at least before a new Hospital is com-  
“plete ; and, apart from Site, I feel sure that the whole of  
“the necessary buildings will entail an outlay, even at the  
“lowest estimate, of £12,000. Hospital accommodation is  
“quite as necessary for the isolation and treatment of cases  
“of Enteric Fever and Diphtheria, as for cases of Scarlet  
“Fever ; while last year only Scarlet Fever cases could be  
“received, and for a time only the more urgent cases could be  
“admitted.

“I hope, therefore, that steps will be taken to procure a suitable  
“Site, and proceed with the erection of a new Hospital  
“without delay.”



DISTRICT COUNCILS WITHOUT MEANS FOR  
ISOLATING INFECTIOUS DISEASE.

*Rock Rural District.*

Dr. Whitaker says with regard to the general question of Isolation and Disinfection he would refer to his last Annual Report, in which the matter was discussed in detail.

The paragraph referred to reads as follows :—

“In dealing with these cases of Infectious Disease we are at  
“great disadvantage in having neither accommodation for  
“isolating such persons as cannot be effectively isolated at  
“home, nor a Steam Disinfector for treating bedding, outer  
“garments, and such other goods as cannot be burned or  
“boiled.”

*Tenbury Rural District.*

I believe there is no Isolation Hospital other than Smallpox—but as Dr. Whitaker has not sent his Annual Report I cannot speak definitely as to the present position.

*Stow-on-Wold Rural District.*

As nearly the whole of this District is in Gloucestershire, the County Council have not deemed it advisable to communicate with the District Council with reference to Isolation Hospital accommodation. Dr. Moore writes in his Annual Report that :—

“An Isolation Hospital for the whole District (situated as  
“centrally as possible) is greatly needed, and would do much  
“towards stamping out the Scarlet Fever outbreaks, which  
“are of only too frequent occurrence.”

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Several Medical Officers allude to the advantage of having fully equipped and suitable Isolation Hospitals, not only as means of checking the disease, but also of saving life.

On reference to Table VIII. the percentage of Scarlatina cases treated in Hospital during the year are given, and it will be seen that the Hospitals have been largely made use of.



## SMALLPOX HOSPITAL ACCOMMODATION.

The action taken by the County Council, and the provision made, is fully described in my Annual Report for 1901, pages 31 to 37.

*Kidderminster Borough.*

*Bewdley Borough.*

*Stourport Urban District.*

*Kidderminster Rural District.*

The Medical Officer for the Borough of Kidderminster writes :—

“*Smallpox Hospital.*—In the early part of the year, in consequence of Smallpox being prevalent throughout the country, the County Council invited a conference of representatives from Local Authorities in the county for the purpose of erecting Joint Smallpox Hospitals, to be under the control of the County Council. Our Authority came to the decision not to join the County Council scheme.

“We subsequently came to terms with the Authorities of Stourport, Bewdley, and the Kidderminster Rural District Council, to erect a Joint Hospital to contain eight beds, such Hospital to be under the control of our Authority, but with equal rights to use.

“The Hospital has been erected, and the old Smallpox Hospital will be used as an administrative building. There is also a large Laundry. The whole of these buildings have been enclosed with a 7ft. corrugated iron fencing.

“They are situated on a hill, a long distance from any dwelling-houses, and 500 feet from our nearest Scarlet Fever Pavilion.

“Although the Hospital is finished, it is not yet furnished, neither is there a Mortuary Disinfecting Apparatus, or Coach-house for the Ambulance. But in reference to the furnishing, the Chairman of the Health Committee is empowered to procure anything necessary.

*Evesham and Pershore Hospital District.*

The iron buildings referred to in my last Annual Report have been built, furnished, and occupied during the year on a suitable Site.

*Upton-on-Severn Hospital District.*

This District includes Malvern.

The Committee have purchased a Site, and the Smallpox Buildings (iron) belonging to the Malvern Urban Council have been valued, and will, I hope, be shortly removed thereto.



*King's Norton and Yardley Hospital District.*

The Medical Officer of Health for the former District writes :—

“ During the year arrangements were come to between this  
“ Council and that of Yardley, for a conjoint Smallpox  
“ Hospital, which was established at Hollywood, near the  
“ Maypole.

“ This is a wood and iron building for 24 patients, and is a  
“ splendid place for the purpose, and in a very good and  
“ isolated position.”

<i>Droitwich Borough.</i>	
<i>Bromsgrove Urban</i>	<i>District.</i>
<i>Bromsgrove North Urban</i>	”
<i>Redditch Urban</i>	”
<i>Bromsgrove Rural</i>	”
<i>Droitwich Rural</i>	”

The Medical Officer for the Bromsgrove Urban District writes :—  
“ The Smallpox Hospital also is now permanently erected at  
Woodgate, so at last we are completely equipped for dealing with  
outbreaks of infectious disease.”

*Rock and Tenbury Rural Districts.*

The “ suitable moveable building ” referred to in the Annual  
Report for last year (page 34) have been erected and occupied during  
the year.

*Stourbridge, Lye, and Halesowen Hospital District.*

These Districts have no accommodation for isolating Smallpox,  
and consequently the County Smallpox Committee have been  
pressing the Hospital Committee in the matter.

I understand, however, that great difficulty has arisen in  
acquiring a suitable Site, but there seems reason for thinking that  
this obstacle will be shortly overcome.

*Tewkesbury Rural District.*

Dr. Turner says :—“ The Isolation Hospital at Tredington, by  
an agreement with the Tewkesbury Urban District Council has  
been reserved for any Smallpox cases which may arise in either  
District during the present epidemic.



*Feckenham Rural District.*

This District is included in the Alcester Joint Hospital District, and the wooden Smallpox Buildings at the Alcester Sanatorium have been removed to a suitable and sufficiently isolated site.

*Shipston-on-Stour Rural District.*

Dr. Findlay writes :—

“In order to be prepared for any case of Smallpox which might suddenly appear in the District, the Joint Hospital Committee acquired from the Guardians the two huts which were used some years ago for a case of Smallpox, and which stood in the Workhouse grounds. These huts have been removed to a distant part of the field in which the Isolation Hospital stands, and have been repaired, and are in readiness to receive one or, at most, two cases of Smallpox at short notice.”

*Martley Rural District.*

Dr. Greensill's Report on this subject is included in the remarks on the General Isolation Hospital accommodation (page 37).

*Oldbury Urban District.*

The Oldbury Council have an Agreement with the Smethwick Corporation to treat Smallpox cases until the 30th June, 1904.

*Newent, Stow-on-Wold, Winchcombe.*

Only very small portions of these Districts are in Worcestershire, so the Smallpox Committee decided to take no action.

## DISINFECTION.

The Isolation Hospital Authorities in the County have now arranged that their Disinfectors can be used by the District Councils on certain conditions, so that this process for purifying infected bedding and clothing can be carried out more completely than heretofore.

There are, however, some Authorities who have no means for disinfection ; for instance, the Feckenham Rural District Council cannot provide a Disinfector without the co-operation of the Alcester Council, who are loathe to move in the matter ; so you have asked the Warwickshire County Council to bring pressure to bear on the Alcester Council.

The Medical Officer for the Martley District says :—“When the Hospital is provided a Disinfector will be part of the equipment.”



Alformant lamps are now being used for fumigating at Bromsgrove, Stourbridge, Evesham, and Malvern, and appear to be giving satisfactory results. There seems good reason for thinking that before very long this process of disinfection will supersede ordinary sulphur fumigation, the efficacy of which is frequently questioned.

### SANITARY WORK.

#### *Sewerage.*

A large number of sewerage improvements have been carried out during the year, for details of which I would refer to the summaries of Annual Reports given later on. The Summaries also show where further sewerage works are required.

#### *Sewage Disposal.*

Some local defects in sewage disposal are also given in the "Summaries" just referred to. The County Council authorised a "representation" being forwarded to the Local Government Board (Public Health Act, 1875, s. 299) with reference to the bad state of sewage disposal in Droitwich Borough, but I am glad to say it was unnecessary to make it, as the Corporation ultimately elected to apply to the Board for a loan of £1,700 to improve it, and with that view have submitted plans.

As instructed, the Clerk of the Council, the County Analyst, and I attended a Local Government Board inquiry at Oldbury, on 18th February, 1903, with reference to a scheme for sewerage Warley, and supported the Oldbury Council in their application for a loan; but called the attention of the Inspector to the present unsatisfactory effluent from the Sewage Farm. The Local Government Board have since then approved the Sewerage Scheme, but have required the District Council to submit a proposal for the extension of the Sewage Disposal Works, in reply to which the Urban Council has applied to the Board for permission to proceed with the Warley Scheme, on condition that it is not to be put in operation until the alterations at the Sewage Farm are completed.

At the date of writing (June 13th, 1903) the Local Government Board have not, so far as I am aware, given their decision with regard to the application of the Stourport Council for a loan of £17,000 for works of sewerage and sewage disposal, as to which one of the Board's Inspectors held a Local Inquiry on September 10th, 1902.

The experiments carried out by direction of the County Council at Malvern, with reference to the "bacterial treatment of domestic sewage," are now complete, and the interesting and instructive Report issued by the Sanitary Committee and County Analyst, is



given as an "appendix" to this Report. Similar experiments at the Oldbury Works, where the sewage is mixed with much trade refuse, are still proceeding, and will be reported upon in due course, when I think it will be found that the results obtained are specially instructive.

### RIVER POLLUTION.      ACID WASTE.

Details of the pollutions in the County will be found in the "Summaries" of Annual Reports, but there are one or two which I think require special mention.

#### *River Severn.*

These are as described in my Report of the 25th April, 1896. The chief pollution is that caused by the crude sewage of the City of Worcester being poured into the River in an untreated condition. The Local Government Board have instituted proceedings in this matter and have informed the County Council that the Worcester City Council have intimated to the Board that it has been "decided" "to proceed with the sewage disposal scheme."

#### *River Rea.*

Dr. Green says that the pollution of the Rea is still under consideration although not much progress has yet been made in preventing it altogether.

As this pollution has been under your notice so long it is scarcely necessary for me to remind you that it is due mainly to the effluent from a paper works and partly to acid waste discharged into it. The Clerk of the King's Norton Council wrote the Clerk of the County Council on the 5th of May, 1903, that the Council had now agreed with Messrs. Baldwins' Solicitors' terms and conditions, which would form the basis of an agreement for the admission of the effluent coming from Messrs. Baldwins' works into the Council sewers, and he subsequently wrote on the 14th of the same month that he "did" "not think there was likely to be any obstacle in the matter."

#### *River Stour.*

*and*

#### *Acid Waste.*

I regret to say that the negotiations between representatives of the County Council, Upper Stour Valley Main Drainage Board, Local District Councils, and the manufacturers who produce acid waste have, after numerous meetings, fallen through, and ultimately the Chairman of the Manufacturers informed the Clerk of the County Council on the 3rd March, 1903, that

"It seemed clear that eleven of the fourteen Manufacturers in  
"the Lye were satisfied that they were so treating their Acid



"Waste, that they were liable to no one to undertake any  
"extra expenses on their trade, and the remaining three Manu-  
"facturers under the circumstances resolve that they would  
"take their own steps with reference to themselves."

The following Extract from the Report of the Acid Waste Committee which was approved by the County Council on the 8th June 1903, represents the present position:—

"The Council on the 8th December 1902 (Minute No. 3743)  
"Resolved—

"(1) That notice be given to each of the Manufacturers  
"that unless they adopt some effective method of treat-  
"ing the Acid Waste, which is to be in use before  
"the 1st day of September 1903, proceedings will be  
"taken against them to compel them to cease pollu-  
"ting the rivers, canals and streams of the district ;

"(2) That application be made under the Rivers Pollution  
"Prevention Acts 1876 and 1893 to the Local Govern-  
"ment Board for permission to take proceedings to  
"restrain the pollution of the rivers, canals, and  
"streams of the district against such of the Manufac-  
"turers in Lye and Halesowen Districts as shall not  
"have adopted before the 1st day of September 1903  
"some effective method of treating their Acid Waste ;  
"and

"(3) That the necessary notices to all or any such Manu-  
"facturers as are required by the Acts to be given  
"before taking such proceedings be given when and  
"as the Acid Waste Committee may deem it necessary.

"Also, that a copy of this Resolution be sent to all the  
"Local Authorities and Manufacturers who were in-  
"vited to attend the Conference referred to in the  
"foregoing Report ; and that a further Conference of  
"the Manufacturers in the Lye and Halesowen Dis-  
"tricts be convened at Stourbridge on Saturday the  
"20th of December 1902, for the purpose of further  
"considering as to the form of treatment to be adopted,  
"and other matters.

"Your Committee further recommend—

"(i) That the Council do forthwith apply to the Local  
"Government Board for leave to institute proceedings  
"after the 1st September next under the Rivers Pollu-  
"tion Prevention Acts against such of the Manufac-  
"turers in the Upper Stour Valley Main Drainage  
"Area who are then found to be turning their un-  
"treated Acid Waste into the streams.



- "(ii) That the Council take such steps as may be necessary  
"to ascertain exactly which Manufacturers in the  
"Upper Stour Valley Main Drainage Area shall on  
"the 1st September next be infringing the provisions  
"of the Rivers Pollution Prevention Acts."

#### WATERSUPPLY.

This subject was fully discussed in my last Annual Report pages 47 to 50), and the summaries of Reports given later show the localities in which defective supplies are to be found and where improvements have been made, from which it will be seen that this is a subject which receives a large amount of attention on the part of District Councils and their Officers.

#### HOUSE ACCOMMODATION.

This question is dealt with very fully in the Annual Reports under review.

In Droitwich Borough it would appear that "there are many  
"houses . . . into which the sunshine seldom or ever enters." In Evesham Borough "Several cottages have insufficient space in the  
"rear." In Kidderminster Borough Dr. Corbett "had to complain  
"of the sanitary arrangements of new houses not being provided in  
"accordance with the building byelaws . . . (but) in future  
"(he believes) this will be remedied."

In Stourbridge Urban District "there are still many . . . in a  
"very bad condition," but as the "Local Government Board have  
"granted permission to the Council to borrow money for (a scheme  
for erecting dwellings to be let at a low rental), this should not be  
tolerated much longer.

In Stourport the Medical Officer of Health says there is "still a  
"great deal of house property . . . of the back-to-back type, or  
"houses without back doors or windows . . . and the supervision  
"over the erection of new houses is inadequate."

The Medical Officer of Health for the Upton District reports that "in many of the Parishes a better class house is requisite for the  
"working classes, and the old ones removed."

Dr. Green advises the King's Norton Council that "in one point  
"marked benefit would accrue to the inhabitants if every new house  
"had a concrete layer over the whole ground plan." I cordially  
agree with his recommendation, the cost of carrying which into  
effect would be but trifling.



In a report I made you (dated 29 January, 1899) on an outbreak of Typhoid Fever in Oldbury, I advised the paving of yards adjacent to houses, as saturation of the subsoil around buildings facilitated the spread of the disease, and I am glad to see that the Sanitary Inspector of this District writes :—"We are still following the cleansing and disinfection of Courts and Yards, and, where possible, causing them to be partly or wholly paved."

As to regulating the erection of *new* houses a few remarks will be found in the paragraph upon "Byelaws," (p. 50<sup>b</sup>).

### EXCREMENT DISPOSAL.

It is evident from the Reports that the advisability of abolishing midden-closets in populous districts, and the substitution of W.C.'s—where, of course, sewers and means of flushing are available—is being acted upon by nearly all the District Councils.

In Stourbridge, which at one time was essentially a "midden town," this is being rapidly proceeded with, and a Special Report on those in Redditch was laid before the Urban Council.

The Medical Officer of Health for Stourport says :—"The midden system still prevails," and is "disgusting."

The Sanitary Inspector for Halesowen Rural District (Cradley Division), writes :—"The number of notices outstanding represents a large number of cases where the Council have issued orders for the provision of sufficient water-closet accommodation in place of the now insufficient and defective privy accommodation."

"The owners of which property have simply repaired and put in order the existing privies. These cannot be called 'notices complied with,' and my Council are now considering what steps shall be taken in these matters."

### SCAVENGING.

Scavenging in most of the Urban Districts is reported to be satisfactorily carried out ; but at Aston Fields in the Bromsgrove Rural District it is said not to be in a very satisfactory condition ; in Halesowen District "the removal of night soil is done by contract, and it is to be feared, often in a perfunctory manner ;" and in Yardley "the extension of the sewers to outlying parts of the District . . . will be (an) immense gain (in) abating the abominable nuisance" (connected with emptying of dumbwells).

In Redditch the Inspector says "there have been a great many



"nuisances caused through occupiers of houses throwing filth and refuse into the streets. Although repeated warnings have been given, the practice does not decrease."

The Sanitary Inspector of Stourbridge says that "in November (he) reported . . . the difficulty in carrying out the work of refuse removal along the routes of the trams, and also in places where all the refuse had to be carried by hand, generally up flights of steps, and asked for the adoption of Byelaws under Section 26 (2) of the Public Health Amendment Act 1890, in view of compelling where necessary the provision of portable receptacles." He does not, however, say if his advice was acted upon, as on the face of it, it seems desirable.

The Malvern Urban and King's Norton Rural Councils have each decided to erect "refuse destructors."

#### SLAUGHTER-HOUSES.

These trades seem to be generally supervised by the Sanitary Officials.

In one or two instances a public Slaughter-House (abattoir) is advocated, and no doubt the advice is good.

As the law now stands however, a District Council has power to erect such a place, but it has no power *to compel* the butchers having old ("registered") private slaughter-houses to abolish them and use it.

For certain resolutions with regard to Meat and Milk which were supported by the County Council at their Meeting held June 8th, 1903, I would refer you to the next paragraph on "Dairies and Cowsheds."

#### DAIRIES AND COWSHEDS.

I have repeated from year to year that the supervision of Dairies and Cowsheds is one constantly receiving more or less attention throughout the County; but in order to ascertain what action is now being taken in each District under the Dairies and Cowsheds Orders of 1885 and 1899, I asked the Medical Officers, on 16 June 1903, if they would be kind enough, "as a personal favour," to supply me with certain information, and stated that I proposed "to classify the replies received in my Digest of Annual Reports for 1902."

With one exception, each of the gentlemen most courteously and promptly acceded to my request; but the Medical Officer of Health



for Tenbury and Rock Rural Districts (Dr. Whitaker) wrote (June 22nd 1903), that "whilst (he) should be very pleased to do anything 'as a personal favour,' (he had) no authority to answer the questions (I sent him)."

Dr. Whitaker suggested that I should ask the Clerk, who is the "official mouthpiece of the Council," for the information, but unfortunately as this Report is now going through the press, time does not permit me to do so. *The following observations must therefore be deemed to have no reference to Rock and Tenbury Rural Districts.*

As the outcome of my enquiries I find that with the exception of the Droitwich Corporation and Shipston-on-Stour and Winchcombe Rural District Councils, each Authority enforces the requirement that every Cowkeeper, Dairyman and Purveyor of Milk shall be registered in accordance with Section 6 of the Dairies, Cowsheds and Milkshops Order of 1885. I am however informed that in Droitwich Rural District "registration . . . (is) only compulsory for 'Purveyors of Milk.'" Therefore as that Authority has no "regulations" for Dairies and Cowsheds, apparently inspection only refers to "Purveyors;" the "number of persons engaged in Milk trade 'now on Register and under supervision'" is reported by the Sanitary Inspector to be 51.

All the Authorities in the County have made regulations under Section 13 of the Order of 1885, except Droitwich Corporation, Bromsgrove and Bromsgrove North Urban, and Droitwich, Feckenham, Newent, Shipston, Tewkesbury and Winchcombe Rural District Councils. From the copies of these regulations in my possession I learn that they were all framed since 1888 (Martley), and some of them so recently as 1901 (Stourport).

At Stourport, I learn that "the regulations adopted have not been 'enforced (as) the Sanitary Inspector reports he has no time to visit, inspect, and report.'"

The Regulations prepared by the Bewdley Corporation prescribe no minimum cubical contents for Cowsheds; but the whole of the others fix 800 feet as a minimum, except those for Martley Rural, which prescribe 700 feet, and Evesham Rural, which require 500 feet.

With reference to the regulation for Kidderminster Borough that there should be "at least 800 feet of fresh air space for each cow 'kept,'" the Sanitary Inspector writes me "at present Cows may be 'placed like herrings in a barrel, and yet the sheds have the required



"cubic space, therefore floor space should be stated in any new regulations."

The "Report of the Royal Commission on Tuberculosis," dated 1898 (referred to at length in my Digest for 1899, pages 32 to 37), contains a recommendation "that in Cowsheds there should be a minimum floor-space of 50 square feet to each adult beast," and this is enjoined in Lye and Wollescote, King's Norton, Malvern and Stourport Urban, and Yardley Rural Districts, by setting forth that in calculating a cubic capacity of 800 feet "no space shall be reckoned which is more than 16 feet above the floor," which regulation shall not apply to any Cowshed the Cows "from which are habitually grazed on grass land during the greater part of the year, and when not so grazed are habitually turned out during a portion of each day."

The covering letter issued on 11 March 1899 with the "Model Regulations of the Local Government Board with respect to Cowsheds," points out that the suggested regulation which deals with the question of air-space does not apply to Cowsheds, the Cows of which are habitually grazed on grass land during the greater part of the year, and when not so grazed are habitually turned out during a portion of each day, as it is obvious that a regulation on this subject, which might be adapted to Towns where the Cows are kept within the building, might be unsuitable for Cowsheds in the Country.

The Royal Commission drew a distinction between the rules which should be observed in Cowsheds in populous and those situated in non-populous places, and personally I am glad that this was so, for it was one of the principal reasons which induced Rural Authorities to refrain from adopting Dairy regulations. I would therefore commend these Model Regulations to the Local Authorities in the County who have not yet framed any.

In reply to my query, "Has any action been taken in connection with the Order of 1899 rendering it illegal to use the Milk certified by a Veterinary Surgeon to be suffering from Tuberculosis of the Udder?" negative answers were invariably received.

The Annual Reports under review indicate that the Dairies and Cowsheds are inspected, and it is but right to assume therefore that the "regulations" are generally enforced.

The Medical Officer of Health for Oldbury writes: "The Cowsheds and Dairies have during the year been regularly visited, and I am pleased to say that the conditions of these sources of our Milk supply are in a much improved state to what they were a few years



"ago. The Farmers themselves acknowledge the good effects resulting from the action of the Sanitary Committee in insisting on improvements being carried out. The animals are healthier, and even from a financial point the Farmers have themselves been benefitted."

It is gratifying to note this improvement of the Oldbury Dairies and Cowsheds, which apparently is the result of the firm stand taken by the Urban Council, when a "test case" (in which I appeared as a witness in support of the Council) resulted in a conviction being granted by the local Petty Sessional Court.

In the early part of the present year the Secretary of the County Councils' Association forwarded certain "resolutions" with regard to Meat and Milk to the Worcestershire County Council, and as the Council has since approved them, with certain additions, I think it desirable to place them on record. They read as follows, viz :—

#### RESOLUTIONS.

"That this Council is of opinion that, pending the report of the Royal Commission on Tuberculosis appointed by the Government on August 31st, 1901, no further power should be given to local authorities by Local Acts to deal with tuberculous meat or milk, but that legislation giving effect to the principles of the following resolutions should be undertaken by the Government at the earliest practicable opportunity after the report of the Commission.

#### *Meat.*

"(1) That it is desirable that the general law should be so amended as to compel county, county borough, and other local authorities, to periodically enter and examine, by means of qualified inspectors, all places within their respective jurisdictions used for the sale of butchers' meat or the slaughtering of cattle; and if upon such examination any animal, carcase or meat exposed for sale, or deposited in any place for sale, or of preparation for sale, and intended for the food of man, is found to be affected with tuberculosis, to take it away and have it dealt with by a justice.

"(2) That the owner of any animal, or carcase, or meat, confiscated and destroyed, wholly or in part, by order of a magistrate, shall receive full compensation and repayment of the amount paid by him therefor, provided—

"(A) That the magistrate ordering confiscation shall satisfy himself that the animal had a good appearance before slaughter, was well nourished, and exhibited no visible signs of tuberculosis.



“(B) That no compensation shall be paid for any animal  
“for which there has been paid less than a minimum price,  
“to be fixed from time to time by the Board of Agriculture  
“according to the market values current, nor in excess of a  
“maximum price to be fixed in the same manner.

“(C) That no sum shall be paid in compensation except  
“on the order of the magistrate ordering the confiscation of  
“the carcase.

“(D) That all compensation so ordered shall be charged  
“against and paid from Imperial funds.

“(3) That the administration of the law with regard to seizure  
“and confiscation be made equal and uniform.

“(4) That, as recommended by the Royal Commission (p. 21,  
“par. 6), the Local Government Board be empowered to issue  
“instructions prescribing the degree of tubercular disease which  
“should cause a carcase or part thereof to be confiscated.

“(5) That the owner of the animal, carcase or meat confis-  
“cated shall have the right of calling rebutting evidence in case of  
“confiscation.

#### *Milk.*

(6) That general legislation on the subject of the inspection  
“of dairies is urgently required, whereby uniform regulations with  
“regard to the sale of milk shall be enforced by the local authori-  
“ties, subject to the control of the Local Government Board or the  
“Board of Agriculture.

“(7) That the expression “Local Authorities” should comprise  
“county councils as well as the existing local authorities.

“(A) That there should be periodical inspections of all  
“dairies and cowsheds by local authorities by means of  
“qualified inspectors within their respective districts.

“(B) That notification by the owner of every disease of  
“the udder should be compulsory.

“(C) That upon a medical officer of health or other inspec-  
“tor of a local authority issuing a certificate of the existence  
“of any disease of the udder, milk from the affected animal  
“or animals should not be used for human food until a  
“qualified expert shall certify that such milk is suitable for  
“that purpose.

“(D) That upon a medical officer of health or other  
“inspector of a local authority issuing a certificate of the



"existence of tuberculous disease of the udder, such certificate shall be supported by the certificate of a veterinary inspector of the Board of Agriculture or of a veterinary surgeon.

"(E) That as soon as practicable after such certificates are issued, the medical officer of health or the inspector of the local authority shall bring the case before a justice, who on being satisfied of the existence of the disease shall order the slaughter of the affected animal or animals, and shall direct full compensation to be given to the owner thereof, provided the disease is of recent origin.

"(F) That all compensation shall be charged against and paid from Imperial funds.

On June 8 1903, the County Council adopted the following report of the Sanitary Committee:—

*Regulations as to Meat and Milk.*

"Your Committee have carefully considered the circular letter received from the County Councils' Association, referred to in their last Report, embodying Resolutions passed by the County Councils of *Northamptonshire* and *Shropshire* relative to the necessity of legislation for giving effect to the principles of those Resolutions relating to the sale of Meat and Milk; and they recommend the Council to approve the principles of the Resolutions referred to, and also of the following additional recommendations of your Committee: namely—(i) that in the case of registered Dairymen and Purveyors of Milk there should be periodical inspection of cows as well as of Dairies, and (ii) that no milk from Dairies in which cows have suffered from Anthrax should be used for human food for a prescribed period.

If therefore "legislation giving effect to the principles of . . . these resolutions should be undertaken," improved management of Meat and Milk Supplies, which is so necessary, will be enforced.

BYE-LAWS.

New Bye-laws have been provided for the Bromsgrove North Urban District.

The Droitwich Corporation still remain in the unique position of not possessing such Regulations, but the Town Clerk writes (28th January 1903) that he is "sorry to say there has been some further delay in respect of the Bye-laws in consequence of certain of the Local Government Board's Model Bye-laws having become out of print, but this want has been supplied by the Local Government



"Board a few days back ; and (he) hopes to have the copy as revised "by the Local Government Board in the hands of the General "Purposes Committee in the course of this week." This question has been under consideration for so many years as almost to be interminable.

The Stourport Council have Byelaws under consideration, but have not adopted them.

In several instances Rural Authorities have adopted Building Byelaws, and these if simple have been found to be of great service.

I strongly recommend the "Model Bye-laws for Rural Districts," issued by the Local Government Board in June 1901, because they are not too restrictive, nor do they increase the cost of building, but merely compel the adoption of sanitary principles. My recommendation on this question is made in my Annual Report for 1901. (50L).

### FACTORIES AND WORKSHOPS.

In my Report for 1901 (p. 50<sup>b</sup>) I mentioned that the Factory and Workshops Act 1901 cast new duties upon and increased the former responsibilities of Local Authorities, and that I anticipated that "next year the Sanitary state of the Workshops will be more "fully discussed" in the Annual Reports.

By this Act, Local Authorities are required, among other duties, to keep a Register of the Workshops ; and the Medical Officer is called upon to report specifically on local administration, and to send a copy of his Report to the Secretary of State, who, I assume, will in future criticise the way in which this Act is carried out. The Annual Reports on Bewdley, Evesham and Kidderminster Boroughs, King's Norton, Lye and Wollescote, Malvern, Oldbury, Redditch and Stourbridge Urban, and Droitwich, Evesham, Feckenham, Halesowen, Martley, Rock, Pershore, Shipston-on-Stour, Tenbury, Upton and Yardley Rural Districts shew that the Act is receiving special attention ; but with the exception of brief references to Bakehouses, the Annual Reports on Droitwich Borough, Bromsgrove, Bromsgrove North, Stourport Urban, and Bromsgrove, Newent, Stow-on-the-Wold, Tewkesbury and Winchcombe, do not explain what, if anything, is being done in the matter ; so that in these instances Section 132 of the Act is not complied with, as it sets forth that "the Medical Officer of Health of every District Council "shall in his Annual Report . . . report specifically on the "administration of this Act in Workshops and Workplaces, and he "shall send a copy of his Annual Report, or so much of it as deals with "this subject, to the Secretary of State."



*Kidderminster Borough.*

Dr. Corbett says :—

“The work has been interrupted by the epidemic of Measles  
“and Scarlet Fever.”

*King's Norton Urban District.*

Dr. Green says :—

“Not very much progress was made during the year in carrying  
“it out. This was owing to the shortage of Staff, combined  
“with a large epidemic of Scarlet Fever.”

*Redditch Urban District.*

Dr. Stevenson says :—

“Owing to the pressure of other work it has not been possible  
“to give as much serious attention as one wished to the  
“administration of this Act.”

*Stourport Urban District.*

Dr. Robinson says :—

“Owing to his many duties the Inspector has been unable to  
“do what ought to be done in visiting, reporting, measuring  
“and registering all places which come under the Act.”

*Droitwich Rural District.*

Mr. Stevens (Sanitary Inspector) writes, January 14th 1903 :—

“That the Register of Workshops will not be complete for  
“several weeks.”

*Kidderminster Rural District.*

Dr. Addenbrooke says :—

“No cause for action has arisen under the Factory and Work-  
“shops Act.”

*Rock Rural District.*

Dr. Whitaker says :—

“This Act has very little application to the District.”

*Upton Rural District.*

Dr. Cowley says :—

“The administration of this Act has . . . been incompletely  
“observed. The Inspector has been much occupied with  
“other matters, and the Register of Workshops is only  
“partially complete.”



506 *Factories and Workshops. Mortuaries. Hop-pickers.  
Vans and Tents.*

*Yardley Rural District.*

Dr. Wilson says :—

“In respect to the administration of the Factory and Workshops Act of 1901, under which a register of all factories, workshops, and workplaces, including bakehouses, has now to be kept, it will be remembered that I recommended the appointment of a qualified assistant from the Surveyor’s Office to co-operate with the Sanitary Inspector in taking all the necessary measurements as regards cubic space and ventilation details, &c., as well as particulars in respect to cleanliness of premises, nature and amount of sanitary conveniences, and other data under the Act. Apart from inspections by myself, detailed inspection has been carried out under my direction, and, as far as it has been possible to ascertain, the register has now been completed. The sanitary defects are not numerous, and the particulars entered in the register are briefly summarized in the appended report of the Sanitary Inspector.”

MORTUARIES.

*Droitwich Borough.*

“The urgent need . . . for a Public Mortuary,” mentioned in Dr. Roden’s Report for 1901, will apparently soon be supplied.

*Stourport Urban District.*

Dr. Robinson repeats this assertion, that “the Mortuary is still insufficiently equipped.”

HOP-PICKERS.

*Martley Rural District.*

In his former Annual Report Dr. Greensill stated that :—“No inspection is made, and your byelaws relating to this matter are doubtless still in some instances evaded.” This year, however, he says :—“A systematic inspection has been made of the accommodation provided for hop-pickers, and the Inspectors report that your byelaws relating to cleanliness, air space, water supply, &c., are generally duly observed.”

VANS AND TENTS.

In several Reports I have called attention to the nuisance on Hartlebury Common (Droitwich Rural District) alleged to be caused by the Gipsies who congregate there. This year the Sanitary Inspector reports that “The Gipsies . . . are as numerous as ever.”

## SPECIAL REPORTS.

Seventy-five Special Reports were received during 1902, 14 of these had reference to outbreaks of Smallpox, 2 to Scarlatina, and 1 to Drainage (Somerleyton Avenue, Kidderminster Rural District); 58 schools were closed this year, as compared with 49 in 1901, viz. :—

33	on account of	Measles.
14	”	”
4	”	”
4	”	”
2	”	”
1	”	”
—		
58		

## MIDWIVES ACT 1902.

By this Act, on and after April 1st 1903 the County Council became the Supervising Authority over Midwives in the County.

By Section 1, after April 1st 1905 no woman is entitled to take or use the title of Midwife unless “certified,” nor is she to practice after April 1st 1910 unless “certified.”

Until the former date a woman is entitled to be so “certified” if she already holds a certificate in Midwifery, or produces evidence that she has been for at least one year in *bonâ fide* practice as a Midwife, and bears a good character.

A Central Midwives’ Board (Sec. 3) is to be constituted, whose duties are to frame rules as to training, examination &c. of Midwives, to appoint examiners and hold examinations, to publish an annual role of Midwives, and to decide as to the suspension or otherwise of Midwives.

The County Council, as the Supervising Authority, is called upon

“(1) To exercise general supervision over all midwives practising within their area in accordance with the rules to be laid down under this Act.

“(2) To investigate charges of malpractice, negligence, or misconduct, on the part of any midwife practising within their



" area, and should a primâ facie case be established, to report  
" the same to the Central Midwives Board.

" (3) To suspend any midwife from practice, in accordance  
" with the rules under this Act, if such suspension appears  
" necessary in order to prevent the spread of infection.

" (4) To report at once to the said Board the name of any mid-  
" wife practising in their area convicted of an offence.

" (5) During the month of January of each year to supply the  
" secretary of the Central Midwives Board with the names  
" and addresses of all midwives who, during the preceding  
" year, have notified their intention to practise within their  
" area, and to keep a current copy of the roll of midwives,  
" accessible at all reasonable times for public inspection.

" (6) To report at once to the Central Midwives Board the death  
" of any midwife or any change in the name or address of any  
" midwife in their area, so that the necessary alteration may  
" be made in the roll.

" (7) To give due notice of the effect of the Act, so far as  
" practicable, to persons at present using the title of mid-  
" wife."

Every "certified" Midwife must before practising give notice in writing to the Supervising Authority of the area in which she resides of her intention to do so, and shall give a like notice in January of each year she continues to practice in that area. And the like notice shall be given to every other Supervising Authority within whose area she at any time practises within 48 hours of commencing to so act.

As soon as this Act became law the County Council appointed a Committee of their number to take the matter up, and these gentlemen gave instructions for enquiries to be made, which have led to the compilation of a long list of Midwives now practising in the County. The Committee now await the issue of Rules by the Central Midwives Board, and as these have already been drafted and submitted to the General Medical Council, confirmation of them is anticipated in a very short time. After which the Committee, I understand, will consider further action.

## COUNTY LABORATORY.

The following is abstracted from the Fourth Annual Report of the County Analyst and Bacteriologist for 1902.

During the past year 3,093 samples have been examined, being 410 more than in the previous year.

These may be divided as follows:

(a) *Chemical*—

Fertilisers and Feeding Stuffs	-	-	-	-	-	-	92
Food and Drugs	-	-	-	-	-	-	709
Miscellaneous	-	-	-	-	-	-	26
Poisoning Cases	-	-	-	-	-	-	22
Sewage	-	-	-	-	-	-	1,062
Water	-	-	-	-	-	-	522

(b) *Bacteriological*—

Anthrax	-	-	-	-	-	-	49
Diphtheria	-	-	-	-	-	-	301
Miscellaneous	-	-	-	-	-	-	3
Tubercle	-	-	-	-	-	-	93
Typhoid	-	-	-	-	-	-	18
Water	-	-	-	-	-	-	196

Twenty-six samples of Foods and Drugs were adulterated, and fines varying from 2/6 to £5 and costs were inflicted.

301 examinations of Swabs for Diphtheria Bacilli were made, and the results of analysis, as in former years, have been reported, with rare exceptions, within 24 hours.

49 specimens were examined for Anthrax bacilli, owing to several outbreaks of the disease in the County.

During the year, 718 waters have been analysed. Of these 522 were subjected to a complete Chemical analysis, and 196 to a Bacteriological examination.

The examination of Foods &c. for Tubercle bacilli continues, and 93 samples were reported upon.

A large number of Sewages and Sewage effluents (1,062) have been examined in order to test the working of the experimental



sewage disposal filters which the County Council put down at Malvern and Oldbury. A full Report on these experiments is given as an Appendix.

The Report on the Oldbury experiments will be issued very shortly.

## Borough of Bewdley.

TABLE A.

Area in acres, 2,105.				
Population 1891	...	...	2,876.	
" 1901	...	...	2,866.	

Decrease 1891-1901	...	10.
Estimated Population, 1902	2,866.	

Name of Medical Officer of Health, U. W. N. MILES.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 26.51.	Nett Death Rate, 18.14.
a) Zymotic Death Rate, 2.44.	(b) Infantile Mortal, 92.10.
Phthisis Death Rate, 1.04.	(c) Resp. Death Rate, 2.09.
Smallpox Death Rate, 0.0.	Measles Death Rate, 1.74.
Scarlatina Death Rate, 0.0.	Diphtheria and Membranous
Whooping Cough Death Rate, 0.0.	Croup Death Rate, 0.0.
(d) Fever Death Rate, 0.69.	(e) Diarrhoea Death Rate, 0.0.
	(f) Enteritis Death Rate 0.69.
Cancer, Malignant Disease Death Rate, 0.34.	

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			20			6	3	
Deaths ...						2		
Hospital Cases			5					
" Deaths								

Diseases prevalent :—Measles

Period :—October and November.

Schools Closed :—November 10th to December 1st.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea."
- Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



## Borough of Bewdley.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	2,876	106	38.68	10	94	48	16.60				48	16.60
1893.	2,876	86	29.65	8	93	51	17.58				51	17.58
1894.	2,876	102	35.17	13	132	44	15.17				44	15.17
1895.	2,876	64	22.2	14	216	60	20.86				60	20.86
1896.	2,876	84	29.2	13	154	53	18.43				53	18.43
1897.	2,876	88	30.59	11	125	43	14.95				43	14.95
1898.	2,876	72	25.03	11	152	42	14.60				42	14.60
1899.	2,876	76	26.42	12	157	41	14.25				41	14.25
1900.	2,876	71	24.68	7	98	51	17.73				51	17.73
1901.	2,866	87	30.35	8	91	39	13.60				39	13.60
Averages for years 1892-1901.	2,875	83	29.19	10	131	47	16.37				47	16.37
1902.	2,866	76	26.51	7	92	52	18.14				52	18.14

\* Rates calculated per 1,000 of population.

*Borough of Bewdley.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..	5		4	1				
Scarlet Fever ... ..								
Whooping-cough ..								
Diphtheria and membranous croup ..								
Croup ... ..								
Fever { Typhus ..								
{ Enteric ...	2			1		1		
{ Other continued								
Epidemic influenza ...								
Cholera ... ..								
Plague ... ..								
Diarrhœa ... ..								
Enteritis ... ..	2		1				1	
Puerperal fever ...								
Erysipelas ... ..								
Other septic diseases...								
Phthisis ... ..	3				3			
Other tubercular diseases ... ..	2	2						
Cancer, malignant disease ... ..	1					1		
Bronchitis ... ..	4		1			1	2	
Pneumonia ... ..	2		2					
Pleurisy ... ..								
Other diseases of Respiratory organs ...								
Alcoholism { ...	1					1		
Cirrhosis of liver {								
Venereal diseases ...								
Premature birth ...	2	2						
Diseases and accidents of parturition ..								
Heart diseases ...	7					2	5	
Accidents ... ..	1						1	
Suicides ... ..	1					1		
.....								
.....								
.....								
.....								
All other causes ..	19	3	1	1		5	9	
All causes ...	52	7	9	3	3	12	18	



*Borough of Bewdley.*

Mr. Miles was appointed in November 1902, as successor to the late Mr. Trevor Webster, whose death is a source of regret, as he was much interested in the promotion of the sanitation of the Town and expressed his views upon such subjects in the most straightforward way.

Mr. Miles shows that the Death-rate (18·1) is rather high.

Measles was prevalent (5 deaths) in the last three months of the year and necessitated the closing of the National Schools.

Two of the six cases of Typhoid Fever were fatal. Four of them were traced to a polluted well. 5 of the 20 cases of Scarlet Fever were isolated in the Kidderminster Hospital.

Since the opening of the waterworks, 169 houses have been supplied with water. Mr. Miles says that the sewerage remains in much the same condition as before: apparently unless some arrangement can be come to for jointly sewerage Bewdley and Wribbenhall, this unsatisfactory state of things must continue, as the Corporation have exhausted their borrowing powers.

The scavenging is said to be satisfactory.

The Bake-houses, Slaughter-houses, Dairies and Cowsheds are reported to be in a satisfactory condition.

## Bromsgrove Urban District.

TABLE A.

Area in acres, 1,071			
Population 1891 ...	...	7,934	
" 1901 ...	...	8,418	
<hr/>			
Increase 1891-1901 ...	...	484	
Estimated Population, 1902		8,460	
Name of Medical Officer of Health, CAMERON KIDD, M.B.			
<i>Mortality per 1,000 of Population living during same period.</i>			
Birth Rate, 28·9.		Nett Death Rate, 13·4.	
(a) Zymotic Death Rate, 1·06.		(b) Infantile Mortal, 57.	
Phthisis Death Rate, ·82.		(c) Resp. Death Rate, 1·5.	
Smallpox Death Rate, 0·0.		Measles Death Rate, 0·0.	
Scarlatina Death Rate, ·47.		Diphtheria and Membranous	
Whooping Cough Death Rate, 0·0.		Croup Death Rate, ·11.	
(d) Fever Death Rate 0·0.		(e) Diarrhœa Death Rate, ·47.	
		(f) Enteritis Death Rate, 0·0.	
Cancer, Malignant Disease Death Rate, 1·06.			

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Chickenpox.
Cases ...			114	3		1	5	12
Deaths ...			4	1				
Hospital Cases			106					
" Deaths			4					

Diseases prevalent:—Scarlet Fever.

Period:—August to end of year.

Schools Closed:—Stourbridge Road Board School and Sidemoor Infants' School, three weeks in August and two weeks from 31st October; St. Peter's School, Rock Hill, 14 days in February; all on account of Scarlet Fever.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhœa.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhœa" are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhœa. Summer diarrhœa;  
 Dysentery and dysenteric diarrhœa;  
 Choleraic diarrhœa, cholera, Cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhœa." Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



## Bromsgrove Urban District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITU- TIONS.	Deaths of Non- residents registered in District.	Deaths of Residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES NETT.	
		Number.	Rate*	Number.	Rate per 1,000 Births registered.	Number.	Rate*				Number.	Rate*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	8,000	245	30.8	39	159	205	25.8	55				
1893.	8,000	279	35.1	51	182	160	20.1	28				
1894.	8,000	226	28.4	24	106	126	15.8	34				
1895.	8,000	244	30.5	34	139	139	17.3	30				
1896.	8,000	234	29.2	30	128	115	14.3	22				
1897.	8,000	241	30.1	32	132	146	18.2	20				
1898.	8,150	225	27.6	31	133	146	16.6	25				
1899.	8,250	217	26.3	36	165	159	18.7	36	4		155	18.7
1900.	8,500	217	24.3	21	96	157	18.0	34	4		153	18.0
1901.	8,416	253	30.0	24	94	152	16.7	28	11		141	16.7
Averages for years 1892-1901.												
	8,131	238	29.2	32	133	150	18.1	31	6		149	17.8
1902.	8,460	245	28.9	14	57	120	13.4	27	6		114	13.4

\* Rates calculated per 1,000 of population.

*Bromsgrove Urban District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All Ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..	6		4	1	1			
Whooping-cough ... ..								
Diphtheria and membranous croup ... ..	2		1		1			
Croup ... ..								
ever { Typhus ... ..								
Enteric ... ..	1				1			
Other continued								
Epidemic influenza ... ..								
Cholera ... ..								
Plague ... ..								
Diarrhœa ... ..	4	4						
Enteritis ... ..								
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases... ..	1				1			
Phthisis ... ..	7				3	4		
Other tubercular diseases ... ..	10	1	2	3		4		
Cancer, malignant disease ... ..	9					4	5	
Bronchitis ... ..	11			2		2	7	
Pneumonia ... ..	2					2		
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism ... ..								
Cirrhosis of liver ... ..	3					3		
Venereal diseases ... ..								
Premature Birth ... ..	3	3						
Diseases and accidents of parturition ... ..	2				1	1		
Heart diseases ... ..	12					6	6	
Accidents ... ..	2		1			1		
Suicides ... ..								
.....								
.....								
.....								
.....								
All other causes ... ..	45	6	2		1	9	27	
All causes ... ..	120	14	10	6	9	36	45	



Dr. Kidd writes:—

“Quite the most satisfactory feature of the year has been the  
“continued diminution in the Infantile Mortality, which has  
“this year reached a record low figure (57), the almost entire  
“absence of Diphtheria and Enteric Fever during the year  
“is another satisfactory feature of this report.”

Dr. Kidd also writes:—

“The figures for the year in short are in every way most favour-  
“able, but on the other hand we have experienced during the  
“year an epidemic of Scarlet Fever exceeding in its extent  
“anything of which I can find a record. No less than 114  
“cases occurred during the year, 97 of these being in the  
“last five months, and four proved fatal. We had not had  
“an epidemic of Scarlet Fever since 1897, when 32 cases  
“occurred, so that a new generation of susceptible children  
“had grown up and there was every material for an extensive  
“outbreak. At the same time it was disappointing to find  
“that although the early cases were promptly removed to the  
“hospital and the houses disinfected, the epidemic appeared  
“to spread as steadily as if nothing were checking it. The  
“closure of the schools which were principally affected, even  
“when continued for four weeks at a time, also seemed to  
“have not the slightest effect upon the spread of the disease,  
“the number of fresh cases each week continuing just about  
“the same whether the schools were opened or closed. One  
“cause of the continued spread of infection undoubtedly lay  
“in the existence of unsuspected or even concealed cases  
“which mixed with other children during the period of con-  
“tagion, and it is difficult to say how many of these cases  
“there may have been, but the number was probably consider-  
“able; but I believe that the true explanation of a heavy  
“epidemic of this kind lies deeper than this. There can be  
“no doubt that the use of the isolation hospital serves over  
“and over again to check the spread of infection when  
“isolated cases occur which are promptly dealt with. In this  
“way many children are saved from contracting the disease. In  
“the absence of the precautions we now take, a certain  
“number of other children would probably be affected after  
“each local introduction of infection, whereas now these  
“repeated small epidemics are checked. In this way the  
“number of susceptible children gradually increases until at  
“length a time comes when there is so much material avail-  
“able that on the introduction of infection in an active form  
“a wide-spread epidemic necessarily results.”

“Of course, the fact that we must occasionally fail to prevent an  
“epidemic does not destroy the value of hospital isolation.



*Bromsgrove Urban District.*

"In countless instances, as I have already said, it serves to  
 "check an outbreak, and even when an epidemic becomes  
 "inevitable the advantages of having the sick removed from  
 "numerous houses and confined to one centre are very  
 "great."

Dr. Kidd says, he hopes, during the coming year, to thoroughly inspect some of the unsatisfactory quarters of the town in company with the new Inspector of Nuisances.

Referring to the House Accommodation, he writes:—

"Remarks in former reports still apply, but I think improvement  
 "is steadily progressing."

With reference to Excrement Disposal, it is stated—

"That it would be better for all privies in the town to be  
 "abolished and for w.c.'s only to be used. I am glad to see  
 "that in almost every case newly-built houses are now provided  
 "with water-closets, and I hope during the coming year to see  
 "a good many existing privies converted."

Dr. Kidd stated last year that the worst sanitary fault in the town was the Slaughter-houses, and this year he adds that he hopes to see the day when a Public Abattoir will be available.

In his Annual Report for 1901, Dr. Kidd advised that the opinion of a Sanitary Engineer be sought as to the defective drainage of Rock Hill, consequently the Clerk of the County Council communicated with the Clerk of the Bromsgrove Council, who replied on 4th February, 1903.

"That the services of an Engineer in this matter are not re-  
 "quired as the drains are in perfect order, the gullies are all  
 "perfectly trapped and in a thoroughly effective sanitary  
 "condition."

Chickenpox was Scheduled as notifiable for 6 months, beginning in April.

The Dairies are reported to be in a fairly good condition.

The Isolation Hospital is reported as now quite complete and to have done excellent service during the year although it was severely tried by the epidemic of Scarlet Fever. The Death-rate in the Hospital was as low as 3 per cent., and in every way it answered the expectations formed of it.

A Smallpox Hospital has also been erected at Woodgate.



*Bromsgrove Urban District.*

Dr. Kidd urges that the County Sanatorium at Knightwick should be supported.

"Alformant lamps" for the generation of "Formic Aldehyde" are used for disinfecting and Dr. Kidd considers them to be "cleanlier and simpler than the Sulphur Method."

The Hospital Disinfector can now be used for disinfecting the bedding of patients, treated at home, on payment of a small fee.

Dr. Kidd concludes with a special report he made in February 1903, upon the sewage farm which shows that a bad state of things was in existence: and writes—

"Last summer I certainly  
 "thought some change inevitable, but I am bound to say  
 "that during the last six months a very great improvement  
 "has been made in the working of the farm, and I am firmly  
 "of opinion now that it can be made to work practically as  
 "well as it ever has done, and that at any rate it would be  
 "wise and justifiable to watch the working of the farm during  
 "another year, with periodical testings of the effluent, &c.,  
 "and to see whether it does not suffice perfectly well for the  
 "requirements of the town. This improvement has been  
 "brought about entirely by the skill and energy of the  
 "recently-appointed Surveyor and Sanitary Inspector, Mr.  
 "Smith. He at once set to work to detect where the faults  
 "lay, and found that many of them were remediable, some  
 "being due to more or less trifling defects, the results of  
 "wear and tear about the tanks, others to errors in the  
 "system under which the farm has been worked." . . . .  
 "The outcome of my investigations, therefore, is shortly this:  
 "that we may find in the Septic Tank system a trustworthy  
 "means of improving the working of the Sewage Farm if  
 "further experience shows that the farm in its present form  
 "is incapable any longer of doing its work efficiently, and  
 "that some change is imperative, but that as far as recent  
 "indications show I believe that the farm, as now repaired  
 "and worked, will prove to be quite sufficient for the needs  
 "of the town for a considerable time to come."

## North Bromsgrove Urban District.

TABLE A.

Area in acres, 10,588.

Population 1891 ...	...	5,072
„ 1901 ...	...	5,688

Increase 1891-1901 ... 616

Estimated Population, 1902 5,740

Name of Medical Officer of Health, CAMERON KIDD, M.B.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 30.6.	Nett Death Rate, 7.8.
(a) Zymotic Death Rate, 0.0.	(b) Infantile Mortal, 56.
Phthisis Death Rate, 0.69.	(c) Resp. Death Rate, 1.04.
Smallpox Death Rate, 0.0.	Measles Death Rate, 0.0.
Scarlatina Death Rate, 0.0.	Diphtheria and Membranous
Whooping Cough Death Rate, 0.0.	Croup Death Rate, 0.0.
(d) Fever Death Rate, 0.0.	(e) Diarrhoea Death Rate, 0.0.
	(f) Enteritis Death Rate, 0.0.

Cancer, Malignant Disease Death Rate, 0.34.

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ..			18			2	3	
Deaths ...								
Hospital Cases			13			1		
„ Deaths								

Diseases prevalent :—Scarlet Fever.

Period:—Oct., Nov., Dec.

Schools Closed :—

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



## North Bromsgrove Urban District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	5,072	157	30.9	26	165	81	15.9					
1893.	5,100	180	35.3	29	161	100	19.6					
1894.	5,100	135	26.2	20	148	69	13.3					
1895.	5,150	164	31.8	18	109	73	14.1					
1896.	5,200	149	28.9	18	120	73	14.1					
1897.	5,300	132	24.9	18	136	67	12.6					
1898.	5,350	167	31.2	18	107	71	13.2					
1899.	5,400	143	26.4	20	139	61	11.9					
1900.	5,450	144	26.4	10	69	62	11.3					
1901.	5,687	174	30.5	21	120	82	14.4					
Averages for Years 1892-1901.	5,280	154	29.2	19	127	73	14.0					
1902.	5,740	176	30.6	10	56	45	7.8					

\* Rates calculated per 1,000 of population.

## North Bromsgrove Urban District.

TABLE IV.

Causes of, and Ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..								
Whooping-cough ... ..								
Diphtheria and membranous croup ... ..								
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued								
Epidemic influenza ... ..								
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..								
Enteritis ... ..								
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases...								
Phthisis ... ..	4			1		3		
Other tubercular diseases ... ..	1					1		
Cancer, malignant disease... ..	2						2	
Bronchitis ... ..	4	1	1			2		
Pneumonia ... ..	2					1	1	
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism {								
Cirrhosis of liver {								
Venereal diseases ... ..								
Premature Birth ... ..	1	1						
Diseases and accidents of parturition ... ..	1					1		
Heart diseases... ..	3					2	1	
Accidents ... ..	1					1		
Suicides ... ..	2					2		
.....								
.....								
.....								
.....								
All other causes... ..	24	8	1			4	11	
All causes ... ..	45	10	2	1		17	15	



*North Bromsgrove Urban District.*

Dr. Kidd says:—

“In the matter of Vital Statistics the year has been a most remarkable one, the figures being in every respect extraordinary. While the Birth-rate is above the average, the Death-rate is unprecedentedly low, being practically half the average of recent years. The Infantile Mortality is less than half the average, and the Zymotic Death-rate is actually nil, not even a single death from Infantile Diarrhœa having occurred. In addition to this there has been no case of diphtheria during the year.

“It is difficult to account for these remarkable figures. All small districts are of course liable to extreme fluctuations in the Vital Statistics, the extent of the possible fluctuation being directly proportionate to the smallness of the population, and I have frequently pointed out the fallacy of attaching too great importance to the figures for any particular year; at the same time this district is sufficiently large to ensure a fairly uniform yearly result, and as a matter of fact during the fifteen years of which I have an accurate record there has never until this year been so excessive a variation in the mortality returns. I believe that neighbouring districts shew a similar improvement for the year, but it is at any rate highly satisfactory to see returns which indicate a very high level of public health throughout the year, and it is a certain indication of what is possible in the district, and what might be a constant condition if Sanitary Laws were strictly obeyed.”

Dr. Kidd adds:—

“There has been an entire absence of Smallpox and Diphtheria, and even such diseases as Whooping Cough and Measles have been conspicuous by their absence. The only epidemic of any importance was that of Scarlet Fever, which commenced in the northern part of the district in October. Even this epidemic proved to be far less severe than might have been expected from the recent experience of neighbouring districts, and the prompt removal of the majority of the cases as they occurred served, I am sure, its purpose in limiting very greatly the spread of infection. The advantage of having a fully-equipped Isolation Hospital becomes more apparent every year.

“A great deal of sanitary detail has been attended to during the year, especially at Catshill and Bournheath, and is referred to more fully below under the headings of systematic inspection and water supply. I was particularly struck when making a house-to-house inspection of parts of Catshill and Bournheath by the generally improved sanitary conditions of



*North Bromsgrove Urban District.*

"the houses as compared with the condition in which I found them when I first inspected these villages twelve to fourteen years ago.

"The Smallpox Hospital provided by the Joint Hospital Committee has now been erected at Woodgate, in an admirably isolated situation, and we are now prepared to deal with any case that may occur at the shortest notice, and without any great difficulties."

With regard to the House Accommodation, Dr. Kidd mentions that building has been proceeding actively in several parts of the District, and that new houses are almost without exception provided with 3 sleeping rooms.

He adds, too:—

"As affecting the housing of the people, I rejoice to see the progress made by the land allotment system in this District. In many cases already families who used to be struggling at the nail trade are now possessed of a decent house, and are making a good living as market gardeners, with allotments of one or two acres and upwards."

Referring to the drainage, Dr. Kidd says:—

"This has been a source of difficulty at Rubery, where the dumbwell system, in a rapidly growing neighbourhood with impermeable clay soil, has given rise to a great deal of nuisance and trouble.

After describing the advantages and results obtained from the "septic tank" treatment of sewage, he adds,—

"I would certainly advise the Council, in the case of Rubery at any rate, to obtain expert advice as to the possibility of dealing with the sewage there in this way; and to private owners of houses in the Lickey District, especially in any case where there may have been difficulty or nuisance with existing dumbwells, I would urge the adoption of this system, which has now had quite a sufficiently long and varied trial to establish its claim to efficiency."

With reference to water supply, he adds:—

"*Water Supply.* As already mentioned, the improvements in the water supply of several parts of the District form one of the satisfactory features in the year's work. I described last year how the supply of well water in parts of Catshill and Bournheath had failed since the sinking of the East Worcestershire Waterworks Company's deep wells at the Washing Stocks. The Waterworks Company asserted that



*North Bromsgrove Urban District.*

"this failure was due to successive dry seasons, but the Council, believing that the deep wells had robbed these Districts of their well water, demanded that the Company should, by way of recompense, lay their mains at their own expense through the affected Districts, particularly through the hamlet of Bournheath. The question was fought out before the Parliamentary Committee which was considering the Bill promoted just then by the Waterworks Company, with the result that a proviso was inserted to the effect that the mains should be laid by the company as desired by the Council. The result has been a great boon to the poor Districts concerned, the supply of water from wells having become very bad indeed. The mains were promptly laid by the Waterworks Company, and before the end of the year no less than 103 new house connections were made in these two villages alone, 56 at Catshill and 47 at Bournheath. In addition to the mains laid by order of the Parliamentary Committee extensions were made during the year at Fock-bury, Inton Fields, Eachway, and a short length in Catshill; 19 new house services were connected at the Eachway, and 30 in other parts of the District, so that the total number of new connections made this year by the Company was 152, a number greatly in excess of any previous year."

Dr. Kidd mentions that the worst local sanitary defects are caused by the old deep leaking privy cesspits; but that as the District is now provided with a complete set of modern byelaws which provide against the construction of such cesspits, no new ones will be erected, and that by condemning those found to create nuisance he hopes to see their number steadily diminish.

River pollution is said not to be at all serious.



## Borough of Droitwich.

TABLE A.

Area in acres, 1,705.

Population 1891	...	...	4,070.
" 1901	...	...	4,201.

Increase 1891-1901 ... 131.

Estimated Population, 1902 4,163.

Name of Medical Officer of Health, P. A. RODEN, M.D.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 24.5.

Nett Death Rate, 11.7.

(a) Zymotic Death Rate, 0.38.

(b) Infantile Mortal, 58.

Phthisis Death Rate, 0.95.

(c) Resp. Death Rate, 1.5.

Smallpox Death Rate, 0.0.

Measles Death Rate, 0.0.

Scarlatina Death Rate, 0.0.

Diphtheria and Membranous

Whooping Cough Death Rate, 0.0.

Croup Death Rate, 0.0.

(d) Fever Death Rate, 0.3.

(e) Diarrhœa Death Rate, 0.0.

(f) Enteritis Death Rate, 0.0.

Cancer, Malignant Disease Death Rate, 0.0.

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			4			3		
Deaths ...						1		
Hospital Cases			4					
" Deaths								

Diseases prevalent :—Measles and Whooping Cough.

Period :—Nov. and Dec.

Schools Closed:—

(a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhœa.

(b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.

(c) Includes Bronchitis, Pneumonia, Pleurisy.

(d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.

(e) Under the heading of "Diarrhœa" are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from

Epidemic enteritis;

Zymotic enteritis;

Epidemic diarrhœa. Summer diarrhœa;

Dysentery and dysenteric diarrhœa;

Choleraic diarrhœa, cholera, cholera nostras (in the absence of Asiatic cholera).

(f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhœa."

Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-Residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	4,021	122	30.3	17	139	82	20.5		17		82	20.5
1893.	4,021	126	31.3	16	126	88	22.0				71	17.7
1894.	4,021	114	27.7	16	140	102	25.5		23		79	19.9
1895.	4,021	130	31.4	22	168	102	25.5		15		87	21.0
1896.	4,130	123	29.4	24	195	79	18.9		9		70	16.8
1897.	4,177	109	26.0	12	110	82	19.6		16		56	15.8
1898.	4,177	112	26.8	14	125	75	17.9		8		67	13.6
1899.	4,338	102	23.5	8	78	74	17.0		16		58	13.6
1900.	4,338	99	25.8	14	116	75	17.2		11		64	14.7
1901.	4,163	101	24.2	16	158	75	18.0	15	8		67	16.0
Averages for Years 1892-1901.	4,140	113	27.6	15	136	83	20.2	15	12		70	16.8
1902.	4,163	102	24.5	6	58	62	14.9	8	13		49	11.7

\* Rates calculated per 1,000 of population.





Dr. Roden reports favourable Vital Statistics, and adds that "there is a marked diminution in the Infantile Death-rate and Phthisis Death-rate." 3 cases of Typhoid Fever were imported into the Workhouse from outlying Districts. Measles and Whooping Cough were prevalent during the latter part of the year.

Dr. Roden says,—

- "I do not know whether any steps have been taken, as proposed, to remedy the defects in the sewers and the sewage Farm.  
 "In my last Annual Report I pointed out the insanitary condition of many of the ashpits. I find that '15 of these have been abolished, and provided with proper dust receptacles, still leaving a good number to be dealt with.'  
 "I must again point out the severe want of byelaws for the Borough. With the steady increase of new houses on the Witton Estate, without some control on the buildings and the laying of pipes, there is great danger of some severe sanitary defect which may be found difficult to alter in years to come. I also mentioned in my last year's Report that there are many houses within the Borough into which the sunshine seldom or never enters, notably those in Fox Alley, and the houses at the back of the Star."  
 "The Salt Union kindly closed certain houses which I pointed out to them. The need of a public mortuary was severely felt during the past year."  
 "The Dairies, Slaughter-houses and Lodging-houses are reported to be in fairly satisfactory condition."

On May 28th, 1903, the Town Clerk informed the County Council that "the Sewerage and Mortuary plans, with the necessary specifications and estimates, are being sent to the Local Government Board to-day. The application for a loan was sent some time ago."

With reference to the Dust-bins, Byelaws and Public Mortuaries, the Town Clerk of Droitwich wrote the Clerk of the County Council on the 29th January 1903:—

- "I beg to inform you that Sanitary Dustbins are now being used here, and that the Plans for Public Mortuary are coming up for consideration of the Corporation at their Quarterly Meeting in February. I am sorry to say there has been some further delay in respect of the Byelaws, in consequence of certain of the Local Government Board's model Byelaws having become out of print, but this want has been supplied by the Local Government Board a few days back, and I hope to have the copies, as revised by the Local Government Board, in the hands of the General Purposes Committee this week."



## Borough of Evesham.

TABLE A.

Area in acres, 2,265.			
Population 1891	...	...	5,836
„ 1901	...	...	7,101
			<hr/>
Increase 1891-1901	...	...	1,265
Name of Medical Officer of Health, G. H. FOSBROKE, D.P.H., Camb.			
<i>Mortality per 1,000 of Population living during same period.</i>			
Birth Rate, 30·8.		Nett Death Rate, 14·5.	
(a) Zymotic Death Rate, 1·4.	(b) Infantile Mortal, 132.		
Phthisis Death Rate, 0·7.	(c) Resp. Death Rate, 1·7.		
Smallpox Death Rate, 0·0.	Measles Death Rate, 0·2.		
Scarlatina Death Rate, 0·0.	Diphtheria and Membranous		
Whooping Cough Death Rate, 0·14.	Croup Death Rate, 0·8.		
(d) Fever Death Rate, 0·0.	(e) Diarrhœa Death Rate, 0·0.		
	(f) Enteritis Death Rate, 0·2.		
Cancer, Malignant Disease Death Rate, 0·2.			

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Chicken-pox.
Cases ..			80	24		2	10	31
Deaths ..				4	2			
Hospital Cases			75	18		1		
„ Deaths								

Diseases prevalent :—Scarlatina, Diphtheria.

Period:—Whole year.

Schools Closed :—None.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhœa.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhœa" are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhœa. Summer diarrhœa;  
 Dysentery and dysenteric diarrhœa;  
 Choleraic diarrhœa, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhœa."
- Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	5,836	177	30.3	29	163	106	18.1					
1893.	5,836	189	32.3	18	95	74	12.6					
1894.	5,836	184	31.5	18	97	79	13.5					
1895.	5,836	203	34.7	26	128	98	16.7					
1896.	5,836	212	36.3	19	89	80	13.7					
1897.	7,150	206	28.7	24	116	93	13.0					
1898.	7,150	201	28.1	24	119	101	14.1					
1899.	7,545	208	27.5	20	96	103	13.6	5	3	5	130	17.0
1900.	7,645	212	27.7	31	146	128	16.7	9	3	7	100	14.0
1901.	7,101	229	32.2	21	91	96	13.5					
Averages for Years 1892-1901.	6,577	202	30.9	24	114	94	14.5	7	3	6	115	15.5
1902.	7,101	219	30.8	29	132	99	13.9	2	2	6	103	14.5

\* Rates calculated per 1,000 of population.

*Borough of Evesham.*

TABLE IV.

Causes of, and Ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..	2	1	1					
Scarlet Fever ... ..								
Whooping-cough ... ..	1	1						
Diphtheria and membranous croup ... ..	6	2	3	1				
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued ... ..								
Epidemic influenza ... ..								
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..								
Enteritis ... ..	2	2						
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases... ..								
Phthisis ... ..	5					5		
Other tubercular diseases ... ..								
Cancer, malignant disease... ..	2					1	1	
Bronchitis ... ..	6	1	1				4	
Pneumonia ... ..	7	1	1			2	3	
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism { ... ..	1						1	
Cirrhosis of liver { ... ..								
Venereal diseases ... ..								
Premature Birth ... ..	6	6						
Diseases and accidents of parturition ... ..								
Heart diseases... ..	10	1	1		1	2	5	
Accidents ... ..	4	1	2	1				
Suicides ... ..								
.....								
.....								
.....								
.....								
.....								
All other causes... ..	52	13	1	4	1	10	23	
All causes ... ..	103	29	10	6	2	19	37	



*Borough of Evesham.*

It is mentioned that Scarlet Fever (80 cases) of a mild type was prevalent in the Borough during the whole year, and that no less than 93 per cent. of the patients were removed to Hospital. There was no indication that any of these cases were due to anything but infection either direct or indirect.

It would appear that the over taxing of the Isolation Hospital resulted in a number of "return cases" *i.e.*: cases occurring in houses where patients have just been sent home.

It is explained that this was not due to laxity on behalf of the Staff, but more probably because the Hospital was at one time seriously over-crowded. As soon as the Joint Hospital Board were informed that such was the case, they caused an additional pavilion to be erected. It is mentioned that the 24 cases of Diphtheria (4 deaths) formed part of the outbreak which occurred in 1901, and which was full discussed in the Annual Report for that year.

The Isolation Hospital was materially improved during the year and a special Smallpox Hospital on a suitable site was erected jointly by the Corporation and the Evesham and Pershore Rural District Councils under an Order issued by the County Council.

The Recks disinfecter is said to be largely made use of.

Attention is called to several cottages which have insufficient air space at their rear. The sewerage has been extended under the advice of Mr. Berrington, C.E., but doubt is expressed as to whether the process of sewage purification, which consists of "single contact" beds and a "septic tank," will provide sufficient nitrification. As, however, the Engineer has said that further bacterial filters can, if required, be laid down, the Corporation are fully justified in not at present going to further expenditure.

The Lodging-houses, Slaughter-houses, Dairies and Cowsheds are reported upon and the sanitary state of 136 workshops and 14 of the Factories in the Borough are discussed in detail.

## Borough of Kidderminster.

TABLE A.

Area in acres, 1,214.

Population 1891	...	...	24,803.
" 1901	...	...	24,681.

Decrease 1891-1901 ... 122.

Estimated Population, 1902 24,700.

Name of Medical Officer of Health, DAVID CORBET, M.R.C.S.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 25.1.

Nett Death Rate, 16.6.

(a) Zymotic Death Rate, 1.09.

(b) Infantile Mortal, 141.

Phthisis Death Rate, 1.09.

(c) Resp. Death Rate, 3.7.

Smallpox Death Rate, 0.0.

Measles Death Rate, 0.5.

Scarlatina Death Rate, 0.04.

Diphtheria and Membranous

Whooping Cough Death Rate, 0.0. Croup Death Rate, 0.08.

(d) Fever Death Rate, 0.0.

(e) Diarrhoea Death Rate, 0.5.

(f) Enteritis Death Rate, 0.6.

Cancer, Malignant Disease Death Rate, 1.1.

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			189	30		10	30	
Deaths ...			1	1				
Hospital Cases			159					
" Deaths								

Diseases prevalent :—Scarlatina, Measles.

Period :—

Schools Closed :—14 departments of seven Schools.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



## Borough of Kidderminster.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-Residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	25,000	674	26.9	108	160	478	19.1	82				
1893.	25,000	668	26.7	97	145	431	17.2	81				
1894.	25,000	641	25.6	78	121	391	15.6	86				
1895.	25,000	637	25.4	104	163	471	18.8	107				
1896.	25,000	614	24.5	108	175	398	15.9	80				
1897.	25,000	617	24.6	111	179	427	17.0	82				
1898.	25,000	568	22.7	89	156	394	15.7	90				
1899.	25,000	571	22.8	87	152	436	17.4	97				
1900.	25,000	600	24.0	103	171	542	21.6	133	43		499	19.9
1901.	24,692	622	25.1	128	205	496	20.0	105	40		456	18.4
Averages for Years 1892-1901.	24,969	621	24.8	101	163	446	17.8	94	41		478	19.1
1902.	24,700	622	25.1	88	141	433	17.5	115	44		389	16.6

\* Rates calculated per 1,000 of population.

*Borough of K;dderminster.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and up-wards.	
Small-pox ... ..								
Measles ... ..	12		11	1				
Scarlet fever ... ..	1			1				
Whooping-cough ... ..								
Diphtheria and membranous croup ... ..	1		1					1
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued ... ..								
Epidemic influenza ... ..	1						1	
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..	12	8	4					2
Enteritis ... ..	14	11	2			1		2
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases... ..	7	6	1					1
Phthisis ... ..	26				4	22		4
Other tubercular diseases ... ..	20	7	6		2	4	1	5
Cancer, malignant disease ... ..	24			1		14	9	8
Bronchitis ... ..	64	10	5	1		15	33	20
Pneumonia ... ..	22	4	2	4		5	7	3
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism ... ..								
Cirrhosis of liver ... ..	1					1		1
Venereal diseases ... ..								
Premature birth ... ..	14	14						
Diseases and accidents of parturition ... ..	2				1	1		1
Heart diseases ... ..	29			2	2	15	10	5
Accidents ... ..	10	1	3		1	3	2	11
Suicides ... ..	3					2	1	
.....								
.....								
.....								
.....								
All other causes ... ..	126	22	6	4	4	32	58	51
All causes ... ..	389	83	41	14	14	115	122	115



*Borough of Kidderminster.*

Mr. Corbet reports a "Nett Death-rate" of 16.6.

Alluding to the high Infantile Mortality (141) for the year, Mr. Corbet says:—

"He has issued a Circular on the feeding and care of Infants  
"which he hopes may have some effect in lessening it."

Scarlet Fever and Measles were prevalent during the year.

Of the 189 cases of Scarlet Fever notified, 23 which occurred in November were traced to the importation of Milk from a Dairy outside the Borough. Mr. Corbet adds that he "should have liked to have been in a position to advise your Committee to have prohibited the sale of the Comberton Dairy Milk in the Borough for a time but as the Town Council had not adopted the Act of which they have now given notice, we were powerless."

I assume that the Act Mr. Corbet refers to is the Infectious Disease Prevention Act, 1890, Sec. 4.

159 of the 189 cases of Scarlatina were treated in the Borough Hospital which is located outside the District.

With reference to the epidemic of Measles which occurred during the last half of the year, no less than 14 departments of seven Schools had to be closed.

Dr. Corbet says it is impossible to say how many cases occurred as the Disease is not notifiable, but that speaking generally the inhabitants seem to be getting alive to the dangers of Measles and consequently are more careful.

Alluding to the Isolation Hospital, he says:—

"*Smallpox Hospital.*—In the early part of the year, in consequence of Smallpox being prevalent throughout the country, the County Council invited a conference of representatives from Local Authorities in the county for the purpose of erecting joint Smallpox Hospitals, to be under the control of the County Council. Our authority came to the decision not to join the County Council scheme.

"We subsequently came to terms with the authorities of Stourport, Bewdley, and the Kidderminster Rural District Council, to erect a joint Hospital to contain eight beds, such Hospital to be under the control of our Authority, but with equal rights to use.

"The Hospital has been erected, and the old Smallpox Hospital  
"will be used as an administrative building. There is also  
"a large laundry. The whole of these buildings have been  
"enclosed with a 7ft. corrugated iron fencing.

"They are situated on a hill, a long distance from any dwelling-  
"houses, and 500 feet from our nearest Scarlet Fever  
"Pavilion.

"Although the Hospital is finished, it is not yet furnished,  
"neither is there a Mortuary, Disinfecting Apparatus, or  
"Coach-house for the Ambulance. But in reference to the  
"furnishing, the Chairman of the Health Committee is em-  
"powered to procure anything necessary.

"In consequence of six cases of Chickenpox and two of Whoop-  
"ing Cough developing in the Hospital, we have had two small  
"isolation wards erected."

It is mentioned that middens and privies are decreasing in the Borough every year and that W.C.'s are being substituted.

The Bake-houses are said to be kept in satisfactory condition and that the "Slaughter-houses," as a whole are as satisfactory as private slaughter-houses are ever likely to be.

Eight houses have been dealt with under the Housing of the Working Classes Act, and 240 have been closed and whitewashed under the Public Health Act 1875, but Dr. Corbet writes:—

"*New Buildings.*—I regret that during the year I have had to  
"complain of the Sanitary arrangements at new houses,  
"not being provided in accordance with the Building Bye-  
"Laws.

"In future I believe this will be remedied, and the Bye-Laws  
"strictly enforced."

Ashes and refuse are said to be easily disposed of without difficulties.

It is mentioned that:—

"*River Stour.*—That section of the bed of the River Stour  
"which has been cleaned out has been satisfactory, but there  
"are still other parts of the river that require similar  
"attention."



Alluding to Factories and Workshops, Mr. Corbet says :—

"*Factory and Workshops' Act.*—I find this Act increases the  
"work of the Inspector's department. The Inspector and his  
"Assistant have been busy visiting, reporting, cubeing, and  
"registering all places which have come under the Act. The  
"work has been interrupted by the epidemic of Measles and  
"Scarlet Fever, which has also caused other work of the  
"department to be neglected. Up to the present we have  
"under inspection 224 Workshops and Workplaces, and on  
"the whole they are kept in a clean and sanitary condition.  
"H. M. Inspector has spoken favourably of our work under  
"the Act."

## King's Norton and Northfield Urban District.

TABLE A.

Area in acres, 24,453.	
Population 1891	... 22,300.
" 1901	... 57,122.
Increase 1891-1901 ... 28,822.	
Estimated Population, 1902 60,358.	
Name of Medical Officer of Health, REGINALD GREEN, M.D.	
<i>Mortality per 1,000 of Population living during same period.</i>	
Birth Rate, 30.1.	Nett Death Rate, 11.6.
(a) Zymotic Death Rate, 1.13.	(b) Infantile Mortal, 109.
Phthisis Death Rate, 0.7.	(c) Resp. Death Rate, 1.5.
Smallpox Death Rate, 0.0.	Measles Death Rate, 0.06.
Scarlatina Death Rate, 0.2.	Diphtheria and Membranous
Whooping Cough Death Rate, 0.2.	Croup Death Rate, 0.2.
(d) Fever Death Rate, 0.11.	(e) Diarrhœa Death Rate, 0.2.
	(f) Enteritis Death Rate 0.2.
Cancer, Malignant Disease Death Rate, 0.4.	

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...	6		524	72	1	26	61	7
Deaths ...			16	13		7		5
Hospital Cases	6		461			4		
" Deaths			15					

Diseases prevalent :—Scarlatina, Whooping Cough, Diphtheria.

Period :—

Schools Closed :—

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhœa.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhœa" are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhœa. Summer diarrhœa;  
 Dysentery and dysenteric diarrhœa;  
 Choleraic diarrhœa, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhœa."
- Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



## King's Norton and Northfield Urban District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	28,562	837	29'30	92	109'91	474	16'59	120	88		386	13'51
1893.	29,884	834	27'90	114	136'60	537	17'96	117	96		441	14'75
1894.	30,977	785	25'34	90	114'64	442	14'26	145	108		334	10'78
1895.	34,127	1,010	29'59	108	106'93	499	14'62	123	100		399	11'69
1896.	38,117	1,031	27'04	122	118'33	541	14'19	124	102		439	11'51
1897.	42,700	1,149	26'90	170	147'95	643	15'05	163	123		520	12'15
1898.	48,500	1,332	27'46	171	128'37	652	13'44	141	113		539	11'11
1899.	52,076	1,546	27'73	187	120'95	755	13'54	182	118		637	11'4
1900.	54,958	1,651	27'51	215	130'22	921	15'36	226	189	1	733	12'21
1901.	57,120	1,773	31'03	227	128'03	888	15'54	227	160		728	12'74
Averages for years 1892-1901.	42,573	1,124	27'98	149	124'2	635	15'05	156	119		515	12'18
1902.	60,779	1,832	30'14	201	110'2	836	13'75	243	180	38	694	11'25

\* Rates calculated per 1,000 of population.

*King's Norton and Northfield Urban District.*

TABLE IV.  
Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..	4	1	2	1				
Scarlet Fever ... ..	16		7	7		2		1
Whooping-cough ... ..	17	10	7					
Diphtheria and membranous croup ... ..	13		7	6				
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..	7			1	1	5		4
{ Other continued ... ..								
Epidemic influenza ... ..	9	1		1		3	4	7
Cholera ... ..								
Plague ... ..								
Diarrhœa ... ..	13	9	3		1			
Enteritis ... ..	17	13	2	1		1		
Puerperal fever ... ..	5				5			
Erysipelas ... ..								
Other septic diseases ... ..	1		1					
Phthisis ... ..	47		2	3	6	31	5	9
Other tubercular diseases ... ..	12	4	2	2	1	3		1
Cancer, malignant disease ... ..	26				1	18	7	13
Bronchitis ... ..	31	12	4	1		12	2	10
Pneumonia ... ..	59	15	16		1	14	3	13
Pleurisy ... ..	2						2	
Other diseases of Respiratory organs ... ..	3				2	1		
Alcoholism ... ..								
Cirrhosis of liver { ... ..	3				2	1		1
Venereal diseases ... ..								2
Premature birth ... ..	39	39						
Diseases and accidents of parturition ... ..	5					5		
Heart diseases ... ..	59			2	3	32	22	40
Accidents ... ..	18	3	4		2	6	3	2
Suicides ... ..	7					6	1	
.....								
.....								
.....								
.....								
All other causes ... ..	281	95	33	1	53	82	17	77
All causes ... ..	694	202	90	26	78	222	76	180



*King's Norton and Northfield Urban District.*

As Dr. Reginald Green only succeeded Dr. Hollinshead on the 1st July 1902, his report deals chiefly with the work carried out in the second half of the year.

Discussing the low Infant Mortality (109), he says:—

"As is well-known, Infant Mortality is largely concerned with the  
"improper feeding and non-hygienic bringing up of babies,  
"which is so frequent among the lower classes.

"The proper education of our girls in cooking and domestic  
"economy in the public elementary schools seems to be a step  
"in the right direction.

"A further advance might be made by including infant feeding  
and domestic hygiene.

"Nowadays, when such a large number of girls are employed in  
"factories, it is difficult for them to acquire any knowledge of  
"matters connected with home management."

Measles and Whooping Cough were prevalent and the Public Elementary Schools (chiefly Infant Departments), were the main cause of the distribution of the Disease.

5,000 handbills dealing with "precautions in Measles and Whooping Cough" were circulated.

Six cases of Smallpox were notified during the year, but only two of these were reported after Dr. Green took office, and in no case could he trace the infection.

"During the year arrangements were come to between this  
"Council and that of Yardley, for a conjoint Smallpox  
"Hospital, which was established at Hollywood, near the  
"Maypole.

"This is a wood and iron building for 24 patients, and is a  
"splendid place for the purpose, and in a very good and  
"isolated position.

"A new 'Thursfield' current steam disinfector has been erected  
"there, to deal with all Smallpox infected bedding and clothes  
"in the two Districts.

"There were no deaths from this Disease, in a long experience  
"I have never had a patient die who had been vaccinated even  
"in infancy.

"I am very pleased - - - - - that  
"vaccination in the District is carried out most efficiently, for

"which great credit is due to the Board of Guardians and to Mr. Fletcher, the vaccination officer.

"Notwithstanding the fact that the voice of the anti-vaccinator is not unheard in the District, there were only 25 out of 1,789 births, or 1·39 per cent. unaccounted for, or outstanding, for the year ending June 30th, 1902."

524 cases of Scarlet Fever were notified, and

"During the early part of the year the epidemic was very bad indeed in King's Heath, afterwards passing to Bournbrook and Stirchley, and practically dying away in King's Heath.

"No less than 462 cases were isolated in the West Heath Hospital, 88 per cent. of the whole."

The deaths were 16, and the rate 3·0 per 1,000.

"Schools of various sorts and similar gatherings of children account to a great extent for the spreading of infection, as is the case in Diphtheria, Measles, etc.

"As emphasised in my monthly reports, however, the chief cause of spread has been the large number of cases that have either been discovered late in the Disease, or not at all.

"There were 10,000 handbills of instructions as to the symptoms of the Disease, distributed round the District and sent to the schools.

"All recent investigations point to the fact that so-called 'return' cases have no connection with the time in hospital, or that there is the slightest infection from late peeling of the skin, especially on the feet.

"The usual causes of 'return' cases are (1) crowded hospitals, especially where acute and convalescent cases are kept together. (2) The bringing out on a patient's return of clothing or other articles, overlooked in the primary disinfection.

"At present there is no absolute standard of freedom from infection in this Disease, and until bacteriology comes to our aid, it is difficult to see where one will come from."

Discussing the 73 cases of Diphtheria, Dr. Green says:—

"From my personal experience I only know of one way of Diphtheria spread, and that is by direct infection, chiefly



"from a patient, but in some instances from infected articles  
"which have been in contact with a patient.

"The popular idea, that one sniff of a sewer or drain opening  
"is enough to cause the Disease, is absurd, as the Diphtheria  
"Bacilli do not thrive in sewage, and sewer gas contains  
"practically no microbes.

"In my opinion all sore throats should be examined bacterio-  
"logically, and more especially those of pupils in schools, as  
"both ordinary sore throats and catarrhal colds are directly  
"infectious, and isolation would be preferable in these cases.

"On my recommendation the Council agreed to provide  
"Diphtheria antitoxin where patients could not afford it, and  
"this has been applied for on various occasions, and is proving  
"a very useful measure.

"On the strong recommendations of the County Council it has  
"been decided to erect a new pavilion at West Heath Hospital  
"for the isolation of this Disease, and a loan is now being  
"applied for, for that purpose.

"I think this a very necessary step, as many cases occur with  
"totally inadequate home isolation, allowing the Disease to  
"attack other members of the family, and also interfering  
"materially with the employment of the adults of the house-  
"hold.

"With the approval of the Council, I fitted out a small Bacterio-  
"logical Laboratory at the Hospital, similar to the one I  
"worked for four years in the north.

"The chief objects are for the Bacterial diagnosis of Diphtheria,  
"and the Serum Reaction for Typhoid Fever."

Of the Watersupply, Dr. Green writes :—

"The Urban parts of the Districts are supplied with the  
"Birmingham Corporation water, and the Rural portions  
"chiefly by surface wells, with the exception of Rednal, where  
"East Worcestershire water is laid on in some cases.

"The supply from both the public sources was good and plentiful  
"during the year.

"As regards wells, some good work has been done in closing  
"polluted wells, where a town supply was obtainable."

Referring to the Excrement Disposal, Dr. Green says :—

“ Except in the Rural parts water closets are the rule, although  
“ a number of foul privies and pan closets still exist in the  
“ Urban Districts.

“ There has, as usual, been a difficulty in disposing of the filth  
“ from these ‘ barbarous ’ contrivances, and in some parts of  
“ the Districts, nuisance has arisen from large deposits of this  
“ and similar material.

“ A case in point is the ‘ Tip ’ at California, and also one at  
“ King’s Norton.

“ I am glad to see, however, that the Council has decided to  
“ erect a Refuse Destructor, the contract being let during the  
“ year to Messrs. Heenan and Froude, of Manchester.

“ This destructor, which is to be shortly put down at Lifford, will  
“ no doubt be a great boon to the comfort and health of the  
“ District.

“ As regards privies and ashpits, no less than 321 have been  
“ converted to water closets, but much work has still to be done  
“ in this line.”

“ In Northfield, Selly Oak, and King’s Norton, when some of the  
“ immense wet ashpits are emptied, fortunately at long  
“ intervals, the gutters run with liquid filth, and pestilential  
“ vapours envelope the vicinity.”

Alluding to drainage, he says :—

“ Many inspections have been made of the drainage in rural  
“ parts of the district, which I am afraid is in many places  
“ not at all satisfactory.

“ This applies more especially to Rednall, Bartley Green and  
“ Woodgate, California, and other outlying parts.

“ A new sewer is to be laid in the Bartley Green district to join  
“ the main sewerage, which will abolish the stream pollution  
“ at present existing.

“ Gross stream pollution occurs at Rednall, where a new sewer is  
“ under consideration.

“ The so-called sewage farm, however, which is intended to deal  
“ with the Rednall sewage, allows practically crude sewage to  
“ enter the stream.



"Some simple system of Bacterial treatment should be tried in all these cases, and no doubt will overcome the difficulties of rural drainage."

Dr. Green says:—

"There is no doubt that in the warmer parts of the year, the River Rea and its tributaries become very foul below Stirchley and are a nuisance and a danger to health to those who live in the vicinity. This pollution is still under consideration and it is stated that an agreement has been practically come to with regard to that due to the paper mills at Lifford."

Referring to the House Accommodation, Dr. Green urges that every new house should have a concrete layer over the whole ground beneath them. There are no common Lodging-houses, offensive trades, or any underground Bake-houses in the District.

The Slaughter-houses are said to be in fair condition and the Dairies and Cowsheds have been visited but some of the outlying ones have still to be looked up.

Referring to the Factories and Workshops' Act, 1901, he says:—

"Not very much progress has been made during the year in carrying it out, owing to the shortage of Staff, combined, with the large epidemic of Scarlet Fever."

For the same reason the Canal Boats were not very efficiently inspected. Now, however, that an additional Assistant Sanitary Inspector, has been appointed this state of things will not continue.

*Lye and Wollescote Urban District.*

TABLE A.

Area in acres, 784			
Population 1891	...	...	10,165
" 1901	...	...	10,976

Increase 1891-1901	...	...	811
Estimated Population, 1902	11,082		

Name of Medical Officer of Health, HENRY CHRISTOPHER DARBY.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 34.0.	Nett Death Rate, 14.7.
(a) Zymotic Death Rate, 1.5.	(b) Infantile Mortal, 116.
Phthisis Death Rate, .99.	(c) Resp. Death Rate, 2.1.
Smallpox Death Rate, 0.0.	Measles Death Rate, .18.
Scarlatina Death Rate, .63.	Diphtheria and Membranous
Whooping Cough Death Rate, 0.0.	Croup Death Rate, .18.
(d) Fever Death Rate .09.	(e) Diarrhœa Death Rate, .36.
	(f) Enteritis Death Rate, .72.
Cancer, Malignant Disease Death Rate, .72.	

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup	Fever.	Erysipelas.	Puerperal Fever.
Cases ...		Not notified	81	5	1	5	5	1
Deaths ...		2	5	1	1	1		
Hospital Cases			51			2		
" Deaths			2					

Diseases prevalent:—Scarlet Fever and Measles.

Period:—Scarlet Fever throughout year. Measles—few cases latter half of year.

Schools Closed:—None.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhœa.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhœa" are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhœa. Summer diarrhœa;  
 Dysentery and dysenteric diarrhœa;  
 Choleraic diarrhœa, cholera, Cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhœa."
- Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



*Lye and Wollescote Urban District.*TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of Residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES NETT.	
		Number.	Rate*	Number.	Rate per 1,000 Births registered.	Number.	Rate*				Number.	Rate*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.												
1893.												
1894.												
1895.												
1896.												
1897.	10,649	386	36.2	69	178	173	16.2					
1898.	10,729	382	35.4	65	170	200	18.6					
1899.	10,810	396	36.6	72	181	193	17.8					
1900.	10,891	379	34.7	57	150	200	18.3			13		
1901.	10,972	384	34.9	62	161	186	16.9			5	191	17.4
Averages for years 1897-1901.	10,810	385	35.5	65	168	190	17.5					
1902.	11,082	377	34.0	44	116	151	13.6			13	164	14.7

\* Rates calculated per 1,000 of population.

*Lye and Wollescote Urban District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All Ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..	2		1	1				
Scarlet Fever... ..	7		5	2				
Whooping-cough ... ..								
Diphtheria and membranous croup ... ..	2		2					
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..	1				1			
{ Other continued ... ..								
Epidemic influenza ... ..	1						1	
Cholera ... ..								
Plague ... ..								
Diarrhoea ... ..	5	4					1	
Enteritis ... ..	8	5	2			1		
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases... ..								
Phthisis ... ..	11		1		3	7		
Other tubercular diseases ... ..	10	8	1			1		
Cancer, malignant disease ... ..	8					4	4	
Bronchitis ... ..	7	2	1			1	3	
Pneumonia ... ..	17	3	4	1	1	4	4	
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..	2	1	1					
Alcoholism ... ..								
Cirrhosis of liver ... ..								
Venereal diseases ... ..								
Premature Birth ... ..	7	7						
Diseases and accidents of parturition ... ..	2				1	1		
Heart diseases ... ..	4	1				3		
Accidents ... ..	5			2		3		
Suicides ... ..								
Convulsions ... ..	5	3	2					
.....								
.....								
.....								
All other causes ... ..	60	11	3	6	2	15	23	
All causes ... ..	164	45	23	12	8	40	36	



*Lye and Wollescote Urban District.*

Dr. Darby mentions that the nett Death-rate is 14·7 and it is the lowest recorded since the formation of the District.

The following remarks are of great interest with regard to Infant Mortality as showing the good work which has been done by the County Council Health Missioner, who is located in the District.

" *Infant Mortality.* Deaths of children under 1 year of age per  
" 1,000 births registered.

" 1902	1901	1900	1899	1898	1897
" 116	161	150	181	170	178

" The most common causes of death in children under one year  
" were as follows :

" Diarrhoea	...	...	3	Year previous	7
" Enteritis	...	...	5	"	5
" Tubercular Diseases			8	"	2
" Bronchitis, Pneumonia " and other Diseases of " the respiratory organs			6	"	8
" Premature Birth	...		7	"	11
" Convulsions	...	...	3	"	7

" Gentlemen, I believe that your request to have a Health  
" Missioner appointed to the District and granting of that  
" request by the County Council, has been productive of very  
" much good throughout the area over which her influence  
" extends.

" In support of these statements I would call your attention to  
" the above figures, and would point out that the Infant  
" Mortality is much lower than it has been since the formation of  
" Lye and Wollescote into an Urban District. The average  
" for 5 years was 168, this year it has fallen to nearly two-  
" thirds of that average. Again there is a marked falling off  
" in the number of deaths from such Diseases as Diarrhoea  
" and Convulsions which are to some extent preventable  
" Diseases. In all there were only 5 deaths amongst children  
" this year from Convulsions as against 12 last year.

" The reduction of the Death-rate generally is principally  
" accounted for by the fewer deaths amongst children.

" The work the Missioners do is not all to be shown on paper,  
" it is much, such as tends to education and reform, and will  
" continue to bear fruit perhaps in the next generation.

" Herewith is an account of the work done.

" 1st by Miss Long. From January to May 1902.

" 345 Infants of less than 1 year old under supervision, of whom

" 5 died from the undermentioned causes.

" 1 Tabes Mesenterica.

" 2 Bronchitis and Pneumonia.

" 1 Premature Birth and Inanition.

" 1 Gastro-enteritis.

" 2nd—Mrs. Lucas. From May to December 1902.

" 270 Infants of less than 1 year old under supervision, of whom

" 16 have died from the undermentioned causes.

" 3 Gastro-enteritis.

" 5 Tabes Mesenterica.

" 2 Bronchitis and Pneumonia.

" 1 Hydrocephalus.

" 5 Inanition. Premature Birth. Debility.

" There have been 8 removals, and 67 Infants just over the year

" old by December 1902."

Scarlet Fever was prevalent throughout the year and 51 of the 81 cases were removed and it is stated that since the new Hospital has been built, " consent for removal was much more easily obtained."

Measles was prevalent towards the close of the year and only 5 cases of Typhoid were notified in 1902 as compared with 24 in 1901.

In a special report on the latter Disease Dr. Darby states:—

" I then pointed out that the most common cause would appear  
" to be polluted subsoil from defective privies or proximity  
" of ashpits and privies to dwellings. I strongly recommend  
" the substitution of W.C.'s wherever possible for privies and  
" ashpits."

Referring to House connections, Dr. Darby says:—

" All new property has W.C.'s, and there have been several  
" conversions. No record of W.C.'s is kept.



"Pearson Street and Cross Street are in process of making.

Years.	Connections.		Houses.
" 1900	...	89	to 194
" 1901	...	87	" 195
" 1902	...	167	" 383

The County Council are still pressing the Urban Council to complete, and the Clerk of the latter wrote 13 May, 1903, that "the total number of houses connected to date was 2081 out of a total of 2215, and (he believed) the Contractor hopes to complete the work this month."

As the Surveyor to the District Council informed me that these drains had not been tested with water and only some of them with smoke, the Committee asked the Lye Council whether, under such circumstances, they were satisfied that each of the new drains was satisfactorily laid as well as water-tight, and expressed regret that all the house drains were not tested with water or smoke before being covered in. To which the Clerk of the Lye Council wrote (June 1st, 1903) that "the Surveyor to the Council reported that the whole of the connections are made to his satisfaction."

The Factories and Workshops have been inspected and Dr. Darby says he has come to the conclusion that some have bad or insufficient privy accommodation.

Dr. Darby makes no special reference to Slaughter-houses, Dairies and Cowsheds or Bake-houses, although in his Annual Report for 1901, he mentions "that some of the Slaughter-house byelaws were still infringed."

## Malvern Urban District.

TABLE A.

Area in acres, 4,777.			
Population 1891 ...	...	14,364*	
„ 1901 ...	...	16,449	
Increase 1891-1901		...	2,085
Name of Medical Officer of Health, G. H. FOSBROKE, D.P.H., Camb.			
<i>Mortality per 1,000 of Population living during same period.</i>			
Birth Rate, 18.9.		Nett Death Rate, 12.2.	
(a) Zymotic Death Rate, 0.2.	(b) Infantile Mortal, 92.		
Phthisis Death Rate, 0.5.	(c) Resp. Death Rate, 1.7.		
Smallpox Death Rate, 0.0.	Measles Death Rate, 0.05.		
Scarlatina Death Rate, 0.0.	Diphtheria and Membranous		
Whooping Cough Death Rate, 0.2.	Croup Death Rate, 0.0.		
(d) Fever Death Rate, 0.0.	(e) Diarrhoea Death Rate, 0.0.		
	(f) Enteritis Death Rate, 0.0.		
Cancer, Malignant Disease Death Rate, 1.0.			

		Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Chicken-pox.
Cases	...			42	10		5	7	98
Deaths	...						1†		
Hospital Cases				41	10		5		
„ Deaths									

Diseases prevalent :—

Period :—

Schools Closed :—Malvern Wells, closed 10th November 1902, on account of Chickenpox.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.

\* This population refers to the new area of the Malvern Urban District.

† This death occurred in the Isolation Hospital which is outside the District.



## Malvern Urban District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	6,133	95	15.6	11	115	91	14.8					
1893.	6,178	95	15.3	8	84	72	11.6					
*1894.	6,185	91	14.7	16	175	85	13.7					
1895.	8,185	135	16.4	20	148	123	15.0					
*1896.	8,848	154	17.4	19	123	102	12.8					
1897.	8,848	146	16.5	13	89	112	12.6					
*1898.	14,838	347	23.4	28	79	196	13.2					
1899.	16,000	296	18.5	27	87	215	13.4					
1900.	16,300	312	19.1	31	99	217	13.3	10	18	10	209	12.8
1901.	16,448	328	19.9	31	94	178	10.8	13	22	13	169	10.2
Averages for Years 1892-1901.	10,196	199	17.5	20	109	139	13.1	11	20	11	189	11.5
1902.	16,448	312	18.9	29	92	194	11.7	18	16	18	196	11.9

\* Rates calculated per 1,000 of population.

## Malvern Urban District.

TABLE IV.  
Causes of, and Ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..	1		1					
Scarlet Fever ... ..								
Whooping-cough ... ..	4	3	1					
Diphtheria and membranous croup ... ..								
Croup ... ..								
Fever { Typhus ... ..	1							
Enteric ... ..								
Other continued ... ..								
Epidemic influenza ... ..								
Cholera ... ..								
Plague... ..								
Diarrhoea ... ..								
Enteritis ... ..								
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases... ..								
Phthisis ... ..	10		1	1	1	7		
Other tubercular diseases ... ..	2			1	1			
Cancer, malignant disease... ..	18					10	8	
Bronchitis ... ..	19	6	1	1		2	9	
Pneumonia ... ..	12	1	3		1	4	3	
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism { ... ..	2					2		
Cirrhosis of liver ... ..								
Venereal diseases ... ..								
Premature Birth ... ..	2	2						
Diseases and accidents of parturition ... ..								
Heart diseases... ..	10				2	5	3	
Accidents ... ..	3		1		1	0	1	
Suicides ... ..	4					3	1	
.....								
.....								
.....								
.....								
.....								
All other causes... ..	109	17	5	3	8	31	45	
All causes ... ..	196	29	13	6	14	64	70	



The Report shows that the Vital Statistics are very satisfactory and that the outbreaks of notifiable disease were few and unimportant. Chickenpox has been Scheduled as a temporary notifiable disease.

Improvement has been made in the House Accommodation, and 4 houses were condemned as unfit for habitation. It is also reported that steady progress is being made with the abolition of old brick sewers and that sewerage extensions have taken place as required. The sewage disposal works at Barnard's Green are being improved by the addition of bacterial filters, and the Surveyor estimates that with filters of 1,700 yards square he could treat the sewage even better and obtain a still more satisfactory effluent than is now produced.

It is mentioned that the Surveyor is empowered to get on with this work at once. Some anxiety has been experienced with regard to watersupply, but this is now happily a thing of the past, as owing to the skill and energy of the Surveyor, Mr. Maybury, a deep boring has been made which yields a bountiful supply of excellent water and a sum of £9,600 for pumping this into the Camp Reservoir has been approved by the Council. It is mentioned that the water filter at this reservoir has been improved by the addition of a sand filter at a cost of £1,600.

The Slaughter-houses, Dairies, and Bake-houses have been improved.

The state of the Factories and Workshops is dealt with at considerable length, and various remedial measures suggested.

The complete Isolation Hospital continues to be largely used.

This District has now been included in the Upton-on-Severn Smallpox District by an order of the County Council on condition that the Smallpox buildings at Halfkey, are taken over by the Committee, and removed to a site to be approved by the Malvern Council.

A new Refuse "Destructor" is about to be erected.



## Oldbury Urban District.

TABLE A.

Area in acres, 3,525.	
Population 1891	... 22,697.
" 1901	... 25,191.
Increase 1891-1901 ... 2,494.	
Estimated Population, 1902 25,600.	
Name of Medical Officer of Health, GEORGE B. BUTTERY, L.R.C.P.	
<i>Mortality per 1,000 of Population living during same period.</i>	
Birth Rate, 38·4.	Nett Death Rate, 16·7.
(a) Zymotic Death Rate, 2·5.	(b) Infantile Mortal, 143.
Phthisis Death Rate, 0·58.	(c) Resp. Death Rate, 3·6.
Smallpox Death Rate, 0·0.	Measles Death Rate, 0·58.
Scarlatina Death Rate, 1·2.	Diphtheria and Membranous
Whooping Cough Death Rate, 0·07.	Croup Death Rate, 0·07.
(d) Fever Death Rate, 0·23.	(e) Diarrhœa Death Rate, 0·3.
	(f) Enteritis Death Rate, 0·38.
Cancer, Malignant Disease Death Rate, 0·6.	

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			518	4	2	32	28	3
Deaths ...			31	1	1	6		3
Hospital Cases			1			9		
" Deaths								

Diseases prevalent :—Scarlet Fever, Typhoid, Measles.

Period :—Whole year.

Schools Closed:—All Schools in July, August and September. Four

Schools closed in December for Measles.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhœa.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhœa" are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhœa. Summer diarrhœa;  
 Dysentery and dysenteric diarrhœa;  
 Choleraic diarrhœa, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhœa." Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



## Oldbury Urban District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-Residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	20,600	892	43.3	192	215	514	24.6					
1893.	20,811	841	40.4	183	217	475	22.8					
1894.	21,000	833	39.6	144	172	349	16.1					
1895.	23,900	882	36.9	179	202	456	19.0					
1896.	24,264	920	37.9	197	214	556	22.9					
1897.	25,172	936	37.1	173	184	423	16.8					
1898.	25,500	973	34.2	227	233	607	23.8					
1899.	26,000	1,003	38.5	226	225	512	19.6					
1900.	26,400	966	36.5	216	223	544	20.6					
1901.	25,191	900	35.7	170	188	428	16.8					
Averages for Years 1892-1901.	23,883	914	38.0	190	207	486	20.3					
1902.	25,600	984	38.4	141	143	432	16.7			37		

\* Rates calculated per 1,000 of population.

*Oldbury Urban District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..	15	3	11	1				
Scarlet fever ... ..	31		21	9	1			
Whooping-cough ... ..	2	2						
Diphtheria and membranous croup ... ..	2		1		1			
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..	6			2	1	3		
{ Other continued ... ..								
Epidemic influenza ... ..	2				1		1	
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..	8	8						
Enteritis ... ..	10	7	2	1				
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases... ..	1						1	
Phthisis ... ..	15			3	6	6		
Other tubercular diseases ... ..	8	6	1	1				
Cancer, malignant disease ... ..	17					14	3	
Bronchitis ... ..	46	12	5			10	19	
Pneumonia ... ..	48	7	25	2	2	11	1	
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism ... ..								
Cirrhosis of liver ... ..	9				1	7	1	
Venereal diseases ... ..								
Premature birth ... ..	20	20						
Diseases and accidents of parturition ... ..	4	1				3		
Heart diseases ... ..	26	2		1		13	9	
Accidents ... ..	8	2	1	1		2	2	
Suicides ... ..	2				1	1		
.....								
.....								
.....								
.....								
All other causes ... ..	152	71	12	3	2	30	36	
All causes ... ..	432	141	78	24	17	100	73	



*Oldbury Urban District.*

Dr. Buttery reports a higher Birth-rate (38·4) than that of England and Wales (28·6) which is satisfactory. He is of opinion that the Death-rate (16·7) may be considered satisfactory. As regards the Infant Mortality, he says:—

“The number of deaths in infants under one year has been 141,  
“which gives a Death-rate of 143 per thousand of children  
“born. This is the lowest rate of Infantile Mortality ever  
“recorded in Oldbury. In the previous year the Infantile  
“Mortality was 188 per thousand of children born, which was  
“considered an improvement on the mortality rates which had  
“prevailed for several previous years. . . . To help to  
“bring about this desired result your Council has, with the  
“assistance of the County Council, appointed a Lady Health  
“Missioner, one of whose chief duties is to afford instruction  
“and assistance to the mothers, especially the younger ones,  
“how to nurse, clothe, suitably feed, and otherwise attend  
“to their children in a proper manner.”

He reports a low Death-rate from Phthisis (0·58 per 1,000), and alludes with satisfaction to the fact that the Town will have the benefits of the Worcestershire Consumption Sanatorium, owing to local Subscribers having contributed the sum of £75 per annum which entitles them to a free bed in the Institution.

Dr. Buttery, however, very pertinently remarks that

“This treatment must be followed up by insisting that the  
“patients shall, after their return home, be placed under more  
“healthful conditions.”

During the year, Oldbury has been visited by a severe epidemic of Scarlet Fever, and I think it desirable to quote at length what is said about the outbreak.

“In the early part of 1902 there were sporadic cases in two or  
“three of the wards, but at the end of May the disease began  
“to manifest itself in a much more serious manner, and in  
“June it assumed the proportions of a severe epidemic.

“The disease first made its appearance on the eastern boundary  
“of the township, and was distinctly traced to children attend-  
“ing schools outside our area, where the disease was very  
“prevalent at the time. Every possible precaution was taken  
“to prevent the spread of the disease as far as lay in our  
“power.

“The children attacked were at once isolated at home, other  
“members of the family of school age were immediately  
“stopped attending school, either in our own District or any  
“of the adjoining Districts. The houses, clothing, bedding,  
“etc., were properly disinfected, but in spite of all our efforts  
“the disease continued to spread. Therefore in the month  
“of July I deemed it advisable to recommend the closing of  
“certain schools in the District. I am now fully convinced that



“by taking this step we did curtail the spread of the disease  
“to a very considerable extent. This fact was shewn by the  
“falling off in the number of the cases notified from three  
“of the Districts as soon as the schools were closed, and  
“intercommunication was stopped by preventing the children  
“from different neighbourhoods meeting together, the disease  
“thus ceased to spread, such especially was the case with  
“regard to Langley, Broadwell, and Warley. . . . .

“In the Langley Ward, which is essentially a residential District,  
“the disease was mitigated in a great measure, and this is proved  
“by there having been only 76 cases in that ward during the  
“year. While in Warley Ward there were only 38 cases, and  
“these were chiefly in the Rood End part of the ward, which  
“borders on the eastern boundary where the disease was pre-  
“valent, in fact there were only 12 cases in what I should  
“designate as Warley proper during the whole year. As soon  
“as the schools were re-opened there was a recrudescence of the  
“disease, especially in the Broadwell Ward.

“The total number of Scarlet Fever cases notified during the  
“year was 518, with 31 deaths. Therefore, although there  
“was a large number of cases, the mortality was not so high  
“as is usually the case in severe outbreaks of the disease.  
“The case mortality being, in fact, a little less than 6 per  
“cent. of the children attacked. The mortality was chiefly  
“in children under five years of age. These figures once  
“again demonstrate that the most fatal period of life in  
“this disease is in the earlier years of childhood.

“There were 71 instances of houses having 2 cases in each  
“family, 26 that had 3 cases, and 12 with 4 cases in each  
“house. In a number of these the second and even the third  
“case had developed before we received any notification.  
“This was in a great measure due to the fact that no medical  
“attendance was requisitioned until two or three were down  
“with the disease. During the epidemic a number of cases  
“came to my knowledge where children had had the complaint  
“in a mild form and where no medical man had been called,  
“the parents pleading in excuse that they did not think the  
“child or children had had anything serious the matter with  
“them, but I found the children peeling, which proved they  
“had suffered from Scarlet Fever. It is doubtless in many  
“instances due to these mild cases that the disease is spread.

Dr. Buttery says:—

“That only 1 of the 518 cases was treated at the Isolation  
“Hospital.”

I am not surprised that the disease spread for I cannot appreciate how children can be isolated in the small cottages to be found in Oldbury.

As to the necessity or desirability of Isolation Hospital Accommodation, Dr. Buttery gives no advice.



It will be seen that the outbreak caused serious interruption of the Schools.

Measles also seems to have been prevalent in the latter part of the year.

I am pleased to note the following statement with regard to Dairies and Cowsheds.

"The Cowsheds and Dairies have, during the year, been regularly visited, and I am pleased to say that the conditions of these sources of our milk supply are in a much improved state to what they were a few years ago. The farmers themselves acknowledge the good effects resulting from the action of the Sanitary Committee in insisting on the improvements being carried out. The animals are healthier, and even from a financial point the farmers have themselves been benefited."

Dr. Buttery mentions that the number of sewers in the town have been relaid on improved foundations, and on better lines than was formerly the case, and he adds that

"In carrying out these improvements of our sewage system I am confident the Council adopted a wise public policy, and one which must most assuredly improve the sanitary condition of the town generally."

There was the "greatest difficulty" in dealing with "dumbwells," but when the Sewerage Scheme is sanctioned by the Local Government Board, these will be abolished.

Of the Factory and Workshops, Dr. Buttery says:—

"124 Workshops and Factories have been registered during the year. This is entailing considerable work on our department, as each of these places of employment has to be supervised. This must eventually benefit those who have to follow their employment in these places, as we have to see that the conditions under which they labour shall be satisfactory."

The County Council have been in communication with the Oldbury Council with regard to the defective sewerage of Warley, and a Local Government Board Inquiry as to a loan of £13,105 for the work was held on 18 Feb., 1903. At this Inquiry the Clerk of the County Council by direction of the Sanitary Committee, supported the Oldbury Council as to their application for a loan, but called the attention of the Local Government Board Inspector to the present defective effluent from the sewage farm to which it is proposed to convey the Warley Sewage. The Staffordshire County Council also opposed, and are pressing the Oldbury Council in the matter as the effluent is discharged into a Staffordshire brook.



## Redditch Urban District.

TABLE A.

Area in acres, 1,023.

Population 1891	...	...	11,311.
" 1901	...	...	13,493.

Increase 1891-1901 ... 2,182.

Estimated Population, 1902 13,784.

Name of Medical Officer of Health, J. STEVENSON, M.B., D.P.H.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 29.2.

Nett Death Rate, 13.2.

(a) Zymotic Death Rate, 1.5.

(b) Infantile Mortal, 156.

Phthisis Death Rate, 1.2.

(c) Resp. Death Rate, 2.5.

Smallpox Death Rate, 0.0.

Measles Death Rate, 0.0.

Scarlatina Death Rate, 0.07.

Diphtheria and Membranous

Whooping Cough Death Rate, 0.07. Croup Death Rate, 0.2.

(d) Fever Death Rate, 0.2.

(e) Diarrhoea Death Rate, 0.1.

(f) Enteritis Death Rate 0.3.

Cancer, Malignant Disease Death Rate, 0.8.

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			79	14		19	23	4
Deaths ...			1	4		4	2	
Hospital Cases			75	4		*7		
" Deaths				1				

Diseases prevalent :—Whooping Cough, Scarlatina.

Period :—

Schools Closed :—None.

(a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.

(b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.

(c) Includes Bronchitis, Pneumonia, Pleurisy.

(d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.

(e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from

Epidemic enteritis;

Zymotic enteritis;

Epidemic diarrhoea. Summer diarrhoea;

Dysentery and dysenteric diarrhoea;

Choleraic diarrhoea, cholera, cholera nostras (in the absence of Asiatic cholera).

(f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea."

Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.

\* 6 of these in Smallwood Hospital and 1 in Bromsgrove Isolation Hospital.



## Redditch Urban District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	11,580	384	33.1	78	203	202	17.4					
1893.	11,800	388	32.8	67	172	205	17.3					
1894.	12,006	330	27.4	26	78	129	10.0					
1895.	12,224	347	28.3	56	161	223	18.2					
1896.	12,442	341	27.4	78	228	206	16.5	4				
1897.	12,660	324	25.5	65	200	214	16.9	10				
1898.	12,894	388	30.0	73	188	209	16.2	9				
1899.	13,112	388	29.5	65	170	184	14.0	8				
1900.	13,330	392	29.4	78	198	264	19.8	6				
1901.	13,550	418	30.8	62	148	184	13.5	10	3	3		
Averages for years 1892-1901.	12,559	370	29.4	64	174	202	15.9					
1902.	13,784	403	29.2	63	156	183	13.2	10	3	3	183	13.2

\* Rates calculated per 1,000 of population.

*Redditch Urban District.*

TABLE IV.  
Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..	1			1				
Whooping-cough ..	10	6	4					
Diphtheria and membranous croup ...	4		2	2				
Croup ... ..								
Fever { Typhus ... ..								
Enteric ... ..	4			1	1	2		
Other continued								
Epidemic influenza ...								
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..	2	2						
Enteritis ... ..	5	4				1		
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases...	4	1			1	2		
Phthisis ... ..	17	1		1	1	13	1	
Other tubercular diseases ... ..	9	3	1	1		4		
Cancer, malignant disease ... ..	12					7	5	
Bronchitis ... ..	26	7	4			5	10	
Pneumonia ... ..	9	4	2		1	1	1	
Pleurisy ... ..								
Other diseases of Respiratory organs ...	1					1		
Alcoholism ... ..								
Cirrhosis of liver { ... ..	2					2		
Venereal diseases ... ..								
Premature birth ... ..	10	10						
Diseases and accidents of parturition ..	1	1						
Heart diseases ... ..	17	1	1		2	5	8	
Accidents ... ..	3	2				1		
Suicides ... ..	2					2		
Senile Decay .....	9							
Convulsions .....	6	6						
Congenital debility ...	10	10						
.....								
All other causes ..	17	4	1			7	5	
All causes ... ..	183	63	15	6	6	54	39	



*Redditch Urban District.*

Dr. Stevenson was appointed Medical Officer during 1902, as successor to Dr. Rutter, the acting Medical Officer of Health, and reports that the Council has every reason to congratulate itself upon the amount of Sanitary work effected and on the lower Death-rate (13·2) which has prevailed.

He says:—

“The Infant Mortality is the annual number of deaths under one year of age to every 1,000 births during the same year. It is regarded as a most reliable test of the Sanitary condition of a district. Sixty-three infants under one year of age died during the year, the Infant Mortality figure being 156. In 1901 it was 148, but the average for the previous ten years stands at 174. The large amount of Mortality among infants has for years engaged your attention, and different opinions have been put forward from time to time as to the cause, or causes of such mortality.

“All writers, however, agree that whatever causes may exist concurrently the chief cause is the neglect of infants in the early days and months of their lives—*i.e.* the want of proper feeding and care due to prejudice and inexperience of mothers.

“Undoubtedly the “industrial conditions” in our town greatly aid this chief cause. The Census Return for 1901 shows that 43·3 per cent. of the married and widowed women in Redditch were engaged in daily occupations.

“To show that this is an extremely high percentage let us compare it with other towns in the County. In Bromsgrove Urban (the next highest) the percentage was 26 ; in Worcester 22 per cent. ; in Oldbury 8 per cent. ; in King’s Norton and Northfield 8 per cent. When so many mothers go out to work daily, one can easily imagine the infants and children, “day-nursed” at home, must to some extent suffer. Redditch always has, and always will so long as its staple industry is needle and fish-hook making, employ very largely of female labour.

““Hereditary tendencies” add somewhat to our high rate of Infantile Mortality. For some generations past the industrial conditions of the district have been such that almost all work was done in close factories and workshops. I think it is



"reasonable to assume that such sedentary work in preceding generations has had a deliterious effect on the present day population.

"The question, however, is how can we best direct our energies to prevent this excessive mortality? I believe the answer lies in the word "Education."

"With this object in view an application has been made to the County Council to obtain the services of a Health Visitor for the district. I trust the Council will grant it. Already we have in the town several District Nurses, and I feel it is impossible to speak too highly of the services they have rendered to the sick and poor of Redditch. The Health Visitor's duties would, however, be different to those of the District Nurses, in that they would mostly consist of visiting houses in the poorer parts of the town, where children have been born, to give the mothers practical instruction in the feeding and care of infants; to enquire into the general condition of such houses, and report thereon; to distribute leaflets as to the feeding of infants, prevention of diseases, etc; and to give short addresses to small classes on personal hygiene, advantages of fresh air, infant feeding, etc., etc."

Chickenpox was scheduled as a notifiable disease on April 1st. for 6 months.

Scarlet Fever of a mild type was prevalent and no less than 97 per cent. of the cases were treated at the Isolation Hospital.

Alluding to the 19 cases of Fever (4 deaths), he says: "that 12 of these were typhoid and that food infection is probably the cause of most of the sporadic cases of Enteric Fever."

Special attention is called to the high rate for Phthisis 1·2 per 1,000 and the benefits of the County Consumption Sanatorium, are explained. The Joint Isolation Hospital at Bromsgrove, opened in 1900, is highly spoken of and it is mentioned that no less than 80 cases were treated there.

Dr. Stevenson says, "The average cost per patient during such residence was about £2 13 0." The provision of a Joint Smallpox Hospital is alluded to.

Dr. Stevenson referring to the collecting of house refuse, urges the Substitution of galvanised iron pans for the dry ashpits; and adds "that where they have been provided they have been emptied on a average once a week." It is stated that many drainage improvements have been made, several ventilation shafts have been erected



and some progress has been made providing a separate system for the conveyance of storm water.

Dr. Stevenson calls attention to the unsuitability of many of the shops in which milk is stored and sold.

It is stated that 200 workshops have been registered but that "owing to pressure of other work it has not been possible to give as much serious attention as one would wish in the administration of the Factory and Workshop Act, 1901."

## Stourbridge Urban District.

TABLE A.

Area in acres, 1,920			
Population 1891	...	...	14,891
" 1901	...	...	16,302
<hr/>			
Increase 1891-1901	...	...	1,411
Estimated Population, 1902	...	...	16,490
Name of Medical Officer of Health, H. WILBERFORCE FREER.			
Mortality per 1,000 of Population living during same period.			
Birth Rate, 28.32.		Nett Death Rate, 14.79.	
(a) Zymotic Death Rate, .97.		(b) Infantile Mortal, 109.2.	
Phthisis Death Rate, .97.		(c) Resp. Death Rate, 3.15.	
Smallpox Death Rate, 0.0.		Measles Death Rate, 0.0.	
Scarlatina Death Rate, .36.		Diphtheria and Membranous	
Whooping Cough Death Rate, .06.		Croup Death Rate, 0.0.	
(d) Fever Death Rate .24.		(e) Diarrhoea Death Rate, .24.	
		(f) Enteritis Death Rate, .3.	
Cancer, Malignant Disease Death Rate, .72.			

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			96	4		12	4	
Deaths ...			6			4		
Hospital Cases			65			4		
" Deaths			3			1		

Diseases prevalent:—Scarlet Fever.

Period:—Entire year.

Schools Closed:—Wollaston St. James', and St. John's, Stourbridge.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, Cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



## Stourbridge Urban District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of Residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES NETT.	
		Number.	Rate*	Number.	Rate per 1,000 Births registered.	Number.	Rate*				Number.	Rate*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.												
1893.												
1894.												
1895.	15,475	464	29.98	70	150.86	255	16.34					
1896.	15,616	445	28.49	63	141.57	243	15.56					
1897.	15,758	463	29.38	82	177.10	276	17.51					
1898.	15,891	456	28.69	74	162.28	246	15.48					
1899.	16,046	479	29.85	68	141.96	266	16.57					
1900.	16,192	469	28.96	77	164.17	302	18.65					
1901.	16,339	478	29.24	72	150.62	237	14.50			40	277	16.95
Averages for years 1895-1901.	15,902	464	29.23	72	155.50	261	16.37					
1902.	16,490	467	28.32	51	109.20	212	12.85			32	244	14.79

\* Rates calculated per 1,000 of population.

## Stourbridge Urban District.

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All Ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..	6		4	2				
Whooping-cough ... ..	1	1						
Diphtheria and membranous croup ... ..								
Croup ... ..								
Fever { Typhus ... ..								
Enteric ... ..	3		1			2		
Other continued ... ..	1				1			
Epidemic influenza ... ..	1					1		
Cholera ... ..								
Plague ... ..								
Diarrhœa ... ..	4	2	1				1	
Enteritis ... ..	5	4					1	
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases ... ..								
Phthisis ... ..	16	1		2	1	12		
Other tubercular diseases ... ..	5	2	1	1			1	
Cancer, malignant disease ... ..	12					5	7	
Bronchitis ... ..	38	10	5			9	14	
Pneumonia ... ..	12	2	3			4	3	
Pleurisy ... ..	2						2	
Other diseases of Respiratory organs ... ..	1					1		
Alcoholism ... ..								
Cirrhosis of liver ... ..	4				1	2	1	
Venereal diseases ... ..	1	1						
Premature Birth ... ..	12	12						
Diseases and accidents of parturition ... ..	3					3		
Heart diseases ... ..	30	1		1	2	16	10	
Accidents ... ..	7	1	1	1		2	2	
Suicides ... ..	1					1		
.....								
.....								
.....								
.....								
All other causes ... ..	79	15	7	1	3	21	32	
All causes ... ..	244	52	23	8	8	79	74	



Dr. Wilberforce Freer records favourable Vital Statistics.

A most noticeable feature of the Report is that the Infant Mortality for 1900 (109) is a great deal below the average for the years 1895 1901 (155); and Dr. Freer says:—

“The Health Missioner paid 1008 visits. The very low Infantile Mortality and few deaths from Diarrhœa prove that the work of the Health Missioner in instructing the mothers of the poorer classes as to feeding and general care of infants is valuable.”

Scarlet Fever (96 cases 6 deaths) was epidemic throughout the year and particularly during the last 3 months, and consequently it was necessary to close two schools.

Dr. Freer says:—

“I consider that schools have been mainly instrumental in disseminating this disease. In several instances children have been attending school whilst desquamating, and in others children from infected houses have attended school until I have become aware of the existence of the disease, which on many occasions was not until the patient was in the desquamating stage.

“Many parents are undoubtedly very indifferent as to the seriousness of this disease, though during the year I have not felt justified in recommending any prosecutions.

“The decrease in the number of cases compared with last year may be attributed to greater facilities for removal of patients to the Isolation Hospital, and also to the efficient disinfection of infected rooms and clothing, etc., introduced.”

Alluding to the disinfection, Dr. Freer says:—

“All infected houses were disinfected with Formalin, and the bedding and clothing in most cases were taken to the Infectious Hospital for disinfection by super heated steam.

“Disinfecting solution was supplied to the occupiers for cleansing purposes. Schools were closed on three occasions owing to Scarlet Fever.

“In May I reported to your Sanitary Committee the advisability of having clothing and bedding disinfected, and I was requested to arrange with the Hospital authorities for this to be done.”

159 Workshops are reported upon and for some details of this work he refers to the report of the Sanitary Inspector a synopsis of which is given later on.

Alluding to the House Accommodation, Dr. Freer says:—

“*House Accommodation.* Three houses were closed during the year as unfit for human habitation—2 by order of the Magistrates, and one by the owner after receiving notice.

“There are still many houses in the District in a very bad condition, especially the smaller ones. There is, however, a great demand for small and cheap houses, and in consequence much discretion is required in carrying out the provisions of the Housing of the Working Classes Act.

“The Council passed a scheme for erecting dwellings to be let at a low rental, and an enquiry was held by Col. Coke, of the Local Government Board, on September 9th and adjourned to October 6th. The Local Government Board subsequently granted permission to the Council to borrow money for this purpose, at the same time suggesting certain modifications to the original scheme.

“Thirty nine houses were erected during the year, mostly of the ‘villa type,’ and let at too high a rental for the average artizan.”

Referring to Vaccination, Dr. Freer makes the following important statement.

“*Vaccination.* This is not as satisfactory as I would wish, owing to the fact that many parents take their children outside



"the District in order to have only one vesicle produced.

"This affords very imperfect protection against Smallpox.

"In my opinion such practice should be prohibited by legisla-  
"tion.

## Stourport Urban District.

TABLE A.

Area in acres, 1,340.			
Population 1891	...	...	4,865
" 1901	...	...	4,529

Decrease 1891-1901	...	336
Estimated Population 1902		4,488

Name of Medical Officer of Health, E. STANLEY ROBINSON.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 23·4.		Nett Death Rate, 13·3.	
(a) Zymotic Death Rate, 1·7.		(b) Infantile Mortal, 111.	
Phthisis Death Rate, 2·2.		(c) Resp. Death Rate, 2·2.	
Smallpox Death Rate, 0·0.		Measles Death Rate, 0·0.	
Scarlatina Death Rate, 0·0.		Diphtheria and Membranous	
Whooping Cough Death Rate, ·6.		Croup Death Rate, ·2.	
(d) Fever Death Rate, 0·0.		(e) Diarrhœa Death Rate, ·6.	
		(f) Enteritis Death Rate, 0·0.	

Cancer, Malignant Disease Death Rate, ·6.

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			22	8		1	4	1
Deaths ...				1				
Hospital Cases			18					
" Deaths								

Diseases prevalent :—Whooping Cough.

Period :—January to March

Schools Closed :—

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhœa.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhœa" are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from
- Epidemic enteritis;
  - Zymotic enteritis;
  - Epidemic diarrhœa. Summer diarrhœa;
  - Dysentery and dysenteric diarrhœa;
  - Choleraic diarrhœa, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhœa."
- Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



## Stourport Urban District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	3,550	98	27.5	18	183	63	17.7				63	17.7
1893.												
1894.												
1895.												
1896.												
1897.												
1898.	4,629	125	27	13	104	52	11.2			4	56	12.0
1899.	4,596	124	26.9	13	104	55	11.9		1		54	11.7
1900.	4,562	122	26.7	12	98	56	12.2			5	61	13.3
1901.	4,521	106	23.4	17	160	62	13.6			8	70	15.4
Averages for Years 1892-1901.	4,577	119	26	13	116	56	12.2		.25	4	60	13.1
1902.	4,486	104	23.4	12	111	52	11.5			8	60	13.3

\* Rates calculated per 1,000 of population.

*Stourport Urban District.*

TABLE IV.

Causes of, and Ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..								
Whooping-cough ... ..	3	2	1					
Diphtheria and membranous croup ... ..	1		1					
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued ... ..								
Epidemic influenza ... ..	1					1		
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..	3	3						
Enteritis ... ..								
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases... ..								
Phthisis ... ..	8				3	4	1	
Other tubercular diseases ... ..	4		2			2		
Cancer, malignant disease... ..	3					1	2	
Bronchitis ... ..	6	1	2			1	2	
Pneumonia ... ..	3	1				1	1	
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..	1	1						
Alcoholism ... ..								
Cirrhosis of liver ... ..	3					2	1	
Venereal diseases ... ..	1	1						
Premature Birth ... ..								
Diseases and accidents of parturition ... ..								
Heart diseases... ..	3					2	1	
Accidents ... ..								
Suicides ... ..								
.....								
.....								
.....								
.....								
All other causes... ..	12	3				2	7	
All causes ... ..	52	12	6		3	16	15	



*Stourport Urban District.*

Mr. Robinson again presents a very outspoken report on the insanitary condition of the District.

Referring to the nett Death-rate (13·3), he says:—

“At first glance the comparatively low Death-rate seems to be  
“satisfactory. It is evident, however, on noting the causes of  
“death that it ought to be considerably lower.”

Of the Infant Mortality, he writes:—

“*Infant Mortality.* An excellent circular has been issued this  
“year by the Kidderminster Corporation, approved by the  
“Kidderminster Medical Society, on the care and feeding of  
“infants, with a view of lessening the Infant Mortality. A  
“similar circular might with advantage be issued by the  
“Stourport District Council and distributed by the Registrar  
“of Births or the Sanitary Committee.”

It is mentioned that “very few infants in the District are un-  
“vaccinated.”

18 of the 22 cases of Scarlet Fever notified were removed to Hospital, and Mr. Robinson states, “at every infected house, some  
“insanitary condition was found.”

And he adds with regard to the eight cases of Diphtheria:—

“At each infected house, except one, sanitary defects were  
“noted, but in no case have they been satisfactorily remedied;  
“indeed, in some instances, nothing has been done.

“In my last Annual Report I wrote: In America, and in many  
“of the larger and progressive cities and towns of this country,  
“including some in this County, the Sanitary Authority—  
“realising the fact that the Death-rate from Diphtheria is  
“increasing—pay for the bacteriological examination of all  
“suspicious throats, and also provide anti-toxin—the remedy  
“which has so largely reduced the mortality of the disease—  
“for those who are unable to afford it. I hope you will decide  
“to do so.

“With the exception of the first week in each instance, so far  
“as clinical symptoms went, the patients were perfectly well  
“all this time, and would probably till recent years have been  
“sent to school, there, possibly, to spread the disease. Even  
“at the present day it is hard for an uneducated person to  
“believe that an apparently healthy child can affect others, and  
“it is almost impossible to get them to carry out the necessary  
“precautions.”

With regard to Tuberculosis, Mr. Robinson says:—



*Stourport Urban District.*

"*Tuberculosis.* 10 deaths were due to Phthisis (Tuberculosis of the lungs, commonly known as Consumption), and 4 to other Tuberculous diseases. The Death-rate from Tuberculous diseases is, therefore, 3.1, and from Phthisis, 2.2. This is the highest Phthisis Death-rate recorded in any town in the County during the last nine years, and more than twice the average County rate. At the end of the year there were 13 known cases in the District, and probably an equal number who had not yet come under the notice of a doctor."

And he urges his Council to subscribe to the Worcestershire Consumption Sanatorium.

Discussing over-crowding, defective ventilation, and general insanitary conditions, Mr. Robinson writes:—

"The above-named conditions, with the exception of over-crowding, which is not common, are so prevalent in the District that it is not difficult to understand why Consumption is so frequent, and why the mortality is the highest—with one exception—in the County. These conditions have been continually brought to your notice."

It is mentioned that the Disinfector at the Kidderminster Isolation Hospital can now be used on payment by persons residing outside the District.

It is stated that pending the adoption of the sewerage scheme, much sanitary work, not urgently necessary, has been postponed from year to year, until the decision of the Council as to a sewage scheme."

Alluding to the sanitary work, Mr. Robinson mentions that—

"In my Report for May 7 of last year, I wrote: 'I feel it necessary to protest against the casual way in which sanitary work is carried out in this District; it is nothing less than scandalous. Apparently no definite instructions are given as to what work is to be done, and it is certain no adequate supervision is given. On two occasions this month I have happened to come across workmen doing work in a most insanitary way, and seen the bad work covered in without testing, or even inspection. So long as the work is done so badly, it were almost better left alone.'

"This Report was never read to the Council, and was also ignored.

"In the Report of August 29, I wrote: 'I wish to disclaim all responsibility for the insanitary condition of the District so long as my advice is ignored, or what is often worse, carried out in a way of which I do not approve.'



*Stourport Urban District.*

" This Report was not read to the Council, and I suppose would  
" have been ignored the same as the others, except that a  
" member by my request brought the matter before the Council.  
" I consider it doubtful policy to suppress and ignore reports  
" which call attention to unsatisfactory conditions in the  
" District. They have always been carefully prepared, and I  
" am always willing to prove their accuracy.  
" The Council have now desired a special Report on this subject,  
" which is being prepared."

He alludes to the Excrement Disposal as " disgusting " and states that there is still a great deal of house property in Stourport of the back to back type, and that " the supervision over the erection of new " houses is inadequate, and the type of cottages unsatisfactory."

Alluding to the Dairies, it is mentioned that although the bye laws were adopted last year, the Inspector has not had time to report on these places.

Many of the Slaughter-houses are said to be too near dwellings, and several Bake-houses to be dark, and not well adapted for the purpose.

With reference to the Factories and Workshops, it is mentioned that—

" Owing to his many duties the Inspector has been unable to do what ought to be done in visiting, reporting, measuring, and registering all plans which come under the Act.

It appears that some correspondence has passed between the Stourport Council and the Kidderminster Corporation with regard to the Kidderminster Sewage Farm, but that the nuisance is still unabated.

New Bye-laws modelled on the basis of those issued by the Local Government Board have been discussed, but not adopted.



*Bromsgrove Rural District.*

TABLE A.

Area in acres, 38,083.

Population 1891 ... 11,818.  
 „ 1901 ... 12,086.

Increase 1891-1901 ... 268.

Estimated Population, 1902 12,100.

Name of Medical Officer of Health, F. W. J. COAKER.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 25.1.

Nett Death Rate, 14.4.

(a) Zymotic Death Rate, 0.99.

(b) Infantile Mortal, 83.

Phthisis Death Rate, 0.99.

(c) Resp. Death Rate, 1.40.

Smallpox Death Rate, 0.0.

Measles Death Rate, 0.08.

Scarlatina Death Rate, 0.08.

Diphtheria and Membranous

Whooping Cough Death Rate, 0.08. Croup Death Rate, 0.08.

(d) Fever Death Rate, 0.16.

(e) Diarrhoea Death Rate, 0.41.

(f) Enteritis Death Rate, 0.16.

Cancer, Malignant Disease Death Rate, 0.90.

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...	1		59	1	1	3	1	
Deaths ...			1	1	1	2		
Hospital Cases	1		36					
„ Deaths								

Diseases prevalent :—Scarlet Fever.

Period :—

Schools Closed:—Cofton and Clent.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



## Bromsgrove Rural District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-Residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	11,836	271	22.8	27	99.6	165	13.9					
1893.	11,836	292	24.5	29	99.3	148	12.5					
1894.	12,100	285	23.6	20	70.1	126	10.4					
1895.	12,170	270	22.1	31	114.8	153	12.5					
1896.	12,286	268	21.8	42	156.6	152	12.3					
1897.	12,232	286	23.3	34	118.8	162	13.2					
1898.	12,232	303	24.7	27	89.1	158	12.9					
1899.	12,300	288	23.4	19	65.9	141	11.4					
1900.	12,300	290	23.5	27	93.1	159	12.1					
1901.	12,086	303	25.0	30	99.0	159	13.1					
Averages for Years 1892-1901.	12,137	285	23.4	28.6	100.2	152.3	12.4					
1902.	12,100	304	25.1	26	85.3	174	14.3			1	175	14.4

\* Rates calculated per 1,000 of population.

*Bromsgrove Rural District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..	1	1						
Scarlet fever ... ..	1			1				
Whooping-cough ... ..	1	1						
Diphtheria and membranous croup ... ..	1		1					
Croup ... ..	1		1					
Fever { Typhus ... ..								
Enteric ... ..	2					2		
Other continued								
Epidemic influenza ... ..	1				1			
Cholera ... ..								
Plague... ..								
Diarrhoea ... ..	5	5						
Enteritis ... ..	2	2						
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases...								
Phthisis ... ..	12		2		1	9		
Other tubercular diseases ... ..	5	2	1			1	1	
Cancer, malignant disease ... ..	11					9	2	
Bronchitis ... ..	11		1			1	9	
Pneumonia ... ..	6	1	3			2		
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism ... ..								
Cirrhosis of liver ... ..	4					4		
Venereal diseases ... ..								
Premature birth ... ..	4	4						
Diseases and accidents of parturition ... ..								
Heart diseases ... ..	24	1		2		13	8	
Accidents ... ..	9	1	1	2	2	2	1	
Suicides ... ..	1					1		
Old age .....	20						20	
Convulsions .....	7	5	2					
Nervous diseases .....	20	1	2		2	7	8	
Kidney diseases.....	5					1	4	
Murder and hanging ... ..	2					2		
All other causes ... ..	16	2	1	3	4	4	2	
All causes ... ..	172	26	15	8	10	58	55	



*Bromsgrove Rural District.*

Dr. Coaker succeeded Dr. Wood "during the last half of the year" and consequently he regrets there is incompleteness in some of the Tables contained in his report.

He regards the Vital Statistics as favourable.

Discussing the case of Smallpox which occurred at Wildmoor in August, he urges efficient Vaccination and states that by "efficient Vaccination" he means "that amount which comes up to the Local Government Board standard, viz., good vesicles extending over half a square inch," and pertinently adds "one mark Vaccination is a delusion."

With reference to the 59 cases of Scarlet Fever he says:—

"The disease has been prevalent during the latter half of the year, especially at Webheath, North Redditch, Cofton Hackett, and Frankley."

As to the sanitary state of the District, he remarks that the populous parts have Watersupplies above suspicion from the East Worcestershire and Stourbridge Waterworks.

It is mentioned that at Aston Fields where sewers and waterworks exist, W.C.'s are gradually replacing middens, but that the disposal of ashes and house refuse is not in a very satisfactory condition.

*Droitwich Rural District.*

TABLE A.

Area in acres, 53,079.

Population 1891 ... 12,900.

" 1901 ... 12,895.

Decrease 1891-1901 ... 5.

Estimated Population, 1902 12,932.

Name of Medical Officer of Health, JOHN WILKINSON, M.D., D.P.H.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 23.5.

Nett Death Rate, 14.4.

(a) Zymotic Death Rate, 0.54.

(b) Infantile Mortal, 124.

Phthisis Death Rate, 0.54.

(c) Resp. Death Rate, 2.6.

Smallpox Death Rate, 0.0.

Measles Death Rate, 0.0.

Scarlatina Death Rate, 0.0.

Diphtheria and Membranous

Whooping Cough Death Rate, 0.54.

Croup Death Rate, 0.0.

(d) Fever Death Rate, 0.07.

(e) Diarrhoea Death Rate, 0.0.

(f) Enteritis Death Rate 0.07.

Cancer, Malignant Disease Death Rate, 0.9.

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			40	13		3	3	
Deaths ...						1		
Hospital Cases			28	6		2		
" Deaths								

Diseases prevalent :—Measles, Whooping Cough.

Period :—Autumn, May to October.

Schools Closed :—

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITU- TIONS.	Deaths of Non- residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	14,230	381	26.7	30	76	207	14.4					
1893.	14,230	386	27.8	42	101	199	14.4					
1894.	14,230	399	28.0	38	120	143	10.2					
1895.	14,300	417	27.0	40	93	222	15.4					
1896.	14,300	377	26.3	44	116	192	13.4					
1897.	14,300	328	24.5	39	118	191	14.0					
1898.	14,300	327	24.3	33	100	170	13.3					
1899.	14,300	352	26.1	26	73	162	12.0					
1900.	14,300	319	22.3	23	72	185	12.9					
1901.	12,932	346	26.7	32	111	160	12.3					
Averages for years 1892-1901.	14,270	363	25.9	34	98	183	12.0					
1902.	12,895	304	23.5	38	124	175	13.5			12	187	14.4

\* Rates calculated per 1,000 of population.

*Droitwich Rural District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..								
Whooping-cough ..	7	5	2					
Diphtheria and membranous croup ...								
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..	1					1		
{ Other continued								
Epidemic influenza ...	2	1					1	
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..								
Enteritis ... ..	1	1						
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases...								
Phthisis ... ..	7		1		3	3		
Other tubercular diseases ... ..	10	5	2	1	1	1		
Cancer, malignant disease ... ..	12					6	6	
Bronchitis ... ..	21	4	2			5	10	
Pneumonia ... ..	13	2	4			4	3	
Pleurisy ... ..								
Other diseases of Respiratory organs ...	1						1	
Alcoholism ... ..								
Cirrhosis of liver { ... ..	3					3		
Venereal diseases ... ..								
Premature birth ... ..	9	9						
Diseases and accidents of parturition ..								
Heart diseases ... ..	24					16	8	
Accidents ... ..	2	2						
Suicides ... ..								
Senile Decay .....								
Convulsions .....								
Congenital debility ...								
.....								
All other causes ...	74	9	1	1	1	14	48	
All causes ...	187	38	12	2	5	53	77	



Dr. Wilkinson succeeded Dr. Swete during 1902, so he says he is able "only to speak generally" for the period he has been in office.

"A marked decrease in the number of cases of infectious disease" is recorded.

Measles, Whooping Cough and Chickenpox were prevalent, and Dr. Wilkinson advises, that should Smallpox become so, it would be of advantage to schedule Chickenpox as "notifiable."

Discussing "Watersupplies," Dr. Wilkinson says:—

"The County Council, by enabling analyses to be obtained at "small cost, has done much to help."

He confirms Dr. Swete's assertion that the Watersupply of Earl's Common is defective, as "the water is derived from pits "in which in many cases surface water flows."

Two samples of water taken from the pool were found to be "unfit for drinking purposes." It is stated that "there is considerable "difficulty and expense required in obtaining a good supply for "Earl's Common."

The majority of the houses are said to be in a good state of repair, and the building byelaws have been productive of good results.

"Old privy cesspools are being gradually done away with."

It is reported that there are 44 Workshops including Bakehouses, and that with one exception,—

"where the necessary alterations were made, these are in a "fairly good state. A few of them have been notified for "improved ventilation."

Two Canal Boats were found to be overcrowded.

As regards the defective Ombersley Sewerage question which has been so long under consideration the Clerk of the Rural District Council wrote the Clerk of the County Council on 30th May, 1903 that:—

"The District Council at their Meeting on Wednesday last " (referred) the above matter to the Committee, having charge "of the same, with instructions to proceed with (it) as soon as "possible."

Referring to the Himbleton drainage question, the Clerk of the Rural District Council wrote, on 5th February, 1903:—

"That the Council have recently renewed and improved the "present Sewers in Himbleton Village, which they hope will "be sufficient for its requirements for the present."

## Evesham Rural District.

TABLE A.

Area in acres, 28,088			
Population 1891	...	...	7,142
" 1901	...	...	7,584
Increase 1891-1901	...	...	442

Name of Medical Officer of Health, G. H. FOSBROKE, D.P.H., Camb.

Mortality per 1,000 of Population living during same period.

Birth Rate, 26.5.	Nett Death Rate, 11.8.
(a) Zymotic Death Rate, 0.3.	(b) Infantile Mortal, 69.
Phthisis Death Rate, 0.7.	(c) Resp. Death Rate, 2.1.
Smallpox Death Rate, 0.0.	Measles Death Rate, 0.0.
Scarlatina Death Rate, 0.12.	Diphtheria and Membranous
Whooping Cough Death Rate, 0.0.	Croup Death Rate, 0.12.
(d) Fever Death Rate 0.0.	(e) Diarrhoea Death Rate, 0.0.
	(f) Enteritis Death Rate, 0.12
Cancer, Malignant Disease Death Rate, 0.6.	

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup	Fever.	Erysipelas.	Chickenpox.
Cases ...	1		32	6			5	11
Deaths ...								
Hospital Cases	1		29	2				
" Deaths								

Diseases prevalent:—Measles.

Period:—March.

Schools Closed:—Sedgeberrow on 3rd March, 1902, for Measles.  
Cleeve Prior on April 18th to May 19th on account of Scarlatina.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
Epidemic enteritis;  
Zymotic enteritis;  
Epidemic diarrhoea. Summer diarrhoea;  
Dysentery and dysenteric diarrhoea;  
Choleraic diarrhoea, cholera, Cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of Residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES NETT.	
		Number.	Rate*	Number.	Rate per 1,000 Births registered.	Number.	Rate*				Number.	Rate*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	7,032	202	28.7	23	113	136	19.3					
1893.	7,142	198	27.7	14	70	105	14.7					
1894.	7,142	218	30.5	16	73	90	12.6					
1895.	7,142	207	28.9	17	82	102	14.2					
1896.	7,142	208	29.1	9	43	78	10.9					
1897.	7,142	227	31.7	13	57	107	14.9					
1898.	7,142	198	27.7	20	101	110	15.4					
1899.	7,142	226	31.6	18	79	120	16.8					
1900.	7,142	222	31.0	17	76	108	15.1	22	7	2	103	14.4
1901.	7,584	229	30.1	23	100	113	14.9	24	7	2	108	14.2
Averages for years 1892-1901.	7,175	213	29.7	17	79	106	14.9	23	7	2	105	14.3
1902.	7,584	201	26.5	14	69	87	11.4	7	5	7	89	11.7

\* Rates calculated per 1,000 of population.

*Evesham Rural District.*

TABLE IV.  
Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All Ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..	1			1				
Whooping-cough ... ..								
Diphtheria and membranous croup ... ..	1		1					
Croup ... ..	1			1				
Fever { Typhus ... ..								
Enteric ... ..								
Other continued								
Epidemic influenza ... ..								
Cholera ... ..								
Plague ... ..								
Diarrhœa ... ..								
Enteritis ... ..	1	1						
Puerperal fever ... ..	1					1		
Erysipelas ... ..								
Other septic diseases...								
Phthisis ... ..	6		1			4	1	
Other tubercular diseases ... ..								
Cancer, malignant disease ... ..	5					3	2	
Bronchitis ... ..	6	3				2	1	
Pneumonia ... ..	9	2	1	1	1	1	3	
Pleurisy ... ..	1			1				
Other diseases of Respiratory organs ... ..								
Alcoholism { ... ..								
Cirrhosis of liver { ... ..								
Venereal diseases ... ..								
Premature Birth .. ..	1	1						
Diseases and accidents of parturition ... ..								
Heart diseases ... ..	9				1	3	5	
Accidents ... ..								
Suicides ... ..								
.....								
.....								
.....								
.....								
All other causes ... ..	47	7	1	1	1	12	26	
All causes ... ..	89	14	4	5	3	26	38	



Favourable Vital Statistics are reported.

A tramp at the Workhouse developed Smallpox on April 9th.

This man was 57 years of age and was discharged from the Alcester Workhouse in an infectious condition; he was alleged to have been vaccinated in infancy, but not re-vaccinated.

The case was isolated in the double Hospital tents as the Smallpox Hospital, since erected, was not then commenced.

14 of the 32 cases of Scarlet Fever occurred at Cleeve Prior and necessitated the closing of the Schools from April 18th to May 19th. This outbreak was persistent and a few of the cases were known as "return" cases associated with overcrowding at the Sanatorium. Immediately this overcrowding occurred, the Evesham Joint Hospital Board ordered an additional ward pavilion to be erected at the Sanatorium and other improvements to be made in the Institution.

The Evesham Board of Guardians is urged to contribute to the Worcestershire Consumption Sanatorium.

A third scheme for the sewerage of Badsey was submitted to the Local Government Board, and a local inquiry was held on the 5th February, 1903, as to a loan of £2,500 for carrying out the work. It is mentioned that this sum is undoubtedly a large one for the village, but even so it is doubtful whether or not the scheme will fulfil the rigid requirements of the Board who almost invariably insist on sewage being disposed of by land treatment. The scheme for sewerage Broadway has been matured and a loan will be sought for carrying out the work.

Minor drainage improvements have taken place at Rouse Lench, Church Lench, and at Bretforton.

The success of the Evesham Villages Water Scheme is alluded to and it is mentioned that of the 737 houses within reach of the mains, 701 are already supplied. Of the 36 not so supplied, 5 were void and 14 others had house connections now being made; so that only 18 are not supplied by the works.

It is stated that some persons who were at one time strongly opposed to these waterworks have stated that now they have experienced their advantages, they would on no account, be without them.

A private water scheme has been carried out at the Village of Norton by the Duc d'Orleans. The water from this spring is very hard and as the pipes now in use are quite small, it is stated that it will not be surprising to find that the mains become choked in course of time.

The Slaughter-houses and Dairies have been inspected and a detailed report is given upon the 43 Workshops and 9 Factories in the District, and suggestion for the removal of various sanitary defects are made.



## Feckenham Rural District.

TABLE A.

Area in acres, 15,204.			
Population 1891 ...	...	5,671	
„ 1901 ...	...	5,532	
Decrease 1891-1901		...	139
Name of Medical Officer of Health, G. H. FOSBROKE, D.P.H., Camb.			
<i>Mortality per 1,000 of Population living during same period.</i>			
Birth Rate, 19'3.		Nett Death Rate, 10'4.	
(a) Zymotic Death Rate, 0'18.		(b) Infantile Mortal, 102.	
Phthisis Death Rate, 1'0.		(c) Resp. Death Rate, 0'9.	
Smallpox Death Rate, 0'0.		Measles Death Rate, 0'0.	
Scarlatina Death Rate, 0'0.		Diphtheria and Membranous	
Whooping Cough Death Rate, 0'18.		Croup Death Rate, 0'0	
(d) Fever Death Rate, 0'0.		(e) Diarrhœa Death Rate, 0'0.	
		(f) Enteritis Death Rate, 0'3.	
Cancer, Malignant Disease Death Rate, 0'3.			

		Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Chickenpox.
Cases	...			19	3		2	4	11
Deaths	...								
Hospital Cases				19					
„ Deaths									

Diseases prevalent :—

Period :—

Schools Closed :—None.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhœa.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhœa" are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhœa. Summer diarrhœa;  
 Dysentery and dysenteric diarrhœa;  
 Choleraic diarrhœa, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhœa." Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



## Feckenham Rural District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	6,300	135	21'4	19	140	82	12'8					
1893.	5,744	156	27'1	18	115	83	14'4					
1894.	5,744	142	24'7	23	161	87	15'1					
1895.	5,744	142	24'7	16	112	77	13'4					
1896.	5,744	157	27'3	15	95	76	13'2					
1897.	5,744	157	27'3	15	95	70	12'1					
1898.	5,744	130	22'6	10	76	69	12'0					
1899.	5,744	153	26'6	17	111	67	11'6					
1900.	5,744	129	22'4	16	124	90	15'6			5	95	16'5
1901.	5,532	131	24'4	14	106	69	12'4			5	74	13'3
Averages for Years 1892-1901.	5,778	143	24'8	16	113	77	13'2			5	84	14'7
1902.	5,532	107	19'3	12	102	56	10'1			4	60	10'8

\* Rates calculated per 1,000 of population.

*Feckenham Rural District.*

TABLE IV.  
Causes of, and Ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..								
Whooping-cough ... ..	1			1				
Diphtheria and membranous croup ... ..								
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued ... ..								
Epidemic influenza ... ..								
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..								
Enteritis ... ..	2	1		1				
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases... ..								
Phthisis ... ..	6	1			3	2		
Other tubercular diseases ... ..								
Cancer, malignant disease... ..	2					2		
Bronchitis ... ..	1	1						
Pneumonia ... ..	4		1		1	2		
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism ... ..								
Cirrhosis of liver ... ..								
Venereal diseases ... ..								
Premature Birth ... ..	1	1						
Diseases and accidents of parturition ... ..								
Heart diseases... ..	5					3	2	
Accidents ... ..	3	1				1	1	
Suicides ... ..								
.....								
.....								
.....								
.....								
All other causes... ..	35	7		1	1	4	22	
All causes ... ..	60	12	1	3	5	14	25	



*Feckenham Rural District.*

Favourable Vital Statistics are recorded and outbreaks of notifiable diseases were few, considering that Scarlet Fever was epidemic in Warwickshire parishes adjoining.

A suitable site with wooden buildings for Smallpox has been specially set apart for the use of the District jointly with the Alcester District.

A disinfecter for the Sanatorium has not yet been provided.

The drainage of Hunt End and Crabbs Cross is in the same unsatisfactory condition described in previous Annual Reports.

Waterworks for Astwood Bank, which have been under consideration for 20 years are now an accomplished fact. One of the Slaughter-houses is said to be in a bad state.

The Dairies and Cowsheds are inspected and a full report upon the 71 Workshops and 17 Factories in the District is given. Yet another year has passed without byelaws being enforced as they are said not to have been finally approved by the Local Government Board.

*Halesowen Rural District.*

TABLE A.

Area in acres, 6,114.

Population 1891 ... 18,481.

" 1901 ... 23,586.

Increase 1891-1901 ... 5,105.

Estimated Population, 1902 23,574.

Name of Medical Officer of Health, T. BRETT YOUNG, M.D.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 36.0. Nett Death Rate, 12.9.

(a) Zymotic Death Rate, 1.5. (b) Infantile Mortal, 106.

Phthisis Death Rate, .5. (c) Resp. Death Rate, 2.5.

Smallpox Death Rate, 0.0. Measles Death Rate, .67.

Scarlatina Death Rate, .2. Diphtheria and Membranous

Whooping Cough Death Rate, .04. Croup Death Rate, .29.

(d) Fever Death Rate, .08. (e) Diarrhœa Death Rate, 0.4.

(f) Enteritis Death Rate, .59.

Cancer, Malignant Disease Death Rate, .46.

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			103	12	12	10	38	4
Deaths ...			5	3	4	1	4	1
Hospital Cases			80			2		
„ Deaths			2					

Diseases prevalent :—Scarlet Fever, Measles.

Period :—Whole of year ; latter part of year.

Schools Closed:—Cakemore, Hill and Quinton.

(a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhœa.

(b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.

(c) Includes Bronchitis, Pneumonia, Pleurisy.

(d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.

(e) Under the heading of "Diarrhœa" are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from

Epidemic enteritis;

Zymotic enteritis;

Epidemic diarrhœa. Summer diarrhœa;

Dysentery and dysenteric diarrhœa;

Choleraic diarrhœa, cholera, cholera nostras (in the absence of Asiatic cholera).

(f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhœa."

Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITU- TIONS.	Deaths of Non- Residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	21,963	825	34.6	111	134	316	14.3			1	317	14.4
1893.	22,551	827	36.6	136	164	361	16.0			5	366	16.2
1894.	23,519	879	27.3	148	168	333	14.1			6	339	14.4
1895.	25,844	865	34.2	105	121	345	13.3			1	346	13.3
1896.	23,574	886	37.5	153	171	386	16.3			15	401	17.0
Averages for Years 1897-1901.	23,490	855	36.6	130	154	348	14.6			5	353	15.2
1902.	23,574	851	36.0	91	106	307	13.0	8	6	5	306	12.9

\* Rates calculated per 1,000 of population.

*Halesowen Rural District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..	16	5	11					
Scarlet fever ... ..	5		1	3	1			7
Whooping-cough ... ..	1	1						
Diphtheria and membranous croup ... ..	7		4	2		1		
Croup ... ..								
{ Typhus ... ..								
{ Enteric ... ..	1					1		1
{ Other continued ... ..								
Epidemic influenza ... ..	1						1	
Cholera ... ..								
Plague ... ..								
Diarrhœa ... ..	1	1						
Enteritis ... ..	14	12	2					
Puerperal fever ... ..	1				1			
Erysipelas ... ..	4	1				1	2	
Other septic diseases ... ..								
Phthisis ... ..	12		1		7	4		
Other tubercular diseases ... ..	4		2	2				
Cancer, malignant disease ... ..	11				6	3	2	
Bronchitis ... ..	40	10	9	1		9	11	
Pneumonia ... ..	17	4	1		5	6	1	
Pleurisy ... ..	2				1		1	
Other diseases of Respiratory organs ... ..								
Alcoholism ... ..								
Cirrhosis of liver ... ..								
Venereal diseases ... ..								
Premature birth ... ..	13	13						
Diseases and accidents of parturition ... ..	1						1	
Heart diseases ... ..	27			2	2	11	12	
Accidents ... ..	5					3	2	
Suicides ... ..	2					1	1	
.....								
.....								
.....								
.....								
.....								
All other causes ... ..	121	44	7	3	1	29	37	
All causes ... ..	306	91	38	13	24	70	70	



*Halesowen Rural District.*

Dr. Brett Young reports favourable Vital Statistics, viz., a high Birth-rate 36.0, a low Death-rate 12.9, and Infant Mortality 106. It is specially satisfactory to note that the Infant Mortality last year (106), was considerably below the average for years 1897-1901 (154), and it is to be hoped, therefore, that the good work which the County Council have done by establishing a Health Missioner in the District is taking effect.

Scarlet Fever (103 cases 5 deaths) was more or less prevalent during the year. The largest number of cases occurred at Cradley (33), where concealment of cases seems to have led to the outbreak.

Dr. Young says, with reference to the 18 cases at Quinton,—

“ There seemed to be two factors which might have contributed  
“ to the spread of the disease, viz:—the prevalence of the  
“ disease in an epidemic from the adjoining Oldbury District,  
“ and the importation from Birmingham, where the disease was  
“ also epidemic, of a large amount of laundry work.”

80 of the 103 cases were removed to Hospital and Dr. Young says:—

“ There is no doubt that leaving at home even a small number  
“ of cases without proper means of Isolation, renders nugatory  
“ much of the good which should result from the removal of  
“ the other cases.”

Measles prevailed to such an extent at Hill, Cakemore, and Quinton during July, September, and October, that it was advisable to close the schools for a time.

The Isolation Hospital at Haley Green is considered to have been a great help in dealing with Infectious Disease, and more especially with Scarlet Fever. Dr. Young again mentions that no means exist for isolation of Smallpox, and that he scarcely conceives that the Council will continue to run the very grave risk of allowing

this state of things to continue. The efficient disinfecter at the Hospital is available for the District.

Alluding to the 4 cases of Puerperal Fever, Dr. Young writes :—

“ I am hopeful that the registration of midwives and their control  
“ by the County Council will, after a time, result in the pro-  
“ duction of a more capable and better class of women for the  
“ work.”

It is mentioned that with a few exceptions, the whole of the houses in the populous parts of the District are now connected with the sewers and that the watersupply, as regards quality, is decidedly satisfactory, although unfortunately in summer time, water is often cut off for what seems an unnecessary length of time. 126 houses were erected during the year and it is said there is no lack of House Accommodation in the District, especially for the working Class, although a large number cannot be considered satisfactory.

The following paragraph in Dr. Young's report with regard to paving of yards is worthy of serious attention.

“ It would be a great gain from a sanitary point of view, if  
“ paving of yards and open spaces round houses were more  
“ general than it is. There is no doubt that the keeping of  
“ fowls where they are allowed to run at large in the courts  
“ and yards of the more Urban parts of the District do much  
“ to bring about a condition of soil pollution with its very  
“ real evils. It is a great advantage that the erection of all  
“ new building is now under the direct supervision of the  
“ Council.”

Privy middens still exist although W.C.'s are gradually being substituted.

It appears that—

“ The removal of Nightsoil is still done by contract, and it is to



"be feared often in a very perfunctory manner."

"The Lodging-houses, Slaughter-houses, Dairies, Cowsheds and  
"Milk-shops, Offensive trades, and now especially Factories  
"and Workshops, are regularly inspected."





## Kidderminster Rural District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES, TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES, NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	9,966	234	23'48	39	166'66	187	18'76	6	6		181	18'2
1893.	9,978	262	26'25	27	103'05	155	15'53	10	10		145	14'5
1894.	9,988	252	25'15	27	107'14	134	13'42	4	4		130	13'1
1895.	9,978	250	25'04	26	104	133	13'33	1	1		132	13'28
1896.	10,018	239	23'85	28	117'11	109	10'8	1	1		108	10'7
1897.	10,200	213	20'88	29	136'15	117	11'47	2	2		115	11'27
1898.	10,100	232	22'7	17	73'28	110	10'78				110	10'78
1899.	10,100	268	26'27	26	97'01	128	12'55	2	2		126	12'35
1900.	10,200	252	24'72	37	146'8	146	14'31				146	14'31
1901.	10,100	251	24'8	28	111'5	134	13'3	1	1		133	13'3
Averages for years 1892-1901.	10,062	245'3	24'3	28'4	113'5	135'3	13'5	2'7	2'7		135	13'2
1902.	10,100	246	24'3	29	117'9	135	13'35	7	7	10	138	13'5

\* Rates calculated per 1,000 of population.



## Kidderminster Rural District.

TABLE IV.  
Causes of, and ages at, Death during Year 1902.-

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..	3	1	1			1		
Scarlet Fever ... ..	7		3	4				
Whooping-cough ... ..	2	2						
Diphtheria and membranous croup ... ..	3		2	1				
Croup ... ..								
Fever { Typhus ... ..								
Enteric ... ..	1					1		
Other continued								
Epidemic influenza ... ..								
Cholera ... ..								
Plague ... ..								
Diarrhœa ... ..	1						1	
Enteritis ... ..	1	1						
Puerperal fever ... ..								
Erysipelas ... ..	1						1	
Other septic diseases ... ..								
Phthisis ... ..	9			1	3	5		
Other tubercular diseases ... ..	4	1	1	1	1	1		
Cancer, malignant disease ... ..	11					9	2	
Bronchitis ... ..	8	1				1	6	
Pneumonia ... ..	5	2				2	1	
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..	2	1					1	
Alcoholism ... ..								
Cirrhosis of liver ... ..	2					2		
Venereal diseases ... ..								
Premature birth ... ..	4	4						
Diseases and accidents of parturition ... ..	2	1				1		
Heart diseases ... ..	13					4	9	
Accidents ... ..	7	2			2	5		
Suicides ... ..	2					2		
Murder ... ..	1	1						
.....								
.....								
.....								
All other causes ... ..	64	14	1	1	1	6	23	
All causes ... ..	135	29	8	8	7	39	44	7



Dr. Addenbrooke mentions that 97 cases of Scarlet Fever were notified but that no death occurred, and adds, he has—

“Reason to believe that many cases have not been recognized  
“and notified, and so the infection has been spread.”

“An outbreak of Scarlet Fever occurred in November in connection with the milk supplied from Comberton Farm. On  
“November 16th, having noticed that several cases of Scarlet  
“Fever on that side of the town had used milk from that Farm,  
“and having been informed that several recent cases in the  
“borough had been supplied with milk from the same dairy, I  
“visited the farm, and after inspecting the cows and sheds,  
“I examined the three children in the house, one of whom  
“was desquamating freely, evidently from Scarlet Fever. The  
“children were said to have had Measles, and from enquiries  
“which I made concerning their illness and its symptoms, I  
“formed the opinion that they all had Measles in the first  
“instance, and that the child who was peeling, had taken  
“Scarlet Fever, concurrently with, or immediately after,  
“Measles. The other two children never had any signs of  
“Scarlet Fever. I pointed out to the farmer the infectious  
“condition of the child, and ordered the cows to be at once  
“removed to sheds half-a-mile away from the house, and that  
“no milk, or anyone having anything to do with  
“the milk, should come to the house, and that no one from  
“the house should go to the cowsheds, or interfere with the  
“milk business in any way. Eight cases in my District,  
“besides those in the borough, were traced to direct infection  
“from this milk supply, but none occurred after six days (the  
“period of incubation of the disease) from the time when the  
“source of infection was discovered and dealt with.

“I have visited the various portions of my District frequently  
“during the year, and after a house-to-house inspection in  
“July, I made by your direction a special report concerning  
“the Somerleyton region, where I found the condition of the  
“tenements improved, and the disposal of the sewage, on the  
“whole, more satisfactorily dealt with; but at Whitville in  
“Sutton Road, Spencer Street, and Hemming Street, the



“local conditions are practically in the same unsatisfactory  
“state as I described in my last year’s report, and I hope that  
“your negotiations will soon lead to the provision of proper  
“drainage for these localities, the serious defects of which  
“were pointed out to your Sub-Committee last year, at  
“their inspection of these localities, with Dr. Fosbroke and  
“myself.

“Anthrax has broken out three times on the Corporation Farm,  
“during the year, and there has been a case at Franche,  
“and one at Spring Grove. I always at once, by a personal  
“visit, satisfy myself that all proper precautions are being  
“carried out in these cases, and believe that to the prompt,  
“energetic and thorough manner in which the Sergeant of  
“County Police deals with them, it is due that in no instance  
“has the disease spread.”

The Clerk of the Kidderminster Rural Council wrote the Clerk of the County Council with reference to the Sutton Road, etc., drainage, that his—

“Council is in communication with the Borough Council in  
“order to ascertain the terms and conditions upon which the  
“drainage thereof could be discharged into the Borough  
“Sewers, and the Town Council have requested their engineers  
“to make a report upon the subject and the possibility thereof.  
“The Council is now urging the Borough Council for the  
“desired information.”

Measles was prevalent to an unusual extent. The following schools were closed on account of infectious diseases.

“Hill Pool Board School, on account of Whooping Cough,  
“and subsequently on account of Scarlet Fever; Arley  
“School, on account of Scarlet Fever; Wolverley Endowed  
“Schools, on two separate occasions, on account of Measles;  
“Rushock School, on account of Diphtheria; Foley Park  
“Schools, on account of Measles; Wribbenhall Church School  
“and Wribbenhall British School on account of Measles.”



Dr. Addenbrooke adds:—

“In Wribbenhall, I am glad to hear that in cases of inadequate  
“or impure supply, water has been laid on from the Bewdley  
“Mains.”

The Bake-houses and Slaughter-houses are reported to be in a  
satisfactory condition, and it is stated that—

“No cause for action has arisen under the Factory and  
“Workshops’ Act.”

## Martley Rural District.

TABLE A.

Area in acres, 59,171			
Population 1891	...	...	13,139
" 1901	...	...	12,944

Decrease 1891-1901...	...	195
Estimated Population, 1902		12,941

Name of Medical Officer of Health, J. H. GREENSILL.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 26.2.		Nett Death Rate, 14.4.	
(a) Zymotic Death Rate, 0.6.		(b) Infantile Mortal, 108.	
Phthisis Death Rate, 0.9.		(c) Resp. Death Rate, 2.08.	
Smallpox Death Rate, 0.0.		Measles Death Rate, 0.07.	
Scarlatina Death Rate, 0.15.		Diphtheria and Membranous	
Whooping Cough Death Rate, 0.15.		Croup Death Rate, 0.0.	
(d) Fever Death Rate 0.7.		(e) Diarrhoea Death Rate, 0.15.	
		(f) Enteritis Death Rate, 0.15	
Cancer, Malignant Disease Death Rate, 0.7.			

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup	Fever.	Erysipelas.	Puerperal Fever.
Cases ...	1		73	6		1	5	2
Deaths ...			2			1	1	1
Hospital Cases	1		32	1				
„ Deaths			1					

Diseases prevalent:—Scarlet Fever, Measles, Whooping Cough.

Period:—

Schools Closed:—Crown East, Stanford, Pensax, Great and Little Witley, Shelsley Beauchamp, Hallow, Cotheridge and Broadheath.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, Cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea."
- Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES, TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of Residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES NETT.	
		Number.	Rate*	Number.	Rate per 1,000 Births registered.	Number.	Rate*				Number.	Rate*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	12,044	320	26.65	41	128.1	222	18.43	15			222	18.43
1893.	13,044	311	25.82	36	115.7	139	11.54	8			139	11.54
1894.	12,044	336	27.98	31	92.2	203	16.85	18			203	16.85
1895.	13,133	342	26.04	41	119.8	191	14.54	14			191	14.54
1896.	13,133	346	26.3	32	92.4	175	13.3	16			175	13.3
1897.	13,133	358	27.3	44	122.9	188	14.31	15			188	14.31
1898.	13,133	345	26.3	31	89.8	188	14.31	20			188	14.31
1899.	13,133	365	27.8	39	106.8	191	14.54	13			191	14.54
1900.	13,133	306	23.3	37	120.9	200	15.2	15	7	14	207	15.7
1901.	12,941	341	26.3	29	85.04	175	13.5	20	4	13	184	14.21
Averages for years 1892-1901.	13,105	343	26.1	36	105.3	187	14.3	16			189	14.4
1902.	12,941	340	26.2	37	108.8	175	13.5	21	1	13	187	14.4

\* Rates calculated per 1,000 of population.

*Martley Rural District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All Ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..	1		1					
Scarlet Fever ... ..	2		1	1				
Whooping-cough ... ..	2	2						
Diphtheria and membranous croup ... ..								
Croup ... ..	1	1						
Fever { Typhus ... ..								
{ Enteric ... ..	1		1					1
{ Other continued								
Epidemic influenza ... ..	3		1			1	1	
Cholera ... ..								
Plague ... ..								
Diarrhœa ... ..	2	2						
Enteritis ... ..	3	1				2		
Puerperal fever ... ..	1					1		
Erysipelas ... ..	1						1	1
Other septic diseases ... ..	3					2	1	1
Phthisis ... ..	12				3	9		3
Other tubercular diseases ... ..	5	2	1	1		1		
Cancer, malignant disease ... ..	11					6	5	2
Bronchitis ... ..	17	4				1	12	1
Pneumonia ... ..	12	2	1			8	1	
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism ... ..								
Cirrhosis of liver ... ..	1					1		
Venereal diseases ... ..								
Premature Birth ... ..	7	7						
Diseases and accidents of parturition ... ..	1					1		
Heart diseases ... ..	30			2	1	9	18	7
Accidents ... ..	7				1	4	2	1
Suicides ... ..	2					2		
Apoplexy ... ..	6					1	5	1
Convulsions ... ..	4	3	1					
Senile Decay ... ..	12						12	
Developmental disease ... ..	8	7	1					
All other causes ... ..	32	7	1	1		13	10	3
All causes ... ..	187	38	9	5	5	62	68	21



Dr. Greensill reports favourable Vital Statistics.

" *Measles* was epidemic in the parishes of Hallow, Little Witley, Great Witley, Pensax, and Shelsley Beauchamp, and in each of these parishes the schools were closed for a time on account of this disease. One death was registered.

" *Scarlet Fever* was very prevalent, 73 cases were notified—this is the largest number notified since the year 1894. The disease generally was of a mild type, but it caused two deaths. Several cases which had not been seen by any medical man, and so had remained unnotified, were discovered by your Inspector and myself. It is these mild undetected cases which invariably cause difficulty in stamping out the disease."

Referring to Smallpox, he says:—

" *Small-pox*. There has been one case of Small-pox. The case occurred in the Tramp Ward of the Workhouse, and the patient was removed to the Worcester Small-pox Hospital.

" The Vaccination Act of 1898 works successfully here, the conscientious objector being almost unknown, and the percentage of unvaccinated children over six months of age is a small one."

As the Isolation Hospital accommodation has recently been a matter of considerable discussion, I extract the following from Dr. Greensill's report:—

" Malvern and Kidderminster Isolation Hospitals have continued to take cases of Scarlet Fever from certain parishes as heretofore, but your arrangement with the Worcester Isolation Hospital for the reception of Scarlet Fever and Diphtheria cases which has hitherto worked so well, has this year failed, as owing to the prevalence of Scarlet Fever in Worcester, cases from this District have since October been refused, and some cases, which without doubt became infected in the City, have been left insufficiently isolated in their cottages in this District. In practice your arrangement with Worcester works out in this way: when there is not much infectious disease in Worcester you have the privilege of sending any cases which occur in the parishes of your District adjoining the City, to the City Isolation Hospital at the extravagant charge of £3 3s. per week, plus



*Martley Rural District.*

"the expenses of removal, but when an epidemic occurs in  
 "Worcester, and these parishes are in constant danger of in-  
 "fection all Isolation accommodation is refused.

"I am convinced that you will be better and more economically  
 "served by a centrally situated Isolation Hospital of your  
 "own.

"Your provision for the isolation of Small-pox is ample. It  
 "consists of—

"1st.—Power under an order of the County Council to send  
 "cases to the present Small-pox Hospital at Malvern,  
 "or any other Small-pox Hospital provided by the  
 "Malvern Urban District Council.

"2nd.—An Agreement under which cases from twelve  
 "parishes can be sent to the Worcester Small-pox  
 "Hospital.

"3rd.—A well isolated cottage, with room for erecting tents,  
 "if necessary, at Abberley.

"4th.—A similar cottage, at Suckley.

"My instructions from you are to send all cases to the Malvern  
 "Isolation Hospital, situated at Halfkey, and in the event  
 "of the removal of this Hospital, to such other Small-pox  
 "Hospital as shall be provided by the Malvern Council.

"Houses invaded by infectious diseases have been disinfected  
 "as usual by your Inspector, but you have no apparatus for  
 "the disinfection of bedding and clothing. This would be  
 "part of the equipment of an Isolation Hospital if you  
 "thought proper to erect one."

Dr. Greensill says, that owing to the exceptional amount of noti-  
 fiable disease, the Inspector has been unable to give as much time  
 as usual to the systematic inspection of the District, and he hopes  
 more work will be done in this direction in future.

The Dairies and Cowsheds have been regularly visited and—

"A systematic inspection has this year been made of the acom-  
 "modation provided for hop-pickers, and the Inspectors report  
 "that your Byelaws relating to cleanliness, air space, water-  
 "supply, etc., are generally duly observed."



*Martley Rural District.*

The 94 Workshops are evidently inspected. A case of Scarlet Fever occurred in the family of a home-worker.

In his report for 1901, Dr. Greensill says the Slaughter-houses were not regularly inspected.

He does not say if that state of things still obtains.

TABLE A.

Area in acres, 5,305.			
Population 1891 ...	...	...	1,308
„ 1901 ...	...	...	1,182
Decrease 1891-1901 ...			126
Estimated Population 1902			1,182

Name of Medical Officer of Health, W. N. MARSHALL.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 22.0.	Nett Death Rate, 13.5.
(a) Zymotic Death Rate, 0.8.	(b) Infantile Mortal, 115.
Phthisis Death Rate, 0.8.	(c) Resp. Death Rate, 1.6.
Smallpox Death Rate, 0.0.	Measles Death Rate, 0.0.
Scarlatina Death Rate, 0.0.	Diphtheria and Membranous
Whooping Cough Death Rate, 0.0.	Croup Death Rate, 0.0
(d) Fever Death Rate, 0.0.	(e) Diarrhoea Death Rate, 0.8.
	(f) Enteritis Death Rate, 0.0.
Cancer, Malignant Disease Death Rate, 1.6.	

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...								
Deaths ...								
Hospital Cases								
„ Deaths								

Diseases prevalent :—

Period :—

Schools Closed :—

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from
- Epidemic enteritis;
  - Zymotic enteritis;
  - Epidemic diarrhoea. Summer diarrhoea;
  - Dysentery and dysenteric diarrhoea;
  - Choleraic diarrhoea, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	1,308	49	37.4	7	143	33	25.2					
1893.	1,308	44	33.7	2	45	28	21.4					
1894.	1,308	20	15.2	2	100	13	9.9					
1895.	1,308	45	35.7	3	66	20	15.3					
1896.	1,308	39	29.8	3	77	13	10.0					
1897.	1,308	26	19.9	9	346	27	20.6					
1898.	1,308	29	22.1	-	0	19	14.5					
1899.	1,308	36	27.5	4	111	22	16.7					
1900.	1,308	26	19.9	5	192	19	14.5					
1901.	1,195	22	20.0	1	45	11	10.0					
Averages for Years 1892-1901.	1,296	33	26.1	3	113	20	15.8					
1902.	1,182	26	22.0	3	115	15	13.5					

\* Rates calculated per 1,000 of population.

*Newent Rural District (Worcestershire Parishes).*

TABLE IV.

Causes of, and Ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..								
Whooping-cough ... ..								
Diphtheria and membranous croup ... ..								
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued ... ..								
Epidemic influenza ... ..								
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..	I	I						
Enteritis ... ..								
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases... ..								
Phthisis ... ..	I				I			
Other tubercular diseases ... ..								
Cancer, malignant disease... ..	2					I	I	
Bronchitis ... ..	2					I	I	
Pneumonia ... ..								
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism } ... ..								
Cirrhosis of liver } ... ..								
Venereal diseases ... ..								
Premature Birth ... ..	I	I						
Diseases and accidents of parturition ... ..								
Heart diseases... ..	I						I	
Accidents ... ..								
Suicides ... ..								
.....								
.....								
.....								
.....								
.....								
All other causes... ..	7	I			I	3	2	
All causes ... ..	15	3			2	5	5	



*Newent Rural District (Worcestershire Parishes).*

This District includes the 2 Worcestershire Parishes of Redmarley and Staunton.

Mr. Marshall says that the past year has been unmarked by any outbreak of disease and that "the Isolation Hospital has not been used during the year."

The Dairies and Cowsheds are reported to be in good condition, and Vaccination is said to be efficiently carried out.

## Pershore Rural District.

TABLE A.

Area in acres, 53,728.

Population 1891 ... 13,086.  
 „ 1901 ... 12,819.

Decrease 1891-1901 ... 267.

Estimated Population, 1902 12,819.

Name of Medical Officer of Health, G. H. FOSBROKE, D.P.H., Camb

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 25·2. Nett Death Rate, 14·8.

- (a) Zymotic Death Rate, 0·4. (b) Infantile Mortal, 68.  
 Phthisis Death Rate, 0·8. (c) Resp. Death Rate, 2·0.  
 Smallpox Death Rate, 0·0. Measles Death Rate, 0·0.  
 Scarletina Death Rate, 0·0. Diphtheria and Membranous  
 Whooping Cough Death Rate, 0·2. Croup Death Rate, 0·2.  
 (d) Fever Death Rate, 0·0. (e) Diarrhœa Death Rate, 0·0.  
 (f) Enteritis Death Rate, 0·5.

Cancer, Malignant Disease Death Rate, 1·0.

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...	2		59	10		2		
Deaths ...				3				
Hospital Cases	2		58					
„ Deaths								

Diseases prevalent :—Scarlatina.

Period :—

Schools Closed:—Elmley Castle, Little Comberton, Great Comberton, Drakes Broughton.

- (a) Includes Smallpox, Measles, Scarletina, Diphtheria, Whooping Cough, Fever and Diarrhœa.  
 (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.  
 (c) Includes Bronchitis, Pneumonia, Pleurisy.  
 (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.  
 (e) Under the heading of “Diarrhœa” are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhœa. Summer diarrhœa;  
 Dysentery and dysenteric diarrhœa;  
 Choleraic diarrhœa, cholera, cholera nostras (in the absence of Asiatic cholera).  
 (f) Under the heading of “Enteritis” are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of “Diarrhœa.”  
 Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-Residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	13,005	346	26.6	43	124	266	20.4				266	20.4
1893.	13,005	338	25.9	40	118	185	14.2				185	14.2
1894.	13,086	352	26.8	40	113	186	14.2				186	14.2
1895.	13,086	366	27.9	42	114	242	18.4				242	18.4
1896.	13,086	322	24.6	39	121	179	13.6				179	13.6
1897.	13,086	351	26.8	37	105	215	16.4				215	16.4
1898.	13,086	358	27.3	32	89	205	15.6				205	15.6
1899.	13,086	314	23.9	34	108	209	15.9				209	15.9
1900.	13,086	324	24.7	32	98	237	18.1				237	18.1
1901.	12,813	315	24.6	25	79	161	12.5				161	12.5
Averages for Years 1892-1901.	13,042	338	25.9	36	106	208	15.9				208	15.9
1902.	12,813	323	25.2	22	68	182	14.2			8	190	14.8

\* Rates calculated per 1,000 of population.

*Pershore Rural District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet fever ... ..								
Whooping-cough ... ..	3	1	2					
Diphtheria and membranous croup ... ..	3		1	2				
Croup ... ..	1							
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued								
Epidemic influenza ... ..								
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..								
Enteritis ... ..	7	4	1		1		1	
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases...								
Phthisis ... ..	11			1	1	8	1	
Other tubercular diseases ... ..	5	1	1	2	1			
Cancer, malignant disease ... ..	15					13	2	
Bronchitis ... ..	22	2	2	2		4	12	
Pneumonia ... ..	8		1		1	4	2	
Pleurisy ... ..	1				1			
Other diseases of Respiratory organs ..								
Alcoholism ... ..	1					1		
Cirrhosis of liver ... ..								
Venereal diseases ... ..								
Premature birth ... ..	3	3						
Diseases and accidents of parturition ..								
Heart diseases ... ..	16	1		1		9	5	
Accidents ... ..	1	1						
Suicides ... ..								
.....								
.....								
.....								
.....								
.....								
All other causes ... ..	94	18	5	2	4	24	41	
All causes ... ..	190	31	13	10	9	63	64	



*Pershore Rural District.*

Favourable Vital Statistics are recorded.

An extended outbreak of mild Scarlet Fever (59 cases no death) occurred and no less than 98 per cent. of these cases were treated at the Isolation huts.

There was no reason for thinking that the outbreak was due to any but personal infection either direct or indirect.

The etiology of the Diphtheria cases is discussed at length. It is stated that nothing further has been done in the Pershore sewerage scheme; as it is impracticable and undesirable to commence it until the question of a local watersupply is settled. Improvements in the sewerage of Fladbury and Cropthorne are contemplated. Bacterial Sewage filters for the former place are not yet put in.

A special report is presented upon the want of water in 15 villages in the District and the District Council are urged to purchase springs which will enable a comprehensive scheme to be carried out on the same lines as that which has been so successful in the Evesham Rural District.

It is shown that of 194 sources of watersupply (chiefly wells) in these villages that were analyzed, 152 were condemned as unfit for domestic use.

A Sub-Committee have the matter in hand, and are giving most serious attention to the matter.

The Slaughter-houses, Dairies, etc., are regularly inspected, and a special report is made upon the 46 workshops in the District, and attention called to various local insanitary conditions with the view of getting these rectified.

Part of a complete Isolation Hospital Scheme has been carried out. A suitable Smallpox Hospital has been provided jointly with the Evesham Authorities.

## Rock Rural District.

TABLE A.

Area in acres, 13,314.

Population 1891	...	...	22,52.
" 1901	...	...	2,150.

Decrease 1891-1901 ... 102.

Estimated Population, 1902 2,150.

Name of Medical Officer of Health, E. T. WHITAKER, M.D.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 23.2.

Nett Death Rate, 15.3.

(a) Zymotic Death Rate, 0.0.

(b) Infantile Mortal, 180.

Phthisis Death Rate, 0.9.

(c) Resp. Death Rate, 0.0.

Smallpox Death Rate, 0.0.

Measles Death Rate, 0.0.

Scarlatina Death Rate, 0.0.

Diphtheria and Membranous

Whooping Cough Death Rate, 0.0.

Croup Death Rate, 0.0.

(d) Fever Death Rate, 0.0.

(e) Diarrhoea Death Rate, 0.0.

(f) Enteritis Death Rate 0.0.

Cancer, Malignant Disease Death Rate, 1.4.

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			7	2			1	
Deaths ...								
Hospital Cases								
" Deaths								

Diseases prevalent :—

Period :—

Schools Closed :—

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



## Rock Rural District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITU- TIONS.	Deaths of Non- residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	2,280	49	21.4	9	183	38	16.6				38	16.6
1893.	2,290	57	24.8	5	87	27	11.7			2	29	12.2
1894.	2,290	52	22.7	6	115	33	14.4			2	35	15.2
1895.	2,290	51	22.2	8	156	30	13.1			2	32	13.9
1896.	2,150	51	23.7	7	137	26	12.0			1	27	12.5
Averages for years 1897-1901.	2,260	52	22.9	7	135	30	13.5			1	32	14.0
1902.	2,150	50	23.2	9	180	31	14.4			2	33	15.3

\* Rates calculated per 1,000 of population.

*Rock Rural District.*

TABLE IV.  
Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..								
Whooping-cough ..								
Diphtheria and membranous croup ...								
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued								
Epidemic influenza ...								
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..								
Enteritis ... ..								
Puerperal fever ...								
Erysipelas ... ..								
Other septic diseases...								
Phthisis ... ..	2				2			
Other tubercular diseases ... ..	2	1		1				
Cancer, malignant disease ... ..	3					1	2	
Bronchitis ... ..	2						2	
Pneumonia ... ..	1				1			
Pleurisy ... ..								
Other diseases of Respiratory organs ...								
Alcoholism ... ..								
Cirrhosis of liver { ... ..								
Venereal diseases ...								
Premature birth ...								
Diseases and accidents of parturition ...	1	1						
Heart diseases ...	4					1	3	
Accidents ... ..	1	1						
Suicides ... ..	1					1		
.....								
.....								
.....								
.....								
All other causes ...	14	6		1		1	6	
All causes ...	31	9		2	3	4	13	



*Rock Rural District.*

Dr. Whitaker says that this District "is a very small one and comprises only 3 parishes." The Birth-rate (23·2) has been stationary for several years and the nett Death-rate (15·3) is the highest since 1897, but Dr. Whitaker adds:—

"The District being so small, the numbers on which all these  
"rates are calculated are small and hence two or three deaths  
"more in any one year make a considerable difference in the  
"rates."

The Infantile Mortality (180) is higher than usual, but Dr. Whitaker adds:—

"It is, however, calculated on a small number of Births, and  
"on the last six years average works out at 144. Even at the  
"best, however, it is far from satisfactory, and a glance at the  
"causes of death will show that by proper knowledge and care  
"most of them might have been avoided. They are as  
"follows:—

Improper feeding.	Overlain.	Want of care at Birth.	Tuberculosis.	Unavoid- able.
" 4	1	1	1	2

"I am afraid that as regards educating adults in these matters  
"not very much improvement can be looked for, though  
"District Visitors if tactful could in some cases impress and  
"teach the mothers. I think more permanent good would  
"result from attempts made to teach the older girls in  
"Elementary Schools. I should like to see practical lessons  
"given in such matters as the preparation and keeping of  
"food, the necessity of perfect cleanliness and order in house-  
"keeping and the care and management of Infants."

Dr. Whitaker says that one family were infected through incomplete disinfection of clothing in another family, and that without a steam disinfector it is quite impossible to deal with the outer garments of these children.

He also adds:—

"Now that the Joint Committee has been formed for Small-pox purposes, and a Hospital provided, I would again advise consideration of joint action with regard to a steam disinfecter. This would be available for all infectious diseases, and shared amongst the three Councils would not be a heavy burden. With regard generally to the questions of isolation and disinfection, I would refer to my last Annual in which I discussed them in some detail."

"The Infectious Diseases Prevention Act, and Sects. of the Amendment Act, 1890, are in force"

Referring to the drainage and scavenging, he says:—

"The outfall at Clow's Top, however, is not satisfactory yet, emptying in two or three places by a public footpath. Some of the houses at Bayton are imperfectly drained."

"Watersupply. So far as it is practicable to supply water, the District is fairly well off. At Clow's Top, the public well is covered in and has a pump, but there is evidence that the water is liable to pollution, and I would advise an analysis to be made of the water. It is some distance from this well to the houses at the other end of the village, and it would certainly be a great convenience if this water (if sufficiently pure) or water from another source, could be distributed through the village. Mamble still remains dependent on individual wells, many of which appear to dry up at times. The 'town well' source might be tested as to yield and purity, and if satisfactory it would be well to consider the advisability of pumping it up to the village."

No Byelaws have been adopted. It is said that the Factories and Workshops' Act, 1901 has little application to the District and that although there are some slaughter-houses in a satisfactory condition, "little killing is done."

Very little milk is sold so as to bring sellers under the Dairies Orders.



The defective watersupplies of Clow's Top and Mamble, referred to in Dr. Whitakers report for 1901, were the subject of a communication addressed to the Rock District Council by the Clerk of the County Council and the Clerk of the former replied on the 29th January, 1903:—

“That his Council were of opinion that the watersupply of  
“Clow's Top and Mamble should be provided by the owners  
“of houses having defective supplies.”

I commend this communication to your consideration.

*Shipston-on-Stour Rural District.*

TABLE A.

Area in acres, 18,466				
Population 1891	...	...	5,187	
" 1901	...	...	4,702	
Decrease 1891-1901...				485
Estimated Population, 1902				4,658

Name of Medical Officer of Health, GEORGE FINDLAY, M.A., M.B.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 24.5.		Nett Death Rate, 17.6.	
(a) Zymotic Death Rate, 0.2.		(b) Infantile Mortal, 87.	
Phthisis Death Rate, 0.8.		(c) Resp. Death Rate, 3.8.	
Smallpox Death Rate, 0.0.		Measles Death Rate, 0.0.	
Scarlatina Death Rate, 0.0.		Diphtheria and Membranous	
Whooping Cough Death Rate, 0.0.		Croup Death Rate, 0.0.	
(d) Fever Death Rate 0.0.		(e) Diarrhoea Death Rate, 0.2.	
		(f) Enteritis Death Rate, 0.6.	
Cancer, Malignant Disease Death Rate, 0.4.			

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			2			1	1	
Deaths ...								
Hospital Cases			2					
" Deaths							1	

Diseases prevalent:—None.

Period:—None.

Schools Closed:—None.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, Cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



## Shipston-on-Stour Rural District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of Residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES NETT.	
		Number.	Rate*	Number.	Rate per 1,000 Births registered.	Number.	Rate*				Number.	Rate*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	4,975	137	27.5	12	88	88	17.6	19	13	5	81	16.0
1893.	4,927	121	24.5	14	115	91	18.4	18	10	0	81	16.4
1894.	4,880	126	25.8	12	94	85	17.4	9	8	1	78	15.9
1895.	4,834	104	21.8	19	182	91	18.8	12	9	1	83	17.1
1896.	4,789	124	25.7	13	105	82	17.0	16	13	1	70	14.5
1897.	4,745	109	22.8	17	156	87	18.2	13	7	1	81	17.0
1898.	4,702	120	25.4	18	150	91	19.2	17	10	1	82	17.3
Averages for years 1895-1901.	4,836	120	24.8	15	127	88	18.1	15	10	1	81	16.3
1902.	4,658	114	24.5	10	87	98	21.0	28	16	0	82	17.6

\* Rates calculated per 1,000 of population.

*Skipston-on-Stour Rural District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All Ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and up-wards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..								
Whooping-cough ... ..								
Diphtheria and membranous croup ... ..								
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued ... ..								
Epidemic influenza ... ..	4						4	
Cholera ... ..								
Plague ... ..								
Diarrhœa ... ..	1	1						
Enteritis ... ..	2	1	1					
Puerperal fever ... ..								
Erysipelas ... ..	1	1						
Other septic diseases... ..	3					2	1	
Phthisis ... ..	4				2	2		
Other tubercular diseases ... ..	2					1	1	
Cancer, malignant disease ... ..	2					1	1	
Bronchitis ... ..	11	1	1			1	8	
Pneumonia ... ..	7	1	1			4	1	
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism ... ..								
Cirrhosis of liver ... ..	1						1	
Venereal diseases ... ..								
Premature Birth ... ..								
Diseases and accidents of parturition ... ..	3				1	2		
Heart diseases ... ..	9					3	6	
Accidents ... ..								
Suicides ... ..	2					2		
Kidney diseases.....	1						1	
Apoplexy .....	4					1	3	
Old age .....	11						11	
.....								
All other causes ... ..	14	5	2		1	3	3	
All causes ... ..	82	10	5		4	22	41	



Dr. Findlay writes :—

“ In the Shipston District the Census figures show that at the same ratio there would be 997 persons, or in other words, “ while a little over 5 per cent. of the population in the County “ are over 65 years of age, in this District nearly 10 per cent. “ of the whole population is over that age.

“ These figures show that the Death-rate (17·6) of this District “ will generally appear rather high, on account of the great “ number comparatively of persons advanced in years.

“ I consider that taken as a whole the foregoing Statistics show “ a continued satisfactory state of general health in the District. “ There has been an almost entire absence of epidemic disease “ in the District.”

Chicken-pox became a notifiable disease on the 9th April to the end of the year.

Referring to the Hospital, Dr. Findlay says :—

“ The Joint Isolation Hospital has been useful in at once being “ able to receive the Scarlet Fever cases which have occurred “ in the District, and has been open the greater part of the “ year with cases from the Brailes District. Fortunately, in “ neither of the Districts has there been any case of Diphtheria, “ so that the accommodation has been so far sufficient, but “ had any case of Diphtheria occurred in this District, requiring removal, we could not have done so having only the one “ ward pavilion.

“ With reference to Diphtheria and also tubercular diseases I “ should like to suggest that managers of Schools should have “ their attention drawn to the habit many children have in “ school of spitting on slates and rubbing them to clean them, “ and which I believe may be the means of transmitting “ disease. I would recommend that small sponges, wrung out “ daily in some disinfectant, be supplied in every school for the “ purpose mentioned.

“ In order to be prepared for any case of Small-pox which might “ suddenly appear in the District, the Joint Hospital Committee acquired from the Guardians the two huts, which were “ used some years ago for a case of Small-pox, and which “ stood in the workhouse grounds. These huts have been “ removed to a distant part of the field in which the Isolation “ Hospital stands and have been repaired and are in readiness “ to receive one or at most two cases of Small-pox at short “ notice.”



The action taken under the Factory Act is said to have been somewhat delayed owing to the lamented death of the late Clerk of the County, Mr. Eden Hiron, but the Workshops and Bake-houses have been inspected and various recommendations made.

I commend the following reference to sanitary work to your consideration.

"SHIPSTON-ON-STOUR.—The new water works opened last year  
"are now in good working order and about two-thirds of the  
"houses in the town are now connected with the mains; the  
"meter shows that an average of about 12,000 gallons of water  
"a day are consumed. Fifteen samples of water taken from  
"wells in the town have been analysed during the year. Four-  
"teen of these were condemned as unsuitable for drinking  
"purposes by the County Analyst. The houses, formerly  
"supplied by these wells, have now been connected with the  
"town supply. With the consent of the Local Government  
"Board the question of the drainage system has been allowed  
"to stand over for the present. It has been found necessary  
"to lay three new lengths of sewers where the existing sewers  
"were so delapidated that they were dangerous to health, and  
"in two places where the sewers had broken in they have been  
"repaired.

"BLOCKLEY.—The water works supplying the town of Blockley  
"have worked satisfactorily during the year. There has been  
"an ample supply, and a sample taken in the town and sent  
"for analysis was found to be satisfactory.

"The sewers became blocked on three occasions, and have been  
"cleaned out. There are three places in the sewers at  
"Blockley where they are liable to become blocked, two  
"places owing to insufficient fall and one from a rather sharp  
"bend in the sewer. The Council have now given instructions  
"that the drain rods be passed through these places  
"periodically, which I hope will obviate the trouble. The  
"sewage out-fall works have been kept in good order during  
"the year."

"At Paxford, a hamlet in the parish of Blockley, the water  
"supply is not yet satisfactory. There is plenty of water at  
"the spring but it is badly distributed by the existing mains.  
"The matter is at present receiving the attention of the  
"Council.

"At Draycott the taps and fittings on the water supply here are  
"not in a satisfactory condition."

Referring to Tredington, Dr. Findlay says:—

"As I have before reported I made house-to-house inspection of



" 206 houses in the parish and found 121 wells, of which  
" 54 were either said by the inhabitants of the house to yield  
" bad water, or from observations I made, seemed very liable  
" to pollution. Five samples taken from wells reported to be  
" good were all condemned by the analyst.

" I am thankful to say that up to the present time there has  
" been no outbreak of any disease in the parish traceable to  
" bad water, but with so many wells liable to pollution, or  
" known to yield indifferent water, I feel it my duty to again  
" bring the matter specially before the Council.

" The difficulty hitherto has been to find any better supply, but  
" now that the mains of the Shipston water works pass about  
" a mile from the nearest hamlet perhaps it would be possible  
" to get a supply from them.

" A new piece of sewer has been laid at Armscott and the sewer  
" ditches of all the hamlets have been cleaned out.

" The subject of bye-laws has been before the Council during  
" the year and will I hope soon be proceeded with. They  
" would be very useful especially at Shipston and Blockley."

In reply to a letter from the Clerk of the County Council, the  
Clerk of the Shipston Council wrote on 27th January, 1903:—

" The (Shipston) Council has not yet taken any action upon the  
" defective water supplies Dr. Findlay calls attention to, or  
" decided as to a set of Byelaws suitable for the District."

I commend these statements of the Medical Officer of Health and  
Clerk to your consideration.



TABLE A.

Area in acres, 2,289.		
Population 1891 ...	...	337
„ 1901 ...	...	292
<hr/>		
Decrease 1891-1901 ...	...	45
Estimated Population 1902		292
Name of Medical Officer of Health, W. CHURCHILL MOORE.		
<i>Mortality per 1,000 of Population living during same period.</i>		
Birth Rate, 17·1.	Nett Death Rate, 17·1.	
(a) Zymotic Death Rate, 0·0.	(b) Infantile Mortal, 200.	
Phthisis Death Rate, 3·0.	(c) Resp. Death Rate, 3·0.	
Smallpox Death Rate, 0·0.	Measles Death Rate, 0·0.	
Scarlatina Death Rate, 0·0.	Diphtheria and Membranous	
Whooping Cough Death Rate, 0·0.	Croup Death Rate, 0·0.	
(d) Fever Death Rate, 0·0.	(e) Diarrhœa Death Rate, 0·0.	
	(f) Enteritis Death Rate, 0·0.	
Cancer, Malignant Disease Death Rate, 0·0.		

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...								
Deaths ...								
Hospital Cases								
„ Deaths								

Diseases prevalent :—

Period :—

Schools Closed :—

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhœa.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhœa" are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
Epidemic enteritis;  
Zymotic enteritis;  
Epidemic diarrhœa. Summer diarrhœa;  
Dysentery and dysenteric diarrhœa;  
Choleraic diarrhœa, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhœa." Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	337	11	32.6	2	181	6	17.8					
1893.	337	8	20.7	1	125	3	8.9					
1894.	337	5	14.8		0.0	4	11.8	1				
1895.	337	7	20.8		0.0		0.0					
1896.	337	6	17.8		0.0	5	14.8		1			
1897.	337	7	20.8	2	285	7	20.8					
1898.	337	5	14.8		0.0	7	20.8					
1899.	337	5	14.8		0.0	3	8.9					
1900.	337	7	20.8		0.0	1	2.6					
1901.	292	7	24.0		0.0	4	14.0					
Averages for Years 1892-1901.	332	6	20.1		59	4	11.9					
1902.	292	5	17.1	1	200	5	17.1					

\* Rates calculated per 1,000 of population.

TABLE IV.  
Causes of, and Ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..								
Whooping-cough ... ..								
Diphtheria and membranous croup ... ..								
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued ... ..								
Epidemic influenza ... ..								
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..								
Enteritis ... ..								
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases... ..								
Phthisis ... ..	1					1		
Other tubercular diseases ... ..	1				1			
Cancer, malignant disease... ..								
Bronchitis ... ..								
Pneumonia ... ..	1					1		
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism ... ..								
Cirrhosis of liver ... ..								
Venereal diseases ... ..								
Premature Birth ... ..	1	1						
Diseases and accidents of parturition ... ..								
Heart diseases... ..								
Accidents ... ..								
Suicides ... ..								
.....								
.....								
.....								
.....								
.....								
All other causes... ..	1						1	
All causes ... ..	5	1			1	2	1	



*Stow-on-the-Wold Rural District (Worcestershire Parishes).*

Dr. W. Churchill Moore has succeeded Dr. Corke as Medical Officer of Health.

The parishes of Daylesford and Evenlode are the only ones in this District which are in Worcestershire.

Dr. Moore reports that Chickenpox was scheduled as a notifiable disease in March and that—

“An Isolation Hospital for the whole District situated as centrally  
“as possible is greatly needed and would do much towards  
“stamping out these outbreaks of Scarlet Fever which are only  
“too frequent occurrence.”

## Tenbury Rural District.

TABLE A.

Area in acres, 23,434.			
Population 1891	...	...	4,936.
„ 1901	...	...	4,838.
<hr/>			
Decrease 1891-1901	...	98.	
Estimated Population, 1902	4,830.		
Name of Medical Officer of Health, E. T. WHITAKER, M.D.			
<i>Mortality per 1,000 of Population living during same period.</i>			
Birth Rate, 22.9.		Nett Death Rate, 12.6.	
a) Zymotic Death Rate, 0.4.	(b) Infantile Mortal, 146.		
Phthisis Death Rate, 0.2.	(c) Resp. Death Rate, 2.2.		
Smallpox Death Rate, 0.0.	Measles Death Rate, 0.0.		
Scarlatina Death Rate, 0.0.	Diphtheria and Membranous		
Whooping Cough Death Rate, 0.2.	Croup Death Rate, 0.0.		
(d) Fever Death Rate, 0.0.	(e) Diarrhœa Death Rate, 0.2.		
	(f) Enteritis Death Rate, 0.0.		
Cancer, Malignant Disease Death Rate, 0.4.			

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			37			1	12	
Deaths ...								
Hospital Cases								
" Deaths								

Diseases prevalent :—

Period :—

Schools Closed:—

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhœa.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhœa" are to be included deaths certified as from diarrhœa, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhœa. Summer diarrhœa;  
 Dysentery and dysenteric diarrhœa;  
 Choleraic diarrhœa, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhœa." Deaths from diarrhœa secondary to some other well-defined disease should be included under the latter.



TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES, TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-Residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES, NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	4,930	123	24.9	19	15.4	70	14.2	11			70	14.2
1893.	4,900	132	26.9	13	9.8	77	15.7	5			77	15.7
1894.	4,900	110	22.4	13	11.8	67	13.6	6	4	2	65	13.2
1895.	4,900	124	25.1	14	11.2	62	12.6	7	2	1	61	12.4
1896.	4,838	107	22.1	15	14.0	68	14.0	10	2	2	68	14.0
Averages for Years 1897-1901.	4,893	119	24.2	14	12.4	68	14.0	7	1.6	1.0	66	13.4
1902.	4,830	109	22.9	16	14.6	60	12.4	8		1	61	12.6

\* Rates calculated per 1,000 of population.

*Tenbury Rural District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet fever ... ..								
Whooping-cough ...	1		1					
Diphtheria and membranous croup ...								
Croup ... ..								
Fever { Typhus ...								
{ Enteric ...								
{ Other continued								
Epidemic influenza ...	1		1					
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..	1		1					
Enteritis ... ..								
Puerperal fever ...								
Erysipelas ... ..	1						1	
Other septic diseases...								
Phthisis ... ..	1					1		
Other tubercular diseases ...								
Cancer, malignant disease ...	2					1	1	
Bronchitis ... ..	8	5		1			2	
Pneumonia ... ..	3					3		
Pleurisy ... ..								
Other diseases of Respiratory organs ...								
Alcoholism ... ..								
Cirrhosis of liver } ...	3					3		
Venereal diseases ...								
Premature birth ...	4	4						
Diseases and accidents of parturition ...								
Heart diseases ...	5					3	2	
Accidents ... ..	2		1			1		
Suicides ... ..	1					1		
.....								
.....								
.....								
.....								
All other causes ...	28	7		1		6	14	
All causes ...	61	16	4	2		19	20	



At the date of printing the final parts of my "Digest for 1902" (July 4th 1903), Dr. Whitaker's Report had not been received by the Clerk of the County Council.

G. H. F.

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*Tewkesbury Rural District (Worcestershire Parishes).*

TABLE A.

Area in acres, 10,019.			
Population 1891	...	...	2,488.
„ 1901	...	...	2,304.
<hr/>			
Decrease 1891-1901	...	...	184.
Estimated Population, 1902	...	...	2,293.
Name of Medical Officer of Health, A. FOWELL TURNER.			
<i>Mortality per 1,000 of Population living during same period.</i>			
Birth Rate, 23.5.	Nett Death Rate, 17.4.		
(a) Zymotic Death Rate, 0.0.	(b) Infantile Mortal, 129.		
Phthisis Death Rate, 2.6.	(c) Resp. Death Rate, 1.2.		
Smallpox Death Rate, 0.0.	Measles Death Rate, 0.0.		
Scarlatina Death Rate, 0.0.	Diphtheria and Membranous		
Whooping Cough Death Rate, 0.0.	Croup Death Rate, 0.0.		
(d) Fever Death Rate, 0.0.	(e) Diarrhoea Death Rate, 0.0.		
	(f) Enteritis Death Rate 0.4.		
Cancer, Malignant Disease Death Rate, 0.8.			

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...	1		1					1
Deaths ...								
Hospital Cases	1							
" Deaths								

Diseases prevalent :—

Period :—

Schools Closed :—

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



*Tewkesbury Rural District (Worcestershire Parishes).*

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES, TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES, NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	2,488	57	23.7	6	105	45	18.0					
1893.	2,488	68	27.2	5	73	41	16.4					
1894.	2,488	52	20.8	6	115	39	15.6					
1895.	2,488	57	22.9	3	52	28	11.2					
1896.	2,488	63	25.3	5	79	45	18.8					
1897.	2,488	62	24.9	4	64	52	20.8					
1898.	2,488	60	23.7	7	116	29	11.6					
1899.	2,488	54	21.7	3	53	30	12.0					
1900.	2,488	50	20.1	5	100	33	13.2					
1901.	2,293	58	25.1	2	34	25	10.8			2	27	11.7
Averages for years 1892-1901.	2,268	58	23.5	4	79	36	16.2			2	27	11.7
1902.	2,293	54	23.5	7	129	40	17.4					

\* Rates calculated per 1,000 of population.

*Tewkesbury Rural District (Worcestershire Parishes).*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..								
Whooping-cough ..								
Diphtheria and membranous croup ...								
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued								
Epidemic influenza ...	1					1		
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..								
Enteritis ... ..	1	1						
Puerperal fever ...								
Erysipelas ... ..								
Other septic diseases...								
Phthisis ... ..	5					5		
Other tubercular diseases ... ..	1	1						
Cancer, malignant disease ... ..	2					1	1	
Bronchitis ... ..	3						3	
Pneumonia ... ..								
Pleurisy ... ..								
Other diseases of Respiratory organs ...								
Alcoholism { ... ..								
Cirrhosis of liver { ... ..								
Venereal diseases ...								
Premature birth ...	1	1						
Diseases and accidents of parturition ..								
Heart diseases ...	9					2	7	
Accidents ... ..								
Suicides ... ..								
.....								
.....								
.....								
.....								
All other causes ...	17	4				7	6	
All causes ...	40	7				16	17	



*Tewkesbury Rural District (Worcestershire Parishes).*

Dr. Turner reports that this Division was remarkably free from notifiable disease during the year.

The solitary case of Smallpox was a lad who came to Bredon from an infected house at King's Norton, and the Medical Officer of Health of the latter District advised Dr. Turner of his arrival ; consequently, the case was kept under observation and removed to the Isolation Tent immediately the earliest symptom developed. This, with other precautionary measures adopted, stamped out the outbreak, and the patient made a good recovery. An arrangement was made between the Tewkesbury Urban and Rural Authorities, by which the Rural District Isolation Hospital was reserved for any Smallpox cases which might occur in either District, but only one such case was removed.

Dr. Turner writes :—

“ The year which is now closed has been marked by considerable  
 “ sanitary improvements. The drainage of the village of  
 “ Overbury, the rectification of the Teddington drainage, the  
 “ appointment by the Council of their Surveyor as manager  
 “ of the Bredon Irrigation land, the steps taken for the proper  
 “ Isolation and treatment of possible cases of Smallpox, the  
 “ formation and adoption of byelaws for the regulation of new  
 “ buildings are all matters of importance which will assist in  
 “ improving the sanitary condition of the District.”

The outfall works at Bredon are said to be “ very much improved.”

He also reports that “ the watersupply of the villages is  
 “ satisfactory. . . .”

The cottages in Crashmore Lane (Overbury),—

“ Which were closed in January, 1898, by order of the  
 “ Magistrates of the Tewkesbury Division have been altered  
 “ to meet the requirements of the County and District Authorities. . . . The watersupply is obtained from the village  
 “ main, and is laid on to each cottage. The drainage of these  
 “ cottages is not very satisfactory and should be examined  
 “ from time to time to see that no nuisance is created. . . .  
 “ During the year a new Vaccination Officer has been appointed and (Dr. Turner has) reason to believe that under  
 “ his supervision the Act will be more stringently carried out  
 “ than has hitherto been the case.”



## Upton-on-Severn Rural District.

TABLE A.

Area in acres, 50,031			
Population 1891	...	...	14,242
" 1901	...	...	14,273

Increase 1891-1901	...	...	31
Estimated Population, 1902	13,000*		

Name of Medical Officer of Health, J. S. COWLEY.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 25.2.		Nett Death Rate, 14.0.	
(a) Zymotic Death Rate, 0.4.		(b) Infantile Mortal, 67.0.	
Phthisis Death Rate, 1.1.		(c) Resp. Death Rate, 1.5.	
Smallpox Death Rate, 0.0.		Measles Death Rate, 0.0.	
Scarlatina Death Rate, 0.0.		Diphtheria and Membranous	
Whooping Cough Death Rate, 0.3.		Croup Death Rate, 0.07.	
(d) Fever Death Rate 0.0.		(e) Diarrhoea Death Rate, 0.0.	
		(f) Enteritis Death Rate, 0.1.	
Cancer, Malignant Disease Death Rate, 1.0.			

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup	Fever.	Erysipelas.	Puerperal Fever.
Cases ...			31	7			11	1
Deaths ...				1				
Hospital Cases			29	4				
„ Deaths								

Diseases prevalent:—Scarlet Fever and Whooping Cough.

Period:—October and November principally.

Schools Closed:—

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
 Epidemic enteritis;  
 Zymotic enteritis;  
 Epidemic diarrhoea. Summer diarrhoea;  
 Dysentery and dysenteric diarrhoea;  
 Choleraic diarrhoea, cholera, Cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.

\* Not including Powick Asylum.



## Upton-on-Severn Rural District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITU- TIONS.	Deaths of Non- residents registered in District.	Deaths of Residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES NETT.	
		Number.	Rate*	Number.	Rate per 1,000 Births registered.	Number.	Rate*				Number.	Rate*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.		430	26.3	55	107.4	407		78	3		329	20.1
1893.		455	27.8	49	107.6	322		71			251	15.3
1894.		339	23.6	42	123.0	320		95	3		225	15.6
1895.		419	29.2	39	93.0	328		77	3		251	17.4
1896.		384	26.7	54	140.0	344		94	2		250	16.0
1897.		370	27.1	42	113.0	317		77			241	17.6
1898.		343	25.1	23	67.0	313		106	3		207	15.1
1899.		337	25.2	36	106.8	283		91			192	14.3
1900.		334	25.0	44	131.0	365		128	5		237	17.7
1901.		303	23.3	31	102.3	281	19.6	134	116	1	175	13.4
Averages for years 1892-1901.		371	25.9	41	109.1	328		92			235	16.2
1902.		328	25.2	22	67.0	312	21.8	146	125	2	182	14.0

\* Rates calculated per 1,000 of population.

*Upton-on-Severn Rural District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All Ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								1
Scarlet Fever ... ..								
Whooping-cough ... ..	5	3	2					
Diphtheria and membranous croup ... ..	1			1				
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued ... ..								1
Epidemic influenza ... ..								
Cholera ... ..								
Plague ... ..								
Diarrhœa ... ..								
Enteritis ... ..	2	1	1					2
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases ... ..								
Phthisis ... ..	18				7	11		20
Other tubercular diseases ... ..								
Cancer, malignant disease ... ..	14					8	6	2
Bronchitis ... ..	9	1	1			3	4	2
Pneumonia ... ..	11	3	1	1		3	3	7
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism ... ..								
Cirrhosis of liver ... ..	1					1		
Venereal diseases ... ..								
Premature Birth ... ..	4	4						1
Diseases and accidents of parturition ... ..	1					1		
Heart diseases ... ..	26	1			1	7	17	10
Accidents ... ..	7		1		1	2	3	
Suicides ... ..	1					1		
Influenza ... ..	1					1		
Malformation ... ..	3	3						
Doubtful existence ... ..	1	1						
Colitis ... ..								16
All other causes ... ..	91	5	1	4	2	21	58	84
All causes ... ..	196	22	7	6	11	59	91	146



Dr. Cowley says:—

*Death-rate.*—Taking the population as 13,000, the Death-rate “is equivalent to 14·0 per 1,000 per annum. This is the nett rate; with the Asylum deaths it would be 21·8.”

Plans for a new Isolation Hospital, consequent upon the dissolution of the Pershore and Upton Joint Hospital Board are now before the Local Government Board. The cottage, which formerly served as a Hospital, having been improved, 28 infectious cases were treated there; and in addition, 3 were sent to Malvern, 1 to Worcester, and 1 to Tewkesbury Hospitals.

It is stated that the Vaccination Act is well carried out.

A scheme for sewerage Powick at a cost of £3,275 is now well nigh complete, and towards this the Lady Abbess of the Covent has generously contributed £1,000.

Referring to Upton-on-Severn drainage, Dr. Cowley says:—

*Upton-on-Severn Drainage.*—The pollution of the river Severn “by the drainage from Upton-on-Severn, and other more “populous places, has been the subject of communication “from the Cheltenham Municipal Authority, who take a “portion of their water supply from the river at Tewkesbury. “The pollution is not denied, but it was pointed out by you “that it was small in comparison to that from such places as “Worcester and Stourport. Your Council had various samples “of water from the river, taken both above and below the “outfall, and curiously the result showed that the water was “purer below the outfall after receiving the sewage than above. “It is practicably impossible to make the water of a navigable “river in its lower reaches pure, with a considerable boat “population, and richly manured land bordering its tributaries.

“A branch sewer up the roadway known as London Lane “was defective and had to be re-constructed, and some im-

*Upton-on-Severn Rural District.*

"portant house drains directly connected with the sewer have  
 "been intercepted, otherwise there is no change from what I  
 "referred to in my report of last year. There is no systematic  
 "scavenging except that the streets are swept twice weekly."

As to Hanley Swan, the Clerk of the Rural District Council writes, 21 February, 1903, "a scheme is now being prepared to deal with  
 "the defective sewage disposal" and of Upton he writes on the same day, "an Engineer has been appointed to make an inspection and  
 "report on the question."

Dr. Cowley this year makes no reference to Ripple, but in his Annual Report for 1901 he stated:—

"That the scheme for the drainage of Ripple, had been  
 "permitted to lapse, as the Parish had substituted a new  
 "sewer for the old one."

In connection with this, the Clerk of the District Council wrote the Clerk of the County Council on the 21 February, 1903, as follows:—

"Certain works have been carried out at Ripple which in the  
 "opinion of the Council are sufficient to remedy matters there:  
 "that there is now no nuisance and no necessity for a further  
 "scheme."

Nothing has been decided as to the defective drainage of Kempsey, but I understand the District Council have instructed their Engineers to prepare a scheme.

It is stated that the recent drainage scheme at Guarlford on the bacterial tank methods, is working well.

The Slaughter-houses, Dairies, Bake-houses, and Canal Boats have all been duly inspected, but it is mentioned that the administration of the Factory and Workshops' Act, 1901, has only been incompletely carried out as the Inspector has been much occupied with other duties. Dr Cowley, however, adds:—

"Probably it affects this as little as any District, we have no  
 "factories."



As to House Accommodation, it is stated:—

"In many of the Parishes a better class house is requisite for  
"the working classes, and the older ones removed. In the  
"latter, the upper rooms are entirely in the roof sometimes, and  
"there is a want of light and ventilation."

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*Winchcombe Rural District (Worcestershire Parish).*

TABLE A.

Area in acres, 1,560.			
Population 1891	...	...	126.
" 1901	...	...	116.
<hr/>			
Decrease 1891-1901	...	...	10.
Estimated Population, 1902			116.

Name of Medical Officer of Health, Wm. Cox.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 34.4.	Nett Death Rate, 25.8.
(a) Zymotic Death Rate, 0.0.	(b) Infantile Mortal, 250.
Phthisis Death Rate, 0.0.	(c) Resp. Death Rate, 8.6.
Smallpox Death Rate, 0.0.	Measles Death Rate, 0.0.
Scarlatina Death Rate, 0.0.	Diphtheria and Membranous
Whooping Cough Death Rate, 0.0.	Croup Death Rate, 0.0.
(d) Fever Death Rate, 0.0.	(e) Diarrhoea Death Rate, 0.0.
	(f) Enteritis Death Rate 0.0.

Cancer, Malignant Disease Death Rate, 8.6.

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup.	Fever.	Erysipelas.	Puerperal Fever.
Cases ...								
Deaths ...								
Hospital Cases								
„ Deaths								

Diseases prevalent :—

Period :—

Schools Closed :—

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
Epidemic enteritis;  
Zymotic enteritis;  
Epidemic diarrhoea. Summer diarrhoea;  
Dysentery and dysenteric diarrhoea;  
Choleraic diarrhoea, cholera, cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES. NETT.	
		Number.	Rate.*	Number.	Rate per 1,000 Births registered.	Number.	Rate.*				Number.	Rate.*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	126	7	55.5			2	15.9					
1893.	126	6	48.1			1	7.9					
1894.	126	5	39.6	2	400	3	23.8					
1895.	126	4	37.1			1	7.9					
1896.	126	5	39.6	1	200	2	15.9					
1897.	126	3	23.8			2	15.9					
1898.	126	6	48.1	1	166	2	15.9					
1899.	126	6	48.1			2	15.9					
1900.	126	5	39.6			1	7.9					
1901.	116	3	25.8			2	17.1					
Averages for years 1892-1901.	122	5	40.2		76	1	14.3					
1902.	116	4	34.4	1	250	3	25.8					

\* Rates calculated per 1,000 of population.

*Winchcombe Rural District (Worcestershire Parish).*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..								
Scarlet Fever ... ..								
Whooping-cough ... ..								
Diphtheria and membranous croup ... ..								
Croup ... ..								
Fever { Typhus ... ..								
{ Enteric ... ..								
{ Other continued ... ..								
Epidemic influenza ... ..								
Cholera ... ..								
Plague... ..								
Diarrhœa ... ..								
Enteritis ... ..								
Puerperal fever ... ..								
Erysipelas ... ..								
Other septic diseases... ..	I	I						
Phthisis ... ..								
Other tubercular diseases ... ..								
Cancer, malignant disease ... ..	I						I	
Bronchitis ... ..	I						I	
Pneumonia ... ..								
Pleurisy ... ..								
Other diseases of Respiratory organs ... ..								
Alcoholism ... ..								
Cirrhosis of liver ... ..								
Venereal diseases ... ..								
Premature birth ... ..								
Diseases and accidents of parturition ... ..								
Heart diseases ... ..								
Accidents ... ..								
Suicides ... ..								
.....								
.....								
.....								
All other causes ... ..								
All causes ... ..	3	1					2	



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*Winchcombe Rural District (Worcestershire Parish).*

Cutsdean is the only Worcestershire parish in this District.

## Yardley Rural District.

TABLE A.

Area in acres, 7,590			
Population 1891	...	...	17,141
" 1901	...	...	33,946
<hr/>			
Increase 1891-1901	...	...	16,805
Estimated Population, 1902			36,030

Name of Medical Officer of Health, GEO. WILSON, M.D., D.P.H.

*Mortality per 1,000 of Population living during same period.*

Birth Rate, 32.2.		Nett Death Rate, 13.0.	
(a) Zymotic Death Rate, 1.47.		(b) Infantile Mortal, 115.	
Phthisis Death Rate, 0.8.		(c) Resp. Death Rate, 2.5.	
Smallpox Death Rate, 0.0.		Measles Death Rate, 0.2.	
Scarlatina Death Rate, 0.3.		Diphtheria and Membranous	
Whooping Cough Death Rate, 0.2.		Croup Death Rate, 0.4.	
(d) Fever Death Rate 0.08.		(e) Diarrhoea Death Rate, 0.08.	
		(f) Enteritis Death Rate, 0.05.	
Cancer, Malignant Disease Death Rate, 0.5.			

	Smallpox.	Measles.	Scarlatina.	Diphtheria.	Membranous Croup	Fever.	Erysipelas.	Puerperal Fever.
Cases ...	6		290	117	2	30	40	
Deaths ...			11	17		3		
Hospital Cases	6		188					
" Deaths			7					

Diseases prevalent:—Measles, Scarlatina, Diphtheria.

Period:—

Schools Closed:—Stetchford, Sparkhill, Greet, on account of Measles;  
College Road and Greet, on account of Diphtheria.

- (a) Includes Smallpox, Measles, Scarlatina, Diphtheria, Whooping Cough, Fever and Diarrhoea.
- (b) Estimated by measuring the proportion of deaths of infants under 1 year per 1,000 of the births registered during the same period.
- (c) Includes Bronchitis, Pneumonia, Pleurisy.
- (d) Includes Typhus, Enteric Fever, and indefinite forms of continued Fevers.
- (e) Under the heading of "Diarrhoea" are to be included deaths certified as from diarrhoea, alone or in combination with some other cause of ill-defined nature; and also deaths certified as from  
Epidemic enteritis;  
Zymotic enteritis;  
Epidemic diarrhoea. Summer diarrhoea;  
Dysentery and dysenteric diarrhoea;  
Choleraic diarrhoea, cholera, Cholera nostras (in the absence of Asiatic cholera).
- (f) Under the heading of "Enteritis" are to be included those certified as from Gastro-enteritis, Muco-enteritis and Gastric catarrh, unless from information obtained by enquiry from the certifying practitioner or otherwise, the Medical Officer of Health should have reason for including such deaths, especially those of infants, under the specific term of "Diarrhoea." Deaths from diarrhoea secondary to some other well-defined disease should be included under the latter.



## Yardley Rural District.

TABLE I.  
FOR WHOLE DISTRICT.

YEAR.	Population estimated to Middle of each Year.	BIRTHS.		DEATHS UNDER ONE YEAR OF AGE.		DEATHS AT ALL AGES. TOTAL.		DEATHS IN PUBLIC INSTITUTIONS.	Deaths of Non-residents registered in District.	Deaths of Residents in Public Institutions registered beyond District.	DEATHS AT ALL AGES NETT.	
		Number.	Rate*	Number.	Rate per 1,000 Births registered.	Number.	Rate*				Number.	Rate*
1	2	3	4	5	6	7	8	9	10	11	12	13
1892.	18,110	551	30.5	66	119	259	14.3	4	4	10	265	14.6
1893.	18,850	573	30.4	73	125	266	14.0	6	6	6	266	13.7
1894.	20,750	558	26.8	70	125	243	11.7	9	9	11	245	11.8
1895.	21,500	565	26.2	70	123	274	12.7	13	13	5	266	12.3
1896.	23,200	577	24.8	61	105	307	13.1	14	14	8	301	12.9
1897.	26,450	685	25.8	93	135	326	12.3	14	14	10	322	12.1
1898.	28,300	833	29.0	121	145	340	12.3	6	6	10	344	12.4
1899.	30,500	864	28.0	115	133	369	12.1	6	6	12	375	12.2
1900.	33,700	983	30.0	120	122	436	13.9	10	10	11	437	13.9
1901.	34,350	1041	30.2	128	122	431	12.5	12	12	11	430	12.5
Averages for years 1892-1901.	25,471	723.0	28.3	91.7	126	325.1	12.7	9.4	9.4	9.4	325.1	12.7
1902.	36,030	1161	32.2	134	115	461	12.7	8	8	17	470	13.0

\* Rates calculated per 1,000 of population.

*Yardley Rural District.*

TABLE IV.

Causes of, and ages at, Death during Year 1902.

CAUSES OF DEATH.	DEATHS IN WHOLE DISTRICT AT SUBJOINED AGES.							Total Deaths in Public Institutions in the District.
	All Ages.	Under 1.	1 and under 5.	5 and under 15.	15 and under 25.	25 and under 65.	65 and upwards.	
Small-pox ... ..								
Measles ... ..	10	3	6	1				
Scarlet Fever ... ..	11		6	5				
Whooping-cough ... ..	9	4	5					
Diphtheria and membranous croup ... ..	17		8	1	1			
Croup ... ..								
Fever { Typhus ... ..								
Enteric ... ..	3					3		
Other continued								
Epidemic influenza ... ..	5					2	3	
Cholera ... ..								
Plague ... ..								
Diarrhœa ... ..	3	1	1			1		
Enteritis ... ..	2	1					1	
Puerperal fever ... ..								
Erysipelas ... ..	1		1					
Other septic diseases...								
Phthisis ... ..	29				7	22		
Other tubercular diseases ... ..	8		3	2	2	1		1
Cancer, malignant disease ... ..	21					16	5	1
Bronchitis ... ..	43	6	3	1		12	21	
Pneumonia ... ..	48	12	17		1	14	4	
Pleurisy ... ..	1					1		
Other diseases of Respiratory organs ... ..	2					1	1	
Alcoholism ... ..								
Cirrhosis of liver } ... ..	10					8	2	
Venereal diseases ... ..								
Premature Birth ... ..	28	28						
Diseases and accidents of parturition ... ..	1					1		
Heart diseases ... ..	28			1	1	14	12	
Accidents ... ..	9	3	2	2		2		
Suicides ... ..	4					3	1	
.....								
.....								
.....								
.....								
All other causes ... ..	177	76	14	8	1	25	53	6
All causes ... ..	470	134	66	28	13	126	103	8



*Yardley Rural District.*

Dr. Wilson writes:—

“Although the Vital Statistics for the year are not so satisfactory as during the previous years on account of the exceptional prevalence of Scarlet Fever and Diphtheria, there has been a very low general Death-rate, and the rate of Infant Mortality is also considerably below the average.”

“Although the number of cases of Scarlet Fever, and more especially of Diphtheria and Diphtheritic sore throats, were much above the average of previous years, it must be remembered that the population of the District is increasing at a rapid rate, and the case mortality of each of these diseases was very low.”

Referring to Smallpox, Dr. Wilson says:—

“The cases of Smallpox occurred at different periods of the year, and all of the cases contracted the infection outside the District, so that there was no spread of the disease in any single instance. The first two cases were isolated in the cottage adjoining the Solihull Joint Isolation Hospital, and the other 4 were removed to the King's Norton Joint Isolation Hospital for Smallpox, where a temporary hut was erected to receive patients in May, and which did good service until the new Joint Smallpox Hospital was completed later on in the year. In addition to prompt removal of the cases, and disinfection of premises, etc., all contacts consented to be re-vaccinated and were kept in quarantine for a fortnight, and the results of these precautionary measures were eminently satisfactory. Now that there is ample accommodation provided in the New Joint Smallpox Hospital at King's Norton, there will be less trouble and anxiety in dealing with cases should any more unfortunately crop up.

“As regards hospital accommodation for other cases of infectious disease, the old Joint Isolation Hospital for Yardley and Solihull, which has done such excellent service for years back, can no longer meet the requirements of both Districts, nor, indeed, of Yardley alone. It has, therefore, been resolved to erect a separate hospital for Yardley, but, even with a due amount of expedition, I am afraid that it will take very probably two years at least before a new hospital is completed, and apart from the Site, I feel sure that the whole of the necessary buildings will entail an outlay even at the lowest estimate, of £12,000.

“Hospital accommodation is quite as necessary for the isolation and treatment of cases of Enteric Fever and Diphtheria as for cases of Scarlet Fever: while last year only cases of Scarlet Fever could be received, and for a time, only the most urgent cases could be admitted. I hope, therefore,



" that steps will be taken to procure a suitable Site, and proceed with the erection of a new Hospital without delay. . . .

" Of the 10 deaths attributed to Measles, 5 occurred in Sparkhill, 2 in Greet, and 3 in Stechford, and the disease assumed such prevalence in Stechford in April that I gave a certificate to close the schools for a time. The deaths attributed to Whooping Cough occurred during the second and third quarters of the year, and were scattered cases. Of the 11 deaths due to Scarlet Fever, 7 occurred in the Joint Isolation Hospital, and the other 4 in their own homes. The disease continued to be more or less prevalent throughout the year, but became more prevalent during the last quarter, and especially among the children attending College Road and Greet Schools. Altogether the number of cases notified during the year amounted to 290, which were distributed as follows :—

" 136 in Sparkhill, 37 in Greet, 55 in Haymill, 19 in Stechford, 9 in Yardley, 27 in Acock's Green, and 7 in Yardley Wood and Hall Green. Out of this number 188 cases were removed to the Isolation Hospital, but, towards the close of September, the hospital accommodation became so strained that only the more severe or pressing cases could be admitted, and lighter cases were treated at home. After November 19, the hospital accommodation was not so severely taxed, and it became possible to remove all cases recommended for removal. During this period of seven weeks, there were as many as 24 single cases treated at home, from which there was no further spread, and during the whole year 59 such cases. In only 14 instances where patients were not removed, did any other cases arise in the same household, and these included families in which two or three cases were notified on the same date, and as regards which, if the cases were mild, removal could do little good, because the mischief had already been done. The great majority of the cases were of an exceedingly mild type, and no doubt a certain proportion escaped notice altogether, but even during the period when all cases recommended for removal could not be admitted into hospital, there was no exceptional spread of the disease, and indeed the number of notifications began to decrease towards the middle of November.

" Of the 17 deaths attributed to Diphtheria, 7 occurred in Sparkhill, 7 in Greet, 2 in Hall Green, and 1 in Hay Mill. Including 2 cases of membranous croup, the total number of cases of the disease which were notified during the year amounted to 117, and 80 of these were notified during the last quarter. The disease assumed special prevalence among the children attending College Road and Greet Schools.



"The great majority of the cases were of a comparatively mild type, and though every care was taken in immediately reporting every case notified to the School Board, and preventing all children from attending school belonging to infected households until after disinfection of the premises and a clean bill of health was established, the spread of the disease was not checked until, as reported at the time, the schools were closed at an earlier date than usual before the Christmas holidays. None of the cases could be traced to milk origin, and there is no doubt the infection was spread through attendance at school of mild and unsuspected cases. As regards the distribution of cases, 48 were notified from Sparkhill, 55 in Greet, 10 in Hall Green and Tysely, 3 in Hay Mill, and only 1 each in Stechford, Yardley and Acock's Green."

Dr. Wilson says that a large amount of sanitary work is being carried out in the District and that plans for the duplication of the Yardley outfall sewer, and for the extension of the sewers to the outlying parts of the District as well as for improving the sewage treatment at Cole Hall and Acock's Green Sewage Farms on the bacteria methods before being turned on to land have been prepared. The provision of the sewers will be the immense gain of abating the abominable nuisance in scavenging dumbwells.

Referring to the administration of the Factories and Workshops, Dr. Wilson advised —

"The appointment of a qualified Assistant in the Surveyor's office to co-operate with the Sanitary Inspector in taking all the necessary measurements as regards cubic space and ventilation details, etc., as well as particulars in respect to cleanliness of premises, nature and amount of sanitary conveniences, and other data under the Act. Apart from inspections by (himself), detailed inspection has been carried out under (his) direction, and, as far as it has been possible to ascertain, the register has now been completed. The sanitary defects are not numerous, and the particulars entered in the register are briefly summarised in the report of the Sanitary Inspector."



*Reports of Sanitary Inspectors.*

The number of Sanitary Inspectors is the same as 1901, viz., 31, and one Assistant Inspector (Mr. A. T. Cottle, King's Norton). Their names, qualifications and summaries of the work they carried out last year are given in Table XVII.

The Sanitary Inspectors of the Bromsgrove Urban and Tewkesbury and Winchcombe Rural Districts have sent no report.

The Sanitary Inspectors send their Reports to me as a matter of courtesy; so I again take this opportunity of thanking them for doing so. In addition to which I desire to express my obligation to them for invariably assisting me whenever I ask them to do so.

*Evesham Borough.*

Mr. Harvey submits a detailed report upon 136 "Workshops" and 14 "Factories" in the Borough; and describes the sanitary condition of each. It appears that not more than 30 workpeople are employed at any factory, and consequently the provisions of the Factory and Workshops' Act, 1901, with regard to fire-escape does not apply. The Public Health Acts, Amendment Act, 1890 s. 22, is in force, so the defective closet accommodation of two factories will have to be dealt with. Inspections of huts and outbuildings tenanted by strangers employed in the Market Gardens, have been made, and resulted in the closure of one such place.

The Isolation Hospital has been improved and enlarged under Mr. Harvey's supervision, as Building Surveyor for the Borough.

*Kidderminster Borough.*

As usual Mr. Cowderoy presents an exhaustive report, giving details of the work carried out during the year at the Dairies, Cowsheds and Milk Shops, Slaughter-houses, Common Lodging-houses, Bake-houses, Factories and Workshops, Canal Boats and Scavenging.

Mr. Cowderoy writes:—

"During the last eighteen years, we have so reduced the  
"numbers of privies and middens that now only one cart is  
"needed to be on night-work one week in every five-and-a-  
"half weeks."

No less than "1713 prohibition notices have been served on  
"parents, School Masters and Mistresses, to keep children from  
"attending School from houses where infectious diseases occurred."  
The Drain Testing apparatus has been frequently used.



A considerable amount of unsound food has been destroyed, and one of two Magisterial Convictions obtained, had reference to selling pastry adulterated with 10 per cent. of maze flour.

60 Samples have been taken under the Sale of Food and Drugs Acts, 5 of which were reported to be adulterated.

Mr. Cowderoy also presents Meteorological Reports upon daily observations made during the year.

*Lye and Wollescote Urban District.*

Mr. Poole mentions that he made a systematic inspection of the District and found "the lime-washing and cleansing of houses was generally bad (and) a great number of uncovered ashpits and dilapidated privies (which) are generally built 2 or 3 feet below ground level."

He adds that a great number of the latter have been re-built.

*Malvern Urban District.*

Mr. Hillyard has carefully inspected the 126 Workshops in the District, and presents a most exhaustive report. Some little overcrowding was met with, and a large number of sanitary defects have already been dealt with. The previous Workshops' Acts were enforced, but Mr. Hillyard was unable, owing to pressure of work in former years to give sufficient attention to them.

The Housing of the Working Classes, the Slaughter-houses, Dairies and Cowsheds in the District have been decidedly improved, and much excellent house-drain work has been carried out. No less than 34 certificates as to good sanitation of the houses were issued during the year; no such certificate is ever granted, until the drains and waste-pipes have been most carefully tested hydraulically and with smoke: nor unless the whole of the work is thoroughly "up to date."

*Oldbury Urban District.*

Mr. Robbins also makes an exhaustive report and says that he has "to record with some satisfaction, the marked change which is taking place in the health condition of . . . the District"; and he adds:—

" Our attention and efforts have been directed to the conditions  
" of dwellings and their surroundings in which the poorer  
" parts of the people live. We have visited from time to  
" time these homes and have found that the occupants do not  
" realise the necessity of following a real and true course of  
" cleanly existence. Their habits are such that they violate  
" every household sanitary law, and make their homes the



“ nurseries of disease by allowing the houses, bedrooms not  
“ excepted, to be the receptacles of rubbish, to the exclusion  
“ of proper air-space and ventilation, and should there be  
“ proper apertures for fresh air these invariably are choked by  
“ old clothes or other filthy media, thus adding to the in-  
“ sanitary conditions already prevailing.”

Privy middens are being largely replaced by “good and sufficient”  
“water closets” and “drain inspection” has caused “continuous  
work.” Successful efforts have been made to abolish the use of  
well water and to connect the dwellings with the water-mains. 125  
Workshops have been registered, and the attention of the owners  
and occupiers are being called to the Workshops’ Acts.

The contractors for Scavenging have been obliged to do their  
work well and expeditiously. Cleansing of courts and yards is still  
followed out, and where possible, such places are being “partly or  
wholly paved.”

300 inspections of the Canal Boats were made during the year,  
and “59 contraventions of Acts” have received attention. Some  
boats were so dilapidated that they were taken off the Register.

*Redditch Urban District.*

Mr. Jameson prefaces his full report, by the statement that—

“The epidemic of Scarlatina . . . towards the end of the  
“year completely altered the regular routine work of the  
“office.”

He also says:—

“Through pressure of other duties little time could be given  
“to the work (of the House-to-House Survey).”

In October he prepared a Special Report with reference to the  
privy middens in the District. It is stated that only 38 of these  
are in existence, and 9 of them have recently been abolished.  
Furthermore, Mr. Jameson says, he will “endeavour to still further  
“reduce the number of these objectionable places.” There are only  
25 wells in use, and analysis of each did not show that the water  
was unfit for use.

The management of a Slaughter-house, “used by several butchers,”  
caused some trouble, but “considerable pressure had been brought to  
“bear, (so) . . . the premises have now been taken over by one  
“person (and) there is every reason to expect good management.”

The Meat and Fish Supplies, Offensive Trades, Bake-houses, and  
Common Lodging-houses, receives constant attention; and a special  
report on the Dairies will be presented during the coming year.



"The time given to the administration of (the Factory and Workshops Acts) has been limited."

"The two thousand 'Hints on the Management and Feeding of  
" 'Infants, prepared by the late Medical Officer, were  
" 'distributed.'"

Attention is called to "a great many nuisances caused through  
" occupiers of houses throwing filth and refuse into the streets."

*Stourbridge Urban District.*

Mr. Kent presents an important report, which summarizes the work associated with the service of 254 Statutory Notices, and prosecution of "proceedings" in 17 instances, details of the action taken, and results obtained with reference to the Dairies and Cowsheds, Bake-houses, Common Lodging-houses and Slaughter-houses, are described, 8 Samples were submitted to the County Analyst under the Sale of Food and Drugs Act, and all were reported to be genuine.

Mr. Kent states that "there are still many houses in the District  
" supplied with well water."

Considerable action has been taken under the Factory and Workshops' Act, 1901, with regard to 159 Workshops, and on the 28th January last, "large bills were posted . . . calling the attention of  
" owners and occupiers . . . to their legal obligations under the  
" Act."

Decided improvement seems to have been made in defective houses. Drain testing is carried out.

Mr. Kent also asked for the adoption of Byelaws under the Public Health Acts, Amendment Act, 1890, Sec. 26 (2), with the view of compelling, when necessary the provision of portable receptacles for house refuse.

No less than 140 privies were converted to W.C.'s during 1901.

The Public Health Acts, Amendment Act, 1890 was adopted in 1901, and came into force on January 1st, 1902; so additional important powers are conferred on the District Council.

Five butchers were found to be slaughtering on unlicensed premises, 3 of whom have since been licensed and 1 has erected a Slaughter-house.

*Droitwich Rural District.*

Mr. Stevens says the Ombersley Sewerage is still "under the  
" consideration of the Council and that great improvement has been  
" made at Old Northwick (Claines) . . . and a drainage scheme

"carried out (by Mrs. W. Lea), the District Council undertaking to "put down the necessary out-fall works" (Bacteria Tanks).

At Earl's Common, "no good water (is) available unless a scheme "is carried out at considerable expense by the District Council."

Mr. Stevens writes (January 14th, 1903): "that the Register of "Workshops will not be complete for several weeks," and adds that there are 10 Bake-houses in the District.

The Dairies and Slaughter-houses are reported upon and it is said that "the Gipsies on Hartlebury Common are as numerous as "ever."

*Evesham Rural District.*

Mr. Harvey presents a detailed report upon the 43 Workshops and 9 Factories in the District, and describes the sanitary condition of each of them. He also describes several sewage improvements carried out under his supervision. He refers to the complete sewerage scheme he has prepared for Broadway, and which no doubt will be carried out as soon as a loan is to be applied for. He also prepared plans for a sewerage scheme at Badsey.

*Feckenham Rural District.*

Mr. Perkins presented a most complete report upon the 71 Workshops and 17 Factories, showing the sanitary defects—if any—met with at each. A noticeable feature of his report is that the sanitary conveniences of several "Factories" are not what they should be: as the Public Health Act, 1890 s. 22 is in force he will take action in the matter. Mr. Perkins reports that at 2 "Factories where more "than 40 persons are employed, additional exits for escape of fire "are needed:" and here too, action is contemplated.

The Scavenging in Feckenham Parish, carried out by the Council's staff, under Mr. Perkins's supervision is "being well looked after."

*Halesowen Rural District.*

*(1) Halesowen Division*

Mr. Russell says he has had several of the Cowsheds closed and new ones built "to comply with the Council's Byelaws."

*(2) Cradley Division.*

Mr. Whitworth says:—

"The Council have issued orders for the provision of sufficient "W.C. accommodation in place of the now insufficient and "defective privy accommodation. The owners of which "property have simply repaired . . . the existing privies . . .



"My Council are now considering what steps shall be taken in these matters."

*Kidderminster Rural.*

Mr. Steadman presents a report giving details of nuisances dealt with, and of infectious diseases notified. The action taken under the Public Health Water Act and with respect to Bakehouses, Slaughter-houses, and Canal Boats is described.

He says there were three breaches of the "Byelaw relating to Nuisances, which he caused to be remedied."

Mr. Steadman also reports upon the 39 Workshops and 3 Factories in the District, and says there are three of the latter employing more than 40 persons, and that "there is proper means of escape from fire."

*Pershore Rural District.*

Mr. Moulson presents a very full report with regard to the Factories and Workshops, and mentions the sanitary defects to be found at each of the 46 Workshops in the Register. He also mentions that parts of the sewers at Wyre and Moor have been relaid with socket pipes.

*Upton-on-Severn Rural District.*

Mr. Price gives details of the work with regard to sewerage and watersupply carried out under his supervision; and the cost of which he says was about £578.

I also know that Mr. Price has recently prepared a scheme for dealing with the sewerage of Guarlford by means of bacterial filters.

*Yardley Rural District.*

Mr. W. Brown gives details of sanitary work he has carried out and of the action he has taken under the Infectious Diseases Notification Act and the Public Health Water Act.

He mentions that with reference to the 173 persons registered as Purveyors of Milk and Cow-keepers that in 33 instances contraventions of the Act were dealt with, and in one instance the sale of milk was stopped on account of infectious disease.

He also refers to the notices issued with regard to Slaughter-house nuisances, and that 30 Canal Boats have been inspected but no infringements of the Act discovered.

He says that under the Factory and Workshop Act, 26 Bakehouses, 65 Workshops, and 21 Factories were registered, and that action was taken against a Firm of Manufacturers of Manure for

carrying on their trade so as to be a nuisance, and that a conviction was obtained.

I know that this decision was "appealed" against, but the Court of Quarter Sessions upheld the action of the Yardley Magistrates.

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In conclusion, I submit the following Statistical Tables, and have the honour to be,

My Lords and Gentlemen,

Your obedient Servant,

G. H. FOSBROKE, D.P.H., Camb.,  
County Medical Officer.

SHIREHALL, WORCESTER,

*June 1903.*



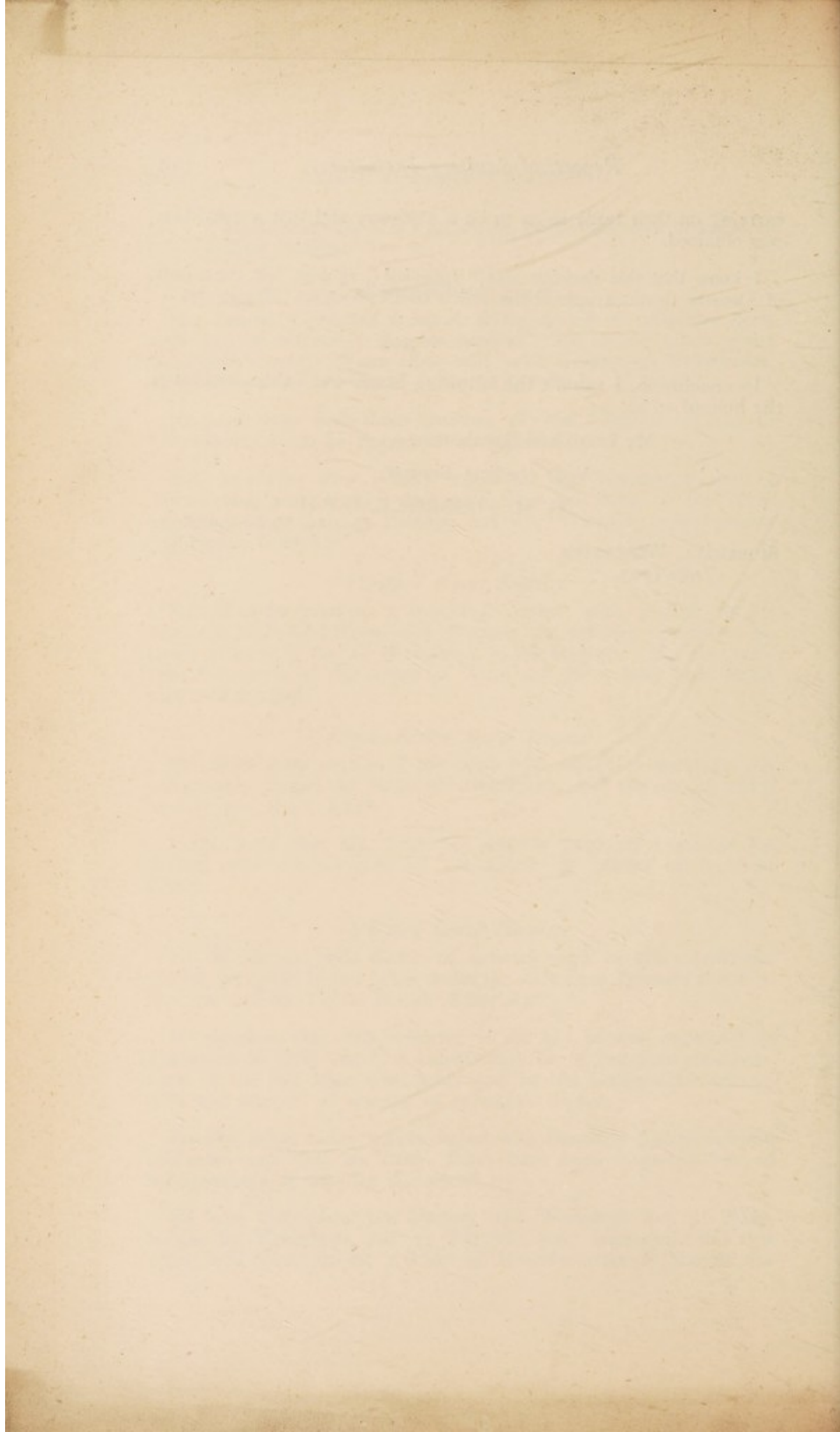


TABLE XV.

\* The Medical Officers of the Districts marked with an asterisk give details of the *total* death rate, instead of the *net* death rate.

\* The Medical Officers of the Districts marked with an asterisk give details of the *total* death rate, instead of the *net* death rate.



1870

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Table XVI. showing Populations, Birth-rates, and Death-rates for 1902.

## URBAN DISTRICTS.

DISTRICT.	Population (Census 1901).	Birth rate per 1000 of Population.	Net Death rate per 1,000 of Population.	Infantile Mortality per 1,000 registered births.	Phthisis death rate per 1,000 of Population.	Respiratory death rate per 1,000 of Population.	Cancer death rate per 10,000 of Population.	Mortality per 1,000 of population for						
								Smallpox.	Measles.	Scarlatina.	Diphtheria	Whooping Cough.	Fever.	Diarrhoea.
Bewdley Borough - - -	2866	26.5	18.1	92	1.0	2.09	3.4	0.0	1.74	0.0	0.0	0.0	0.69	0.0
Bromsgrove - - -	8418	28.9	13.4	57	0.8	1.5	10.6	0.0	0.0	0.4	0.11	0.0	0.0	0.4
Bromsgrove, North - -	5688	30.6	7.8	56	0.6	1.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Droitwich Borough - -	4201	24.5	11.7	58	0.9	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Evesham Borough - - -	7101	30.8	14.5	132	0.7	1.7	2.0	0.0	0.2	0.0	0.8	0.14	0.0	0.0
Kidderminster Borough -	24681	25.1	16.6	141	1.09	3.7	11.0	0.0	0.5	0.04	0.08	0.0	0.0	0.5
King's Norton and Northfield-	57122	30.1	11.6	109	0.7	1.5	4.0	0.0	0.06	0.2	0.2	0.2	0.11	0.2
Lye and Wollescote - -	10976	34.0	14.7	116	0.9	2.1	7.2	0.0	0.18	0.6	0.18	0.0	0.09	0.3
Malvern - - -	16449	18.9	12.2	92	0.5	1.7	10.0	0.0	0.05	0.0	0.0	0.2	0.0	0.0
Oldbury - - -	25191	38.4	16.7	143	0.5	3.6	6.0	0.0	0.58	1.2	0.07	0.07	0.23	0.3
Redditch - - -	13493	29.2	13.2	156	1.2	2.5	8.0	0.0	0.0	0.07	0.2	0.7	0.2	0.1
Stourbridge - - -	16302	28.3	14.7	109	0.9	3.1	7.2	0.0	0.0	0.3	0.0	0.06	0.2	0.2
Stourport - - -	4529	23.4	13.3	111	2.2	2.2	6.0	0.0	0.0	0.0	0.2	0.6	0.0	0.6

## RURAL DISTRICTS.

Bromsgrove - - -	12086	25.1	14.4	83	0.9	1.4	9.0	0.0	0.08	0.08	0.08	0.08	0.16	0.41
Droitwich - - -	12895	23.5	14.4	124	0.54	2.6	9.0	0.0	0.0	0.0	0.0	0.5	0.07	0.0
Evesham - - -	7584	26.5	11.8	69	0.7	2.1	6.0	0.0	0.0	0.12	0.12	0.0	0.0	0.0
Feckenham - - -	5532	19.3	10.4	102	1.0	0.9	3.0	0.0	0.0	0.0	0.0	0.18	0.0	0.0
Halesowen - - -	23586	36.0	12.9	106	0.5	2.5	4.6	0.0	0.6	0.2	0.2	0.04	0.08	0.04
Kidderminster - - -	10111	24.3	13.5	117	0.8	1.4	10.9	0.0	0.2	0.6	0.2	0.1	0.09	0.09
Martley - - -	12944	26.2	14.4	108	0.9	2.0	7.0	0.0	0.07	0.15	0.0	0.15	0.07	0.15
Newent (part) - - -	1182	22.0	13.5	115	0.8	1.6	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Pershore - - -	12819	25.2	14.8	68	0.8	2.0	10.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0
Rock - - -	2150	23.2	15.3	180	0.9	0.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shipston-on-Stour - - -	4702	24.5	17.6	87	0.8	3.8	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Stow-on-the-Wold (part)-	292	17.1	17.1	200	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tenbury - - -	4838	22.9	12.6	146	0.2	2.2	4.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2
Tewkesbury (part) - -	2304	23.5	17.4	129	2.0	1.2	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upton-on-Severn - - -	14273	25.2	14.0	67	1.1	1.5	1.0	0.0	0.0	0.0	0.07	0.3	0.0	0.0
Winchcombe (part)- -	116	34.4	25.8	250	0.0	8.6	86.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yardley - - -	33946	32.2	13.0	115	0.8	2.5	5.0	0.0	0.2	0.3	0.4	0.2	0.08	0.08



# Table 1.1. Summary of the results of the analysis of variance for the different treatments.

Treatment	Mean	Standard Error	Significance	Mean	Standard Error	Significance
Control	1.2	0.1	0.05	1.2	0.1	0.05
T1	1.5	0.1	0.05	1.5	0.1	0.05
T2	1.8	0.1	0.05	1.8	0.1	0.05
T3	2.1	0.1	0.05	2.1	0.1	0.05
T4	2.4	0.1	0.05	2.4	0.1	0.05
T5	2.7	0.1	0.05	2.7	0.1	0.05
T6	3.0	0.1	0.05	3.0	0.1	0.05
T7	3.3	0.1	0.05	3.3	0.1	0.05
T8	3.6	0.1	0.05	3.6	0.1	0.05
T9	3.9	0.1	0.05	3.9	0.1	0.05
T10	4.2	0.1	0.05	4.2	0.1	0.05
T11	4.5	0.1	0.05	4.5	0.1	0.05
T12	4.8	0.1	0.05	4.8	0.1	0.05
T13	5.1	0.1	0.05	5.1	0.1	0.05
T14	5.4	0.1	0.05	5.4	0.1	0.05
T15	5.7	0.1	0.05	5.7	0.1	0.05
T16	6.0	0.1	0.05	6.0	0.1	0.05
T17	6.3	0.1	0.05	6.3	0.1	0.05
T18	6.6	0.1	0.05	6.6	0.1	0.05
T19	6.9	0.1	0.05	6.9	0.1	0.05
T20	7.2	0.1	0.05	7.2	0.1	0.05
T21	7.5	0.1	0.05	7.5	0.1	0.05
T22	7.8	0.1	0.05	7.8	0.1	0.05
T23	8.1	0.1	0.05	8.1	0.1	0.05
T24	8.4	0.1	0.05	8.4	0.1	0.05
T25	8.7	0.1	0.05	8.7	0.1	0.05
T26	9.0	0.1	0.05	9.0	0.1	0.05
T27	9.3	0.1	0.05	9.3	0.1	0.05
T28	9.6	0.1	0.05	9.6	0.1	0.05
T29	9.9	0.1	0.05	9.9	0.1	0.05
T30	10.2	0.1	0.05	10.2	0.1	0.05
T31	10.5	0.1	0.05	10.5	0.1	0.05
T32	10.8	0.1	0.05	10.8	0.1	0.05
T33	11.1	0.1	0.05	11.1	0.1	0.05
T34	11.4	0.1	0.05	11.4	0.1	0.05
T35	11.7	0.1	0.05	11.7	0.1	0.05
T36	12.0	0.1	0.05	12.0	0.1	0.05
T37	12.3	0.1	0.05	12.3	0.1	0.05
T38	12.6	0.1	0.05	12.6	0.1	0.05
T39	12.9	0.1	0.05	12.9	0.1	0.05
T40	13.2	0.1	0.05	13.2	0.1	0.05
T41	13.5	0.1	0.05	13.5	0.1	0.05
T42	13.8	0.1	0.05	13.8	0.1	0.05
T43	14.1	0.1	0.05	14.1	0.1	0.05
T44	14.4	0.1	0.05	14.4	0.1	0.05
T45	14.7	0.1	0.05	14.7	0.1	0.05
T46	15.0	0.1	0.05	15.0	0.1	0.05
T47	15.3	0.1	0.05	15.3	0.1	0.05
T48	15.6	0.1	0.05	15.6	0.1	0.05
T49	15.9	0.1	0.05	15.9	0.1	0.05
T50	16.2	0.1	0.05	16.2	0.1	0.05
T51	16.5	0.1	0.05	16.5	0.1	0.05
T52	16.8	0.1	0.05	16.8	0.1	0.05
T53	17.1	0.1	0.05	17.1	0.1	0.05
T54	17.4	0.1	0.05	17.4	0.1	0.05
T55	17.7	0.1	0.05	17.7	0.1	0.05
T56	18.0	0.1	0.05	18.0	0.1	0.05
T57	18.3	0.1	0.05	18.3	0.1	0.05
T58	18.6	0.1	0.05	18.6	0.1	0.05
T59	18.9	0.1	0.05	18.9	0.1	0.05
T60	19.2	0.1	0.05	19.2	0.1	0.05
T61	19.5	0.1	0.05	19.5	0.1	0.05
T62	19.8	0.1	0.05	19.8	0.1	0.05
T63	20.1	0.1	0.05	20.1	0.1	0.05
T64	20.4	0.1	0.05	20.4	0.1	0.05
T65	20.7	0.1	0.05	20.7	0.1	0.05
T66	21.0	0.1	0.05	21.0	0.1	0.05
T67	21.3	0.1	0.05	21.3	0.1	0.05
T68	21.6	0.1	0.05	21.6	0.1	0.05
T69	21.9	0.1	0.05	21.9	0.1	0.05
T70	22.2	0.1	0.05	22.2	0.1	0.05
T71	22.5	0.1	0.05	22.5	0.1	0.05
T72	22.8	0.1	0.05	22.8	0.1	0.05
T73	23.1	0.1	0.05	23.1	0.1	0.05
T74	23.4	0.1	0.05	23.4	0.1	0.05
T75	23.7	0.1	0.05	23.7	0.1	0.05
T76	24.0	0.1	0.05	24.0	0.1	0.05
T77	24.3	0.1	0.05	24.3	0.1	0.05
T78	24.6	0.1	0.05	24.6	0.1	0.05
T79	24.9	0.1	0.05	24.9	0.1	0.05
T80	25.2	0.1	0.05	25.2	0.1	0.05
T81	25.5	0.1	0.05	25.5	0.1	0.05
T82	25.8	0.1	0.05	25.8	0.1	0.05
T83	26.1	0.1	0.05	26.1	0.1	0.05
T84	26.4	0.1	0.05	26.4	0.1	0.05
T85	26.7	0.1	0.05	26.7	0.1	0.05
T86	27.0	0.1	0.05	27.0	0.1	0.05
T87	27.3	0.1	0.05	27.3	0.1	0.05
T88	27.6	0.1	0.05	27.6	0.1	0.05
T89	27.9	0.1	0.05	27.9	0.1	0.05
T90	28.2	0.1	0.05	28.2	0.1	0.05
T91	28.5	0.1	0.05	28.5	0.1	0.05
T92	28.8	0.1	0.05	28.8	0.1	0.05
T93	29.1	0.1	0.05	29.1	0.1	0.05
T94	29.4	0.1	0.05	29.4	0.1	0.05
T95	29.7	0.1	0.05	29.7	0.1	0.05
T96	30.0	0.1	0.05	30.0	0.1	0.05
T97	30.3	0.1	0.05	30.3	0.1	0.05
T98	30.6	0.1	0.05	30.6	0.1	0.05
T99	30.9	0.1	0.05	30.9	0.1	0.05
T100	31.2	0.1	0.05	31.2	0.1	0.05

TABLE XVII. Shewing SANITARY WORK done in the SANITARY INSPECTORS' DEPARTMENT during the year 1902, in the COUNTY OF WORCESTER.

## SUMMARY OF REPORTS.

[illegible]



Date		Description		Amount	
1870	Jan 1	Balance		100.00	
1870	Feb 1	Interest		5.00	
1870	Mar 1	Interest		5.00	
1870	Apr 1	Interest		5.00	
1870	May 1	Interest		5.00	
1870	Jun 1	Interest		5.00	
1870	Jul 1	Interest		5.00	
1870	Aug 1	Interest		5.00	
1870	Sep 1	Interest		5.00	
1870	Oct 1	Interest		5.00	
1870	Nov 1	Interest		5.00	
1870	Dec 1	Interest		5.00	
1870	Dec 31	Total		140.00	

APPENDIX.



APPENDIX

The Tables and Diagrams marked D., E. and F., referred to in Report, can be seen at the Offices of the County Analyst, Shirehall, Worcester.

[8 June 1903].

I



WORCESTERSHIRE COUNTY COUNCIL.  
REPORT OF EXPERIMENTS  
ON THE  
BACTERIAL TREATMENT OF SEWAGE.

*First Report on the best methods of Sewage disposal applicable for use in the County.*

1. In the Year 1900, the Council on the advice of the Sanitary Committee resolved to undertake certain work in order to ascertain as far as possible the best methods of Sewage disposal that were applicable to the varying conditions existing in *Worcestershire*. These conditions differ more than in most Counties. They can be divided into *three* great classes applicable to—

- (1) Domestic Sewage.
- (2) Sewage with Acids, Alkalies and Compounds of Iron.
- (3) Sewage with Manufacturers' Dyeing Waste.

Sewage of each kind passes down one or other of the sewers in the County and has to be dealt with by some method of Sewage treatment. The *first* is far the simplest class and prevails over the larger portion of the County. While the *second* is principally found in the *Stour* watershed and at *Oldbury*, in which Town considerable quantities of Acid and Alkaline Waste are passed into the sewers, the *third* is mainly confined to *Kidderminster*.

2. A beginning has been made with Domestic Sewage and as to this the *first* series of experiments are now concluded. Certain conclusions of practical value have been arrived at which are of interest and importance to the Local Authorities who have to deal with the question of the disposal of this class of Sewage. It is therefore desirable that these should be stated at once without waiting for a complete report on the whole subject. Advantage is taken of this opportunity to give some account of the work the County Council is doing. This report will therefore state—

- (a) Why the work was undertaken.
- (b) The modes in which it is being carried out.
- (c) The work already done and what remains to be done.
- (d) The results arrived at.



(a) *Why the work was undertaken.*

3. The *Worcestershire* County Council was formed in 1889 and at their *first* Meeting the question of the Sanitary state of the County was raised. Ultimately in that *Year*, a Sanitary Committee was appointed of which the late Sir *Douglas Galton* was Chairman and in their *first* Report the Committee called attention to the urgent necessity of dealing with the pollution of the rivers of the County. In 1890 a County Medical Officer was appointed and in his earliest reports the Council had before it, for the *first* time, a statement of the Sanitary condition of the County as a whole.

4. Such reports shewed the necessity for the Council taking steps to secure a more effective method of dealing with Sewage than then existed, not only in the towns, but also in country places and in connection with small groups of houses. Any attempt to deal with these places was at once frustrated by the large cost a scheme of Sewage disposal involved.

5. All the then known systems included, not merely the collection of the Sewage and its conveyance to a place for treatment, often a costly matter even if it could be done by gravitation, and still more costly if pumping was necessary as that involved an annual outlay in addition to the cost of the machinery, but also when the Sewage reached the place of treatment the Local Government Board insisted that it should be dealt with upon land, whether it had or had not been previously treated by chemicals.

6. To make matters worse, the Queen's Bench Division decided that under the Public Health Act 1875, ss. 4. 13, a drain which receives the drainage of two or more houses, belonging to the same owner, is a sewer vested in the Local Authority, and it is the duty of the Local Authority to repair, cleanse and maintain it so that it shall not be a nuisance.

7. Furthermore, the River Pollution Prevention Acts of 1876 and 1893, prohibit the passage of Sewage into streams unless "the best practicable and available means to render harmless the Sewage matter" are taken.

8. The result is to make it obligatory on all Sanitary Authorities to adopt some means of dealing with all the Sewage in their area, even if it only come from two or more houses. As a rule this means a series of small Sewage farms, for these in most cases there had to be a loan, and the Local Government Board made it a condition to their assent that part of the treatment should include land. This led to



the result that most of the smaller Sanitary Authorities neglected their duty and their Sewage remained untreated.

9. The question then arose if some other means could not be found, less costly than irrigation, but equally effective; so attention was directed to filtration. As far back as 1876, filtration had been employed at *Wimbledon* in connection with Sewage, but difficulties arose in the practical working of the system. In 1893, experiments were made in *America* as to treating Sewage in bacterial filter beds, whereby the bacteria present in the Sewage were enabled to effect a partial purification. These experiments attracted a good deal of attention. The *London County Council* carried out experiments with the *London Sewage* based on the *Massachusetts* plan. Various attempts at adopting some such system were made in other parts of the Country, and the Sewage of some 2,000 persons at *Exeter* was treated in "bacteria beds" in *Cameron's* septic tank process.

10. The reports from *Exeter* as to the success of this system and the great saving of cost effected by its adoption excited general attention, consequently the Sanitary Committee, at the suggestion of their Chairman, Sir *Douglas Galton*, instructed the County Medical Officer to report upon the Bacteriological processes of Sewage disposal. Dr. *Fosbroke's* Report of 23 April 1898, was prepared after he had visited many places where "Bacterial Filters" of various kinds were being tried and deals with—"Lowcock's," "Ducat's," "Scott Moncrieff's," "Dibdin's," "Cameron's" and "Garfield's" processes.

11. Among the conclusions which the County Medical Officer arrived at were "(a) that the Bacteriological tanks were most "promising and would probably lead to a revolution of Sewage disposal, (b) that in the near future the present regulations of the Local Government Board with respect to Sewage would have to be materially modified and that even should the provision of land be insisted upon, still the adoption of the Bacteriological system would so greatly assist in the disintegration of such refuse, that the area asked for will be considerably less than it now is and (c) that with respect to the character of the Sewage with which Bacteriological tanks are capable of dealing, a decidedly open view should be entertained, for it was not proved that Manufacturers' refuse can be satisfactorily dealt with, or that Acid Waste refuse, if perceptible in Sewage, will not stultify microbial action."

12. In 1898 a Royal Commission was appointed to inquire and report—



- (1) What method or methods of treating and disposing of sewage (including any liquid from any factory or manufacturing process) may properly be adopted, consistently with due regard for the requirements of the existing law, for the protection of the public health, and for the economical and efficient discharge of the duties of Local Authorities; and
- (2) If more than *one* method may be so adopted, by what rules in relation to the nature or volume of sewage, or the population to be served, or other varying circumstances or requirements, should the particular method of treatment and disposal to be adopted be determined; and
- (3) To make any recommendations which may be deemed desirable with reference to the treatment and disposal of Sewage.

13. The Commissioners found that it had been the practice of the Local Government Board to require, except in exceptional cases, that any scheme of Sewage disposal for which money was borrowed with their sanction, should provide for the application of the Sewage or effluent to an adequate area of suitable land before its discharge into a stream.

14. The Commissioners came to the conclusion that peat and stiff clay lands were generally unsuitable for the purification of sewage; that their use for this purpose was always attended with difficulty, and that where the depth of top soil is very small, say *six inches* or less, the area of such lands which would be required for efficient purification would in certain cases be so great as to render land treatment impracticable.

15. A very large area of *Worcestershire* is of the character which the Commissioners here describe as unsuited for the purification of sewage. The Sanitary Committee felt that they could not recommend the Council to take proceedings to compel Local Authorities to carry out the law when the result of such proceedings would be that the Local Government Board would make the Authority spend a large sum of the Ratepayers money in providing a system which a Royal Commission reported to be unsuitable.

16. It thus seemed that matters had reached a deadlock; but the Commission went on to say that they were satisfied that it is practicable to produce by artificial processes alone, an effluent which will not putrify, which might be discharged into a stream without fear of creating a nuisance, that therefore there were cases in which the Local Government Board would be justified in modifying under



proper safeguards their present rule as regards the application of sewage to land. They added no general rule as to what these safeguards should be; probably it will always be necessary that each case should be considered on its own merits.

17. The deductions to be drawn from the Commissioners Report therefore were—

- (i.) That for a great part of *Worcestershire* the system of irrigation was useless.
- (ii.) That by artificial processes the same result as would be obtained where irrigation was successful could be arrived at.
- (iii.) That the proper process to adopt for any particular place had to be decided with reference to that place.

18. The Commissioners gave the following general classification of the artificial processes to which they alluded :—

Closed septic tanks and contact beds.  
Open septic tanks and contact beds.  
Chemical treatment, subsidence tanks and contact beds.  
Subsidence tanks and contact beds.  
Contact beds alone.  
Closed septic tanks, followed by continuous filtration.  
Open septic tanks, followed by continuous filtration.  
Chemical treatment, subsidence tanks and continuous filtration.  
Subsidence tanks, followed by continuous filtration.  
Continuous filtration alone.

19. The Commissioners reported that they were not in a position to express an opinion upon the relative merits of the several artificial processes, nor make a complete comparison between the land treatment and the artificial treatment of sewage, or state how far purification of Sewage can be uniformly effected by one or other artificial process, and at what cost as compared with land treatment. In effect, the Commissioners said, "one or other of these methods will do what you want as to purification, but you must find out for yourselves the one that suits your case."

20. At the request of the Sanitary Committee the Council at once took steps to induce the Local Authorities to adopt the one of these artificial processes best adapted to their work. For this purpose they carefully considered the various Bacteriological systems, and arrived at the conclusion that the following *three* were the best adapted to meet the varying cases in this County :—



- i. Liquefying tanks with ærobie filter beds.
- ii. Rough contact beds with ærobie filter beds; and
- iii. Upward anærobie filter beds with ærobie filter beds.

*M. Inst* 21. Having arrived at this conclusion, they instructed Mr. Lowcock C.E. (Birmingham) in June 1900 to prepare a diagram shewing each of these processes, with a detailed specification describing how each should be constructed. These diagrams were and are still in great request, and are given to all persons in the County who wish to make a trial of such methods of Sewage treatment, to District Sanitary Officers and others interested in the question.

22. The Council then made a further attempt to compel the Sanitary Authorities to take active steps as to Sewage disposal, but the authorities were unable to make up their minds which one of the systems to adopt, and made this uncertainty a plea for doing nothing; it therefore became apparent that unless the Council took some steps to place itself in such a position as it could say to a Local Authority, this is the system for your case and this we insist on your carrying out, nothing would be effectively done. It also became clear that the particular system that would be suitable to one place could only be settled after a series of reliable experiments, and the Committee felt that in such matters local experiments by Local Authorities could not be implicitly relied on. The Local Authorities also objected to pay the cost of experiments, which they alleged were for the general good of the County, not merely for that of their locality.

23. The Committee felt the weight of these objections, and that trustworthy results could only be obtained if the Council themselves did the work. They also felt that the experiments being for the advantage of the whole County, the whole County should bear the cost. They therefore determined to apply to the Council for authority to carry out such works as might be necessary to ascertain the best methods of treatment adapted for the County. The Council authorized the Committee to do this.

24. The reasons therefore which rendered it necessary for the work to be undertaken by the Council are—

- (1) The obstinate adherence of the Local Government Board to a system which was in certain cases ineffective, and even when effective was so costly as to be prohibitive.
- (2) The knowledge that out of a certain number of systems there were some that would enable the sewage of the County to be cheaply and effectively dealt with.
- (3) The necessity of ascertaining, in order to protect the health



and improve the sanitary conditions of the County, which were the systems the Council could insist on being used by the different Local Sanitary Authorities.

(b) *The mode in which the experiments are being carried on.*

25. In order to understand the system adopted it is necessary to say something as to what is required to be done in the treatment of Sewage to render it harmless. The first thing to ascertain is the composition of the Sewage as delivered at the Sewage works. Usually it is of *two* kinds, (a) ordinary domestic Sewage, (b) domestic Sewage combined with manufacturing refuse. This last is the result of the Rivers Pollution Prevention Act 1876, which provided that under certain conditions facilities were to be given by Local Authorities to manufacturers to discharge their refuse into Sewers, a point which seems to be emphasized in the Third Report dated 2nd March 1903 of the Sewage Commissioners.

26. Ordinary domestic Sewage may be roughly defined as the solid and liquid excretions of man and animals mixed with water, the waste liquids and solids from the kitchens, and the domestic slops. The object in treating Sewage is to remove the objectionable constituents by a process of purification; this must be done before such liquid can be safely turned into a river. One method of taking out the solids is by means of chemical processes. The Sewage is placed in tanks and clarified, the suspended matter being removed to a greater or less extent. But the chemical process deals mainly with solids in suspension and not so much with solids in solution.

27. In the Bacterial treatment of Sewage the filters, or Bacteria beds, to be effective, require certain defined conditions to be carried out, viz. (1) They must not choke; this they will be liable to do if the suspended mineral and organic matter of the Sewage is not dealt with before filtration, to effect which anærobic action is induced to liquify the sludge by means of septic tanks, (2) They must be properly aerated so that ærobic organisms can be established which will attack the organic matter and convert it into harmless products. In this part of the process the size of the substance composing the bacterial filter beds is a most important factor in order to insure that the largest amount of bacterial action may result. (3) There must be no "ponding," as that will prevent the proper action of the filters.

28. The ultimate aim of bacterial treatment of Sewage is to produce an effluent that can be discharged into a stream without causing any injury. It was claimed for some of the processes that they, by means of the bacteria, disposed of the objectionable constituents



of the Sewage and produced a safe effluent. So what had to be determined was, which of the *three* systems selected would produce the best effluent, that is, dispose of the largest proportion of the objectionable constituents. The Committee, to ascertain this, determined to test the *three* selected processes with *two* kinds of Sewage—

Domestic.

Mixed domestic and manufacturing waste.

29. The place selected for the experiments on domestic Sewage was *Malvern Wells*, where the Sewage was dealt with by irrigation. A carrier from the main outfall sewer was laid down to the experimental tanks, which were placed side by side. For mixed Sewage and manufacturing waste *Oldbury* was selected, and a more difficult Sewage to treat can scarcely be imagined. The *Oldbury* experiments are still going on and will be dealt with in a future report.

30. It was intended to have had another set of filters at *Kidderminster* where the Sewage is of a most interesting nature, as in addition to the domestic Sewage, a good deal of dye waste liquid finds its way into the sewers from the dye works and carpet works in the Town. At present the Sewage of *Kidderminster* is dealt with on the broad irrigation system. But there are complaints (a) that the farm is a nuisance and (b) that it is productive of anthrax. Unfortunately the filters have not yet been laid down at *Kidderminster* as the Local Government Board places obstacles in the way, and threatens to surcharge the Council with the cost. It is rather hard that Boroughs are allowed to make what experiments they please under the name of Sewage works, while if a County Council tries to save the ratepayers' pockets by ascertaining which is the best system before adopting any, it should be surcharged. It is right to add, that after a protest the surcharge which was made in respect of the *Malvern* and *Oldbury* Works was remitted, but the Council are forbidden to go on with the *Kidderminster* experiments.

31. The principle underlying the County Council experiments was to place the *three* selected Bacterial systems side by side, to feed them with Sewage under the same conditions as nearly as possible, to shew by the analysis of the Sewage entering the system what was its composition and to ascertain by analysis of the effluent from each system, which of the *three* got rid of the largest percentage of objectionable matter and so produced the most satisfactory effluent. This principle was only settled after a good deal of consideration. It has been fortunate in obtaining the approval of the Royal Commissioners on Sewage, who say in their report upon these experiments—"The idea



“of making parallel observations with the same set of processes in various places with the view of ascertaining the relative merits under one and another set of conditions appears to us excellent, and these particular experiments, although small, should give valuable results if carefully watched and frequently examined.”

32. A full description of each system will be found in the Appendix. Each of these systems was placed side by side and constructed so as to treat 1,000 gallons of Sewage per day of 24 hours. A carrier open to the air was made from one of the main sewers to the place where the systems were laid down. The Sewage passed from the carrier into each of the systems through a V shaped slot identical in size in each case. The Sewage flowed from the sewer down the carrier by gravitation to the system and received no previous treatment of any kind before entering it. The *three* diagrams marked D. E. and F. shew the results obtained. Full details of the different systems are given in the County Analyst's first Report on the Bacteriological Purification of Sewage, which is appended.

33. Samples were taken at fixed dates both of the crude Sewage before it entered the systems and of the effluents as they passed from the systems, all of which were submitted to analysis.

34. The work began in *July* 1901 and was continued until *July* 1902, and during that time 156 analyses of the Crude Sewage were made.

35. When the Sewage had passed through the various parts of the different systems the effluent from each was analysed. Some 780 analyses of these effluents were made.

36. These analyses enabled the amount of purification effected by each system to be ascertained, and it was found that System D (a system consisting of a closed septic tank combined with a coke bacterial bed) gave a higher percentage of purification than any of the others, with a greater purity of the effluent. If a coke bed was employed the effluent was still sufficiently aerated not to destroy fish life, while no less than 94 *per cent.* of the final effluents proved on analysis to be so purified that they would not putrify if passed into a river.

37. The result of the experiments is that the Council is now in a position in cases where the Sewage to be dealt with consists of domestic Sewage, to recommend a system (D) that will so effectually deal with it as to enable an effluent to be obtained that can be safely



[8 June 1903].

admitted into a stream without being first treated on land. This result will however only follow if the system is properly carried out and the tanks kept in good working order.

38. As to cost. Mr. *Maybury* (Engineer to the *Malvern* Council), who put down the Experimental Tanks at *Malvern*, as well as several others in accordance with System D, estimates that an installation for dealing with 1,000 gallons of Sewage *per day* can in ordinary cases be constructed at a cost of about £100.

39. Having thus ascertained a practicable and available means for dealing with domestic Sewage at a reasonable cost, it remains for the Council to carry out the work that they felt was necessary 10 years ago, and the necessity for which has since then largely increased, namely to take effective steps to see that all the domestic Sewage in the County is effectively treated before it is passed into any streams.

40. The experiments as to Sewage consisting of domestic Sewage mixed with acids, alkalies and compounds of iron are still being carried on, so it is thought better to postpone any general remarks on the question of Sewage disposal until a complete report can be presented on the entire question.

SIGNED on behalf of the Sanitary Committee.

HENRY HOWARD

Chairman.

SHIREHALL, WORCESTER,  
16 May 1903.

## APPENDIX.

### *County Analyst's Report on the Sewage Purification Experiments.*

1. This Report describes the results of the experiments on the Purification of Sewage by means of the Experimental Bacteria Beds.
2. The Report is divided into two parts; the first will deal with the experiments made at Malvern, and the second will take into consideration the experiments made at Oldbury.

### PART I.

#### *(Malvern Experiments).*

#### *Chemical and Bacteriological Composition of the Malvern Domestic Sewage (free from the Waste Products of Manufacturies).*

3. The Crude Sewage experimented with at Malvern contains very little surface water, and is purely Domestic, being composed of the Solid and Liquid Excretions of man and animals, mixed with much water; the waste liquids and solids from the kitchens, and the domestic "slops."

4. Malvern Crude Sewage varied somewhat in volume and composition when examined at different times of the day; but the following may be taken as a good average example. For comparison, the composition of Malvern drinking water and River Severn water at Upton is also given.



In parts per 100,000.	Crude Sewage. Malvern.	Malvern Water.	River Severn Water.
Solids in Suspension - - -	43.2	None	Trace
„ „ Solution - - -	78.1	17.0	32.0
Chlorine - - -	12.2	1.3	4.4
Free and Saline Ammonia as Nitrogen - - -	11.8	0.0005	0.006
Albuminoid Ammonia as Nitro- gen - - -	1.2	0.001	0.01
Nitrogen in Solids in Suspension	1.9	None	Trace
Oxygen absorbed in 4 hours at 60 degrees F. - - -	6.5	0.02	0.2
Nitrogen in Nitrates - - -	None	None	None
„ „ Nitrites - - -	„	„	„
Appearance - - -	Dark yellow	Clear	Opalescent
Odour - - -	Not very bad	None	None
Reaction - - -	Alkaline	Neutral.	Neutral

5. The Bacterial Composition of the Crude Sewage also varies to a considerable extent—the number of Bacteria varying from many thousands to several millions per cubic centimeter. These Bacteria—which are extremely minute organisms—play a very important part in the natural purification of Sewage. Their properties and peculiarities have been carefully studied with a view to determine in what way they react upon the Sewage and how their purifying action on it can be best utilised.

6. The Bacteria found in Sewage may be divided up into the following groups:—

ANAEROBIC. Those which will not develop in the presence of air (oxygen).

AEROBIC. Those which require the oxygen of the atmosphere for their development.

FACULTATIVE ANAEROBIC } Those which can develop in  
„ AEROBIC } the absence or presence of  
air.

7. All Bacteria are injuriously affected by the action of light. Bacteria require for their active growth a certain amount of warmth, moisture and food. Their food is derived from the Organic and Mineral matter of the Sewage. The temperature necessary for active growth is derived in part from the surroundings (warm soil



or air), and in part from the chemical reactions taking place in the fermenting Sewage.

8. If Crude Sewage is kept very cold, little or no change will take place in its chemical and bacteriological composition. With a rise of temperature there will be an increase in the chemical and bacteriological changes; these changes increase up to a certain point, when the fermentation of the Sewage attains a maximum. If above this point the temperature is still further increased by artificial means fermentation will be at first retarded, and then quite stopped. If the temperature is raised to the boiling point of water, fermentation will be destroyed; simply cooling the Sewage will not restore it. A Sewage so treated is said to be sterile, but may be made to ferment again if cooled and mixed with Crude Sewage or left in contact with the atmosphere.

9. The Anaerobic and Facultative Anaerobic Bacteria present in Crude Sewage have the important property of being able to attack and liquefy the solid organic matter (albuminoid and vegetable matter) of Sewage if the atmosphere is carefully excluded. These organisms therefore have the important property of dissolving the solid organic matter of Sewage, and converting it in part into gases and into substances which are dissolved by the water of the Sewage. As the oxygen of the atmosphere slowly diffuses into fermenting Sewage the Anaerobic Organisms become less, but the Aerobic and Facultative Aerobic become more active. The organic and nitrogenous substances in solution in the Crude Sewage are attacked and converted into Ammonia, Nitrites, Carbonic Acid Gas, Marsh Gas, Nitrogen &c. The final stage in the fermentation or purification of the Sewage is reached when there is complete aeration; the Nitrites then being oxidised to Nitrates and the organic matter broken up into inert substances, such as Carbonic Acid Gas and Water. .

Such, shortly, are the chief changes produced by natural fermentation or purification of Crude Sewage. By these changes the objectionable substances present in the Sewage are converted into inert bodies and a liquid is obtained from which most of the objectionable properties of Crude Sewage are removed; the newly formed liquid possesses no unpleasant odour, will not ferment any further and may support fish life. All the above changes are not entirely due to the action of Bacteria, for in these more highly organised forms of animal and vegetable life play a part.

10. Crude Sewage if kept from contact with the atmosphere becomes almost free from organic solids in suspension; if this partly purified sewage is then brought into contact with the atmosphere a further



change takes place, the organic matter in solution is further acted upon, inert bodies are formed, and a high standard of purification may be arrived at. The rapidity of this purification will, to a considerable extent, depend upon the temperature of the Sewage and the means employed for collecting together the organisms responsible for this work and preventing them being washed away.

11. To obtain all the above-mentioned conditions for the Bacteriological purification of Crude Sewage a number of "Systems" have been devised.

12. Three Experimental Systems were selected for the County experiments. These were laid down, side by side, and supplied with flowing sewage from the main sewer as it enters the Shuttlefast Sewage Farm, Malvern Wells.

13. Each System was constructed so as to treat 1,000 gallons of Crude Sewage per day of 24 hours.

These three Systems are called:—System D, System E, and System F.

#### SYSTEM D.

(*Figure D, Table D, Diagrams D1-4.*)

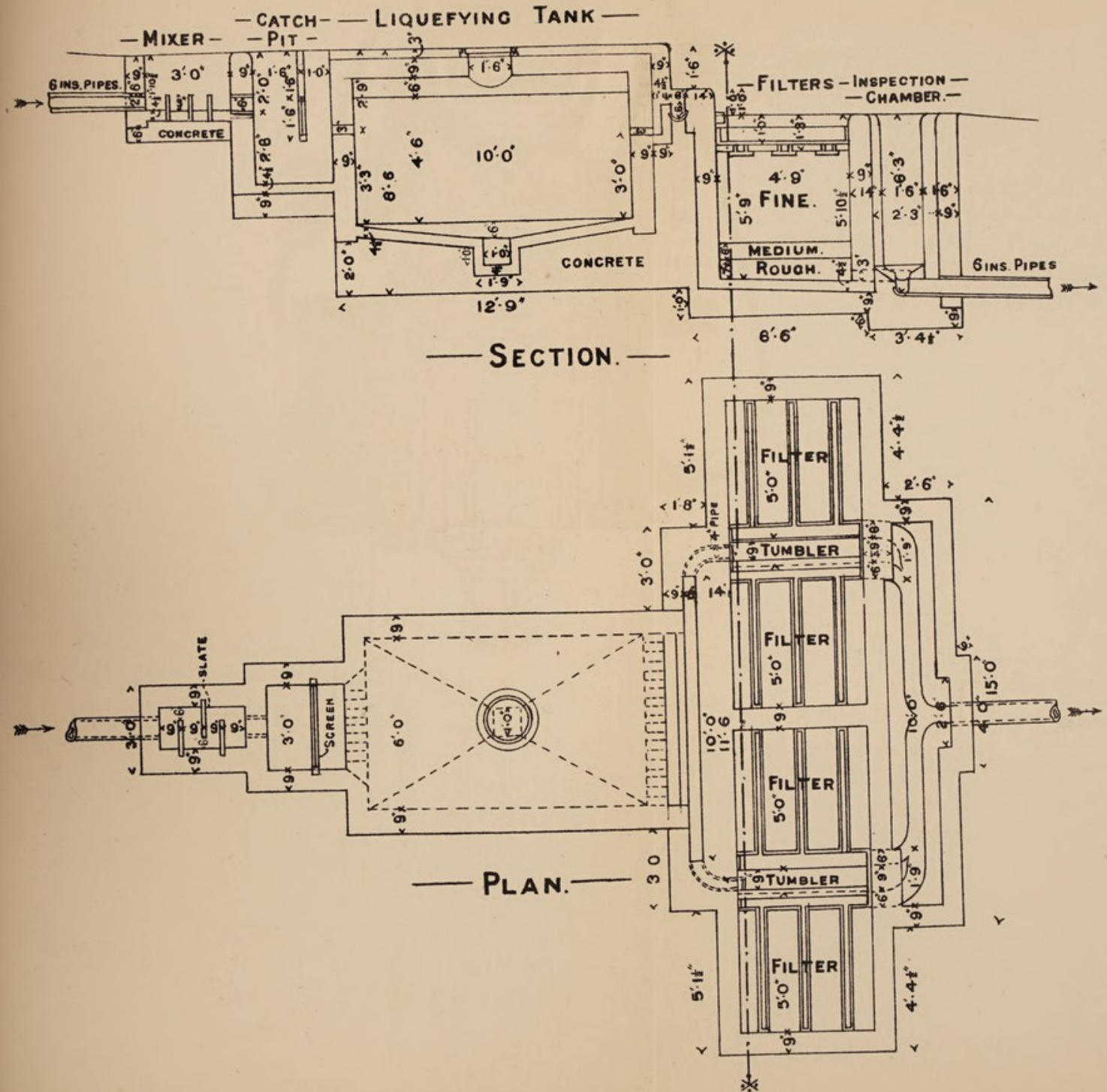
*Description. Figure D.*

14. This System consists of a LIQUEFYING TANK (Closed Septic) for Anaerobic treatment and BACTERIAL BEDS (filters) for the final oxidation or the Aerobic treatment.

15. The Crude Sewage passes from the main sewer into the System through a V shaped slot, designed to allow a flow of 1,000 gallons of Crude Sewage every 24 hours to be treated by the System. On several occasions the flow of Crude Sewage was, however, considerably greater than this. The Sewage after passing through the slot enters the MIXING CHAMBER (internal measurements—3 feet by 1 foot 6 inches by 1 foot 10½ inches), which contains upright slate baffles (6 inches high and 1 foot long), built into the brickwork, and so constructed as to offer as much resistance as possible to the flow of solid matter in the Sewage so as to disintegrate it, thereby ensuring more rapid liquefaction in the Liquefying Tank subsequently described.

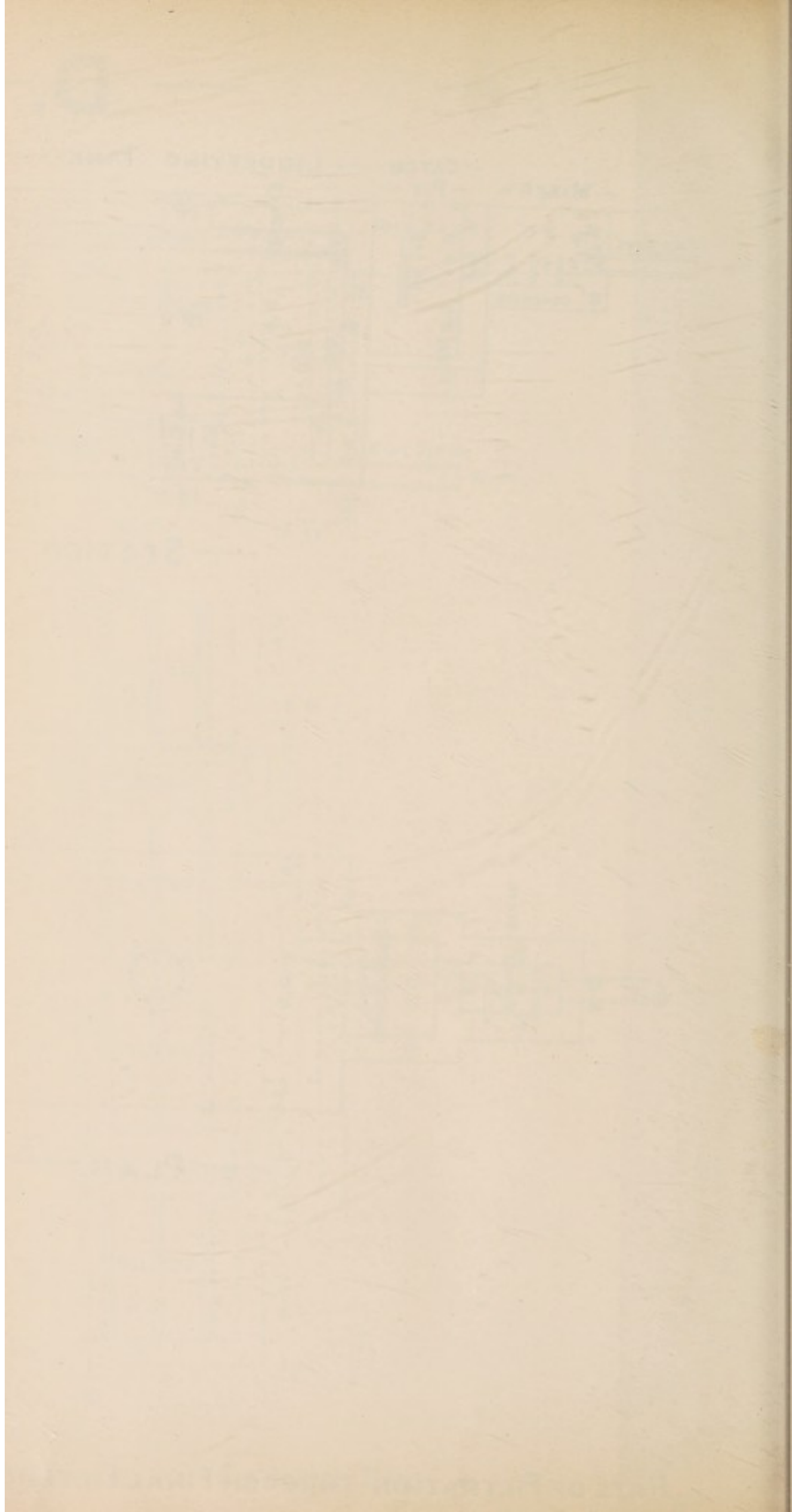
16. The well mixed and disintegrated Sewage then flows into the CATCH PIT (internal measurement, 2 feet 6 inches by 3 feet by 4 feet 6 inches; depth of Sewage in pit, 2 feet 6 inches), where is deposited most of the heavy mineral matter (such as sand and gravel), which would in time, if allowed to pass on, choke up the Liquefying Tank. The Catch Pit is cleaned out by means of a scoop from time to time. In the case of the Malvern Catch Pits there was so little

**D.**



RATE OF FILTRATION THROUGH FINAL FILTERS = 100 GALLS PER SQ. YD. PER DAY.





mineral matter that they were in no need of being cleared out, not even after Sewage had been passing through them for one year. In the Catch Pit a considerable amount of fermentation takes place.

17. The liquids and the suspended solids of the Sewage are then passed into the LIQUEFYING TANK (internal measurement, 10 feet by 6 feet by 5 feet), by a submerged inlet. The Tank is completely closed up with the exception of the submerged inlet and outlet, so as to prevent the atmosphere from interfering with the action of the Liquefying (Anaerobic) organisms present in the Sewage, which liquefy or dissolve the solid organic matter therein. Great changes take place in this tank; nearly the whole of the organic solids of the Sewage are liquefied or dissolved, while at the same time other organic bodies are being acted upon in such a manner as prepares them for the next step in the purification. The top of the Tank is fitted with a manhole and cover, through which the unliquefiable solids of the Sewage carried past the Catch Pit (fine sand and dirt, pieces of wool, wax matches, candle wax, grease, hair, cloth, wool, etc.) are pumped out when they become too voluminous. At Malvern it was not necessary to empty this Tank, although it has been working for one year. The liquid passes out of the Tank through a submerged outlet; it then contains only a very small quantity of solid matter in suspension. This solid matter is almost entirely composed of masses of Bacteria, mixed with partly liquefied matter and some vegetable and animal organisms (worms) more highly organised than Bacteria. These solids rarely amount to more than a grain per gallon of liquid. There is, however, one point to be observed about them; they are very apt, unless steps are taken to prevent it, to choke up the Bacterial Beds (filters) upon which they are next poured.

18. The liquid on passing from the Liquefying Tank falls over a small weir, and is then divided into two equal streams. One half of the liquid is made to flow to the right and the other half to the left, through open pipes into IRON TUMBLERS, (the same length as the Bacterial Bed, and holding on either side a volume of liquid equal to about four gallons). These tumblers work automatically and give alternate deliveries of the liquid into zinc troughs pierced with numerous small perforations through which the liquid passes, and is distributed all over the surface of the solid materials with which the four Bacterial Beds (filters) are filled. It should be noticed that the liquid on leaving the Liquefying Tank is always brought into intimate contact with as much air as possible so that aeration is encouraged.

19. The next step in the process of purification is a very important one, and is one in which the partly purified Sewage is brought into intimate contact with the atmosphere and with the Bacteria which aid in oxidation and final purification. This object is best arrived at by placing in the Bacterial Beds (filters), solids of varying size and composition, such as, for example:—Coke, coal, broken brick, local stone



(if not too soft), hard burnt clinker, hard burnt ballast, gravel. With the object of holding back the Bacteria etc., which are to act upon the liquid passing from the Tumblers and through the Bacterial Beds (filter) as much as possible.

#### BACTERIAL BEDS (Filters).

20. At Malvern the three Systems have each attached four Bacterial Beds (filters) of the same size, and each containing a different solid material. These Bacterial Beds (filters) are called: Bed No. 1, 2, 3, and 4, and the System they belong to is denoted by the letters D, E, and F. (Internal measurements, 4 feet 9 inches by 5 feet by 5 feet nine inches).

				Size. "Fine" on Top of Bed.	Size. "Medium" in between.	Size. "Rough" at Bottom of Bed.
Bed No. 1 contains Coke-	-	To pass $\frac{1}{4}$ -inch sieve and rejected by $\frac{1}{8}$ -inch. Thickness	To pass $\frac{5}{8}$ -inch sieve and rejected by $\frac{1}{4}$ -inch. Thickness	To pass $1\frac{3}{4}$ -in. sieve and rejected by $\frac{5}{8}$ -inch. Thickness		
		3' 3"	6"	9"		
" 2 " Coal -	-	"	"	"		
" 3 " Brick (broken) -	-	"	"	"		
" 4 " Local Stone (Granite)	-	"	"	"		

The different materials used were well washed and graded before being placed in these beds. Each layer of material was carefully and evenly spread to its proper thickness.

21. The liquid having passed through these Beds is the product of the treatment, and is known as the final effluent, and it is from its analysis that the results of the purification effected by the different systems are obtained.

22. The total fall at Malvern from the upper end of the mixing chamber to the outlet from the lower side of the inspection chamber is seven feet.

23. It was decided that once a week for a period of at least one year the Crude Sewage entering the System D should be subjected



to a complete Chemical Analysis, and similar analyses should be made of the final effluent after passing through the Liquefying Tank and the four Bacterial Beds (filters). This has been done and the figures obtained by analysis are given in Table D and the results are also shewn in Diagrams D 1-4.

TABLE D.

24. This table contains the figures obtained from the analysis of all the samples taken from the System D during one year. The table shews the percentage purification of the ORGANIC NITROGEN and OXYGEN ABSORPTION of the Sewage. The appearance of the samples when collected and after being kept for 14 days at the ordinary temperature is described. The final column of figures on the right of the table shews the average composition and purification of the samples for the year.

25. The Diagrams (D 1-4) give the amount of Organic Nitrogen (Diagram D 1) and Oxygen Absorbed (Diagram D 3) and also the percentage Purification (Diagrams D 2 and 4) of the Sewage after it has passed through the Liquefying Tank and Bacterial Beds. The average results are shewn by a straight line across the diagram. The Tank and each Bacterial Bed of the System has a coloured line of its own so that they can be distinguished at once. For the sake of clearness only the Bacterial Beds which give the lowest and highest purification are plotted out in full, whilst the two intermediate Beds are indicated by an average line.

26. The Solids in Suspension of the Crude Sewage experimented upon are always very high, averaging 63 parts per 100,000. During wet weather the amount of these solids was reduced and the Crude Sewage itself appeared to be visibly more dilute.

27. In the Liquefying Tank the Solids in Suspension were almost entirely liquefied and on only a few occasions did they pass out in amount equal to one grain per gallon of liquid, thus shewing that the conditions in the tank were satisfactory. This liquefaction brings the greater portion of the Organic matter of the Solids in Suspension into solution and into a better condition for oxidation, this was shewn on several occasions by the increased Oxygen Absorbed by the Tank effluent. The average Oxygen absorption of the Crude Sewage is equal to 7.73 parts of oxygen per 100,000, that of the Tank effluent is equal to 5.09 parts per 100,000. The variations are clearly shewn in the Diagrams D 3 and 4.

28. Of the four Bacterial Beds (filters), D No. 1 (Coke) gave



the highest percentage purification both of the Organic Nitrogen and Oxygen Absorption, as will be seen from the following tables:—

*Oxygen Absorption.*

System D.	Average per 100,000.	Percentage purification.	Material.
Tank - - -	5.09	27.7	
Bacterial Bed No. 1	1.11	82.2	Coke
" " " 2	1.79	71.2	Coal
" " " 3	1.93	70.0	Brick
" " " 4	2.36	62.7	Granite

*Organic Nitrogen.*

System D.	Average per 100,000.	Percentage purification.	Material.
Tank - - -	0.73	71.1	
Bacterial Bed No. 1	0.2	94.0	Coke
" " " 2	0.34	89.6	Coal
" " " 3	0.4	89.0	Bricks
" " " 4	0.44	86.7	Granite

29. These results are probably due to the fact that Coke is capable of holding back in its numerous chinks and crevices the oxidising bacteria, which are thus able to concentrate and rapidly oxidise the liquids passing through the Bed after treatment in the Septic Tank.

*Nitrification.*

30. As was expected, no Nitrification took place in the Liquefying Tank. The Organic Nitrogen of the Crude Sewage was gradually decomposed as it passed through the System into Ammonia, which in its turn was oxidised into Nitrites and then into Nitrates with frequent formation of free Nitrogen Gas which passed off into the atmosphere and was lost. All the Nitrates and Nitrites were formed in the Bacterial Beds (filters).

TABLE shewing Decomposition of Organic Nitrogen into Ammonia, Nitrates and Nitrites.

Averages for the year in parts per 100,000.

System D.	Organic Nitrogen.	Ammonia as Nitrogen.	Nitrates & Nitrites as Nitrogen.	Total Nitrogen found.
Crude Sewage	4.25	12.97	None	17.22
Tank Effluent	0.73	10.23	"	10.96
Bact. Bed No. 1 Eff.	0.2	3.05	3.7	6.95
" " " 2 "	0.34	7.46	0.35	8.15
" " " 3 "	0.4	2.93	3.85	7.18
" " " 4 "	0.44	8.24	0.02	8.7



31. The Bacterial Beds Nos. 1 (COKE) and 3 (BRICKS) gave the highest amount of Nitrates and Nitrites. These two beds contained the most porous material of the four and the effluents from them were good both in appearance and keeping qualities. In fact 94 per cent. of both the effluents were returned as good. The effluents of these two beds were able to support Fish life. The Beds Nos. 2 and 4 respectively gave effluents 36 per cent. and 7 per cent. good, shewing a very great difference from Nos. 1 and 3. The materials in these beds were hard and non-porous, viz., Coal and Granite.

*Remarks on the Working of System D.*

32. During the whole year the experiments were made the Liquefying Tank never required clearing out. The amount of sludge in the tank at the end of the year was not large. The small quantity of Solids in Suspension in the effluent from the Tank has a tendency to choke up the surface of the four Bacterial Beds and to cause "ponding." To remove this difficulty the surface of the Beds was raked over several times. Still the Beds ponded—especially Nos. 2 (Coal) and 4 (Granite)—but afterwards they recovered on their own account and again worked perfectly. This ponding appeared to be due, to a considerable extent, to the formation of a vegetable growth in the Beds which prevented the effluent from the Tank passing through readily. This growth appeared to give way to a development of small animals (worms, infusoria, etc.) which seem to consume the vegetable matter, thus more or less clearing up the Beds and allowing the liquid to pass through more readily. The worms, etc., finally gave way to bacteria, when the Beds resumed their normal working. This went on for some time, but subsequently the vegetable growth again appeared and caused ponding.

33. The ponding difficulty can be overcome by duplicating the Beds, so that when a Bed shews signs of ponding it should be given a rest and the other Bed used. Raking over the Beds cannot be recommended—it has a tendency to disintegrate the material, rendering it too fine in texture, thus causing ponding. If the ponding is very bad it would be best to remove the surface and renew it with fresh material.

34. Of all the three Systems, when coke was used in the Bacterial Bed, D undoubtedly gave the best results, both as regards percentage purification of Organic Nitrogen and Oxygen Absorption. It had to purify a more concentrated Sewage than the other Systems because a selective sedimentation took place in the Sewage before it passed into *these* ~~this System owing to it being the first to tap the carrier.~~ On several occasions more than 1,000 gallons of Crude Sewage were treated by this System in 24 hours. The Liquefying Tank being covered up caused no nuisance. The depth of the whole apparatus was equal to seven feet, whilst the Systems E and F required a depth of 11 feet 6 inches and 6 feet 10 inches respectively.



## SYSTEM E.

(Figure E, Table E, Diagrams E 1-4).

*Description.*

35. This System consists of ROUGH CONTACT BEDS and AEROBIC BEDS (filters). Like System D, it treated 1,000 gallons of Crude Sewage per 24 hours. The Crude Sewage entered the System through a V shaped slot as in D and passed through a similar Mixing Chamber (internal measurements 3 feet by 1 foot 6 inches by 1 foot 10½ inches) into two contact Beds (8 feet by 6 feet 1½ inches by 4 feet 4½ inches to 4 feet 7½ inches), lying side by side. Each Contact Bed was filled with a bottom layer of Rough Material (Coke) six inches deep, and the rest with Medium, 2 feet 9 inches deep. The Crude Sewage was delivered automatically and alternately on to each of the Beds. The Sewage was left in contact with the Coke in the Beds for about two hours and then syphoned off on to four Bacterial Beds (filters) similar in every detail to those described in System D. (See Paragraph 20).

36. The Crude Sewage when in the Contact Beds lost most of its Solids in Suspension through liquefaction and at the same time some of the Organic Solids in Solution were so changed as to prepare them for the final Oxidation which took place in the four Bacterial Beds (filters) into which the Sewage next flowed. The Sewage from the Contact Beds was syphoned off by an automatic syphon and passed on to two Iron Tumblers, similar to those described under System D (paragraph 18), and from these into Zinc distributing troughs on to the surface of the four Bacterial Beds (filters), which are exactly similar in all respects to those described under System D (See Paragraph 20). In these Beds the final Oxidation of the liquid took place.

37. It should be noticed that this apparatus is a very deep one and requires a total fall of at least eleven feet six inches from the upper end of the Mixing Chamber to the final outlet.

38. The year's analyses of the Crude Sewage, entering the System E, taken once a week, and also similar analyses of the effluents from the Contact Beds and from the four Bacterial Beds (filters), have been made, and the figures obtained by analysis are given in Table E. The results are also shewn in Diagrams E 1-4.

## TABLE E.

39. The percentage purification of the Organic Nitrogen and of the Oxygen absorbed are given, as well as the figures obtained from the analyses. The appearance of the samples when collected, and after being kept for 14 days at the ordinary temperature, is described.

—E.—



## — PLAN —

**RATE OF FILTRATION THROUGH FINAL FILTERS=100 GALLS. PER SQ. YD. PER DAY.**



PLAN  
SECTION  
MIXER  
CONTACT  
SECTION  
PLAN  
SECTION

The final column of figures of the table shews the average composition and percentage purification of the samples.

40. The Diagrams E 1-4 represent the amount of Organic Nitrogen (Diagram E 1), Oxygen Absorbed (Diagram E 3), and the percentage purification (Diagrams E 2 and 4) of the Sewage after it had passed through the Rough Contact Beds and Bacterial Beds (filters). The average results are shewn by a straight line across the Diagram, the Contact Beds and each Bacterial Bed (filter) of the System has a coloured line of its own, so that they can be distinguished at once. For the sake of clearness only the Bacterial Beds (filters) which give the lowest and highest purification are plotted out in full, whilst the two intermediate beds are indicated by an average line.

41. The Solids in Suspension of the Crude Sewage experimented upon were less in quantity than those in System D because of the selective sedimentation. (See Paragraph 34). The average of the Solids in Suspension was 37·2 per 100,000 of Crude Sewage. In the Rough Contact Beds the Solids in Suspension were almost entirely liquefied, and on only a few occasions did they pass out in amount equal to 1 grain per gallon of liquid. In these Rough Contact Beds Anaerobic—and some Aerobic—action took place.

42. The average Oxygen Absorption of the Crude Sewage was equal to 5·91 parts of Oxygen per 100,000. That of the effluent from the Rough Contact Beds was equal to 3·14 parts per 100,000. These variations are shown in Diagram E 3.

43. Of the four Bacterial Beds (filters) No. 2 E (coal) gave the highest percentage purification of Oxygen Absorbed and of Organic Nitrogen. (See Diagrams E 2 and 4). The average percentage purification of Oxygen Absorbed and Organic Nitrogen of the Contact Beds and the four Bacterial Beds (filters) is as follows:—

*Oxygen Absorbed.*

System E.		Average per 100,000.	Percentage Purification.	Material.
Contact Beds	-	3·14	42·4	Coke
Bacterial Bed No. 1	-	1·44	72·2	"
" " " 2	-	1·36	73·1	Coal
" " " 3	-	1·44	72·0	Bricks
" " " 4	-	1·63	69·2	Granite

*Organic Nitrogen.*

Contact Beds	-	0·77	65·2	Coke
Bacterial Bed No. 1	-	0·30	85·0	"
" " " 2	-	0·27	86·6	Coal
" " " 3	-	0·31	84·1	Bricks
" " " 4	-	0·34	83·3	Granite



From these experiments it will be seen that all these Bacterial Beds (filters) gave very similar results. The Coal gave the best, but only slightly better than the Coke or Bricks.

#### *Nitrification.*

44. On three occasions Nitrates appeared in the effluent from the Rough Contact Beds, varying from a trace to 0.05 and 0.31 per 100,000.

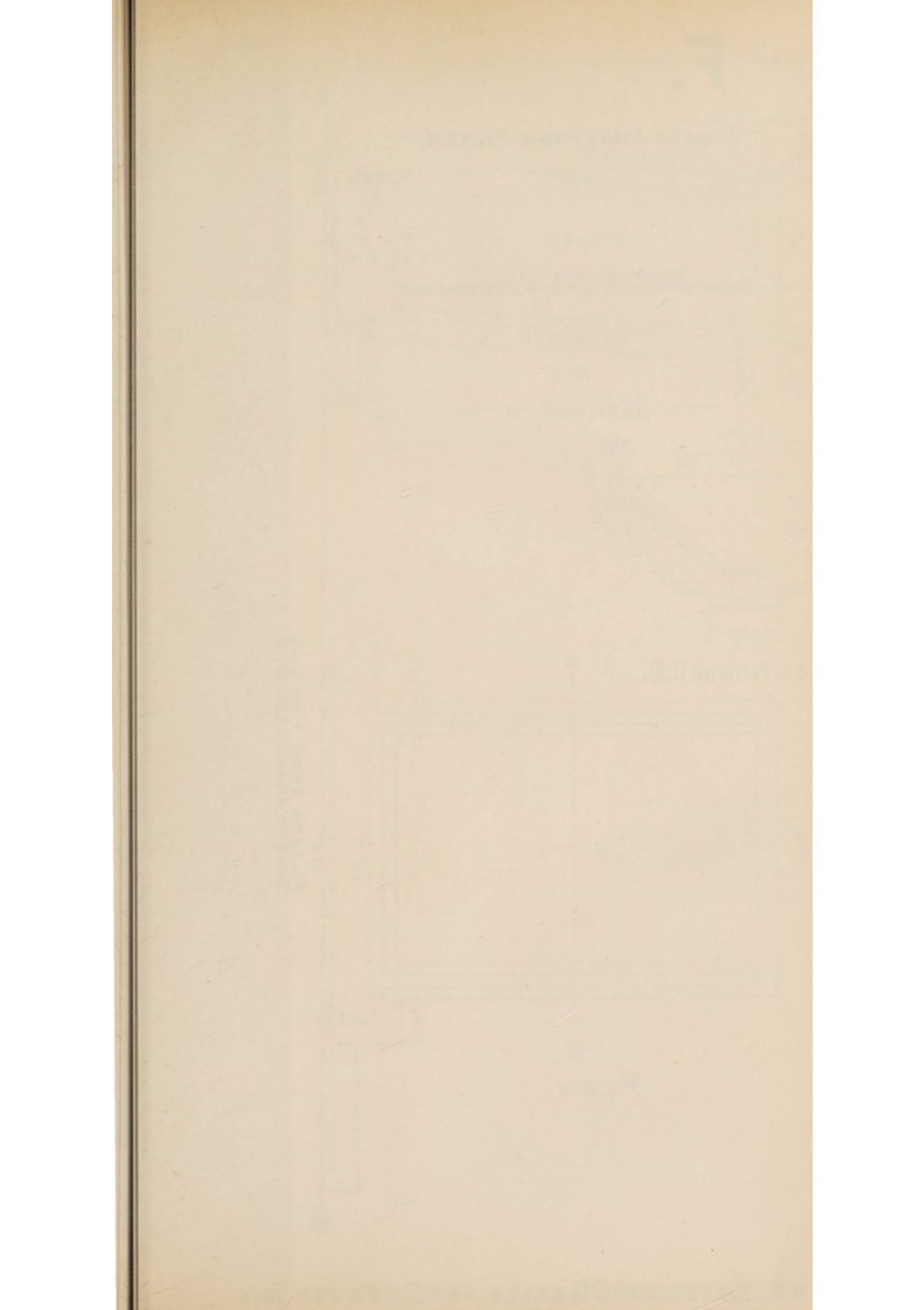
In the four Bacterial Beds (filters) a much greater amount of Nitrification takes place, as will be seen from the following table:—

TABLE shewing Decomposition of Organic Nitrogen into Ammonia, Nitrates and Nitrites.

System E.	Organic Nitrogen.	Ammoniacal Nitrogen.	Nitrates and Nitrites as Nitrogen.	Total Nitrogen found.
Crude Sewage- -	2.74	10.29	None	13.03
Rough Contact Beds	0.77	7.55	Trace	8.32
Bacterial Bed No. 1	0.30	2.59	1.87	4.76
" " " 2	0.27	3.10	1.42	4.79
" " " 3	0.31	1.59	4.53	6.43
" " " 4	0.34	1.87	3.71	5.92

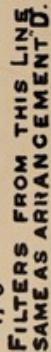
45. The flow of liquid from the Rough Contact Beds through the syphon on to the four Bacterial Beds (filters) was very rapid. The liquid did not remain in contact with the material of the Bacterial Beds for more than five minutes, and yet there was considerable nitrification. This nitrification was almost continuous during the rapid flow, as is shewn by the following experiments made with Bacterial Bed (filter) No. 4 E (Granite). The time taken for the liquid contents of the Rough Contact Bed to syphon off and pass through the Bacterial Beds was about 15 minutes. Twelve samples of the effluent from Bacterial Bed No. 4 E were taken at intervals of one minute from the time the first quantity of liquid appeared until the Bed had ceased to give off an effluent, and the Nitrates and Nitrites were determined together.

Time.	Nitrates and Nitrites as Nitrogen per 100,000 parts.			
1st minute	-	-	-	5.6
2nd "	-	-	-	4.5
3rd "	-	-	-	4.3
4th "	-	-	-	4.6
5th "	-	-	-	4.4
6th "	-	-	-	4.4
7th "	-	-	-	4.4
8th "	-	-	-	4.3
9th "	-	-	-	4.5
10th "	-	-	-	4.1
11th "	-	-	-	4.0
12th "	-	-	-	4.5





— F. —



**RATE OF FILTRATION THROUGH FINAL FILTERS=100 GALLS. PER SQ.YD. PER DAY.**

When the above experiments were made the Bed was in very good working order.

46. The Bacterial Beds Nos. 3 (Bricks) and 4 (Granite) gave much better results than Nos. 1 and 2. The keeping qualities of the effluents from Bacterial Beds (Filters) Nos. 1, 3 and 4 were respectively 84, 84 and 90 per cent. good.

*Working of the System.*

47. The automatic arrangement for passing the Crude Sewage on to the two Rough Contact Beds was frequently out of order. This was due, on several occasions, to stoppage of the apparatus by leaves and sludge. Leaky joints also interfered with the proper working of the apparatus.

The rate at which the effluent from the Rough Contact Beds was syphoned off on to the four Bacterial Beds (filters) was too great. The liquid contents of one Rough Contact Bed taking only about 15 minutes to syphon off and pass through the Bacterial Beds. This was distinctly too fast, but in future the rush of liquid can be reduced by constricting the exit tube of the syphon.

48. The Rough Contact Beds which were open to the atmosphere attracted in summer time a large number of flies but were never offensive.

49. The great fall required for working this apparatus—as much as 11 feet 6 inches—is a great drawback to its use.

50. There was distinct ponding on several occasions of the Bacterial Beds (filters). No. 4 was only slightly affected but No. 2 badly. The Beds that ponded cleared up on their own account and got into good working order again. To a considerable extent the trouble was caused by vegetable matter. The surface of the Bacterial Beds should be removed from time to time and covered with fresh material so as to reduce the ponding to a minimum. (See Paragraphs 32 and 33).

51. This System did not do so well as System D Bacterial Bed No. 1 (Coke).

SYSTEM F.

(Fig. F. Table F. Diagrams F 1-4.)

*Description.*

52. This System consists of an UPWARD ANAEROBIC BED and four AEROBIC BACTERIAL BEDS (Filters).

This System has been constructed like the others so as to treat 1,000 gallons of Crude Sewage per 24 hours. The Crude Sewage enters



the System through a V shaped slot as in Systems D and E, and then passes through a similar Mixing Chamber into a catch pit 2 feet 6 inches by 2 feet and 4 feet 9 inches in depth, internal measurement. From the catch pit the Sewage flows along a channel covered by an iron grating which supports the filtering material of the Upward Anaerobic Bed. The filtering material (granite) is at the bottom of the Bed of a mean diameter of about eight inches and from six inches to four inches through the body of the Bed up to the level of the overflow, with six inches of smaller material, from three inches to one and a half inches, on the top above the level of the overflow. The total depth of material is 3 feet. The Sewage passes upwards through the material and then falls over a long weir formed along each side of the Bed, and thence by a channel to the pipes leading on to the Iron Tumblers, which automatically deliver alternately on to the Bacterial Beds on each side of them, making in all four Bacterial Beds (filters) similar in every detail to those attached to Systems D and E. (See Paragraph 20). The total fall required from the upper end of the Mixing Chamber to the outflow of the System is six feet ten and a half inches.

53. In the upward Anaerobic Bed most of the Organic Solids in Suspension are liquefied, and the liquid passing from the Bed is almost free from solid matter. It was, however, very frequently noticed that especially during warm weather, the surface of the material of the Bed became heavily coated with vegetable matter (algæ and also animal matter, *i.e.*, worms, etc.). After a time this became detached and passed on to the four Bacterial Beds (filters), causing them to choke and therefore to pond. This ponding occurred on several occasions. This was not the only trouble. Frequently a bad odour was given off from the top of the Bed; it also attracted vast numbers of flies in warm weather. These difficulties could probably be overcome by covering the Bed.

54. Similar analyses were made once a week, for a period of at least one year, of the Crude Sewage entering the System F, and also analyses of the effluents from the Upward Anaerobic Bed and from the four Bacterial Beds (filters), as in the other Systems. The figures obtained by these analyses are given in Table F and Diagrams F 1-4.

TABLE F.

55. This Table shews the result of the analyses and also the percentage purification of the Organic Nitrogen and of the Oxygen Absorbed. The appearance of the samples when collected and after being kept for 14 days at the ordinary temperature is described. The final column of figures of Table F shews the average composition and percentage purification of the samples. The



Diagrams (Diagrams F 1-4) give the amount of Organic Nitrogen (Diagram F 1), Oxygen Absorbed (Diagram F 3), and the percentage purification (Diagrams F. 2 and 4) of the Crude Sewage after passing through the Upward Anaerobic Bed and the Bacterial Beds (filters). The average results are shewn by a straight line across the Diagram; the different beds having coloured lines of their own so that they can be distinguished at once. Only the Bacterial Beds (filters) giving the highest and lowest purification are plotted out in full; the two intermediate ones are indicated by an average line across the diagram.

56. Owing to the selective sedimentation, the Solids in Suspension of the Crude Sewage supplied to this System were less in quantity than those in the Sewage supplied to Systems D and E. The average amount of Solids in Suspension was 29.5 parts per 100,000. In the Upward Anaerobic Bed the Solids in Suspension were almost entirely liquefied—only on one occasion did they exceed 1 grain per gallon of liquid.

57. The average Oxygen Absorbed equals 5.96 parts of Oxygen per 100,000 of the Crude Sewage. That of the Upward Anaerobic Bed effluent equals 4.86 parts per 100,000. These variations are shewn in the Diagram F 3. Of the four Bacterial Beds (filters) No. 1 F (Coke) gave the highest percentage purification in Oxygen Absorbed and Organic Nitrogen. (Diagrams F 4 and 2). The average percentage purifications are—

*Oxygen Absorbed.*

System F.				Average per 100,000.	Percentage Purification.	Material.
Upward Anaerobic Bed	-			4.86	16.7	Granite
Bacterial Bed (filter) No. 1	1			1.51	71.7	Coke
" " " " 2	2			2.16	60.2	Coal
" " " " 3	3			2.63	51.0	Brick
" " " " 4	4			2.55	52.1	Granite

*Organic Nitrogen.*

Upward Anaerobic Bed	-			0.85	57.6	Granite
Bacterial Bed (filter) No. 1	1			0.26	85.6	Coke
" " " " 2	2			0.35	81.4	Coal
" " " " 3	3			0.36	79.8	Brick
" " " " 4	4			0.37	78.8	Granite

From these experiments it will be seen that the Bacterial Bed (filter) No. 1 (containing Coke) gave by far the best results as regards percentage purification of Organic Nitrogen and Oxygen Absorbed. The percentage purification of the Organic Nitrogen of Bacterial Beds



(filters) Nos. 2, 3 and 4 were very similar, and varied from 78.8 to 81.4 per cent.

### *Nitrification.*

58. No Nitrates or Nitrites appeared in the effluent from the Upward Anaerobic Bed, its action being purely Anaerobic.

Of the four Bacterial Beds (filters) No. 1 (Coke) gave the highest amount of Nitrification, viz., 1.56 parts per 100,000. The production of Nitrates and Nitrites in these beds was not always continuous. The decomposition of Organic Nitrogen into Ammonia, Nitrates and Nitrites was—

### *Average for the year in parts per 100,000.*

System F.				Organic Nitrogen.	Ammonia as Nitrogen.	Nitrates and Nitrites as Nitrogen.	Total Nitrogen found.
Crude Sewage	-	-	-	2.52	12.28	None	14.80
Upward Anaerobic Bed				0.85	10.13	"	10.98
Bacterial Bed	No.	1	-	0.26	4.03	1.56	5.85
"	"	2	-	0.35	6.57	Trace	6.92
"	"	3	-	0.36	6.57	0.23	7.16
"	"	4	-	0.37	6.48	0.08	6.93

### *Working of the System.*

59. As mentioned before (Paragraph 53), the surface of the open Upward Anaerobic Bed frequently became covered with masses of vegetable matter which passed off the bed with the effluent on to the Bacterial Beds and choked them from time to time. This difficulty could probably be overcome by raising the height of the material in the Anaerobic Bed by at least a foot or by covering the whole and making it like the Septic Tank of System D. This would be very much more satisfactory as the bad odours observed from time to time, and the fly nuisance would be abated. During warm weather a very large volume of gas was given off from this bed.

60. The ponding of the four Bacterial Beds which occurred on several occasions, was due almost entirely to the large masses of vegetable matter passing from the Upward Anaerobic Bed on to these Beds and choking their surface. This matter was constantly removed, and the Bacterial Beds if left to themselves gradually got into working order again. The nuisance caused by the odours given off from the Upward Anaerobic Bed and by the flies would make this System very objectionable if erected near habitations.



*The Effect of the Crude Sewage and Effluents of the 3 Systems upon Fish-life.*

61. Experiments were made with a view to determine how far the effluents from the 3 Systems described above, if allowed to flow into a stream, would or would not injuriously affect Fish-life. To get at the result, experiments were made on the effect of placing Gold Fish and Trout into the Crude Sewage and into the final Effluents from the experimental tanks and beds. The experiments were made by placing Trout or Gold Fish in a glass vessel (capable of holding 10 litres of water) with a known volume of Sewage, or Sewage Effluent as the case may be. When Crude Sewage was used the Trout almost at once became restless and tried to spring out of the vessel. In about ten minutes time they were almost dead, but when removed and placed at once into pure water they recovered rapidly and appeared none the worse. The same kind of fish were then placed into the same Crude Sewage, after it had been well shaken with air. By so aerating the Sewage its injurious action on the fish was not so noticeable and they remained in it for a much longer time without shewing much uneasiness. Prolonged exposure to these conditions (20 minutes) almost destroyed the life of the fish, but in most cases when removed and placed into cold and well aerated fresh water, the fish recovered. Gold fish experimented upon in the same manner were found to be much less sensitive to the action of Crude Sewage. When placed in it, the gold fish came to the surface and gulped down air with the liquid in large quantities. This continued in several experiments for over an hour when the fish shewed symptoms of distress. On being removed and placed into well aerated fresh water they completely recovered. If the Crude Sewage was well and continuously agitated with air the Gold Fish were able to exist in it without any apparent inconvenience for the whole time the experiments lasted, at least two hours. It therefore appeared that the effect of crude domestic Sewage upon fish is dependent on the amount of aeration the Sewage has undergone.

62. Similar experiments were made with the effluents from the Septic Tank of System D, the Upward Anaerobic Bed of System F and the Contact Beds of System E. The effect of these liquids was much more injurious on the fish than in the case when Crude Sewage was experimented with, both the Trout and Gold Fish becoming rapidly ill. The Trout, if left in for only a few minutes, were apparently dead, and all attempts to revive them by placing them in fresh well aerated water, failed. The Gold Fish in several cases were revived by careful treatment in well aerated water. The effluent from the Septic Tank of System D, when well shaken with constantly renewed air, absorbed enough Oxygen to support the life of Gold Fish for some 30 minutes.

63. The effect of the final effluents from the different Bacterial Beds of the 3 Systems on Trout and Gold Fish was also observed.



If the Bacterial Beds were all in good working order, Trout could exist in the effluents for a considerable length of time. In the case of the Gold Fish, they remained in the effluents for several days without any injurious effects. Gold Fish have existed in the mixed effluents passing from the 3 Systems for over one month without any apparent ill effect.

64. From these experiments it will be seen that—

- (1) The final effluents from the 3 Systems experimented with may not destroy Fish-life (gold fish) if the Bacterial Beds are in good working order, that is to say, when there is little or no ponding.
- (2) That the injury to Fish-life depends on the want of oxygen in the effluent.
- (3) That *Salmonidæ* require a larger quantity of oxygen than *Cyprinidæ*.
- (4) That it is unsafe to allow an effluent from a Sewage system dealing with domestic Sewage to pass into a river containing *Salmonidæ*, which is stated to be innocuous to fish-life unless the facts of the case and the kind of fish experimented on are known.

#### CONCLUSIONS.

65. From a consideration of the above results, there can be no doubt that Domestic Sewage (Sewage containing no waste materials from manufacturies) can be satisfactorily purified by treatment in a system such as has been described under System D. (See paragraphs 14-23.)

66. The apparatus should consist of a closed Septic Tank for the liquefaction of the organic solids of the Crude Sewage with Bacterial Beds (filters), filled with Coke. Coke is recommended for the final oxidation of the organic matter because that material gave better results with the Septic Tank than when Coal, Brick, or Local Stone (Granite) were used as material for the Bacterial Beds.

67. It is desirable to have two Bacterial Beds in order to prevent ponding. The Beds can then be worked alternately, so that each may have a rest, which is the most certain safeguard against ponding.

68. The three Systems were not altered in any way during the experiments.

69. It was noticed that there was considerable selective sedimentation of the Solids in Suspension of the Crude Sewage in the carrier which supplied the Systems with Sewage. The System D, the first reached by the carrier, was the first to receive its supply, and accordingly received a much more concentrated Sewage; whilst the others, whose inlets were placed further along the carrier,



did not get nearly so concentrated a Sewage, because of the rapid settling of the Solids in Suspension of the Sewage in the carrier.

Again, on several occasions the System D took considerably more than 1,000 gallons of Sewage per day because of the stopping up of the V shaped slots of Systems E and F by large lumps of solid matter present in the Sewage. These stoppages were as carefully guarded against as possible, but were sometimes unavoidable. This could not have been entirely avoided without considerable alteration to the carrier. The difficulty was quite unforeseen and therefore was not guarded against in building the systems.

With the exception of the failure of the automatic apparatus (see paragraph 47) attached to System E, to work on certain occasions, the remainder of the apparatus of all the Systems was in good working order during the whole time and up to the end of the experimental year.

#### METHODS OF ANALYSIS.

70. It is of great importance that the methods employed in analysing the samples of Crude Sewage and Sewage Effluents should be described in detail, in order that the results obtained by them may be compared with those of other Chemists.

71. The samples of Crude Sewage in a small Winchester quart bottle were taken at the V-shaped entrance of each System. The carrier containing the Crude Sewage is a branch of the main sewer and runs at the head of the three Experimental Systems, which lie side by side. It ends in a *cul de sac*. It would have been much more satisfactory if this carrier had contained rapidly flowing Sewage as the selective sedimentation which obviously took place along the carrier would not have occurred. Samples of the effluents were taken when sufficient time had elapsed for the Crude Sewage to have passed through the different Systems. When the Bacterial Beds were in very good working order the effluents from the tanks above passed through them in about five minutes. These samples were at once forwarded to the County Chemical Laboratory where they were always received the same day as taken. They were conveyed with great care, only two samples being lost. On their arrival at the Laboratory the following points were at once noted:—Appearance, Reaction to Litmus, and Odour. The substances most liable to change were at once estimated and those not so liable were dealt with later. The samples were kept in a cool place so as to keep fermentation at a minimum. A quantity of each sample (about one-half) was kept for 14 days at the ordinary temperature of the Laboratory when its appearance and odour were noted.

72. The following determinations were made so that an opinion as to the composition and purification of the samples could be expressed:—



The determination of Solids in Suspension (1).

" " " " Solution (2).

" " " Chlorine (3).

" " " Ammoniacal Nitrogen (4).

" " " Albuminoid Nitrogen (5).

" " " Oxygen absorbed in 4 hours from Permanganate at 60 deg. F. (Oxygen Absorption), (6).

" " " Nitrogen in Solids in Suspension (Kjeldahl) (7).

" " " Nitrogen in Nitrates and Nitrites (8).

The Organic Nitrogen was determined by adding the Albuminoid Nitrogen found, to the Nitrogen in the Solids in Suspension (9).

#### (1). *Determination of Solids in Suspension.*

73. The Sample is well shaken and one hundred cubic centimeters measured off in an upright graduated cylinder (if the quantity of suspended matter is small 250 c.c. should be taken), and filtered through a weighed filter-paper (15 cm. in diameter) on a flat Buchner funnel. The filtration should be hastened by using a water pump. The solids on the paper are well washed with distilled water and drained as free from moisture as possible whilst still upon the pump. The filter-paper and solids are then removed from the funnel and placed on a tile in an oven kept at 100 deg. C. for 3 hours, the final drying taking place in a drying-tube in the water-oven until the weight is constant. The increase of weight of the filter paper gives the weight of Solids in Suspension in the volume of Sample taken. The weight found was calculated into parts per 100,000 of the Sample. The Solids in Suspension so obtained were further examined for Organic Nitrogen as described under the determination of Nitrogen in Solids in Suspension (Kjeldahl) (7).

#### (2). *Determination of Solids in Solution.*

74. Measure 100 c.c. of the clear liquid obtained by filtering off the Solids in Suspension (if the Solids in Suspension were greater than one grain per gallon of sample) into a weighed dish, evaporate on water-bath, and then dry in oven at 100 deg. C. until constant in weight. The increase of weight of the dish represents the weight of Solids in Solution in 100 c.c. of the Sample; this multiplied by 1,000 will give the amount of Solids in Solution in 100,000 parts of the Sample. The appearance of the dried matter was observed. The loss in weight on igniting these Solids was determined, and the ignited Solids were examined for the presence or absence of Phosphates. Phosphates were always found in heavy traces.

#### (3). *Determination of Chlorine.*

75. Measure exactly 10 c.c. of the clear Sample into a porcelain dish add a drop of Potassium Chromate solution (free from Chlorides),



and titrate with Standard Silver Nitrate Solution (1 c.c. of which is equal to 0.000354 gramme of Chlorine) until the liquid is faintly red. Another portion of the Sample was boiled and titrated as described above. It was found necessary to do this in several cases, as the presence of Sulphuretted Hydrogen interfered with the reaction. If the Sample is acid it should be neutralised by adding a pinch of pure powdered chalk before titrating.

(4 & 5). *Determination of (a) Ammoniacal Nitrogen and  
(b) Albuminoid Nitrogen.*

76. The determination of the above substances is of great importance and we proceed as follows:—

The distilled water manufactured in the Laboratory (using a Copper-Still and a Tin Condenser) always contains more than a trace of Free Ammonia, and as it is of the greatest importance that the distilled water used in these experiments should be quite free from Ammonia some experiments were made with a view to determine a rapid method for the production of Ammonia Free Water. Distilling tap water, made alkaline with pure Sodium Carbonate, was not found to be satisfactory; the same may be said when tap-water was made slightly acid with Sulphuric Acid and distilled in a glass flask. The following process was found to be most satisfactory as Ammonia Free Water could be produced rapidly and in large quantities. Into a 1½ litre round bottomed flask measure 1,200 c.c. of ordinary distilled water, add two or three drops of Bromine Water and boil for at least five minutes or until all smell of Bromine has disappeared. The cooled liquid never gave any colour with Nessler Solution, being Ammonia Free.

(a). *Determination of the Ammoniacal Nitrogen.*

Into a round bottomed Jena glass distillation flask, about 1½ litre in capacity, measure 1,200 c.c. of ordinary distilled water, add two or three drops of Bromine water; boil for five minutes or until free from Bromine and connect flask to a glass condenser which is attached to the same iron upright as the distillation flask, and distill over into Nessler tubes until the distillate gives no colour when mixed with 1 c.c. of Nessler after standing 5 minutes. (The Nessler tubes used were 10 c.m. long up to the 50 c.c. mark). The distillation is stopped, the apparatus being free from Ammonia. The water in the distillation flask is allowed to cool. Then add a few drops of a saturated solution of Sodium Carbonate and the quantity of sample required for the analysis. In the case of a Crude Sewage 20 c.c. of the clear liquid (the Nitrogen in the suspended matter being determined as described later on in (7)) was used; in the case of a tank effluent 20 c.c. was also used, the sample being well shaken before being measured, except in the case when the Solids in



Suspension were large enough to be estimated separately when the sample was not shaken. In the case of a Bacterial Bed or Filter effluent 50 c.c. were used, the sample being well shaken before it was measured off, except in the case when the Solids in Suspension were large enough to be estimated separately, when the clear liquid was used.

The distillation flask is at once connected with the condenser and the contents distilled. The distillate is collected in a 250 c.c. graduated flask which when filled up to the mark is removed and placed on one side. The distillation is continued until 50 c.c. of the distillate in a Nessler tube gives very little or no coloration after standing for 5 minutes in contact with Nessler's solution. The distillation is then stopped and the Free Ammonia in the distillate contained in the 250 c.c. flask and Nessler tubes determined by Nesslerising. The standard Ammonium Chloride solution used was of such a strength that 1 c.c. = 0.0000082 gramme Nitrogen. The results are given in parts per 100,000 of Crude Sewage, Tank Effluent, or Bacterial Bed or Filter Effluent as the case may be.

(b) *Determination of Albuminoid Nitrogen.*

77. The partly cooled liquid in the distillation flask is now used for the determination of the Albuminoid Ammonia and we proceed as follows:—

To the cooled liquid in the flask is added 50 c.c. of alkaline permanganate; the flask is then attached to the condenser and the liquid boiled. The distillate is collected in a 250 c.c. graduated flask, which when filled up to the mark is removed and placed on one side. The distillation is continued until no colouration is produced, when 50 c.c. of the distillate is mixed with Nessler's solution, or the distillation was continued until it was dangerous to distill further. By this process most of the nitrogen of the albuminoids is converted into Ammonia, which is estimated in the same manner as described above. The estimation of Ammonia by Nessler's process is best performed in bright daylight, but as the experiments had to be made in a cellar, which had at the best very little daylight, another source of light had to be found which would give satisfactory results. Ordinary gas light was of no use, it being too yellow; the same may be said of the electric (incandescent) light. Some experiments were made with an ordinary Welsbach (incandescent mantle), which gave satisfactory results. A burner having a mantle about 9 centimeters high and about 3 centimeters broad at the base, and well heated all over gave very satisfactory results, and overcame what was a very great trouble.

The gas pressure should be as high as possible (4 inches of water) and the mantles should be heated some 50-100 hours before use, as they give during the first 50 hours a light having a slight yellow tint.



(6). *Determination of Oxygen Absorbed from Permanganate in 4 hours at 60 degrees F.*

78. A measured volume of the well-mixed sample (50 c.c. of Crude Sewage or Tank Effluent, diluted to 250 c.c. with pure distilled water, or 250 c.c. of Bacterial Bed or Filter Effluent were taken) is placed in a clean glass flask with 10 c.c. of pure diluted Sulphuric Acid (strength 1 to 2) and 10 c.c. of Potassium Permanganate Solution (strength 10 c.c.=0.005 Gramme Oxygen). The mixture was allowed to stand four hours in the cold (60°F.), with frequent shaking. If the pink colour of the Permanganate Solution became at all faint during the four hours, further measured quantities of Sulphuric Acid and Permanganate Solution were added. At the same time a "blank" experiment was started for comparison, using the same quantities of Sulphuric Acid and Permanganate Solution mentioned above and 250 c.c. of pure distilled water. At the end of four hours the undecomposed Permanganate was decomposed by adding an excess of Potassium Iodide Solution and titrating the free Iodine with Thiosulphate Solution, using Starch as an indicator. The difference between the quantity of Thiosulphate used in the blank experiment and that used in the titration of the samples, multiplied by the amount of available Oxygen contained in the Permanganate added, and the product divided by the volume of Thiosulphate corresponding to the latter, is equal to the amount of Oxygen absorbed by the sample.

(7). *Determination of Nitrogen in Solids in Suspension by Kjeldahl's Method.*

79. When the Solids in Suspension were present in the samples in quantities greater than one grain per gallon they were filtered off and determined as described in paragraph 73. The Nitrogen in these dried Solids was determined as follows:—The dried Solids in Suspension and the filter paper were placed in a  $\frac{1}{2}$  litre round bottomed Jena glass flask and moistened with 20 c.c. of concentrated Sulphuric Acid. Three grammes of Sodium Pyrophosphate were then added and the mixture boiled until the liquid became quite colourless. The liquid was then cooled, washed into a distillation flask with ammonia free distilled water and made strongly alkaline by adding 70 c.c. of caustic soda (1 lb. in litre). The liquid was distilled and the distillate collected in a 250 c.c. graduated flask. The 250 c.c. contained all the Ammonia derived from the nitrogenous matter in the Solids in Suspension and from the re-agents. The Ammonia was determined in the usual manner by Nesslerising. A blank experiment was made with the re-agents used (including filter paper) and the Ammonia found, deducted from that determined above.

(8). *Determination of Nitrogen in Nitrates and Nitrites.*

80. The Nitrates and Nitrites were determined together by evaporating to dryness in a porcelain dish on a water bath 100 c.c. of the



sample made alkaline with pure caustic soda. The caustic soda was added in order to decompose any Ammonium Nitrite present and convert it into Sodium Nitrite, otherwise the Ammonium Nitrite would be decomposed on heating the solution, into free Nitrogen and water, which would give low results. The residue in the dish was extracted with about 2 c.c. of distilled water and the extract poured into the cup of a Lunge Nitrometer. The extract was drawn into the tube of the Nitrometer and then 5 c.c. of pure concentrated Sulphuric Acid added. The carbonates and chlorides present will be quickly decomposed into Carbonic Acid and Hydrochloric Acid gas which should be driven out of the Nitrometer. The mixed liquids were then well shaken and all Nitrates and Nitrites decomposed into Nitric Oxide gas the volume of which was determined in the usual way. This volume, expressed in c.c.'s and corrected to normal temperature and pressure, gives, when multiplied by 0.625, the Nitrogen in the Nitrates and Nitrites in parts per 100,000. The above process gave very satisfactory results except when the sample contained much Chlorine. It was found that high results were obtained when the sample contained more than 12 grains of common salt per gallon. When this occurred a saturated solution of Silver Sulphate was added to precipitate all or nearly all the Chlorine present. The Silver Chloride was filtered off, washed and the filtrate and washings evaporated and treated as described above.

By the above process the Nitrates and Nitrites were estimated together. The Nitrites were in some cases determined by a modified Griess' process. By this process the Nitrites in Solution are made to act upon a colourless Solution of Meta-phenylene-diamine in the presence of free Sulphuric Acid, when a brown coloration (due to the formation of Bismarck Brown) is produced, and the depth of which will depend on the quantity of Nitrite present. The colour is compared with the colour produced by a known quantity of standard Nitrite Solution, acting upon acid Meta-phenylene-diamine. The Standard Nitrite Solutions were found not to remain as constant as was expected, and after a number of experiments had been made, the process was modified by taking a weighed quantity of pure Bismarck Brown and determining its value in terms of Nitrous Nitrogen by comparing its colour with that produced by a known weight of pure Nitrite. The standard solution of Bismarck Brown remained remarkably constant even when left exposed to daylight for over a month. This process is being further tested.

#### (9). *Organic Nitrogen.*

81. The quantity of Organic Nitrogen in each sample was obtained by adding together the Albuminoid Nitrogen and, if any, the Solids in Suspension Nitrogen.

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The Tables and Diagrams marked D., E. and F., referred to in Report, can be seen at the Offices of the County Analyst, Shirehall, Worcester.

[8 June 1903].

I



WORCESTERSHIRE COUNTY COUNCIL.  
REPORT OF EXPERIMENTS  
ON THE  
BACTERIAL TREATMENT OF SEWAGE.

*First Report on the best methods of Sewage disposal applicable for use in the County.*

1. In the Year 1900, the Council on the advice of the Sanitary Committee resolved to undertake certain work in order to ascertain as far as possible the best methods of Sewage disposal that were applicable to the varying conditions existing in *Worcestershire*. These conditions differ more than in most Counties. They can be divided into *three* great classes applicable to—

- (1) Domestic Sewage.
- (2) Sewage with Acids, Alkalies and Compounds of Iron.
- (3) Sewage with Manufacturers' Dyeing Waste.

Sewage of each kind passes down one or other of the sewers in the County and has to be dealt with by some method of Sewage treatment. The *first* is far the simplest class and prevails over the larger portion of the County. While the *second* is principally found in the *Stour* watershed and at *Oldbury*, in which Town considerable quantities of Acid and Alkaline Waste are passed into the sewers, the *third* is mainly confined to *Kidderminster*.

2. A beginning has been made with Domestic Sewage and as to this the *first* series of experiments are now concluded. Certain conclusions of practical value have been arrived at which are of interest and importance to the Local Authorities who have to deal with the question of the disposal of this class of Sewage. It is therefore desirable that these should be stated at once without waiting for a complete report on the whole subject. Advantage is taken of this opportunity to give some account of the work the County Council is doing. This report will therefore state—

- (a) Why the work was undertaken.
- (b) The modes in which it is being carried out.
- (c) The work already done and what remains to be done.
- (d) The results arrived at.



(a) *Why the work was undertaken.*

3. The *Worcestershire* County Council was formed in 1889 and at their *first* Meeting the question of the Sanitary state of the County was raised. Ultimately in that *Year*, a Sanitary Committee was appointed of which the late Sir *Douglas Galton* was Chairman and in their *first* Report the Committee called attention to the urgent necessity of dealing with the pollution of the rivers of the County. In 1890 a County Medical Officer was appointed and in his earliest reports the Council had before it, for the *first* time, a statement of the Sanitary condition of the County as a whole.

4. Such reports shewed the necessity for the Council taking steps to secure a more effective method of dealing with Sewage than then existed, not only in the towns, but also in country places and in connection with small groups of houses. Any attempt to deal with these places was at once frustrated by the large cost a scheme of Sewage disposal involved.

5. All the then known systems included, not merely the collection of the Sewage and its conveyance to a place for treatment, often a costly matter even if it could be done by gravitation, and still more costly if pumping was necessary as that involved an annual outlay in addition to the cost of the machinery, but also when the Sewage reached the place of treatment the Local Government Board insisted that it should be dealt with upon land, whether it had or had not been previously treated by chemicals.

6. To make matters worse, the Queen's Bench Division decided that under the Public Health Act 1875, ss. 4, 13, a drain which receives the drainage of two or more houses, belonging to the same owner, is a sewer vested in the Local Authority, and it is the duty of the Local Authority to repair, cleanse and maintain it so that it shall not be a nuisance.

7. Furthermore, the River Pollution Prevention Acts of 1876 and 1893, prohibit the passage of Sewage into streams unless "the best practicable and available means to render harmless the Sewage matter" are taken.

8. The result is to make it obligatory on all Sanitary Authorities to adopt some means of dealing with all the Sewage in their area, even if it only come from two or more houses. As a rule this means a series of small Sewage farms, for these in most cases there had to be a loan, and the Local Government Board made it a condition to their assent that part of the treatment should include land. This led to



the result that most of the smaller Sanitary Authorities neglected their duty and their Sewage remained untreated.

9. The question then arose if some other means could not be found, less costly than irrigation, but equally effective; so attention was directed to filtration. As far back as 1876, filtration had been employed at *Wimbledon* in connection with Sewage, but difficulties arose in the practical working of the system. In 1893, experiments were made in *America* as to treating Sewage in bacterial filter beds, whereby the bacteria present in the Sewage were enabled to effect a partial purification. These experiments attracted a good deal of attention. The *London County Council* carried out experiments with the *London Sewage* based on the *Massachusetts* plan. Various attempts at adopting some such system were made in other parts of the Country, and the Sewage of some 2,000 persons at *Exeter* was treated in "bacteria beds" in *Cameron's* septic tank process.

10. The reports from *Exeter* as to the success of this system and the great saving of cost effected by its adoption excited general attention, consequently the Sanitary Committee, at the suggestion of their Chairman, Sir *Douglas Galton*, instructed the County Medical Officer to report upon the Bacteriological processes of Sewage disposal. Dr. *Fosbrooke's* Report of 23 April 1898, was prepared after he had visited many places where "Bacterial Filters" of various kinds were being tried and deals with—"Lowcock's," "Ducat's," "Scott Moncrieff's," "Dibdin's," "Cameron's" and "Garfield's" processes.

11. Among the conclusions which the County Medical Officer arrived at were "(a) that the Bacteriological tanks were most "promising and would probably lead to a revolution of Sewage disposal, (b) that in the near future the present regulations of the Local Government Board with respect to Sewage would have to be materially modified and that even should the provision of land be insisted upon, still the adoption of the Bacteriological system would so greatly assist in the disintegration of such refuse, that the area asked for will be considerably less than it now is and (c) that with respect to the character of the Sewage with which Bacteriological tanks are capable of dealing, a decidedly open view should be entertained, for it was not proved that Manufacturers' refuse can be satisfactorily dealt with, or that Acid Waste refuse, if perceptible in Sewage, will not stultify microbial action."

12. In 1898 a Royal Commission was appointed to inquire and report—



- (1) What method or methods of treating and disposing of sewage (including any liquid from any factory or manufacturing process) may properly be adopted, consistently with due regard for the requirements of the existing law, for the protection of the public health, and for the economical and efficient discharge of the duties of Local Authorities; and
- (2) If more than *one* method may be so adopted, by what rules in relation to the nature or volume of sewage, or the population to be served, or other varying circumstances or requirements, should the particular method of treatment and disposal to be adopted be determined; and
- (3) To make any recommendations which may be deemed desirable with reference to the treatment and disposal of Sewage.

13. The Commissioners found that it had been the practice of the Local Government Board to require, except in exceptional cases, that any scheme of Sewage disposal for which money was borrowed with their sanction, should provide for the application of the Sewage or effluent to an adequate area of suitable land before its discharge into a stream.

14. The Commissioners came to the conclusion that peat and stiff clay lands were generally unsuitable for the purification of sewage; that their use for this purpose was always attended with difficulty, and that where the depth of top soil is very small, say *six inches* or less, the area of such lands which would be required for efficient purification would in certain cases be so great as to render land treatment impracticable.

15. A very large area of *Worcestershire* is of the character which the Commissioners here describe as unsuited for the purification of sewage. The Sanitary Committee felt that they could not recommend the Council to take proceedings to compel Local Authorities to carry out the law when the result of such proceedings would be that the Local Government Board would make the Authority spend a large sum of the Ratepayers money in providing a system which a Royal Commission reported to be unsuitable.

16. It thus seemed that matters had reached a deadlock; but the Commission went on to say that they were satisfied that it is practicable to produce by artificial processes alone, an effluent which will not putrify, which might be discharged into a stream without fear of creating a nuisance, that therefore there were cases in which the Local Government Board would be justified in modifying under



proper safeguards their present rule as regards the application of sewage to land. They added no general rule as to what these safeguards should be; probably it will always be necessary that each case should be considered on its own merits.

17. The deductions to be drawn from the Commissioners Report therefore were—

- (i.) That for a great part of *Worcestershire* the system of irrigation was useless.
- (ii.) That by artificial processes the same result as would be obtained where irrigation was successful could be arrived at.
- (iii.) That the proper process to adopt for any particular place had to be decided with reference to that place.

18. The Commissioners gave the following general classification of the artificial processes to which they alluded :—

Closed septic tanks and contact beds.  
Open septic tanks and contact beds.  
Chemical treatment, subsidence tanks and contact beds.  
Subsidence tanks and contact beds.  
Contact beds alone.  
Closed septic tanks, followed by continuous filtration.  
Open septic tanks, followed by continuous filtration.  
Chemical treatment, subsidence tanks and continuous filtration.  
Subsidence tanks, followed by continuous filtration.  
Continuous filtration alone.

19. The Commissioners reported that they were not in a position to express an opinion upon the relative merits of the several artificial processes, nor make a complete comparison between the land treatment and the artificial treatment of sewage, or state how far purification of Sewage can be uniformly effected by one or other artificial process, and at what cost as compared with land treatment. In effect, the Commissioners said, "one or other of these methods will do what you want as to purification, but you must find out for yourselves the one that suits your case."

20. At the request of the Sanitary Committee the Council at once took steps to induce the Local Authorities to adopt the one of these artificial processes best adapted to their work. For this purpose they carefully considered the various Bacteriological systems, and arrived at the conclusion that the following *three* were the best adapted to meet the varying cases in this County :—



- i. Liquefying tanks with ærobic filter beds.
- ii. Rough contact beds with ærobic filter beds; and
- iii. Upward anærobic filter beds with ærobic filter beds.

21. Having arrived at this conclusion, they instructed Mr. *Lowcock* C.E. (*Birmingham*) in June 1900 to prepare a diagram shewing each of these processes, with a detailed specification describing how each should be constructed. These diagrams were and are still in great request, and are given to all persons in the County who wish to make a trial of such methods of Sewage treatment, to District Sanitary Officers and others interested in the question.

22. The Council then made a further attempt to compel the Sanitary Authorities to take active steps as to Sewage disposal, but the authorities were unable to make up their minds which one of the systems to adopt, and made this uncertainty a plea for doing nothing; it therefore became apparent that unless the Council took some steps to place itself in such a position as it could say to a Local Authority, this is the system for your case and this we insist on your carrying out, nothing would be effectively done. It also became clear that the particular system that would be suitable to one place could only be settled after a series of reliable experiments, and the Committee felt that in such matters local experiments by Local Authorities could not be implicitly relied on. The Local Authorities also objected to pay the cost of experiments, which they alleged were for the general good of the County, not merely for that of their locality.

23. The Committee felt the weight of these objections, and that trustworthy results could only be obtained if the Council themselves did the work. They also felt that the experiments being for the advantage of the whole County, the whole County should bear the cost. They therefore determined to apply to the Council for authority to carry out such works as might be necessary to ascertain the best methods of treatment adapted for the County. The Council authorized the Committee to do this.

24. The reasons therefore which rendered it necessary for the work to be undertaken by the Council are—

- (1) The obstinate adherence of the Local Government Board to a system which was in certain cases ineffective, and even when effective was so costly as to be prohibitive.
- (2) The knowledge that out of a certain number of systems there were some that would enable the sewage of the County to be cheaply and effectively dealt with.
- (3) The necessity of ascertaining, in order to protect the health



and improve the sanitary conditions of the County, which were the systems the Council could insist on being used by the different Local Sanitary Authorities.

(b) *The mode in which the experiments are being carried on.*

25. In order to understand the system adopted it is necessary to say something as to what is required to be done in the treatment of Sewage to render it harmless. The first thing to ascertain is the composition of the Sewage as delivered at the Sewage works. Usually it is of *two* kinds, (a) ordinary domestic Sewage, (b) domestic Sewage combined with manufacturing refuse. This last is the result of the Rivers Pollution Prevention Act 1876, which provided that under certain conditions facilities were to be given by Local Authorities to manufacturers to discharge their refuse into Sewers, a point which seems to be emphasized in the Third Report dated *2nd March* 1903 of the Sewage Commissioners.

26. Ordinary domestic Sewage may be roughly defined as the solid and liquid excretions of man and animals mixed with water, the waste liquids and solids from the kitchens, and the domestic slops. The object in treating Sewage is to remove the objectionable constituents by a process of purification; this must be done before such liquid can be safely turned into a river. One method of taking out the solids is by means of chemical processes. The Sewage is placed in tanks and clarified, the suspended matter being removed to a greater or less extent. But the chemical process deals mainly with solids in suspension and not so much with solids in solution.

27. In the Bacterial treatment of Sewage the filters, or Bacteria beds, to be effective, require certain defined conditions to be carried out, viz. (1) They must not choke; this they will be liable to do if the suspended mineral and organic matter of the Sewage is not dealt with before filtration, to effect which anærobic action is induced to liquify the sludge by means of septic tanks, (2) They must be properly aerated so that ærobic organisms can be established which will attack the organic matter and convert it into harmless products. In this part of the process the size of the substance composing the bacterial filter beds is a most important factor in order to insure that the largest amount of bacterial action may result. (3) There must be no "ponding," as that will prevent the proper action of the filters.

28. The ultimate aim of bacterial treatment of Sewage is to produce an effluent that can be discharged into a stream without causing any injury. It was claimed for some of the processes that they, by means of the bacteria, disposed of the objectionable constituents



of the Sewage and produced a safe effluent. So what had to be determined was, which of the *three* systems selected would produce the best effluent, that is, dispose of the largest proportion of the objectionable constituents. The Committee, to ascertain this, determined to test the *three* selected processes with *two* kinds of Sewage—

Domestic.

Mixed domestic and manufacturing waste.

29. The place selected for the experiments on domestic Sewage was *Malvern Wells*, where the Sewage was dealt with by irrigation. A carrier from the main outfall sewer was laid down to the experimental tanks, which were placed side by side. For mixed Sewage and manufacturing waste *Oldbury* was selected, and a more difficult Sewage to treat can scarcely be imagined. The *Oldbury* experiments are still going on and will be dealt with in a future report.

30. It was intended to have had another set of filters at *Kidderminster* where the Sewage is of a most interesting nature, as in addition to the domestic Sewage, a good deal of dye waste liquid finds its way into the sewers from the dye works and carpet works in the Town. At present the Sewage of *Kidderminster* is dealt with on the broad irrigation system. But there are complaints (a) that the farm is a nuisance and (b) that it is productive of anthrax. Unfortunately the filters have not yet been laid down at *Kidderminster* as the Local Government Board places obstacles in the way, and threatens to surcharge the Council with the cost. It is rather hard that Boroughs are allowed to make what experiments they please under the name of Sewage works, while if a County Council tries to save the ratepayers' pockets by ascertaining which is the best system before adopting any, it should be surcharged. It is right to add, that after a protest the surcharge which was made in respect of the *Malvern* and *Oldbury* Works was remitted, but the Council are forbidden to go on with the *Kidderminster* experiments.

31. The principle underlying the County Council experiments was to place the *three* selected Bacterial systems side by side, to feed them with Sewage under the same conditions as nearly as possible, to shew by the analysis of the Sewage entering the system what was its composition and to ascertain by analysis of the effluent from each system, which of the *three* got rid of the largest percentage of objectionable matter and so produced the most satisfactory effluent. This principle was only settled after a good deal of consideration. It has been fortunate in obtaining the approval of the Royal Commissioners on Sewage, who say in their report upon these experiments—"The idea



“of making parallel observations with the same set of processes in various places with the view of ascertaining the relative merits under one and another set of conditions appears to us excellent, and these particular experiments, although small, should give valuable results if carefully watched and frequently examined.”

32. A full description of each system will be found in the Appendix. Each of these systems was placed side by side and constructed so as to treat 1,000 gallons of Sewage per day of 24 hours. A carrier open to the air was made from one of the main sewers to the place where the systems were laid down. The Sewage passed from the carrier into each of the systems through a V shaped slot identical in size in each case. The Sewage flowed from the sewer down the carrier by gravitation to the system and received no previous treatment of any kind before entering it. The *three* diagrams marked D. E. and F. shew the results obtained. Full details of the different systems are given in the County Analyst's first Report on the Bacteriological Purification of Sewage, which is appended.

33. Samples were taken at fixed dates both of the crude Sewage before it entered the systems and of the effluents as they passed from the systems, all of which were submitted to analysis.

34. The work began in July 1901 and was continued until July 1902, and during that time 156 analyses of the Crude Sewage were made.

35. When the Sewage had passed through the various parts of the different systems the effluent from each was analysed. Some 780 analyses of these effluents were made.

36. These analyses enabled the amount of purification effected by each system to be ascertained, and it was found that System D (a system consisting of a closed septic tank combined with a coke bacterial bed) gave a higher percentage of purification than any of the others, with a greater purity of the effluent. If a coke bed was employed the effluent was still sufficiently aerated not to destroy fish life, while no less than 94 per cent. of the final effluents proved on analysis to be so purified that they would not putrify if passed into a river.

37. The result of the experiments is that the Council is now in a position in cases where the Sewage to be dealt with consists of domestic Sewage, to recommend a system (D) that will so effectually deal with it as to enable an effluent to be obtained that can be safely



[8 June 1903].

admitted into a stream without being first treated on land. This result will however only follow if the system is properly carried out and the tanks kept in good working order.

38. As to cost. Mr. *Maybury* (Engineer to the *Malvern* Council), who put down the Experimental Tanks at *Malvern*, as well as several others in accordance with System D, estimates that an installation for dealing with 1,000 gallons of Sewage *per day* can in ordinary cases be constructed at a cost of about £100.

39. Having thus ascertained a practicable and available means for dealing with domestic Sewage at a reasonable cost, it remains for the Council to carry out the work that they felt was necessary 10 years ago, and the necessity for which has since then largely increased, namely to take effective steps to see that all the domestic Sewage in the County is effectively treated before it is passed into any streams.

40. The experiments as to Sewage consisting of domestic Sewage mixed with acids, alkalies and compounds of iron are still being carried on, so it is thought better to postpone any general remarks on the question of Sewage disposal until a complete report can be presented on the entire question.

SIGNED on behalf of the Sanitary Committee.

HENRY HOWARD  
Chairman.

SHIREHALL, WORCESTER,  
16 May 1903.

## APPENDIX.

### *County Analyst's Report on the Sewage Purification Experiments.*

1. This Report describes the results of the experiments on the Purification of Sewage by means of the Experimental Bacteria Beds.
2. The Report is divided into two parts; the first will deal with the experiments made at Malvern, and the second will take into consideration the experiments made at Oldbury.

### PART I.

#### *(Malvern Experiments).*

### *Chemical and Bacteriological Composition of the Malvern Domestic Sewage (free from the Waste Products of Manufacturies).*

3. The Crude Sewage experimented with at Malvern contains very little surface water, and is purely Domestic, being composed of the Solid and Liquid Excretions of man and animals, mixed with much water; the waste liquids and solids from the kitchens, and the domestic "slops."

4. Malvern Crude Sewage varied somewhat in volume and composition when examined at different times of the day; but the following may be taken as a good average example. For comparison, the composition of Malvern drinking water and River Severn water at Upton is also given.



In parts per 100,000.	Crude Sewage. Malvern.	Malvern Water.	River Severn Water.
Solids in Suspension - - -	43·2	None	Trace
„ „ Solution - - -	78·1	17·0	32·0
Chlorine - - -	12·2	1·3	4·4
Free and Saline Ammonia as Nitrogen - - -	11·8	0·0005	0·006
Albuminoid Ammonia as Nitro- gen - - -	1·2	0·001	0·01
Nitrogen in Solids in Suspension	1·9	None	Trace
Oxygen absorbed in 4 hours at 60 degrees F. - - -	6·5	0·02	0·2
Nitrogen in Nitrates - - -	None	None	None
„ „ Nitrites - - -	„	„	„
Appearance - - -	Dark yellow	Clear	Opalescent
Odour - - -	Not very bad	None	None
Reaction - - -	Alkaline	Neutral.	Neutral

5. The Bacterial Composition of the Crude Sewage also varies to a considerable extent—the number of Bacteria varying from many thousands to several millions per cubic centimeter. These Bacteria—which are extremely minute organisms—play a very important part in the natural purification of Sewage. Their properties and peculiarities have been carefully studied with a view to determine in what way they react upon the Sewage and how their purifying action on it can be best utilised.

6. The Bacteria found in Sewage may be divided up into the following groups:—

ANAEROBIC. Those which will not develop in the presence of air (oxygen).

AEROBIC. Those which require the oxygen of the atmosphere for their development.

FACULTATIVE ANAEROBIC } Those which can develop in  
„ AEROBIC } the absence or presence of  
air.

7. All Bacteria are injuriously affected by the action of light. Bacteria require for their active growth a certain amount of warmth, moisture and food. Their food is derived from the Organic and Mineral matter of the Sewage. The temperature necessary for active growth is derived in part from the surroundings (warm soil



or air), and in part from the chemical reactions taking place in the fermenting Sewage.

8. If Crude Sewage is kept very cold, little or no change will take place in its chemical and bacteriological composition. With a rise of temperature there will be an increase in the chemical and bacteriological changes; these changes increase up to a certain point, when the fermentation of the Sewage attains a maximum. If above this point the temperature is still further increased by artificial means fermentation will be at first retarded, and then quite stopped. If the temperature is raised to the boiling point of water, fermentation will be destroyed; simply cooling the Sewage will not restore it. A Sewage so treated is said to be sterile, but may be made to ferment again if cooled and mixed with Crude Sewage or left in contact with the atmosphere.

9. The Anaerobic and Facultative Anaerobic Bacteria present in Crude Sewage have the important property of being able to attack and liquefy the solid organic matter (albuminoid and vegetable matter) of Sewage if the atmosphere is carefully excluded. These organisms therefore have the important property of dissolving the solid organic matter of Sewage, and converting it in part into gases and into substances which are dissolved by the water of the Sewage. As the oxygen of the atmosphere slowly diffuses into fermenting Sewage the Anaerobic Organisms become less, but the Aerobic and Facultative Aerobic become more active. The organic and nitrogenous substances in solution in the Crude Sewage are attacked and converted into Ammonia, Nitrites, Carbonic Acid Gas, Marsh Gas, Nitrogen &c. The final stage in the fermentation or purification of the Sewage is reached when there is complete aeration; the Nitrites then being oxidised to Nitrates and the organic matter broken up into inert substances, such as Carbonic Acid Gas and Water.

Such, shortly, are the chief changes produced by natural fermentation or purification of Crude Sewage. By these changes the objectionable substances present in the Sewage are converted into inert bodies and a liquid is obtained from which most of the objectionable properties of Crude Sewage are removed; the newly formed liquid possesses no unpleasant odour, will not ferment any further and may support fish life. All the above changes are not entirely due to the action of Bacteria, for in these more highly organised forms of animal and vegetable life play a part.

10. Crude Sewage if kept from contact with the atmosphere becomes almost free from organic solids in suspension; if this partly purified sewage is then brought into contact with the atmosphere a further



change takes place, the organic matter in solution is further acted upon, inert bodies are formed, and a high standard of purification may be arrived at. The rapidity of this purification will, to a considerable extent, depend upon the temperature of the Sewage and the means employed for collecting together the organisms responsible for this work and preventing them being washed away.

11. To obtain all the above-mentioned conditions for the Bacteriological purification of Crude Sewage a number of "Systems" have been devised.

12. Three Experimental Systems were selected for the County experiments. These were laid down, side by side, and supplied with flowing sewage from the main sewer as it enters the Shuttlefast Sewage Farm, Malvern Wells.

13. Each System was constructed so as to treat 1,000 gallons of Crude Sewage per day of 24 hours.

These three Systems are called:—System D, System E, and System F.

#### SYSTEM D.

(Figure D, Table D, Diagrams D1-4).

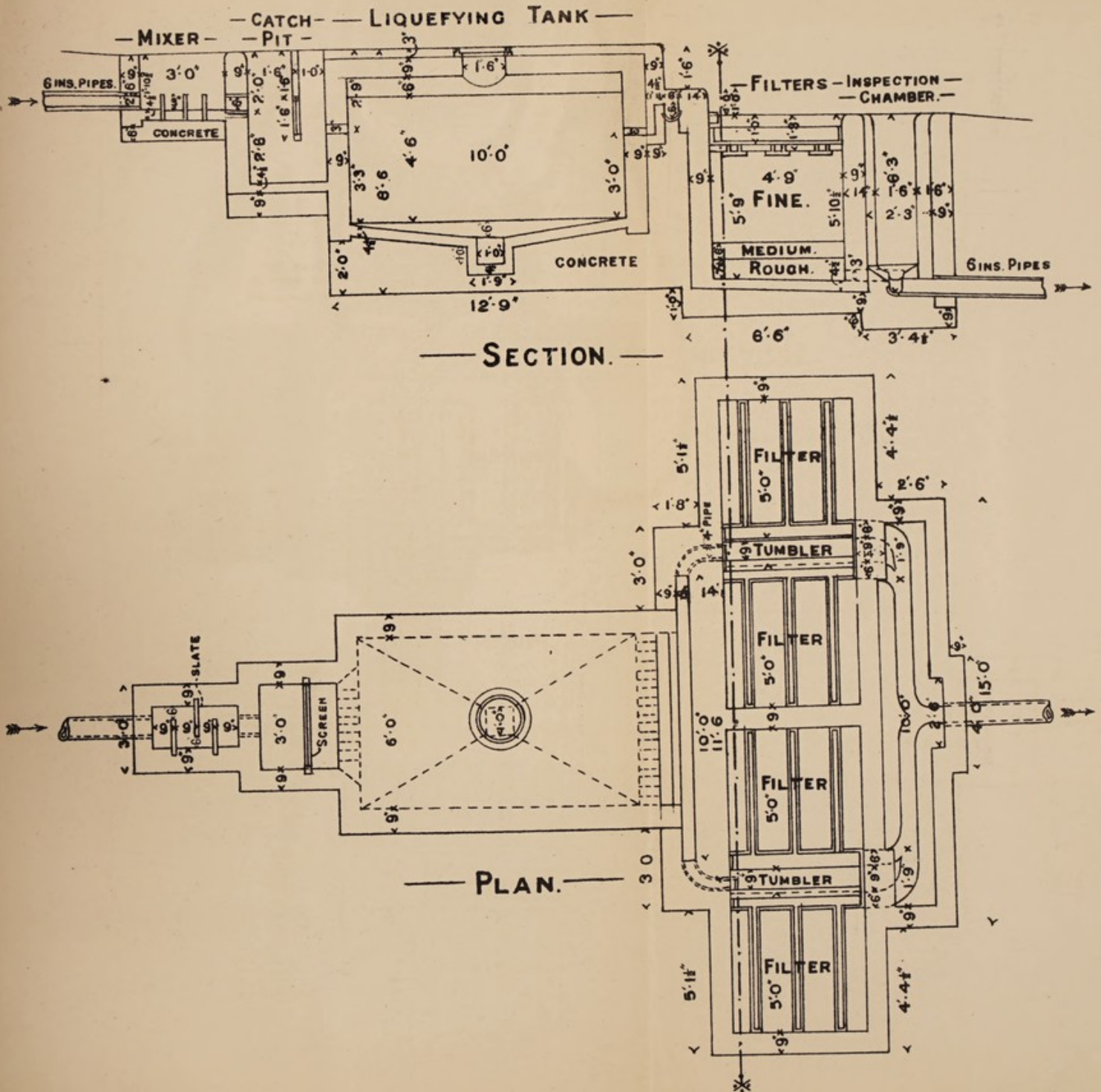
*Description. Figure D.*

14. This System consists of a LIQUEFYING TANK (Closed Septic) for Anaerobic treatment and BACTERIAL BEDS (filters) for the final oxidation or the Aerobic treatment.

15. The Crude Sewage passes from the main sewer into the System through a V shaped slot, designed to allow a flow of 1,000 gallons of Crude Sewage every 24 hours to be treated by the System. On several occasions the flow of Crude Sewage was, however, considerably greater than this. The Sewage after passing through the slot enters the MIXING CHAMBER (internal measurements—3 feet by 1 foot 6 inches by 1 foot 10½ inches), which contains upright slate baffles (6 inches high and 1 foot long), built into the brickwork, and so constructed as to offer as much resistance as possible to the flow of solid matter in the Sewage so as to disintegrate it, thereby ensuring more rapid liquefaction in the Liquefying Tank subsequently described.

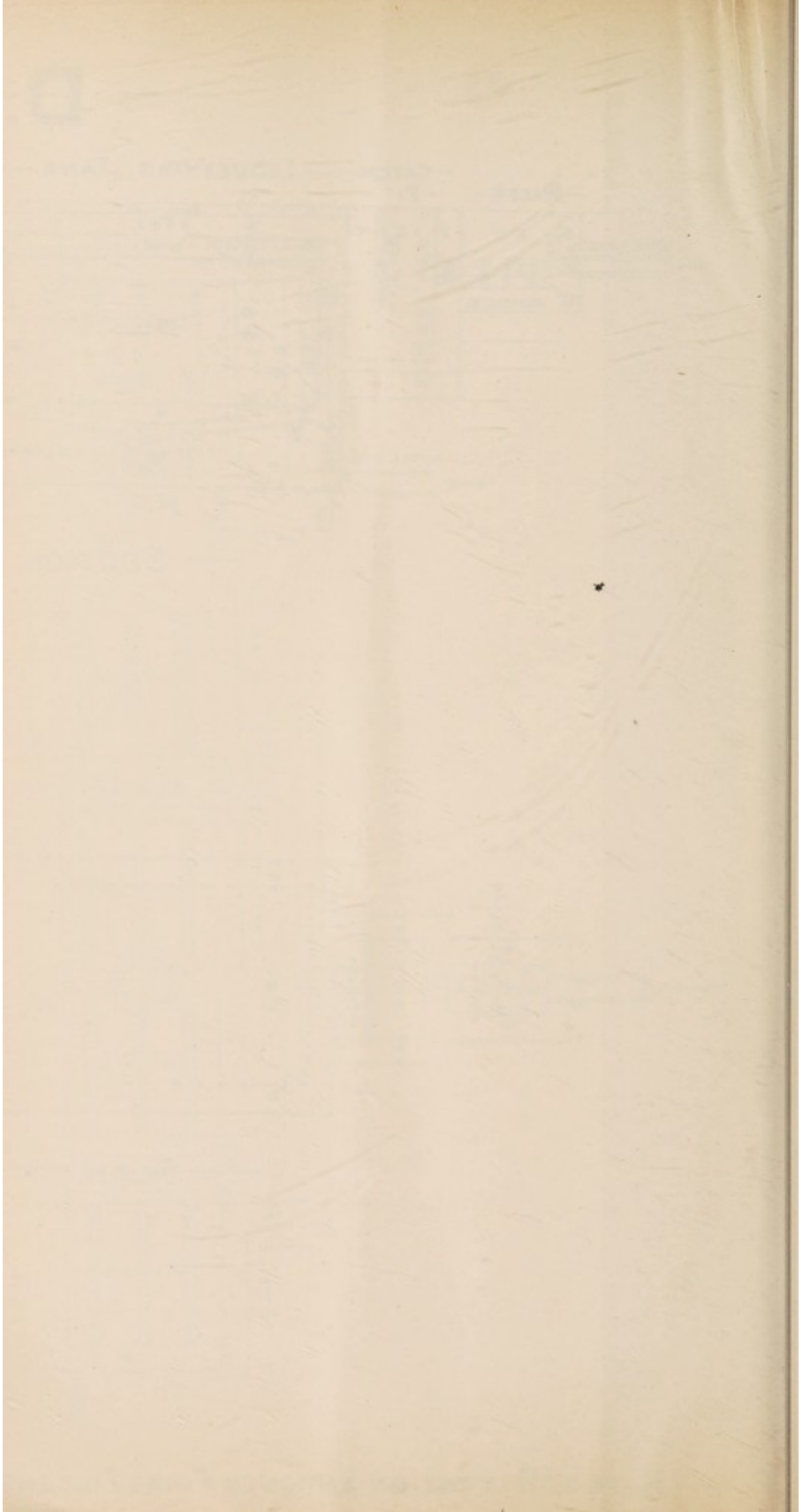
16. The well mixed and disintegrated Sewage then flows into the CATCH PIT (internal measurement, 2 feet 6 inches by 3 feet by 4 feet 6 inches; depth of Sewage in pit, 2 feet 6 inches), where is deposited most of the heavy mineral matter (such as sand and gravel), which would in time, if allowed to pass on, choke up the Liquefying Tank. The Catch Pit is cleaned out by means of a scoop from time to time. In the case of the Malvern Catch Pits there was so little

**D.**



RATE OF FILTRATION THROUGH FINAL FILTERS=100 GALLS PER SQ.YD. PER DAY.





mineral matter that they were in no need of being cleared out, not even after Sewage had been passing through them for one year. In the Catch Pit a considerable amount of fermentation takes place.

17. The liquids and the suspended solids of the Sewage are then passed into the LIQUEFYING TANK (internal measurement, 10 feet by 6 feet by 5 feet), by a submerged inlet. The Tank is completely closed up with the exception of the submerged inlet and outlet, so as to prevent the atmosphere from interfering with the action of the Liquefying (Anaerobic) organisms present in the Sewage, which liquefy or dissolve the solid organic matter therein. Great changes take place in this tank; nearly the whole of the organic solids of the Sewage are liquefied or dissolved, while at the same time other organic bodies are being acted upon in such a manner as prepares them for the next step in the purification. The top of the Tank is fitted with a manhole and cover, through which the unliquefiable solids of the Sewage carried past the Catch Pit (fine sand and dirt, pieces of wool, wax matches, candle wax, grease, hair, cloth, wool, etc.) are pumped out when they become too voluminous. At Malvern it was not necessary to empty this Tank, although it has been working for one year. The liquid passes out of the Tank through a submerged outlet; it then contains only a very small quantity of solid matter in suspension. This solid matter is almost entirely composed of masses of Bacteria, mixed with partly liquefied matter and some vegetable and animal organisms (worms) more highly organised than Bacteria. These solids rarely amount to more than a grain per gallon of liquid. There is, however, one point to be observed about them; they are very apt, unless steps are taken to prevent it, to choke up the Bacterial Beds (filters) upon which they are next poured.

18. The liquid on passing from the Liquefying Tank falls over a small weir, and is then divided into two equal streams. One half of the liquid is made to flow to the right and the other half to the left, through open pipes into IRON TUMBLERS, (the same length as the Bacterial Bed, and holding on either side a volume of liquid equal to about four gallons). These tumblers work automatically and give alternate deliveries of the liquid into zinc troughs pierced with numerous small perforations through which the liquid passes, and is distributed all over the surface of the solid materials with which the four Bacterial Beds (filters) are filled. It should be noticed that the liquid on leaving the Liquefying Tank is always brought into intimate contact with as much air as possible so that aeration is encouraged.

19. The next step in the process of purification is a very important one, and is one in which the partly purified Sewage is brought into intimate contact with the atmosphere and with the Bacteria which aid in oxidation and final purification. This object is best arrived at by placing in the Bacterial Beds (filters), solids of varying size and composition, such as, for example:—Coke, coal, broken brick, local stone



(if not too soft), hard burnt clinker, hard burnt ballast, gravel. With the object of holding back the Bacteria etc., which are to act upon the liquid passing from the Tumblers and through the Bacterial Beds (filter) as much as possible.

#### BACTERIAL BEDS (Filters).

20. At Malvern the three Systems have each attached four Bacterial Beds (filters) of the same size, and each containing a different solid material. These Bacterial Beds (filters) are called: Bed No. 1, 2, 3, and 4, and the System they belong to is denoted by the letters D, E, and F. (Internal measurements, 4 feet 9 inches by 5 feet by 5 feet nine inches).

				Size. "Fine" on Top of Bed.	Size. "Medium" in between.	Size. "Rough" at Bottom of Bed.
Bed No. 1	contains	Coke-	-	To pass $\frac{1}{4}$ -inch sieve and rejected by $\frac{1}{16}$ -inch. Thickness 3' 3"	To pass $\frac{5}{8}$ -inch sieve and rejected by $\frac{1}{4}$ -inch. Thickness 6"	To pass $1\frac{3}{4}$ -in. sieve and rejected by $\frac{5}{8}$ -inch. Thickness 9"
" 2	"	Coal -	-	"	"	"
" 3	"	Brick (broken) -	-	"	"	"
" 4	"	Local Stone (Granite)	-	"	"	"

The different materials used were well washed and graded before being placed in these beds. Each layer of material was carefully and evenly spread to its proper thickness.

21. The liquid having passed through these Beds is the product of the treatment, and is known as the final effluent, and it is from its analysis that the results of the purification effected by the different systems are obtained.

22. The total fall at Malvern from the upper end of the mixing chamber to the outlet from the lower side of the inspection chamber is seven feet.

23. It was decided that once a week for a period of at least one year the Crude Sewage entering the System D should be subjected

to a complete Chemical Analysis, and similar analyses should be made of the final effluent after passing through the Liquefying Tank and the four Bacterial Beds (filters). This has been done and the figures obtained by analysis are given in Table D and the results are also shewn in Diagrams D 1-4.

TABLE D.

24. This table contains the figures obtained from the analysis of all the samples taken from the System D during one year. The table shews the percentage purification of the ORGANIC NITROGEN and OXYGEN ABSORPTION of the Sewage. The appearance of the samples when collected and after being kept for 14 days at the ordinary temperature is described. The final column of figures on the right of the table shews the average composition and purification of the samples for the year.

25. The Diagrams (D 1-4) give the amount of Organic Nitrogen (Diagram D 1) and Oxygen Absorbed (Diagram D 3) and also the percentage Purification (Diagrams D 2 and 4) of the Sewage after it has passed through the Liquefying Tank and Bacterial Beds. The average results are shewn by a straight line across the diagram. The Tank and each Bacterial Bed of the System has a coloured line of its own so that they can be distinguished at once. For the sake of clearness only the Bacterial Beds which give the lowest and highest purification are plotted out in full, whilst the two intermediate Beds are indicated by an average line.

26. The Solids in Suspension of the Crude Sewage experimented upon are always very high, averaging 63 parts per 100,000. During wet weather the amount of these solids was reduced and the Crude Sewage itself appeared to be visibly more dilute.

27. In the Liquefying Tank the Solids in Suspension were almost entirely liquefied and on only a few occasions did they pass out in amount equal to one grain per gallon of liquid, thus shewing that the conditions in the tank were satisfactory. This liquefaction brings the greater portion of the Organic matter of the Solids in Suspension into solution and into a better condition for oxidation, this was shewn on several occasions by the increased Oxygen Absorbed by the Tank effluent. The average Oxygen absorption of the Crude Sewage is equal to 7.73 parts of oxygen per 100,000, that of the Tank effluent is equal to 5.09 parts per 100,000. The variations are clearly shewn in the Diagrams D 3 and 4.

28. Of the four Bacterial Beds (filters), D No. 1 (Coke) gave



the highest percentage purification both of the Organic Nitrogen and Oxygen Absorption, as will be seen from the following tables:—

*Oxygen Absorption.*

System D.		Average per 100,000.	Percentage purification.	Material.
Tank -	-	5.09	27.7	
Bacterial Bed No. 1	-	1.11	82.2	Coke
"	" 2	1.79	71.2	Coal
"	" 3	1.93	70.0	Brick
"	" 4	2.36	62.7	Granite

*Organic Nitrogen.*

Tank -	-	0.73	71.1	
Bacterial Bed No. 1	-	0.2	94.0	Coke
"	" 2	0.34	89.6	Coal
"	" 3	0.4	89.0	Bricks
"	" 4	0.44	86.7	Granite

29. These results are probably due to the fact that Coke is capable of holding back in its numerous chinks and crevices the oxidising bacteria, which are thus able to concentrate and rapidly oxidise the liquids passing through the Bed after treatment in the Septic Tank.

*Nitrification.*

30. As was expected, no Nitrification took place in the Liquefying Tank. The Organic Nitrogen of the Crude Sewage was gradually decomposed as it passed through the System into Ammonia, which in its turn was oxidised into Nitrites and then into Nitrates with frequent formation of free Nitrogen Gas which passed off into the atmosphere and was lost. All the Nitrates and Nitrites were formed in the Bacterial Beds (filters).

TABLE shewing Decomposition of Organic Nitrogen into Ammonia, Nitrates and Nitrites.

Averages for the year in parts per 100,000.

System D.		Organic Nitrogen.	Ammonia as Nitrogen.	Nitrates & Nitrites as Nitrogen.	Total Nitro- gen found.
Crude Sewage	-	4.25	12.97	None	17.22
Tank Effluent	-	0.73	10.23	"	10.96
Bact. Bed No. 1 Eff.	-	0.2	3.05	3.7	6.95
"	" 2	0.34	7.46	0.35	8.15
"	" 3	0.4	2.93	3.85	7.18
"	" 4	0.44	8.24	0.02	8.7



31. The Bacterial Beds Nos. 1 (COKE) and 3 (BRICKS) gave the highest amount of Nitrates and Nitrites. These two beds contained the most porous material of the four and the effluents from them were good both in appearance and keeping qualities. In fact 94 per cent. of both the effluents were returned as good. The effluents of these two beds were able to support Fish life. The Beds Nos. 2 and 4 respectively gave effluents 36 per cent. and 7 per cent. good, shewing a very great difference from Nos. 1 and 3. The materials in these beds were hard and non-porous, viz., Coal and Granite.

*Remarks on the Working of System D.*

32. During the whole year the experiments were made the Liquefying Tank never required clearing out. The amount of sludge in the tank at the end of the year was not large. The small quantity of Solids in Suspension in the effluent from the Tank has a tendency to choke up the surface of the four Bacterial Beds and to cause "ponding." To remove this difficulty the surface of the Beds was raked over several times. Still the Beds ponded—especially Nos. 2 (Coal) and 4 (Granite)—but afterwards they recovered on their own account and again worked perfectly. This ponding appeared to be due, to a considerable extent, to the formation of a vegetable growth in the Beds which prevented the effluent from the Tank passing through readily. This growth appeared to give way to a development of small animals (worms, infusoria, etc.) which seem to consume the vegetable matter, thus more or less clearing up the Beds and allowing the liquid to pass through more readily. The worms, etc., finally gave way to bacteria, when the Beds resumed their normal working. This went on for some time, but subsequently the vegetable growth again appeared and caused ponding.

33. The ponding difficulty can be overcome by duplicating the Beds, so that when a Bed shews signs of ponding it should be given a rest and the other Bed used. Raking over the Beds cannot be recommended—it has a tendency to disintegrate the material, rendering it too fine in texture, thus causing ponding. If the ponding is very bad it would be best to remove the surface and renew it with fresh material.

34. Of all the three Systems, when coke was used in the Bacterial Bed, D undoubtedly gave the best results, both as regards percentage purification of Organic Nitrogen and Oxygen Absorption. It had to purify a more concentrated Sewage than the other Systems because a selective sedimentation took place in the Sewage before it passed into this System owing to it being the first to tap the carrier. On several occasions more than 1,000 gallons of Crude Sewage were treated by this System in 24 hours. The Liquefying Tank being covered up caused no nuisance. The depth of the whole apparatus was equal to seven feet, whilst the Systems E and F required a depth of 11 feet 6 inches and 6 feet 10 inches respectively.



## SYSTEM E.

(Figure E, Table E, Diagrams E 1-4).

*Description.*

35. This System consists of ROUGH CONTACT BEDS and AEROBIC BEDS (filters). Like System D, it treated 1,000 gallons of Crude Sewage per 24 hours. The Crude Sewage entered the System through a V shaped slot as in D and passed through a similar Mixing Chamber (internal measurements 3 feet by 1 foot 6 inches by 1 foot 10½ inches) into two contact Beds (8 feet by 6 feet 1½ inches by 4 feet 4½ inches to 4 feet 7½ inches), lying side by side. Each Contact Bed was filled with a bottom layer of Rough Material (Coke) six inches deep, and the rest with Medium, 2 feet 9 inches deep. The Crude Sewage was delivered automatically and alternately on to each of the Beds. The Sewage was left in contact with the Coke in the Beds for about two hours and then syphoned off on to four Bacterial Beds (filters) similar in every detail to those described in System D. (See Paragraph 20).

36. The Crude Sewage when in the Contact Beds lost most of its Solids in Suspension through liquefaction and at the same time some of the Organic Solids in Solution were so changed as to prepare them for the final Oxidation which took place in the four Bacterial Beds (filters) into which the Sewage next flowed. The Sewage from the Contact Beds was syphoned off by an automatic syphon and passed on to two Iron Tumblers, similar to those described under System D (paragraph 18), and from these into Zinc distributing troughs on to the surface of the four Bacterial Beds (filters), which are exactly similar in all respects to those described under System D (See Paragraph 20). In these Beds the final Oxidation of the liquid took place.

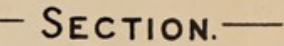
37. It should be noticed that this apparatus is a very deep one and requires a total fall of at least eleven feet six inches from the upper end of the Mixing Chamber to the final outlet.

38. The year's analyses of the Crude Sewage, entering the System E, taken once a week, and also similar analyses of the effluents from the Contact Beds and from the four Bacterial Beds (filters), have been made, and the figures obtained by analysis are given in Table E. The results are also shewn in Diagrams E 1-4.

## TABLE E.

39. The percentage purification of the Organic Nitrogen and of the Oxygen absorbed are given, as well as the figures obtained from the analyses. The appearance of the samples when collected, and after being kept for 14 days at the ordinary temperature, is described.

—E.—

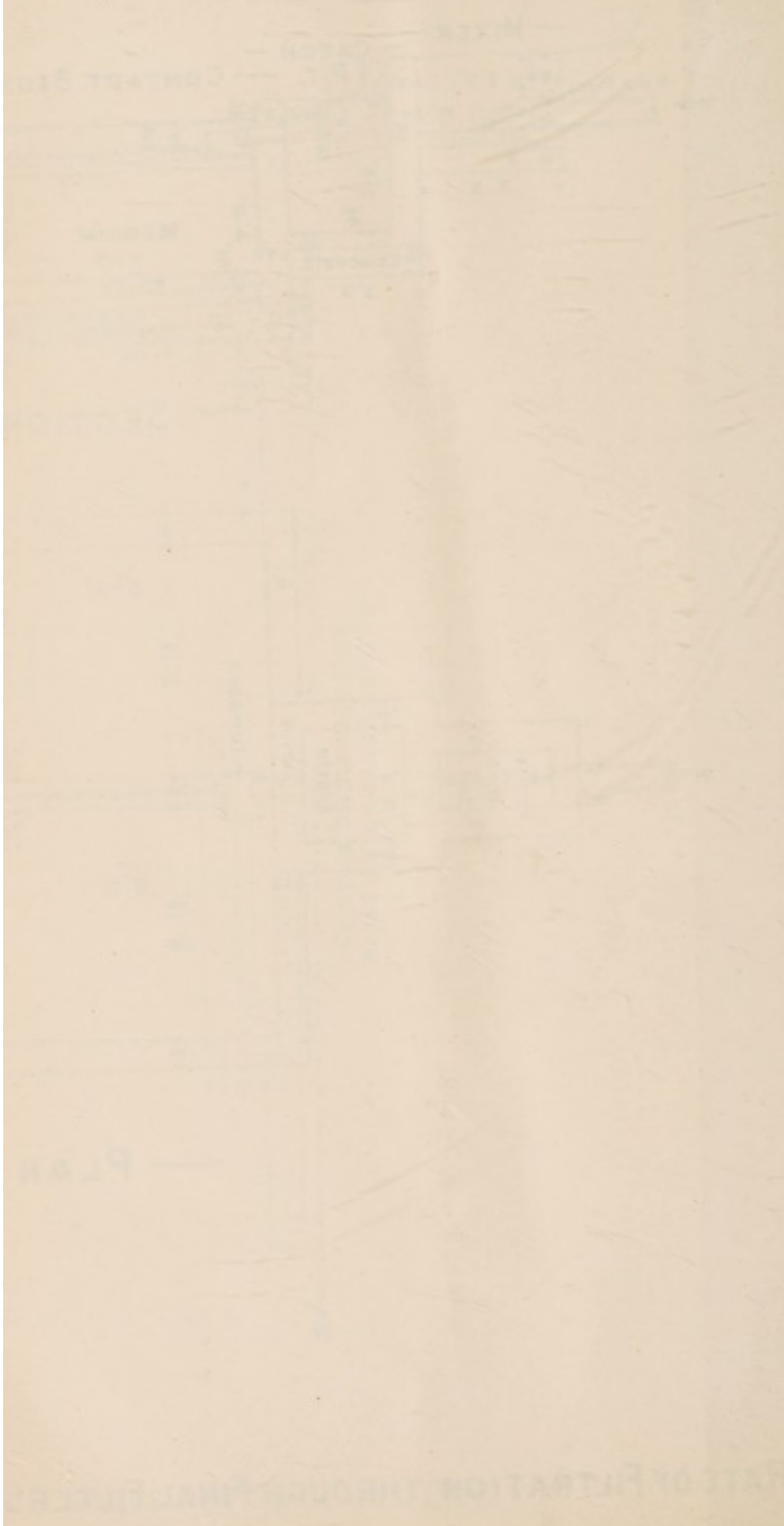


— PLAN —

**RATE OF FILTRATION THROUGH FINAL FILTERS = 100 GALLS. PER SQ. YD. PER DAY.**



100



The final column of figures of the table shews the average composition and percentage purification of the samples.

40. The Diagrams E 1-4 represent the amount of Organic Nitrogen (Diagram E 1), Oxygen Absorbed (Diagram E 3), and the percentage purification (Diagrams E 2 and 4) of the Sewage after it had passed through the Rough Contact Beds and Bacterial Beds (filters). The average results are shewn by a straight line across the Diagram, the Contact Beds and each Bacterial Bed (filter) of the System has a coloured line of its own, so that they can be distinguished at once. For the sake of clearness only the Bacterial Beds (filters) which give the lowest and highest purification are plotted out in full, whilst the two intermediate beds are indicated by an average line.

41. The Solids in Suspension of the Crude Sewage experimented upon were less in quantity than those in System D because of the selective sedimentation. (See Paragraph 34). The average of the Solids in Suspension was 37.2 per 100,000 of Crude Sewage. In the Rough Contact Beds the Solids in Suspension were almost entirely liquefied, and on only a few occasions did they pass out in amount equal to 1 grain per gallon of liquid. In these Rough Contact Beds Anaerobic—and some Aerobic—action took place.

42. The average Oxygen Absorption of the Crude Sewage was equal to 5.91 parts of Oxygen per 100,000. That of the effluent from the Rough Contact Beds was equal to 3.14 parts per 100,000. These variations are shown in Diagram E 3.

43. Of the four Bacterial Beds (filters) No. 2 E (coal) gave the highest percentage purification of Oxygen Absorbed and of Organic Nitrogen. (See Diagrams E 2 and 4). The average percentage purification of Oxygen Absorbed and Organic Nitrogen of the Contact Beds and the four Bacterial Beds (filters) is as follows:—

*Oxygen Absorbed.*

System E.		Average per 100,000.	Percentage Purification.	Material.
Contact Beds	-	3.14	42.4	Coke
Bacterial Bed No. 1	-	1.44	72.2	"
" " " 2	-	1.36	73.1	Coal
" " " 3	-	1.44	72.0	Bricks
" " " 4	-	1.63	69.2	Granite

*Organic Nitrogen.*

Contact Beds	-	0.77	65.2	Coke
Bacterial Bed No. 1	-	0.30	85.0	"
" " " 2	-	0.27	86.6	Coal
" " " 3	-	0.31	84.1	Bricks
" " " 4	-	0.34	83.3	Granite



From these experiments it will be seen that all these Bacterial Beds (filters) gave very similar results. The Coal gave the best, but only slightly better than the Coke or Bricks.

#### *Nitrification.*

44. On three occasions Nitrates appeared in the effluent from the Rough Contact Beds, varying from a trace to 0.05 and 0.31 per 100,000.

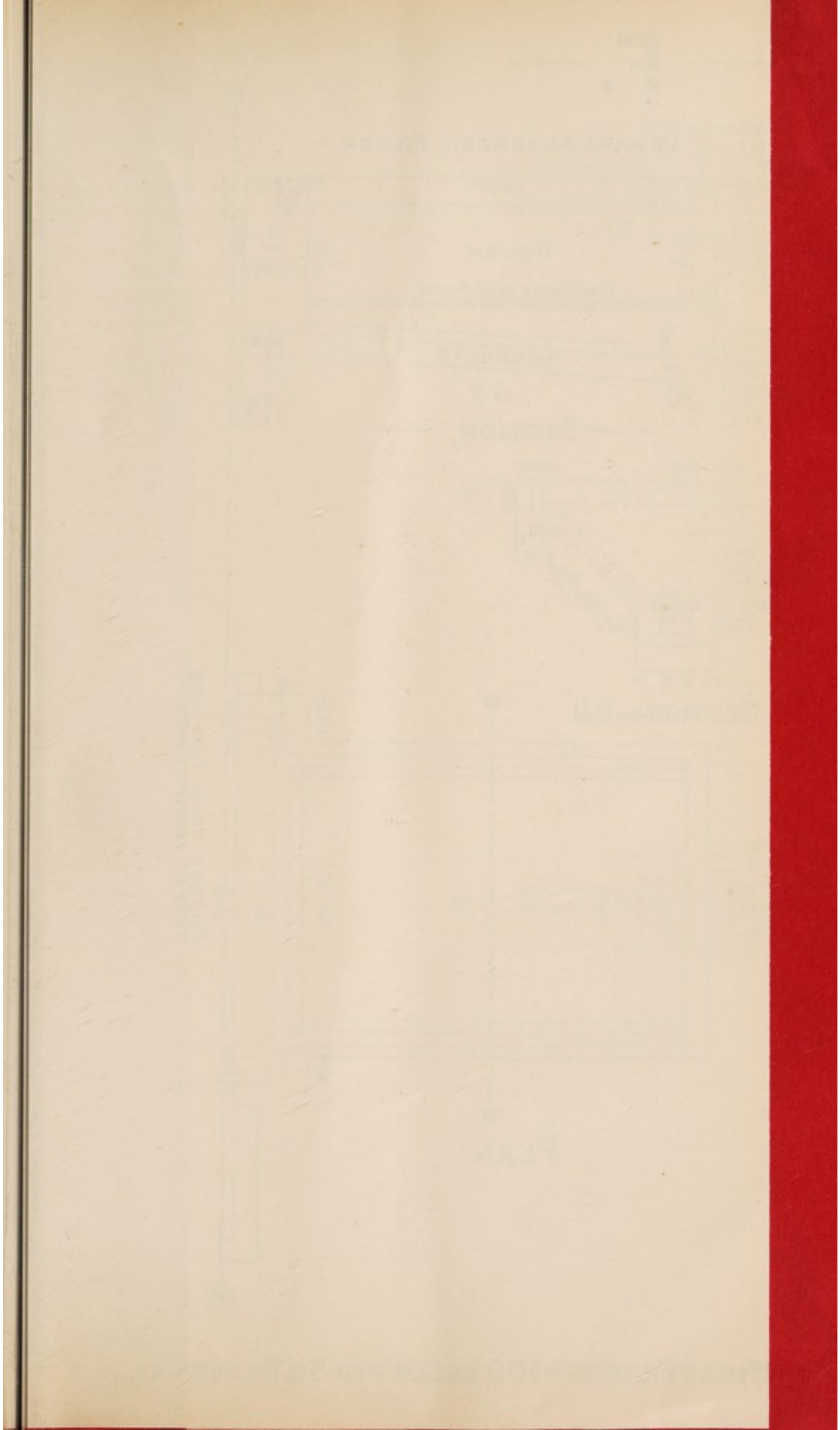
In the four Bacterial Beds (filters) a much greater amount of Nitrification takes place, as will be seen from the following table:—

TABLE shewing Decomposition of Organic Nitrogen into Ammonia, Nitrates and Nitrites.

System E.	Organic Nitrogen.	Ammoniacal Nitrogen.	Nitrates and Nitrites as Nitrogen.	Total Nitrogen found.
Crude Sewage- -	2.74	10.29	None	13.03
Rough Contact Beds	0.77	7.55	Trace	8.32
Bacterial Bed No. 1	0.30	2.59	1.87	4.76
"    "    "    2	0.27	3.10	1.42	4.79
"    "    "    3	0.31	1.59	4.53	6.43
"    "    "    4	0.34	1.87	3.71	5.92

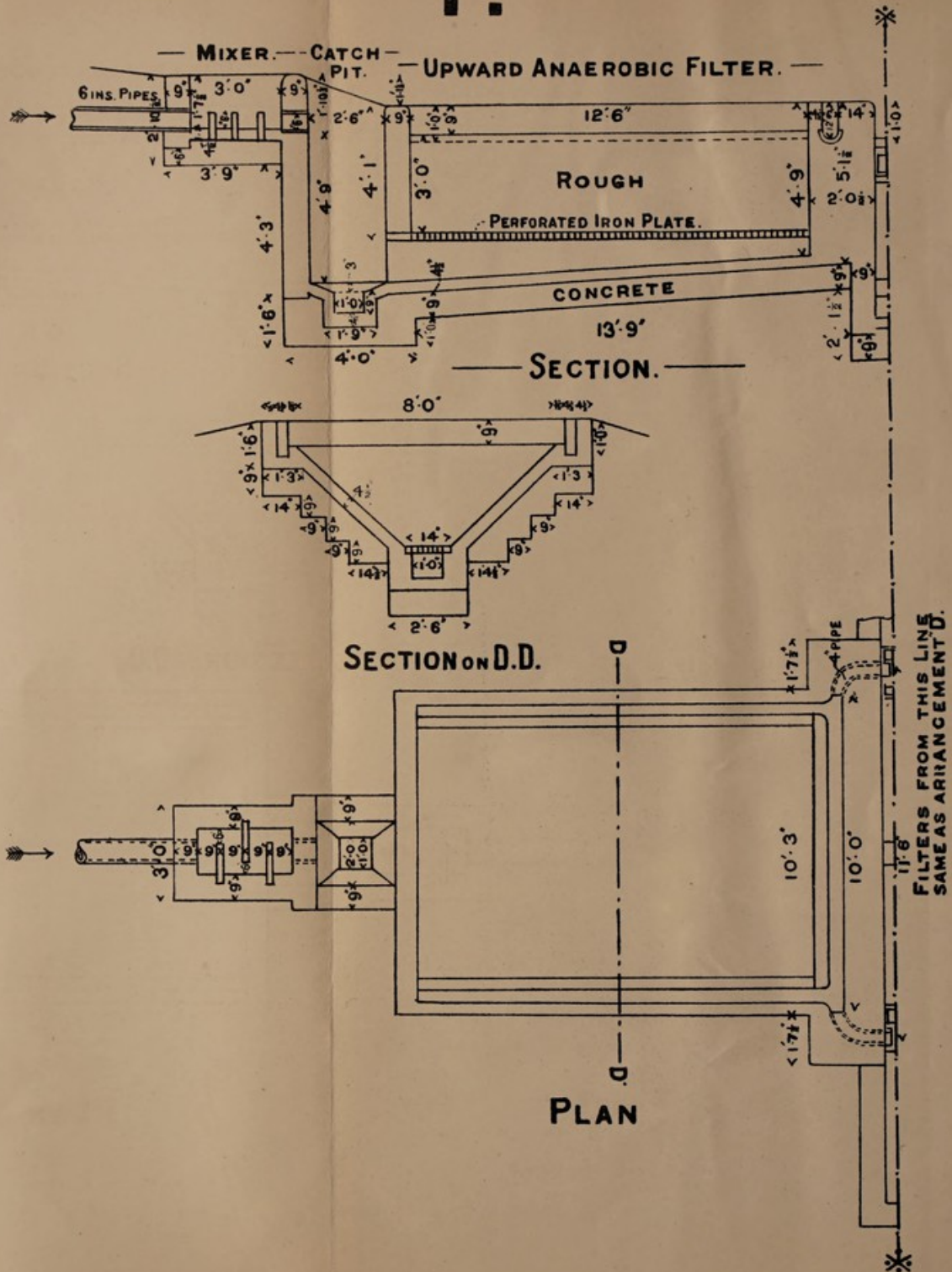
45. The flow of liquid from the Rough Contact Beds through the syphon on to the four Bacterial Beds (filters) was very rapid. The liquid did not remain in contact with the material of the Bacterial Beds for more than five minutes, and yet there was considerable nitrification. This nitrification was almost continuous during the rapid flow, as is shewn by the following experiments made with Bacterial Bed (filter) No. 4 E (Granite). The time taken for the liquid contents of the Rough Contact Bed to syphon off and pass through the Bacterial Beds was about 15 minutes. Twelve samples of the effluent from Bacterial Bed No. 4 E were taken at intervals of one minute from the time the first quantity of liquid appeared until the Bed had ceased to give off an effluent, and the Nitrates and Nitrites were determined together.

Time.	Nitrates and Nitrites as Nitrogen per 100,000 parts.			
1st minute	-	-	-	5.6
2nd "	-	-	-	4.5
3rd "	-	-	-	4.3
4th "	-	-	-	4.6
5th "	-	-	-	4.4
6th "	-	-	-	4.4
7th "	-	-	-	4.4
8th "	-	-	-	4.3
9th "	-	-	-	4.5
10th "	-	-	-	4.1
11th "	-	-	-	4.0
12th "	-	-	-	4.5





**F.**



**RATE OF FILTRATION THROUGH FINAL FILTERS=100 GALLS. PER SQ.YD. PER DAY.**

When the above experiments were made the Bed was in very good working order.

46. The Bacterial Beds Nos. 3 (Bricks) and 4 (Granite) gave much better results than Nos. 1 and 2. The keeping qualities of the effluents from Bacterial Beds (Filters) Nos. 1, 3 and 4 were respectively 84, 84 and 90 per cent. good.

#### *Working of the System.*

47. The automatic arrangement for passing the Crude Sewage on to the two Rough Contact Beds was frequently out of order. This was due, on several occasions, to stoppage of the apparatus by leaves and sludge. Leaky joints also interfered with the proper working of the apparatus.

The rate at which the effluent from the Rough Contact Beds was syphoned off on to the four Bacterial Beds (filters) was too great. The liquid contents of one Rough Contact Bed taking only about 15 minutes to syphon off and pass through the Bacterial Beds. This was distinctly too fast, but in future the rush of liquid can be reduced by constricting the exit tube of the syphon.

48. The Rough Contact Beds which were open to the atmosphere attracted in summer time a large number of flies but were never offensive.

49. The great fall required for working this apparatus—as much as 11 feet 6 inches—is a great drawback to its use.

50. There was distinct ponding on several occasions of the Bacterial Beds (filters). No. 4 was only slightly affected but No. 2 badly. The Beds that ponded cleared up on their own account and got into good working order again. To a considerable extent the trouble was caused by vegetable matter. The surface of the Bacterial Beds should be removed from time to time and covered with fresh material so as to reduce the ponding to a minimum. (See Paragraphs 32 and 33).

51. This System did not do so well as System D Bacterial Bed No. 1 (Coke).

#### SYSTEM F.

(Fig. F. Table F. Diagrams F 1-4.)

##### *Description.*

52. This System consists of an UPWARD ANAEROBIC BED and four AEROBIC BACTERIAL BEDS (Filters).

This System has been constructed like the others so as to treat 1,000 gallons of Crude Sewage per 24 hours. The Crude Sewage enters



the System through a V shaped slot as in Systems D and E, and then passes through a similar Mixing Chamber into a catch pit 2 feet 6 inches by 2 feet and 4 feet 9 inches in depth, internal measurement. From the catch pit the Sewage flows along a channel covered by an iron grating which supports the filtering material of the Upward Anaerobic Bed. The filtering material (granite) is at the bottom of the Bed of a mean diameter of about eight inches and from six inches to four inches through the body of the Bed up to the level of the overflow, with six inches of smaller material, from three inches to one and a half inches, on the top above the level of the overflow. The total depth of material is 3 feet. The Sewage passes upwards through the material and then falls over a long weir formed along each side of the Bed, and thence by a channel to the pipes leading on to the Iron Tumblers, which automatically deliver alternately on to the Bacterial Beds on each side of them, making in all four Bacterial Beds (filters) similar in every detail to those attached to Systems D and E. (See Paragraph 20). The total fall required from the upper end of the Mixing Chamber to the outflow of the System is six feet ten and a half inches.

53. In the upward Anaerobic Bed most of the Organic Solids in Suspension are liquefied, and the liquid passing from the Bed is almost free from solid matter. It was, however, very frequently noticed that especially during warm weather, the surface of the material of the Bed became heavily coated with vegetable matter (algæ and also animal matter, *i.e.*, worms, etc.). After a time this became detached and passed on to the four Bacterial Beds (filters), causing them to choke and therefore to pond. This ponding occurred on several occasions. This was not the only trouble. Frequently a bad odour was given off from the top of the Bed; it also attracted vast numbers of flies in warm weather. These difficulties could probably be overcome by covering the Bed.

54. Similar analyses were made once a week, for a period of at least one year, of the Crude Sewage entering the System F, and also analyses of the effluents from the Upward Anaerobic Bed and from the four Bacterial Beds (filters), as in the other Systems. The figures obtained by these analyses are given in Table F and Diagrams F 1-4.

TABLE F.

55. This Table shews the result of the analyses and also the percentage purification of the Organic Nitrogen and of the Oxygen Absorbed. The appearance of the samples when collected and after being kept for 14 days at the ordinary temperature is described. The final column of figures of Table F shews the average composition and percentage purification of the samples. The



Diagrams (Diagrams F 1-4) give the amount of Organic Nitrogen (Diagram F 1), Oxygen Absorbed (Diagram F 3), and the percentage purification (Diagrams F. 2 and 4) of the Crude Sewage after passing through the Upward Anaerobic Bed and the Bacterial Beds (filters). The average results are shewn by a straight line across the Diagram; the different beds having coloured lines of their own so that they can be distinguished at once. Only the Bacterial Beds (filters) giving the highest and lowest purification are plotted out in full; the two intermediate ones are indicated by an average line across the diagram.

56. Owing to the selective sedimentation, the Solids in Suspension of the Crude Sewage supplied to this System were less in quantity than those in the Sewage supplied to Systems D and E. The average amount of Solids in Suspension was 29.5 parts per 100,000. In the Upward Anaerobic Bed the Solids in Suspension were almost entirely liquefied—only on one occasion did they exceed 1 grain per gallon of liquid.

57. The average Oxygen Absorbed equals 5.96 parts of Oxygen per 100,000 of the Crude Sewage. That of the Upward Anaerobic Bed effluent equals 4.86 parts per 100,000. These variations are shewn in the Diagram F 3. Of the four Bacterial Beds (filters) No. 1 F (Coke) gave the highest percentage purification in Oxygen Absorbed and Organic Nitrogen. (Diagrams F 4 and 2). The average percentage purifications are—

*Oxygen Absorbed.*

System F.		Average per 100,000.	Percentage Purification.	Material.
Upward Anaerobic Bed	-	4.86	16.7	Granite
Bacterial Bed (filter) No. 1	1	1.51	71.7	Coke
" " " " 2	2	2.16	60.2	Coal
" " " " 3	3	2.63	51.0	Brick
" " " " 4	4	2.55	52.1	Granite

*Organic Nitrogen.*

Upward Anaerobic Bed	-	0.85	57.6	Granite
Bacterial Bed (filter) No. 1	1	0.26	85.6	Coke
" " " " 2	2	0.35	81.4	Coal
" " " " 3	3	0.36	79.8	Brick
" " " " 4	4	0.37	78.8	Granite

From these experiments it will be seen that the Bacterial Bed (filter) No. 1 (containing Coke) gave by far the best results as regards percentage purification of Organic Nitrogen and Oxygen Absorbed. The percentage purification of the Organic Nitrogen of Bacterial Beds



(filters) Nos. 2, 3 and 4 were very similar, and varied from 78.8 to 81.4 per cent.

#### *Nitrification.*

58. No Nitrates or Nitrites appeared in the effluent from the Upward Anaerobic Bed, its action being purely Anaerobic.

Of the four Bacterial Beds (filters) No. 1 (Coke) gave the highest amount of Nitrification, viz., 1.56 parts per 100,000. The production of Nitrates and Nitrites in these beds was not always continuous. The decomposition of Organic Nitrogen into Ammonia, Nitrates and Nitrites was—

#### *Average for the year in parts per 100,000.*

System F.				Organic Nitrogen.	Ammonia as Nitrogen.	Nitrates and Nitrites as Nitrogen.	Total Nitrogen found.
Crude Sewage	-	-	-	2.52	12.28	None	14.80
Upward Anaerobic Bed				0.85	10.13	"	10.98
Bacterial Bed No. 1	-			0.26	4.03	1.56	5.85
"	"	"	2	0.35	6.57	Trace	6.92
"	"	"	3	0.36	6.57	0.23	7.16
"	"	"	4	0.37	6.48	0.08	6.93

#### *Working of the System.*

59. As mentioned before (Paragraph 53), the surface of the open Upward Anaerobic Bed frequently became covered with masses of vegetable matter which passed off the bed with the effluent on to the Bacterial Beds and choked them from time to time. This difficulty could probably be overcome by raising the height of the material in the Anaerobic Bed by at least a foot or by covering the whole and making it like the Septic Tank of System D. This would be very much more satisfactory as the bad odours observed from time to time, and the fly nuisance would be abated. During warm weather a very large volume of gas was given off from this bed.

60. The ponding of the four Bacterial Beds which occurred on several occasions, was due almost entirely to the large masses of vegetable matter passing from the Upward Anaerobic Bed on to these Beds and choking their surface. This matter was constantly removed, and the Bacterial Beds if left to themselves gradually got into working order again. The nuisance caused by the odours given off from the Upward Anaerobic Bed and by the flies would make this System very objectionable if erected near habitations.



*The Effect of the Crude Sewage and Effluents of the 3 Systems upon Fish-life.*

61. Experiments were made with a view to determine how far the effluents from the 3 Systems described above, if allowed to flow into a stream, would or would not injuriously affect Fish-life. To get at the result, experiments were made on the effect of placing Gold Fish and Trout into the Crude Sewage and into the final Effluents from the experimental tanks and beds. The experiments were made by placing Trout or Gold Fish in a glass vessel (capable of holding 10 litres of water) with a known volume of Sewage, or Sewage Effluent as the case may be. When Crude Sewage was used the Trout almost at once became restless and tried to spring out of the vessel. In about ten minutes time they were almost dead, but when removed and placed at once into pure water they recovered rapidly and appeared none the worse. The same kind of fish were then placed into the same Crude Sewage, after it had been well shaken with air. By so aerating the Sewage its injurious action on the fish was not so noticeable and they remained in it for a much longer time without shewing much uneasiness. Prolonged exposure to these conditions (20 minutes) almost destroyed the life of the fish, but in most cases when removed and placed into cold and well aerated fresh water, the fish recovered. Gold fish experimented upon in the same manner were found to be much less sensitive to the action of Crude Sewage. When placed in it, the gold fish came to the surface and gulped down air with the liquid in large quantities. This continued in several experiments for over an hour when the fish shewed symptoms of distress. On being removed and placed into well aerated fresh water they completely recovered. If the Crude Sewage was well and continuously agitated with air the Gold Fish were able to exist in it without any apparent inconvenience for the whole time the experiments lasted, at least two hours. It therefore appeared that the effect of crude domestic Sewage upon fish is dependent on the amount of aeration the Sewage has undergone.

62. Similar experiments were made with the effluents from the Septic Tank of System D, the Upward Anaerobic Bed of System F and the Contact Beds of System E. The effect of these liquids was much more injurious on the fish than in the case when Crude Sewage was experimented with, both the Trout and Gold Fish becoming rapidly ill. The Trout, if left in for only a few minutes, were apparently dead, and all attempts to revive them by placing them in fresh well aerated water, failed. The Gold Fish in several cases were revived by careful treatment in well aerated water. The effluent from the Septic Tank of System D, when well shaken with constantly renewed air, absorbed enough Oxygen to support the life of Gold Fish for some 30 minutes.

63. The effect of the final effluents from the different Bacterial Beds of the 3 Systems on Trout and Gold Fish was also observed.



If the Bacterial Beds were all in good working order, Trout could exist in the effluents for a considerable length of time. In the case of the Gold Fish, they remained in the effluents for several days without any injurious effects. Gold Fish have existed in the mixed effluents passing from the 3 Systems for over one month without any apparent ill effect.

64. From these experiments it will be seen that—

- (1) The final effluents from the 3 Systems experimented with may not destroy Fish-life (gold fish) if the Bacterial Beds are in good working order, that is to say, when there is little or no ponding.
- (2) That the injury to Fish-life depends on the want of oxygen in the effluent.
- (3) That *Salmonidæ* require a larger quantity of oxygen than *Cyprinidæ*.
- (4) That it is unsafe to allow an effluent from a Sewage system dealing with domestic Sewage to pass into a river containing *Salmonidæ*, which is stated to be innocuous to fish-life unless the facts of the case and the kind of fish experimented on are known.

#### CONCLUSIONS.

65. From a consideration of the above results, there can be no doubt that Domestic Sewage (Sewage containing no waste materials from manufacturies) can be satisfactorily purified by treatment in a system such as has been described under System D. (See paragraphs 14-23.)

66. The apparatus should consist of a closed Septic Tank for the liquefaction of the organic solids of the Crude Sewage with Bacterial Beds (filters), filled with Coke. Coke is recommended for the final oxidation of the organic matter because that material gave better results with the Septic Tank than when Coal, Brick, or Local Stone (Granite) were used as material for the Bacterial Beds.

67. It is desirable to have two Bacterial Beds in order to prevent ponding. The Beds can then be worked alternately, so that each may have a rest, which is the most certain safeguard against ponding.

68. The three Systems were not altered in any way during the experiments.

69. It was noticed that there was considerable selective sedimentation of the Solids in Suspension of the Crude Sewage in the carrier which supplied the Systems with Sewage. The System D, the first reached by the carrier, was the first to receive its supply, and accordingly received a much more concentrated Sewage; whilst the others, whose inlets were placed further along the carrier,



did not get nearly so concentrated a Sewage, because of the rapid settling of the Solids in Suspension of the Sewage in the carrier.

Again, on several occasions the System D took considerably more than 1,000 gallons of Sewage per day because of the stopping up of the V shaped slots of Systems E and F by large lumps of solid matter present in the Sewage. These stoppages were as carefully guarded against as possible, but were sometimes unavoidable. This could not have been entirely avoided without considerable alteration to the carrier. The difficulty was quite unforeseen and therefore was not guarded against in building the systems.

With the exception of the failure of the automatic apparatus (see paragraph 47) attached to System E, to work on certain occasions, the remainder of the apparatus of all the Systems was in good working order during the whole time and up to the end of the experimental year.

#### METHODS OF ANALYSIS.

70. It is of great importance that the methods employed in analysing the samples of Crude Sewage and Sewage Effluents should be described in detail, in order that the results obtained by them may be compared with those of other Chemists.

71. The samples of Crude Sewage in a small Winchester quart bottle were taken at the V-shaped entrance of each System. The carrier containing the Crude Sewage is a branch of the main sewer and runs at the head of the three Experimental Systems, which lie side by side. It ends in a *cul de sac*. It would have been much more satisfactory if this carrier had contained rapidly flowing Sewage as the selective sedimentation which obviously took place along the carrier would not have occurred. Samples of the effluents were taken when sufficient time had elapsed for the Crude Sewage to have passed through the different Systems. When the Bacterial Beds were in very good working order the effluents from the tanks above passed through them in about five minutes. These samples were at once forwarded to the County Chemical Laboratory where they were always received the same day as taken. They were conveyed with great care, only two samples being lost. On their arrival at the Laboratory the following points were at once noted:—Appearance, Reaction to Litmus, and Odour. The substances most liable to change were at once estimated and those not so liable were dealt with later. The samples were kept in a cool place so as to keep fermentation at a minimum. A quantity of each sample (about one-half) was kept for 14 days at the ordinary temperature of the Laboratory when its appearance and odour were noted.

72. The following determinations were made so that an opinion as to the composition and purification of the samples could be expressed:—



The determination of Solids in Suspension (1).

" " " " Solution (2).

" " " Chlorine (3).

" " " Ammoniacal Nitrogen (4).

" " " Albuminoid Nitrogen (5).

" " " Oxygen absorbed in 4 hours from Permanganate at 60 deg. F. (Oxygen Absorption), (6).

" " " Nitrogen in Solids in Suspension (Kjeldahl) (7).

" " " Nitrogen in Nitrates and Nitrites (8).

The Organic Nitrogen was determined by adding the Albuminoid Nitrogen found, to the Nitrogen in the Solids in Suspension (9).

#### (1). *Determination of Solids in Suspension.*

73. The Sample is well shaken and one hundred cubic centimeters measured off in an upright graduated cylinder (if the quantity of suspended matter is small 250 c.c. should be taken), and filtered through a weighed filter-paper (15 cm. in diameter) on a flat Buchner funnel. The filtration should be hastened by using a water pump. The solids on the paper are well washed with distilled water and drained as free from moisture as possible whilst still upon the pump. The filter-paper and solids are then removed from the funnel and placed on a tile in an oven kept at 100 deg. C. for 3 hours, the final drying taking place in a drying-tube in the water-oven until the weight is constant. The increase of weight of the filter paper gives the weight of Solids in Suspension in the volume of Sample taken. The weight found was calculated into parts per 100,000 of the Sample. The Solids in Suspension so obtained were further examined for Organic Nitrogen as described under the determination of Nitrogen in Solids in Suspension (Kjeldahl) (7).

#### (2). *Determination of Solids in Solution.*

74. Measure 100 c.c. of the clear liquid obtained by filtering off the Solids in Suspension (if the Solids in Suspension were greater than one grain per gallon of sample) into a weighed dish, evaporate on water-bath, and then dry in oven at 100 deg. C. until constant in weight. The increase of weight of the dish represents the weight of Solids in Solution in 100 c.c. of the Sample; this multiplied by 1,000 will give the amount of Solids in Solution in 100,000 parts of the Sample. The appearance of the dried matter was observed. The loss in weight on igniting these Solids was determined, and the ignited Solids were examined for the presence or absence of Phosphates. Phosphates were always found in heavy traces.

#### (3). *Determination of Chlorine.*

75. Measure exactly 10 c.c. of the clear Sample into a porcelain dish add a drop of Potassium Chromate solution (free from Chlorides),



and titrate with Standard Silver Nitrate Solution (1 c.c. of which is equal to 0.000354 gramme of Chlorine) until the liquid is faintly red. Another portion of the Sample was boiled and titrated as described above. It was found necessary to do this in several cases, as the presence of Sulphuretted Hydrogen interfered with the reaction. If the Sample is acid it should be neutralised by adding a pinch of pure powdered chalk before titrating.

(4 & 5). *Determination of (a) Ammoniacal Nitrogen and  
(b) Albuminoid Nitrogen.*

76. The determination of the above substances is of great importance and we proceed as follows:—

The distilled water manufactured in the Laboratory (using a Copper-Still and a Tin Condenser) always contains more than a trace of Free Ammonia, and as it is of the greatest importance that the distilled water used in these experiments should be quite free from Ammonia some experiments were made with a view to determine a rapid method for the production of Ammonia Free Water. Distilling tap water, made alkaline with pure Sodium Carbonate, was not found to be satisfactory; the same may be said when tap-water was made slightly acid with Sulphuric Acid and distilled in a glass flask. The following process was found to be most satisfactory as Ammonia Free Water could be produced rapidly and in large quantities. Into a 1½ litre round bottomed flask measure 1,200 c.c. of ordinary distilled water, add two or three drops of Bromine Water and boil for at least five minutes or until all smell of Bromine has disappeared. The cooled liquid never gave any colour with Nessler Solution, being Ammonia Free.

(a). *Determination of the Ammoniacal Nitrogen.*

Into a round bottomed Jena glass distillation flask, about 1½ litre in capacity, measure 1,200 c.c. of ordinary distilled water, add two or three drops of Bromine water; boil for five minutes or until free from Bromine and connect flask to a glass condenser which is attached to the same iron upright as the distillation flask, and distill over into Nessler tubes until the distillate gives no colour when mixed with 1 c.c. of Nessler after standing 5 minutes. (The Nessler tubes used were 10 c.m. long up to the 50 c.c. mark). The distillation is stopped, the apparatus being free from Ammonia. The water in the distillation flask is allowed to cool. Then add a few drops of a saturated solution of Sodium Carbonate and the quantity of sample required for the analysis. In the case of a Crude Sewage 20 c.c. of the clear liquid (the Nitrogen in the suspended matter being determined as described later on in (7)) was used; in the case of a tank effluent 20 c.c. was also used, the sample being well shaken before being measured, except in the case when the Solids in



Suspension were large enough to be estimated separately when the sample was not shaken. In the case of a Bacterial Bed or Filter effluent 50 c.c. were used, the sample being well shaken before it was measured off, except in the case when the Solids in Suspension were large enough to be estimated separately, when the clear liquid was used.

The distillation flask is at once connected with the condenser and the contents distilled. The distillate is collected in a 250 c.c. graduated flask which when filled up to the mark is removed and placed on one side. The distillation is continued until 50 c.c. of the distillate in a Nessler tube gives very little or no coloration after standing for 5 minutes in contact with Nessler's solution. The distillation is then stopped and the Free Ammonia in the distillate contained in the 250 c.c. flask and Nessler tubes determined by Nesslerising. The standard Ammonium Chloride solution used was of such a strength that 1 c.c. = 0.000082 gramme Nitrogen. The results are given in parts per 100,000 of Crude Sewage, Tank Effluent, or Bacterial Bed or Filter Effluent as the case may be.

*(b) Determination of Albuminoid Nitrogen.*

77. The partly cooled liquid in the distillation flask is now used<sup>1</sup> for the determination of the Albuminoid Ammonia and we proceed as follows:—

To the cooled liquid in the flask is added 50 c.c. of alkaline permanganate; the flask is then attached to the condenser and the liquid boiled. The distillate is collected in a 250 c.c. graduated flask, which when filled up to the mark is removed and placed on one side. The distillation is continued until no colouration is produced, when 50 c.c. of the distillate is mixed with Nessler's solution, or the distillation was continued until it was dangerous to distill further. By this process most of the nitrogen of the albuminoids is converted into Ammonia, which is estimated in the same manner as described above. The estimation of Ammonia by Nessler's process is best performed in bright daylight, but as the experiments had to be made in a cellar, which had at the best very little daylight, another source of light had to be found which would give satisfactory results. Ordinary gas light was of no use, it being too yellow; the same may be said of the electric (incandescent) light. Some experiments were made with an ordinary Welsbach (incandescent mantle), which gave satisfactory results. A burner having a mantle about 9 centimeters high and about 3 centimeters broad at the base, and well heated all over gave very satisfactory results, and overcame what was a very great trouble.

The gas pressure should be as high as possible (4 inches of water) and the mantles should be heated some 50-100 hours before use, as they give during the first 50 hours a light having a slight yellow tint.



(6). *Determination of Oxygen Absorbed from Permanganate in 4 hours at 60 degrees F.*

78. A measured volume of the well-mixed sample (50 c.c. of Crude Sewage or Tank Effluent, diluted to 250 c.c. with pure distilled water, or 250 c.c. of Bacterial Bed or Filter Effluent were taken) is placed in a clean glass flask with 10 c.c. of pure diluted Sulphuric Acid (strength 1 to 2) and 10 c.c. of Potassium Permanganate Solution (strength 10 c.c. = 0.005 Gramme Oxygen). The mixture was allowed to stand four hours in the cold (60°F.), with frequent shaking. If the pink colour of the Permanganate Solution became at all faint during the four hours, further measured quantities of Sulphuric Acid and Permanganate Solution were added. At the same time a "blank" experiment was started for comparison, using the same quantities of Sulphuric Acid and Permanganate Solution mentioned above and 250 c.c. of pure distilled water. At the end of four hours the undecomposed Permanganate was decomposed by adding an excess of Potassium Iodide Solution and titrating the free Iodine with Thiosulphate Solution, using Starch as an indicator. The difference between the quantity of Thiosulphate used in the blank experiment and that used in the titration of the samples, multiplied by the amount of available Oxygen contained in the Permanganate added, and the product divided by the volume of Thiosulphate corresponding to the latter, is equal to the amount of Oxygen absorbed by the sample.

(7). *Determination of Nitrogen in Solids in Suspension by Kjeldahl's Method.*

79. When the Solids in Suspension were present in the samples in quantities greater than one grain per gallon they were filtered off and determined as described in paragraph 73. The Nitrogen in these dried Solids was determined as follows:—The dried Solids in Suspension and the filter paper were placed in a  $\frac{1}{2}$  litre round bottomed Jena glass flask and moistened with 20 c.c. of concentrated Sulphuric Acid. Three grammes of Sodium Pyrophosphate were then added and the mixture boiled until the liquid became quite colourless. The liquid was then cooled, washed into a distillation flask with ammonia free distilled water and made strongly alkaline by adding 70 c.c. of caustic soda (1 lb. in litre). The liquid was distilled and the distillate collected in a 250 c.c. graduated flask. The 250 c.c. contained all the Ammonia derived from the nitrogenous matter in the Solids in Suspension and from the re-agents. The Ammonia was determined in the usual manner by Nesslerising. A blank experiment was made with the re-agents used (including filter paper) and the Ammonia found, deducted from that determined above.

(8). *Determination of Nitrogen in Nitrates and Nitrites.*

80. The Nitrates and Nitrites were determined together by evaporating to dryness in a porcelain dish on a water bath 100 c.c. of the



sample made alkaline with pure caustic soda. The caustic soda was added in order to decompose any Ammonium Nitrite present and convert it into Sodium Nitrite, otherwise the Ammonium Nitrite would be decomposed on heating the solution, into free Nitrogen and water, which would give low results. The residue in the dish was extracted with about 2 c.c. of distilled water and the extract poured into the cup of a Lunge Nitrometer. The extract was drawn into the tube of the Nitrometer and then 5 c.c. of pure concentrated Sulphuric Acid added. The carbonates and chlorides present will be quickly decomposed into Carbonic Acid and Hydrochloric Acid gas which should be driven out of the Nitrometer. The mixed liquids were then well shaken and all Nitrates and Nitrites decomposed into Nitric Oxide gas the volume of which was determined in the usual way. This volume, expressed in c.c.'s and corrected to normal temperature and pressure, gives, when multiplied by 0.625, the Nitrogen in the Nitrates and Nitrites in parts per 100,000. The above process gave very satisfactory results except when the sample contained much Chlorine. It was found that high results were obtained when the sample contained more than 12 grains of common salt per gallon. When this occurred a saturated solution of Silver Sulphate was added to precipitate all or nearly all the Chlorine present. The Silver Chloride was filtered off, washed and the filtrate and washings evaporated and treated as described above.

By the above process the Nitrates and Nitrites were estimated together. The Nitrites were in some cases determined by a modified Griess' process. By this process the Nitrites in Solution are made to act upon a colourless Solution of Meta-phenylene-diamine in the presence of free Sulphuric Acid, when a brown coloration (due to the formation of Bismarck Brown) is produced, and the depth of which will depend on the quantity of Nitrite present. The colour is compared with the colour produced by a known quantity of standard Nitrite Solution, acting upon acid Meta-phenylene-diamine. The Standard Nitrite Solutions were found not to remain as constant as was expected, and after a number of experiments had been made, the process was modified by taking a weighed quantity of pure Bismarck Brown and determining its value in terms of Nitrous Nitrogen by comparing its colour with that produced by a known weight of pure Nitrite. The standard solution of Bismarck Brown remained remarkably constant even when left exposed to daylight for over a month. This process is being further tested.

#### (9). *Organic Nitrogen.*

81. The quantity of Organic Nitrogen in each sample was obtained by adding together the Albuminoid Nitrogen and, if any, the Solids in Suspension Nitrogen.