[Report 1937] / Medical Officer of Health, Cork County Borough.

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COUNTY BOROUGH OF CORK.

ANNUAL REPORT

OF THE

MEDICAL OFFICER OF HEALTH

AND

PORT MEDICAL OFFICER

FOR THE YEAR 1937.

J. C. SAUNDERS, M.D., D.P.H.,

Medical Officer of Health.

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Medical Officer of Health.

CORK:
Guy & Co. Limited, 70 Patrick Street.
1938.

To the Lord Mayor, Aldermen and Councillors
of the County Borough of Cork.

My Lord Mayor and Gentlemen,

I submit herewith my Annual Report for the year 1937. There has been an increase in the general mortality figures as compared with the immediately preceding years due, in the main, to the epidemic of influenza which occurred early in the year. I regret also to have to draw attention again to excessive infant mortality, due chiefly to an increase in deaths from gastro-enteritis. I have stressed in previous reports the factors which predispose to this condition and have laid emphasis on the importance of bad environmental conditions such as piggeries, stables, etc., in densely crowded localities. There has been no improvement in such conditions and it seems likely that there will not be until public opinion is centred on this question. It is a waste of time and energy trying to inculcate ideas of hygiene and cleanliness while such conditions are allowed to persist.

I have acknowledged in the text the assistance received from the various gentlemen concerned whom I have to thank once more.

For the first time the Report of the School Medical Officer on the work of her department is included in this Report, as is my annual report to the Port Sanitary Authority.

I have the honour to remain,

Your obedient servant,

J. C. SAUNDERS.

PUBLIC HEALTH STAFF

Medical Officer of Health :
J. C. Saunders, M.D., D.P.H.

Assistant Medical Officer of Health :
Patrick F. Fitzpatrick, M.B., B.Ch., B.A.O., D.P.H.

School Medical Officer :
Annie M. Sullivan, M.B., B.Ch., B.A.O., D.P.H.

Public Analyst.
Daniel J. O'Sullivan, M.Sc., F.I.C.

Chief Veterinary Officer :
S. R. J. Cussen, D.V.S.M., M.R.C.V.S.

Assistant Veterinary Officers :
C. Lucey, M.R.C.V.S.
Maurice Herlihy, M.R.C.V.S.
Charles B. Adams, M.R.C.V.S.
Joseph P. Daly, M.R.C.V.S.
Edmund O'Donnell, M.R.C.V.S.
John T. Barry, M.R.C.V.S.

Housing Superintendent :
G. A. Byrne, B.E., M.R.San.I.

Sanitary Inspectors :
John O'Brien
Timothy Newman
Charles Murray
Daniel Murphy
James V. Nerney
Miss N. Dunn

Tuberculosis Nurse :
Miss L. Lyndon

Maternity and Child Welfare Nurses :
Miss M. Gillespie
Miss H. Neville
Miss H. A. Crowley

School Nurses :
Miss M. Lordan
Miss M. O'Sullivan
Miss J. Twomey

Clerk and Inspector to Port Sanitary Authority :
J. P. Kieran

CONTENTS.

SUMMARY OF STATISTICS.

Area (in Acres)	2,618
Population (Census 1936)	80,713
Density of Population (persons to the acre)	30.8
Rateable Value	£235,958
Sum represented by a Penny Rate	£983
Number of Births	2085
Birth Rate	22.0
Number of Deaths	1403
Death Rate	17.4
Maternal Mortality Rate	Nil
Infantile Mortality	103
Zymotic Death Rate	1.2

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FOR THE YEAR 1937

Section I.—Physical Features of the Area

The City of Cork is situated on the river Lee, fifteen miles from its mouth in Cork Harbour. On the north bank of the river there is steep rising ground almost prohibiting building development, save in the form of hillside roads and open building of large houses, with the exception of the marked break of the Blackpool valley, very full use of which has been made. Next comes the flat island comprising the centre of the City. This island is almost entirely artificial, and consists of six feet of filled-in material, with ten feet of slob below that and then gravel overlying old red sandstone. Southwards is a gently undulating tract of land about one and a half miles wide enclosed by a range of hills. There is a considerable amount of land liable to flood in the Lee Valley, west of the city, towards Carrigrohane, and the flatness of the islands on which the city is built and the height to which unusual tides ascend being nearly to the crown of the arches of the old bridges, render certain portions of the city itself also liable to flooding.

The geological formation of the city region is simple and clearly marked in its effect on the landscape. There are only two systems visible, both paleozoic rocks, the carboniferous limestone and the older underlying Devonian, representing the old red sandstone. Each of these formations is in two series ; the carboniferous in a crystalline limestone and in a dark shale (with some 10 feet slate) ; the Devonian in the upper old red sandstone (yellowish and reddish) and in the lower, old red sandstone (red and purple). The characteristic aspect of the countryside has been caused by the crinkling of these strata into regular parallel folds. Further the limestone which should have formed the ridge of the anticlines has been denuded or dissolved away, so that the highest ground consists of old red sandstone, and even the lower series of this ; the hollow folds, floored by limestone, have been subsequently protected from further denudation by a covering of boulder clay. In this immediate region there are thus three old red sandstone ridges and two limestone valleys, in the northern of which the city stands under the brow of the northern sandstone ridge. If this sandstone ridge had possessed its original limestone capping, it would probably have been at least 2,000 feet high.

Section II.—Vital Statistics

1.—Population.

According to the provisional figures issued by the Registrar-General in connection with the census of 1936 the present population of the city is 80,713, an increase of 2,249 over that revealed by the previous census taken in 1926. The population at the various census years has been as follows :—

1881	80,124
1891	75,345
1901	76,122
1911	76,673
1926	78,464
1936	80,713

It is not possible to sub-divide the population into age and sex groups (as was done last year) since the necessary information is not yet available.

2.—Births.

According to the Annual Summary of the Registrar-General the total number of births *registered* in Cork during 1937 was 2,085. Of these 1,706 were of children whose parents resided in the city area and 369 whose parents resided elsewhere. The number of live births *notified* to the Public Health Department (in accordance with the provisions of the Notification of Births Act) was 1818. In addition to this latter figure there were 73 still births notified, bringing the total *notified* births to 1,891 for the year. There is therefore a difference of 112 between the number of registered live births and the number of notified live births, the former being in excess. On the basis of the Registration General's figures the birth-rate for the year was 22.0. The birth-rate in this city has preserved a remarkable steadiness of character over the past fifty-seven years as shown in Table I. The decimal averages during this period were as follows :—

1881–90	26.2
1891–1900	27.2
1901–10	26.0
1911–20	24.7
1921–30	23.5
1931–36	24.0
1937	22.0

TABLE 1.

Birth Rates for Cork City and Éire from 1881 to 1937.

Year	Cork	Éire	Year	Cork	Éire
1881	27.7	24.0	1911	26.0	22.8
1882	28.2	23.8	1912	24.8	22.7
1883	27.0	23.4	1913	24.2	22.6
1884	27.4	23.5	1914	24.3	22.3
1885	25.6	23.1	1915	23.2	22.0
1886	25.4	22.7	1916	22.6	21.1
1887	25.5	22.5	1917	20.2	20.0
1888	25.7	22.1	1918	20.8	19.9
1889	25.2	22.0	1919	23.8	19.9
1890	25.0	21.6	1920	28.3	21.6
1891	26.9	22.3	1921	24.6	19.7
1892	24.6	21.7	1922	24.2	19.5
1893	27.8	22.1	1923	26.2	20.5
1894	27.4	22.1	1924	25.5	21.0
1895	28.9	22.3	1925	23.8	20.8
1896	29.2	22.7	1926	21.5	20.6
1897	27.5	22.5	1927	21.7	20.3
1898	28.7	22.3	1928	21.7	20.1
1899	27.3	22.1	1929	20.9	19.8
1900	25.8	21.8	1930	25.4	19.9
1901	25.6	21.8	1931	24.4	19.4
1902	26.2	22.2	1932	23.0	19.0
1903	27.1	22.1	1933	23.7	19.3
1904	27.4	22.7	1934	24.4	19.5
1905	27.6	22.6	1935	24·8	19·6
1906	27.5	22.8	1336	23·7	19·6
1907	25.6	22.4	1937	22·5	19·1
1908	27.3	22.7			
1909	26.3	22.9			
1910	25.8	22.8			

3.—Deaths.

The number of deaths recorded during the year was 1,403, equivalent to a rate of 17.4 per 1,000 population. These figures represent crude death rates based on population only. The standardised death rate for the city is based on the age and sex constitution of Éire as a whole at the census. The figures for 1937 on this basis are not yet available. In 1936 the crude death rate in Cork City was 14.7 (Registrar-General's figure) and the standardised rate for the same year 18.6 (an increase of 14.9) compared with a rate of 13.98 for the whole country.

A pronounced increase in the death rate was recorded during the year—from 14.7 per 1,000 in 1936 to 17.4 per 1,000 in 1937. During this period the general death rate for the whole country increased only from 14.3 to 15.3 per 1,000. The local increase was almost entirely due to the outbreak of influenza which occurred in the early weeks of the year. That epidemic was fully described in last year's report so that it is unnecessary to go into it again in detail. It will suffice to touch upon the principal features and, while adverting to the fact that from

the standpoint of mortality it was comparatively mild, nevertheless, emphasizing again the fact that the disease came earlier to Cork than any other part of the country and was of a definitely more severe character here than elsewhere. This feature is illustrated in the table reproduced herewith, showing general mortality rates for weekly periods in various towns before, during and after the epidemic period.

Table 2.—Weekly Death Rates (crude) in Urban Areas in relation to the epidemic of Influenza in 1937.

Week ended	Total 12 towns	Cork	Dublin	Dun Laoghaire	Limerick	Waterford
5/12/26	13.4	11.0	15.1	10.5	11.3	11.2
12/12/36	15.4	12.9	17.3	10.5	11.3	20.5
19/12/36	16.1	14.9	16.1	17.0	12.6	18.6
26/12/36	11.8	11.6	11.4	22.3	12.6	13.1
2/1/37	19.9	30.4	19.8	14.4	21.4	18.6
9/1/37	15.5	21.3	15.2	19.6	18.9	11.2
16/1/37	19.3	**50.4**	15.4	16.9	25.2	13.1
23/1/37	26.4	34.2	27.6	16.9	23.9	13.1
30/1/37	24.2	**45.2**	22.0	15.6	25.2	16.8
6/2/37	32.2	27.1	**36.0**	23.5	**26.5**	16.8
13/2/37	25.7	19.4	28.8	**31.3**	23.9	24.2
20/2/37	21.3	18.1	21.0	22.2	27.7	26.1
27/2/37	18.5	22.6	17.5	7.8	27.2	**37.3**
6/3/37	18.0	23.3	17.3	14.3	13.9	22.4
13/3/37	18.1	14.2	18.3	13.0	17.6	29.8
20/3/37	18.0	18.1	19.8	16.9	16.4	20.5
27/3/37	20.0	24.5	19.8	18.3	15.1	20.5

It will be noted that there was a definite and marked increase in the rate for Cork for the week ended 2nd January, followed by a slight reduction the next week and a huge increase to 50.4 per 1,000 for the week ended 16th January and another very high figure (45.2 per 1,000) for the week ended the 30th January. It may be said that there was abnormally high mortality for the period from the 2nd January to 6th February. In the other towns increased mortality made its appearance later and there are no figures in any way comparable to that of 50.4 per 1,000 recorded in Cork. The nearest to it are 36.0 per 1,000 for Dublin during the week ended 6th February and 37.3 per 1,000 in Waterford during the week ended 27th February. It is apparent therefore that so far as Cork is concerned the visitation was of a definitely more severe type than in any other part of the country. Furthermore, reference to the appropriate records of the Health Section of the League of Nations showed that the severity of the epidemic was more marked in Cork than in any city in Europe. These records were of interest also in showing that the epidemic had its genesis in Central Europe, travelling thence to England and reaching Ireland via Cork, where it had its maximum severity. It was part of a pandemic in which practically all countries of the world were affected.

The effects of the epidemic were reflected not only in an increased number of deaths from influenza and influenzal pneumonia but also in increased numbers of deaths from other respiratory diseases. This

feature is brought out in the following table in which deaths from these causes during and after the epidemic period have been analysed.

Table 3.—The effect of the Influenza Epidemic on General Mortality and certain other causes of Death.

Week ended	No. of Deaths	General Death Rate	DEATHS FROM		
			Influenza	Pneumonia	Other Respiratory Diseases
5/12/36	17	11.0	—	1	—
12/12/36	20	12.9	—	3	—
19/12/36	23	14.9	—	1	4
26/12/36	18	11.6	—	—	2
2/1/37	47	30.4	1	5	5
9/1/37	33	21.3	—	6	5
16/1/37	78	50.4	4	5	15
23/1/37	70	45.2	17	10	8
30/1/37	53	34.2	10	4	8
6/2/37	42	27.1	4	2	5
13/2/37	30	19.4	2	2	6
20/2/37	28	18.1	1	3	5
27/2/37	35	22.6	—	4	3

It will be noted that there was a very marked increase in deaths from respiratory diseases during the epidemic period in addition to a similar increase in deaths specifically referred to influenza. That the increased general death rate for the year is almost entirely due to increased deaths as a result of the influenza outbreak is shewn by these figures and it is confirmed by the fact that there was a very marked increase in the total number of deaths from bronchitis during the year. The number of such deaths jumped from 77 in 1936 to 124 in 1937 and take second place in the list of causes of death for the year.

Table 4, which is based on Abstract V. of the Registrar-General's Annual Report, is an analysis of the causes of death during the year 1937. It differs from Abstract V. in this respect that the age-groups are more extended and that the causes of death have been sub-divided in some instances. For example, under the headings " other forms of tuberculosis " and " other defined diseases " the various causes of death are more fully set out. This has been made possible by the system of weekly collection of deaths from the district Registrar's registers and the card-index system of filing which has been adopted in connection with it.

This table is compiled from the weekly returns collected by us from the local Registrars and the totals do not correspond with those of the Registrar-General in his Summary, which are not fully corrected.

I have, once more, pleasure in acknowledging the courtesy of the Registrar-General in assisting in the correct compilation of these and other figures during the year 1937.

Table 4.—Analysis of **Causes of Death** at different age-periods during the year 1937.

Causes of Death	Sex		Un. 1 yr.	1 to 5	5 to 15	15 to 25	25 to 35	35 to 45	45 to 55	55 to 65	65 to 75	75 to 85	8 and up
	M.	F.											
*Typhoid Fever	1	–	–	–	–	–	–	1	–	–	–	–	
Measles	6	4	1	9	–	–	–	–	–	–	–	–	
Whooping Cough	4	8	5	7	–	–	–	–	–	–	–	–	
Diphtheria	14	3	1	9	6	–	1	–	–	–	–	–	
Scarlet Fever	4	6	1	5	2	–	1	1	–	–	–	–	
Cerebro-Spinal Fever	2	1	–	1	1	–	1	–	–	–	–	–	
Influenza	26	29	1	3	2	2	3	5	6	15	7	10	
Pulmonary Tuberculosis	56	40	–	–	2	19	19	23	17	13	2	–	
Other Tuberculosis Diseases :—													
(a) Meningitis	5	7	1	5	3	1	2	–	–	–	–	–	
(b) Spinal	2	1	–	1	–	1	1	1	–	–	–	–	
(c) Abdominal	2	2	1	–	–	1	–	1	–	–	1	–	
(d) Joint	1	–	–	–	–	–	–	–	–	1	–	–	
(e) Other Forms	3	1	–	–	–	1	–	–	–	1	2	–	
Cancer	64	53	–	–	–	–	2	6	30	38	31	10	
Diabetes	5	2	–	–	1	2	–	–	–	1	2	1	
Cerebral Haemorrhage	27	46	–	–	–	–	1	2	11	23	22	14	
Heart Disease	143	165	–	–	5	6	9	16	24	72	112	56	
Arterio-Sclerosis	3	3	–	–	–	–	–	–	2	–	2	2	
Bronchitis	66	58	5	1	–	–	–	5	15	30	51	16	
Pneumonia :—													
(a) Lobar	24	12	5	4	1	1	1	6	6	7	1	3	
(b) Broncho	40	25	25	13	1	–	–	5	4	6	6	5	
Other Respiratory Diseases	14	9	2	3	–	1	–	5	2	6	4	–	
Gastric and Duodenal Ulcer	7	2	–	–	–	–	–	2	4	2	1	–	
Diarrhoea and Enteritis (Under 2 years)	32	20	45	7	–	–	–	–	–	–	–	–	
Appendicitis	–	1	–	–	1	–	–	–	–	–	–	–	
Cirrhosis of Liver	1	1	–	–	–	–	–	1	–	–	1	–	
Nephritis	14	21	–	–	1	1	2	4	3	13	8	2	
Congenital Debility. Malformation and Premature Birth	23	27	50	–	–	–	–	–	–	–	–	–	
Suicide	2	–	–	–	–	–	–	–	–	1	1	–	
Other Violent Deaths	16	6	–	–	2	1	2	1	2	3	5	5	
Other Defined Diseases :—													
(1) Gastro-Intestinal	6	8	3	1	–	2	–	1	1	3	2	1	
(2) Convulsions	10	10	19	1	–	–	–	–	–	–	–	–	
(3) Central Nervous System (including Mental diseases)	12	6	–	–	2	1	3	1	5	1	5	–	
(4) Anaemia and Blood Diseases	3	9	–	2	–	1	1	2	2	4	–	–	
(5) Genito-Urinary	7	1	–	–	–	–	–	–	–	2	5	1	
(6) Marasmus	7	5	10	1	1	–	–	–	–	–	–	–	
(7) Rheumatic Diseases	2	7	–	–	1	1	–	1	1	2	2	–	
(8) Meningitis	8	2	3	3	4	–	–	–	–	–	–	–	
(9) Senile Decay	32	49	–	–	–	–	–	–	–	1	27	28	
(10) Miscellaneous	26	16	9	4	2	4	6	3	2	4	6	2	

* This death occurred in the year 1920, but was not registered until 1937.

The principal causes of death during 1937 were (in order of importance) as follows :—

1.	Heart Disease	308	(265)
2.	Bronchitis	124	(77)
3.	Cancer	117	(121)
4.	Pulmonary Tuberculosis	96	(85)
5.	Senile Decay	81	(65)
6.	Cerebral Haemorrhage	73	(69)
7.	Broncho-Pneumonia	65	(62)
8.	Diarrhoea and Enteritis (under 2 years)	52	(41)
9.	Premature Birth (etc.)	50	(44)
10.	Lobar Pneumonia	36	(35)
11.	Nephritis	35	(22)
12.	Violence	24	(32)

The figures in brackets are those corresponding for the previous year.

Cardiac Disease. Once more heart disease heads the list of killing diseases and the number of deaths from this cause is the highest in any year since I started to compile these reports. It is unfortunate that in Table 12 no column was included for heart disease as it would be of the greatest interest and instruction to study the trend of mortality from this disease. It is very surprising that no provision has been made for its inclusion in the table, all the more so since it must have been one of the chief, if not absolutely the chief, causes of death during the whole period to which the table relates. We can, however, study its trend for a limited number of years as the local compilation of statistics from the district Registrar's returns have now put this information at our disposal, and reports for the past six years have included particulars in this regard. In the following table the three principal causes of death are studied from this angle.

Table 5.—Trend of mortality from the three principal causes of death in Cork City 1931–1937.

	Condition		
Year	Heart Disease	Cancer	Pulmonary Tuberculosis
1931	250	124	103
1932	258	98	111
1933	240	114	106
1934	258	111	107
1935	245	133	115
1936	265	121	85
1937	308	117	96

In view of the importance which heart disease assumes as a cause of death it is surprising that more attention has not been directed to it. An examination of Table 4 shows that while practically all ages are represented, the great bulk of the deaths occurs in the later age periods. It first assumes significance in 45–55 years group, increases steadily with age and reaches its maximum importance 65–75 years decade after which it again dwindles. We may probably infer from this that a great deal of it is due to ordinary wear and tear consequent on the degenerative processes of advancing age but, nevertheless, there would seem to be grounds for investigation as to whether deaths under this heading could not be substantially reduced by the ascertainment and removal of the underlying causes. In the following table the figures in which Table 3 are based are further examined as to age grouping.

Table 6.—Analysis of deaths from heart disease 1931–37.

Year	Under 5 years	5/15 years	15/25 years	25/35 years	35/45 years	45/55 years	55/65 years	65/75 years	75 yrs and up	Total
1931	—	6	3	5	18	31	66	87	34	250
1932	—	6	2	9	17	39	50	99	36	258
1933	—	2	4	5	15	31	58	83	42	240
1934	1	3	4	5	20	17	66	103	39	258
1935	2	3	1	7	11	29	63	93	36	245
1936	4	3	3	7	6	32	64	98	48	265
1937	—	5	6	9	16	24	72	112	64	308

It will be seen from this table that the feature referred to above relative to the bulking of the deaths in the later age groups has been consistently maintained in each year.

Cancer. The number of deaths attributable to this disease recorded by us, was 117, as compared with 121 in 1936. The corresponding figures of the Registrar-General are 110 (uncorrected) and 122. The discrepancy observable here, no doubt, is due to a difference in classification, all forms of malignant disease being classed by us under this heading. For comparative purposes the Registrar-General's are the more correct figures. On the basis of 117 deaths the rate was 1.4 per 1,000 of the population, as compared with 1.7 per 1,000 last year.

Phthisis Death Rate. The deaths from pulmonary tuberculosis numbered 96, equivalent to a rate of 1.20 per 1,000 of the population. The corresponding figures for last year were 84 and 1.06 per 1,000 respectively. The figures for the years from 1911 onwards are set out in Section IV.

Infant Mortality. The number of deaths of children under one year of age was 187, which is equivalent to a rate of 103 per 1,000 live births. In 1936 the number of deaths was 154 and the rate, 80 per 1,000. The contributing factors are discussed in Section V.

Maternal Mortality.—There were no deaths from causes under this heading during the year.

Infectious Disease Death Rate. The number of deaths from infectious disease was 102, equivalent to 1.2 per 1,000 of the population. In 1936 the figures were 68 and 0.84 per 1,000 respectively.

Table 7 shows the death rates per 1,000 persons living in Cork City, Éire and England and Wales for the 57 years ended 1937. The figures set forth do not serve as an estimate of the relative healthiness of the communities compared as they are based on crude death rates. In order to compare such conditions the figures would have to be based on standardised death rates. Standardised death rates based on age and sex constitutions have been drawn up by the Registrar-General for Éire based upon the distribution of the population according to the census of 1926. Taking 14.37 as the standard death rate for Éire in 1936, then the standard death rate for Cork City becomes 18.67 instead of 14.7. The table, however, indicates that the general trend of the death rate is distinctly downward and that there has been a marked annual saving of life in recent years as compared with the earlier period.

The standard death rates from 1928 to 1937 are set out in Table 8.

Table 7—Crude Death Rates per 1,000 living for Cork City, Éire and England and Wales, 1881–1937.

Year	Cork	Éire	E. & W.	Year	Cork	Éire	E. & W.
1881	26.8	17.1	18.9	1911	21.2	16.3	14.6
1882	24.7	16.9	19.6	1912	19.1	16.2	13.4
1883	24.9	18.6	19.6	1913	21.5	16.8	13.8
1884	26.7	17.4	19.7	1914	20.2	16.1	14.0
1885	26.2	18.0	19.2	1915	20.7	17.5	15.7
1886	22.1	17.4	19.5	1916	18.2	16.5	14.3
1887	22.4	17.9	19.1	1917	17.4	16.9	14.2
1888	24.1	17.4	18.1	1918	20.4	17.5	17.3
1889	22.3	16.9	18.2	1919	20.2	17.9	14.0
1890	22.2	17.6	19.5	1920	17.5	14.7	12.4
1891	26.9	17.6	20.2				
1892	26.4	18.7	19.0	1921	15.4	14.3	12.1
1893	24.5	17.3	19.2	1922	18.0	14.7	12.8
1894	24.9	17.7	16.6	1923	14.0	14.0	11.6
1895	23.9	17.7	18.7	1924	17.8	15.0	12.2
1896	22.6	15.9	17.1	1925	15.5	14.7	12.2
1897	24.7	17.8	17.4	1926	17.3	14.0	11.6
1898	23.7	17.7	17.5	1927	14.7	14.8	12.3
1899	26.3	17.0	18.2	1928	15.2	14.2	11.7
1900	24.2	19.1	18.2	1929	16.9	14.6	13.4
1901	23.0	17.1	16.9	1930	17.3	14.1	11.4
1902	21.5	17.0	16.3				
1903	19.4	17.0	15.5	1931	16.4	14.5	12.3
1904	21.6	17.6	16.3	1932	15.7	14.4	12.0
1905	21.7	16.4	15.3	1933	14.9	13.6	12.3
1906	20.2	16.2	15.5	1934	14.7	12.9	11.8
1907	20.6	17.0	15.1	1935	14.8	13.9	11.7
1908	22.2	17.1	14.8	1936	14.7	14.3	12.1
1909	22.1	16.8	14.6	1937	17.4	15.3	12.4
1910	19.3	16.6	13.5				

Table 8.—Showing the effect on the Death-rate of correction for transfers and of Standardisation.

Year	Death Rate per 1,000 Population		
	Corrected for Transfers (1)	Standardised Rate (2)	Effect of Standardisation (3)
1928	15.20	18.24	+3.04
1929	16.92	19.98	+3.06
1930	17.39	20.37	+2.98
1931	16.47	19.62	+3.15
1932	15.76	18.91	+3.15
1933	15.01	17.81	+2.80
1933	15.01	17.81	+2.80
1934	14.91	17.98	+3.28
1935	14.35	17.75	+3.40
1936	14.35	18.67	+3.90

This Table is compiled from the Annual Reports of the Registrar-General for the years concerned and represents fully corrected figures. These figures do not correspond with those in Table 12 which are not fully corrected, having been compiled before the corrected figures were available.

The following table (which has been extracted from the Annual Reports of the Registrar-General for the relevant years) gives the standardised death rates over a number of years for the County Boroughs.

Table 9.—Standardised Death Rates of the four County Boroughs.

Year	Cork	Dublin	Limerick	Waterford
1928	18.24	18.14	18:84	17.17
1929	19.98	19.69	18.87	18.94
1930	20.37	17.97	19.42	17.86
1931	19.62	16.00	19.06	17.84
1932	18.91	18.64	19.04	20.29
1933	17.81	18.98	21.56	15.58
1934	17.98	17.03	16.49	15.60
1935	17.75	19.33	20.28	18.93
1936	18.67	20.75	19.39	16.76

Table 11.—Showing for the year 1937 (52 weeks) ended 1st January, 1938, the mortality from All Causes and from some of the Principal Causes of Residents of the several Registrars' Districts comprising the City of Cork, also the Deaths at certain age periods and the number of Uncertified Deaths.

REGISTRARS' DISTRICTS, Etc.	Infant Mortality per 1,000 Births	Annual Rate of Mortality per 1,000 Living Represented by Deaths		Total No. of Deaths.	DEATHS.																									
					Ages at Death.								Deaths from																	
													Principal Epidemic Diseases						Influenza	Tuberculosis.		Cancer.	Diseases of the Respiratory System.		Violence.	Other Causes	Inquest Cases.	In Public Institutions	No. of Uncertified Deaths
		From all Causes	From Principal Epidemic Diseases		Under 1 year.	1 year and under 2 years	2 and under 5 years.	5 and under 15 years.	15 and under 25 years.	25 and under 45 years.	45 and under 65 years.	65 years and upwards.	Typhoid Fever, Typhus, Small Pox, Dysentery	Measles	Scarlet Fever.	Whooping Cough.	Diphtheria.	Diarrhœa and Enteritis under 2 years		Pulmonary	Other Forms.		Pneumonia.	Other.					
CITY OF CORK																														
Cork Urban No. 1	93	As the populations of these districts, according to the Census of 1936 are not at present available, the rates have been omitted.		187	22	3	9	2	3	14	46	88	....	3	3	1	3	2	5	8	1	20	11	15	6	109	5	64	7
,, No. 2	122			190	27	7	4	6	11	22	44	69	....	3	....	4	....	6	7	13	2	19	13	16	3	104	4	94	4
,, No. 3	117			228	35	11	10	7	9	25	67	64	....	2	1	3	5	14	10	21	4	15	22	22	2	107	4	120	3
,, No. 4	111			170	23	7	2	3	2	22	55	56	....	....	1	....	1	5	9	12	2	14	11	25	1	89	5	94	2
,, No. 5	169			111	24	3	....	2	2	15	34	31	....	....	....	....	....	7	3	6	2	12	7	13	2	59	8	61	4
,, No. 6	94			179	22	6	6	7	2	16	45	75	1a	2	2	2	3	6	6	9	3	10	13	15	2	105	6	95	1
,, No. 7	72			314	30	4	12	10	15	30	93	120	....	....	3	2	5	8	15	25	8	19	30	23	9	167	9	153	7
Total City of Cork	107	17·1	1·2	1379	183	41	43	37	44	144	384	503	1	10	10	12	17	48	55	94	22	109	107	129	25	740	41	681	28

Note :– This Table is taken from the Annual Summary of the Registrar-General, the returns of which are not fully corrected. Its principal value is a comparative estimate of the health of the different districts.

(*a*) This death (typhoid fever) occurred in 1920, but was not registered until 1937.

Table 12.

Summary of Births and Deaths Registered during the Years 1878 to 1937, inclusive, in the Cork Urban Sanitary District with the number of Deaths from some of the principal causes.

YEAR	POPULATION	Rate per 1,000 persons represented by			NUMBER REGISTERED.																						
						DEATHS.																					
			DEATHS from						NUMBER CAUSED BY																		
		BIRTHS.	All Causes.	Principal Zymotic Diseases.	BIRTHS.	TOTAL NUMBER.	Under 1 year of age.	At 65 years & upwards.	Smallpox.	Measles.	Scarlet Fever.	Typhus.	Whooping Cough.	Diphtheria.	Enteric Fever.	Diarrhœa	Influenza.	Pneumonia.	Tubercu-lous Disease. Pulmonary	Other forms.	Cancer.	Diseases of Respira-tory System.	Violence	Inquest Cases.	No. in Public Institutions	Number of Uncertified
1878		31.7	27.0	....	2,546	2,464	350	681	....	61	1	....	59	1	....	75	....	....	....	....	....	....	23	87	863	....
1879		33.5	29.0	3.8	2,707	2,689	319	711	....	49	65	....	19	2	....	48	....	....	....	....	....	....	30	113	977	....
1880		28.5	30.8	5.9	2,620	2,837	376	624	....	73	204	....	47	13	....	86	....	....	289	....	....	448	23	99	1026	....
1881		27.7	26.8	4.1	2,167	2,101	271	611	....	36	30	88	61	4	4	87	....	....	237	....	....	486	14	82	673	....
1882		28.2	24.7	2.3	2,212	1,935	282	490	....	20	8	54	25	5	4	55	....	....	274	....	....	488	11	77	574	....
1883		27.0	24.9	2.0	2,161	1,993	236	572	....	35	8	46	5	10	11	38	....	....	271	....	....	552	9	50	646	....
1884		27.4	26.7	2.8	2,199	2,139	253	553	....	41	27	37	45	6	13	51	....	....	292	....	....	584	12	50	671	....
1885		25.6	26.2	2.3	2,054	2,098	247	614	....	6	48	21	55	5	9	35	....	....	287	....	....	484	7	36	587	....
1886	80,124	25.4	22.1	2.1	2,037	1,769	225	430	....	12	30	17	5	8	42	50	....	....	253	....	....	239	11	40	525	....
1887		25.5	22.4	1.8	2,042	1,792	252	490	....	34	1	12	6	2	20	67	....	....	236	....	....	378	15	43	490	....
1888		25.7	24.1	3.5	2,058	1,934	288	501	....	146	6	21	49	18	9	30	....	....	231	....	....	452	7	32	499	....
1889		25.2	22.3	1.9	2,023	1,786	253	497	....	1	10	5	88	7	9	32	....	....	278	....	....	351	8	34	433	....
1890		25.0	22.2	1.0	2,005	1,778	214	571	....	1	5	7	14	8	12	29	....	....	295	....	....	387	20	43	479	....
1891		26.9	26.9	1.4	2,024	2,025	281	630	....	....	4	5	29	11	17	34	....	....	295	....	....	531	15	35	557	....
1892		24.6	26.4	1.9	1,978	1,988	297	560	....	40	....	23	42	3	17	17	....	....	303	....	....	511	17	65	682	..
1893		27.8	24.5	1.3	2,092	1,844	268	517	....	6	2	7	14	3	14	51	....	....	314	....	....	395	15	58	596	..
1894		27.4	24.9	1.8	2,062	1,874	310	517	....	51	15	2	16	4	13	32	....	....	296	....	....	426	31	63	609	....
1895		28.9	23.9	1.6	2,179	1,798	287	494	....	1	3	8	65	2	16	28	....	....	261	....	....	348	24	68	957	....
1896	75,345	29.2	22.6	1.2	2,144	1,706	229	477	....	2	2	7	16	1	24	40	....	....	299	....	....	295	14	66	619	....
1897		27.5	24.7	2.7	2,073	1,858	316	452	....	75	1	3	59	10	9	47	....	....	260	....	....	368	22	64	680	....
1898		28.7	23.7	1.9	2,160	1,787	285	493	....	3	1	11	25	4	13	86	....	....	283	....	....	303	14	75	640	....
1899		27.3	26.3	2.8	2,060	1,980	276	525	....	34	1	6	33	5	8	121	....	....	320	....	....	341	9	79	749	....
1900		25.8	24.2	1.4	1,944	1,821	235	496	....	9	22	4	1	2	5	59	....	....	281	....	....	354	7	51	597	....
1901		25.6	23.0	1.9	1,942	1,745	272	440	....	3	17	2	36	11	5	73	....	....	289	....	....	284	13	54	558	....
1902		26.2	21.5	1.3	2,031	1,667	258	430	....	21	3	....	30	4	5	34	....	....	287	....	....	279	25	65	564	....
1903		27.1	19.4	1.3	2,066	1,476	232	336	....	2	4	....	44	4	5	37	....	....	279	....	....	231	19	46	518	....
1904		27.4	21.6	1.0	2,089	1,642	249	408	....	8	1	1	27	6	8	27	....	....	352	....	....	275	39	75	563	....
1905		27.6	21.7	1.0	2,099	1,650	276	468	....	14	....	2	....	7	8	47	....	103	294	....	....	221	18	50	605	....
1906	76,122	27.5	20.2	1.7	2,094	1,535	279	406	....	....	....	4	14	11	5	92	....	66	261	81	62	177	20	54	593	....
1907		25.6	20.6	1.5	1,946	1,570	254	427	....	....	2	6	52	5	4	48	....	77	278	84	77	178	14	53	609	84
1908		27.3	22.3	1.9	2,084	1,700	281	472	....	13	6	6	13	9	16	79	....	62	245	93	59	233	12	53	651	83
1909		26.3	22.1	2.3	2,000	1,680	251	457	....	3	15	5	72	11	15	54	....	106	264	78	62	170	13	75	673	91
1910		25.8	19.3	0.9	1,965	1,469	189	489	....	....	2	3	7	11	13	34	....	71	233	75	73	165	25	50	630	77
1911		26.0	21.2	1.9	1,992	1,622	277	377	....	17	2	....	28	10	5	78	....	91	252	73	64	175	28	61	627	81
1912		24.8	19.1	0.7	1,903	1,464	204	412	....	6	5	....	11	6	6	18	....	69	231	71	66	166	16	58	560	58
1913		24.2	21.5	1.9	1,853	1,645	253	424	....	16	4	2	....	3	6	114	....	110	202	79	95	300	14	57	643	60
1914		24.3	19.9	2.1	1,897	1,551	226	367	....	9	9	1	64	13	4	67	....	85	231	79	74	242	15	48	581	60
1915		23.1	20.7	1.5	1,778	1,584	235	418	....	14	12	....	22	14	5	49	....	152	211	72	66	255	13	50	590	79
1916		22.6	18.2	1.0	1,732	1,394	182	387	....	6	6	1	11	9	6	35	....	97	189	69	66	132	14	31	564	51
1917		20.2	17.5	0.8	1,552	1,340	169	395	....	....	1	1	14	3	3	34	....	74	202	78	62	127	24	40	51	60
1918	76,673	20.8	20.5	2.2	1,599	1,570	189	326	....	88	1	1	27	6	8	40	....	247	187	75	61	111	20	29	596	43
1919		23.8	20.2	1.1	1,825	1,551	183	414	....	1	2	3	7	32	1	40	....	248	156	68	69	167	19	26	564	50
1920		28.3	17.5	1.9	2,169	1,341	173	355	....	2	5	....	40	60	13	22	....	69	159	46	86	159	30	32	574	59
1921		24.6	15.4	1.4	1,887	1,181	144	313	....	....	..	1	1	56	4	1	....	40	126	34	75	81	71	82	482	59
1922		24.2	18.0	1.06	1,853	1,383	173	392	....	38	....	....	....	42	2	....	37	128	176	39	70	127	39	28	571	67
1923		26.2	14.0	0.7	2,007	1,071	133	332	....	....	....	1	....	23	1	24	4	55	130	32	84	79	28	38	446	42
1924		25.5	17.8	1.4	1,990	1,386	175	396	....	....	....	....	81	12	2	10	25	146	164	32	94	133	18	29	568	40
1925		23.8	15.5	0.8	1,827	1,185	136	397	....	....	2	....	2	6	5	45	8	60	134	31	92	108	25	38	457	32
1926		21.5	17.3	2.4	1,687	1,359	220	361	....	75	6	1	32	18	2	53	13	116	126	46	82	100	25	27	501	37
1927		21.7	14.7	0.5	1,101	1,152	148	343	....	1	6	....	....	9	2	24	17	63	129	35	78	104	28	27	449	52
1928		21.7	15.0	0.8	1,767	1,179	135	398	....	....	4	....	8	22	2	28	17	80	109	29	101	178	27	34	459	34
1929		20.9	16.7	1.4	1,816	1,308	156	404	....	15	3	1	30	33	1	25	12	81	141	17	92	93	26	44	552	42
1930	78,490	25.4	16.1	1.8	1,998	1,264	155	399	....	22	8	....	5	64	....	37	5	88	117	25	96	118	22	36	584	25
1931		24.4	16.2	0.5	1,921	1,275	138	388	....	....	....	....	5	24	1	34	*34	96	124	46	107	110	26	24	515	33
1932		23.0	15.8	0.7	1,819	1,239	163	400	....	1	1	....	18	17	1	46	11	82	111	43	98	125	27	40	607	18
1933		23.7	14.9	0.8	1,852	1,168	165	367	....	1	1	....	3	14	‡2	45	20	60	106	19	104	165	22	43	557	22
1934		24.4	14.7	1.0	1,922	1,151	139	403	....	3	2	....	16	25	....	36	6	61	107	21	111	148	21	43	542	13
1935		24,8	14.8	0.9	1,945	1,158	162	386	....	11	....	....	1	7	....	56	5	29	115	29	133	155	24	29	552	19
1936	80,713	23.8	14.7	0.9	1,921	1,188	154	404	....	7	7	....	5	8	....	41	6	35	85	20	121	186	32	49	628	10
1937		22.5	17.4	1.2	1,818	1,403	187	493	....	10	10	....	12	17	....	52	55	36	96	24	117	248	44	47	706	18

* Including 23 from Influenzal Pneumonia.

‡ Both were resident in Mental Hospital (outside City area) for several years.

Table 10.—Showing the number of deaths from the principal epidemic diseases during the past ten years.

Year	Small Pox	Typhus Fever	Typhoid Fever	Simple Contd. Fever	Scarlatina	Puerperal Fever	Membraneous Croup	Diphtheria	Measles	Diarrhoea	Whooping Cough
1928	—	—	2	—	4	3	1	21	—	26	8
1929	—	1	1	—	3	—	1	32	12	24	30
1930	—	—	—	—	6	1	1	64	26	31	4
1931	—	—	1•	—	—	1	—	24	—	34	5
1932	—	—	1•	—	1	1	—	17	1	46	18
1933	—	—	2†	—	—	2	—	14	1	45	3
1934	—	—	—	—	2	5	—	25	3	36	16
1935	—	—	—	—	—	1	—	7	11	56	1
1936	—	—	—	—	7	1	—	8	7	41	5
1937	—	—	—	—	10	—	—	17	10	52	12

• Infection in these cases was incurred outside the City area.

† Both these cases had been resident many years in the Mental Hospital (outside City area).

Uncertified Deaths. Ten uncertified deaths were recorded during the year as compared with nineteen in 1934.

The following table shows the number of uncertified deaths each year since 1920. (Figures compiled from Annual Report of Registrar-General) :—

1920	....	59	1929	....	49
1921	....	59	1930	....	25
1922	....	67	1931	....	33
1923	....	42	1932	....	18
1924	....	40	1933	....	22
1925	....	32	1934	....	13
1926	....	37	1935	....	19
1927	....	52	1936	....	11
1928	....	34	1937	....	18

Deaths from Violence. In the 24 recorded instances the cause of death was as follows :—

Falls	....	....	....	7
Motor Car Accidents		....	....	6
Suicide	....	....	....	2
Bicycle Accidents		....	....	2
Drowning	....	....	....	4
Miscellaneous	....	....	....	3

Table 13.—INFANT DEATH RATE.

Year	Births	Deaths under 1 year	Deaths per 1000 Births	Year	Births	Deaths under 1 year	Deaths per 1000 Births
1881	2167	271	124	1910	1965	189	96
1882	2212	283	127	1911	1992	277	139
1883	2161	236	109	1912	1903	204	107
1884	2199	253	110	1913	1853	253	136
1885	2054	247	120	1914	1897	226	119
1886	2037	225	110	1915	1778	235	132
1887	2042	252	123	1916	1732	182	105
1888	2058	288	139	1917	1552	169	108
1889	2023	253	125	1918	1559	189	118
1890	2005	214	106	1919	1825	183	100
1891	2024	281	138	1920	2169	173	79
1892	1978	297	150	1921	1887	144	76
1893	2092	268	132	1922	1853	173	93
1894	2063	310	150	1923	2007	133	66
1895	2179	287	131	1924	1990	175	87
1896	2144	229	106	1925	1827	136	74
1897	2073	316	152	1926	1687	220	130
1898	2160	285	131	1927	1701	148	87
1899	2060	276	133	1928	1764	135	76
1900	1944	235	120	1929	1816	156	85
1901	1942	272	139	1930	1998	155	77
1902	2031	258	127	1931	1921	138	71
1903	2066	232	112	1932	1819	168	89
1904	2089	249	118	1933	1852	165	89
1905	2099	276	131	1934	1922	139	72
1906	2094	279	133	1935	1945	162	83
1907	1946	254	139	1936	1921	154	80
1908	2084	281	134	1937	1818	187	103
1909	2000	251	125				

Section III.—Infectious Diseases

The following diseases are compulsorily notifiable in this area :—

Small Pox	Measles
Cholera	Diarrhoea
Typhus	Acute Primary Pneumonia
Typhoid (Enteric Fever)	Acute Influenzal Pneumonia
Simple Continued Fever	Malaria
Scarlatina	Dysentry
Puerperal Fever	Encephalitis Lethargica
Diphtheria	Varicella
Membraneous Croup	Cerebro Spinal Meningitis
Erysipelas	Poliomyelitis

The Infectious Disease (Notification) Act, 1889, was by a resolution of the Corporation, dated 7th February, 1890, adopted in the County Borough.

The Act was subsequently made to apply to the following diseases :—

Name of Disease	Date of Resolution making Act applicable.	Period in force
Cerebro-Spinal Meningitis	13 July, 1900	Till 31st December, 1900
do.	22 February, 1907	Till revoked
Varicella or Chicken Pox	7 March, 1902	do.
Measles	26 May, 1905	do.
Diarrhoea	14 December, 1906	1 July, 1907, to 31 Oct., 1907
do.	12 February, 1909	1 July, 1909, until revoked
Poliomyelitis or Infantile Paralysis	10 November, 1916	Till revoked.

The Infectious Disease (Prevention) Act, 1890, was, by a resolution of the Corporation, dated 11th March, 1892, adopted and put into force in the County Borough.

The Public Health Acts Amendment Acts, 1907, was adopted and put into force by a resolution dated the 24th January, 1908, save as regards Sections 21, 24 to 33, 48, 66, 78 to 86, and 91 to 95.

The Public Health (Ireland) (Pneumonia, Malaria, Dysentry, etc.) Regulations, 1919 were revoked and are replaced by " The Public Health (Infectious Diseases) Regulations, 1929." Trench Fever, which was included in the 1919 Regulations, has been withdrawn in the new order.

The following Table shows the number of cases of Infectious disease notified each year for the past ten years.

Table 14.—Prevalence of Infectious Disease over a period of ten years, 1928–1937.

Disease	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
Small Pox	–	–	–	–	–	–	–	–	–	–
Typhus	1	1	–	–	–	–	–	–	–	–
S. Continued Fever	–	–	1	–	–	–	–	–	–	–
Scarlatina	208	216	238	98	81	181	118	52	437	454
Puerperal Fever	7	6	6	1	9	11	13	11	12	6
Memb. Croup	15	4	5	1	1	–	–	1	1	–
Diphtheria	385	369	588*	288	85	109	109	56	24	80
Erysipelas	24	24	38	19	13	24	28	24	18	26
Measles	6	226	241	3	242	49	126	300	233	88
Diarrhoea	79	78	59	85	178	189	80	178	261	246
Acute Primary Pneumonia	12	7	3	49	28	3	2	5	14	21
Acute Influenzal Pneumonia	–	–	–	41	7	2	1	2	14	45
Varicella	64	80	72	71	99	79	158	53	69	218
Encephalitis Lethargica	–	2	1	1	1	1	–	–	–	–
Cerebro-Spinal Meningitis	1	–	–	1	–	–	–	–	3	3
Poliomyelitis	–	–	–	–	1	–	–	–	–	1
Typhoid Fever	17	6	–	1	1	2	1	3	2	1

* In addition to the 588 cases of Diphtheria notified during 1930, there were 36 cases of Diphtheria and Scarlatina, two cases of Diphtheria and Measles, and one case which was notified as "Diphtheria, Scarlatina and Measles." To the 369 cases notified in 1929, must be added three cases of Scarlatina and Diphtheria, and two cases of Diphtheria and Measles.

The total number of notifications received was 1,217 (as compared with 1,094 in 1936). Reference to the above table shows that the principal increase was in respect of varicella in which the numbers rose from 69 in the previous year to 218 in 1937. There was a pronounced decrease in the number of cases of measles and, also, a definite increase in diphtheria.

DIPHTHERIA.

There has been a regrettable increase in the number of cases of this disease (80 as compared with 25 in the previous year). It is not possible to account definitely for the cause of this increase but I would like to refer to one very suggestive factor, which I have alluded to more than once, the relationship between the number of children treated at our immunisation clinic and the number of cases of diphtheria notified. It has been found repeatedly that when the former figure was high the latter was low. This was noticable in the years 1931 and 1933 and especially in 1936 when the attendances at the clinic reached very high figures and the number of notifications was exceptionally low. In 1937 the attendances at the clinic were very low indeed for the first half of the year and it was only during the second half that they really reached satisfactory proportions and that, apparently, only as the result of short, sharp outbreaks of the disease (involving the deaths of some children) in two localities in the City. It is really deplorable that the great bulk of parents do not seem to trouble about protecting their children until they have been scared into doing so.

It seems now that the inevitable result of this policy of *laissez faire* is that we must expect periodic increase and decline in the incidence of diphtheria; for when the disease is rife, parents will bring their children for treatment in large numbers, a good herd immunity becomes established, the disease declines and once more the attendances at the immunisation clinics fall. The proportion of susceptible children then increases and once more the disease makes its appearance. No doubt the position in this City has greatly improved if we compare the incidence of the disease with that of the bad years from 1919 to 1930 but there is still one very disquieting feature to stress—the virulence of the disease when it does occur. Seventeen deaths occurred in the past year out of a total of 80 cases (a fatality rate of 21.2 per cent). This is an abnormaly high *proportion*. One wonders if parents realise that in the event of one of their children contracting diphtheria, his chance of recovery is only little over 1 in 4. That the type of diphtheria prevalent in this area is of an exceptionally virulent character has been proved, firstly by the high fatality rate and secondly by the fact that in those instances in which the necessary bacteriological examinations were made the *gravis* type of bacillus has been invariably demonstrated.

In considering this matter of the high fatality rate of diphtheria in this area there is, however, another factor which must be taken into consideration. I refer now to the delay which occurs in many cases in seeking medical advice. That this is a definite contributory factor to the high fatality rate has been established by enquiries made in connection with the cases. In four instances it was stated that the children had been ill for only *one day* before death and in three others for only *two days*. It can scarcely be held that diphtheria (even if untreated) will kill as rapidly as this; we have therefore in these figures prima facie evidence that there has been prolonged delay in securing medical advice and it is reasonable to suppose that if treatment had been initiated sufficiently early these lives would have been saved. In one case there was a history of seven days illness and in another of four days illness before a doctor was called in, in which instances, of course, the chances of recovery were very remote. We have therefore a group of nine deaths concerning which there is little or no doubt that the disease was not recognised sufficiently early for effective treatment to be applied and if it be deducted from the total of seventeen deaths we begin to get a fatality rate, still high, but within reasonable bounds.

Year after year I have had to emphasize the folly of neglecting to take precautions against this disease, the folly of neglecting to call in medical advice when children fall ill and the folly of neglecting to protect children against it. In four instances the parents of children who died during the past year had definitely refused to have them immunised and, in view of the general knowledge of the method, it may be said that there is scarcely a parent in this city who is not well aware of the facilities provided for protection against diphtheria. In view of this fact it is really deplorable to have to record each year the toll of death from the disease. So far as the local authority is concerned, every facility is at the disposal of parents and, if not availed of, the blame must rest on their shoulders for these needless deaths. In the following table the cases and deaths are analysed according to age groups.

Table 15.—Analysis of cases and deaths.

Age Groups	CASES		DEATHS	
	Number	Proportion to Total	Number	Proportion to Total
0–2 years	3	3.8 per cent.	2	11.3 per cent.
2–4 „	10	12.5 „	3	17.9 „
4–6 „	16	20.0 „	5	29.6 „
6–8 „	14	17.6 „	2	11.3 „
8–10 „	13	16.2 „	3	17.9 „
10–15 „	15	18.7 „	1	6.0 „
15 and over	9	11.2 „	1	6.0 „
Total	80	100.0 per cent.	17	100.0 per cent.

The proportion of cases under two years is considerably less than the previous year (eight out of twenty-five) on the other hand the proportion at the other end of the scale is increased. In 1936 there were no cases over 15 years and all the age-groups over 6 years show a definite increase in their ratio to the whole. The largest proportion of deaths occurred in the 4–6 group (29.6 per cent.) but there is an unusually large number recorded for the later age-groups. In one instance the diseased person was a woman aged 34 years. This is the oldest age, in my experience, in which a death from diphtheria has been recorded and it represents a tragedy of delayed treatment. The woman left Cork in early July to visit relatives in County Limerick and complained of sore throat on the day after her arrival but made nothing of it. Unfortunately, specific treatment was not available until the fifth day after the commencement of her illness and it was then too late to be effective. There was an antecedent history of contact with definite cases of diphtheria in a neighbour's house before she left the city. The large proportion of deaths which were recorded in last year's report as occurring under two years of age led us to commence immunisation at an earlier age. Up to that time we did not recommend it earlier than two years, now we administer it at eighteen months. Whether this has had any influence in reducing the deaths in this group during 1937 it is not possible to say, but it will be of interest to study this feature in future years.

The increase in the *number* of recorded cases of diphtheria in 1937 probably has some relationship to the universal increase in this disease during the same period recorded by the statistical department of the Health Section of the League of Nations and is probably a manifestation of the well-known tendency to cyclical increase of this disease every six or seven years. Whatever it be it serves as a warning that there can be no relaxation in the efforts to combat it. Of all the measures adopted to this end it may be fairly said that immunisation has proved the most effective. It is a great pity, therefore, that it has not been more widely availed of.

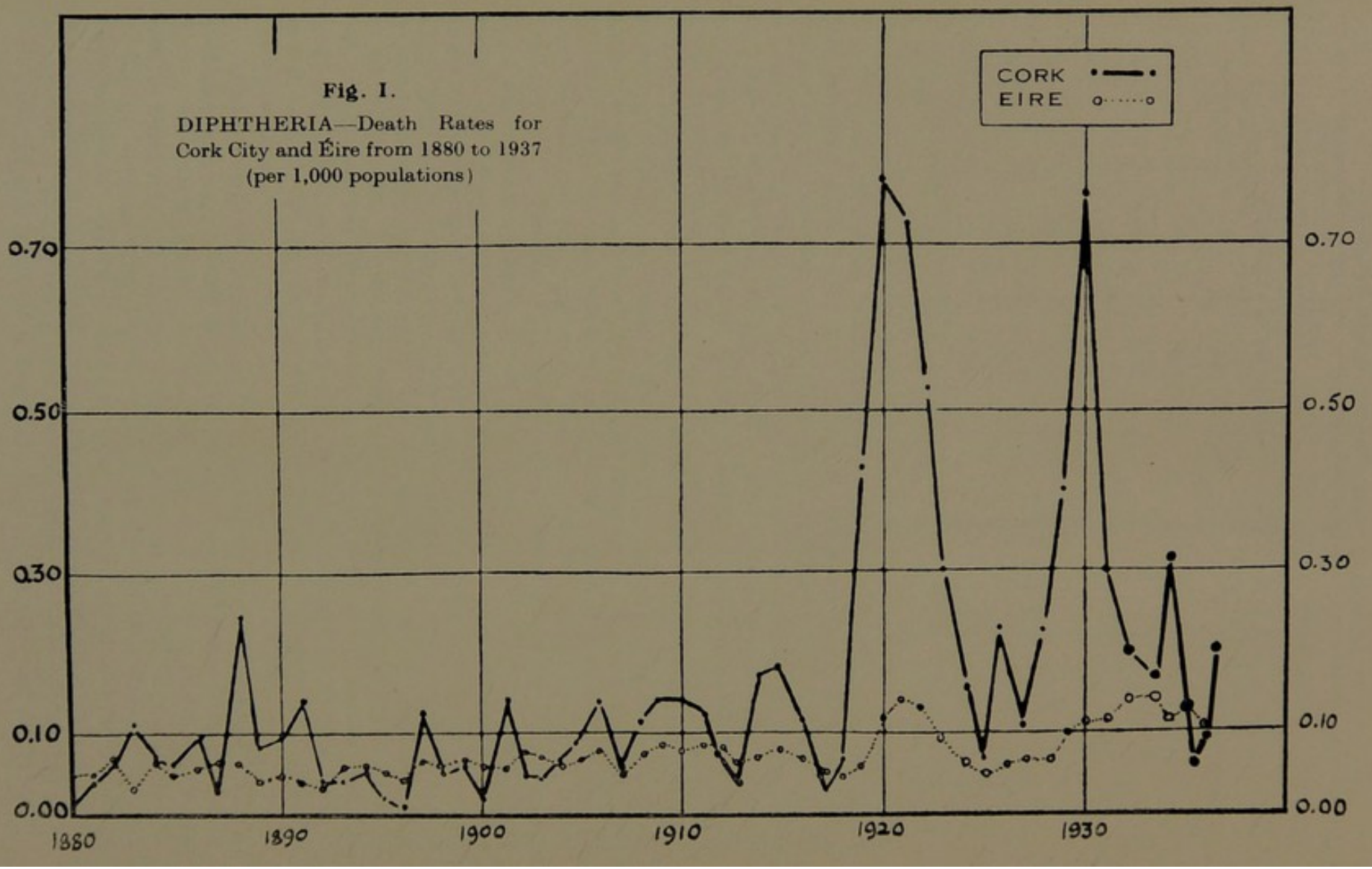


Fig. I.

DIPHTHERIA—Death Rates for Cork City and Éire from 1880 to 1937 (per 1,000 populations)

Table 16.—Incidence and Case Fatality of Diphtheria from 1890 to 1937.

Year	Cases	Rate per 1000	Deaths	Fatality Rate
1890	20	0.2	8	40.00
1891	37	0.49	11	29.97
1892	11	0.14	3	27.27
1893	18	0.23	3	16.66
1894	14	0.18	4	28.57
1895	6	0.07	2	33.33
1896	7	0.09	1	14.28
1897	21	0.27	10	47.61
1898	18	0.23	4	22.22
1899	18	0.23	5	27.77
1900	23	0.30	2	0.86
1901	26	0.34	11	42.30
1902	8	0.10	4	50.00
1903	17	0.22	4	17.53
1904	29	0.38	6	20.60
1905	18	0.23	6	33.33
1906	37	0.48	11	29.73
1907	37	0.48	5	13.51
1908	40	0.56	9	22.50
1909	66	0.86	11	16.66
1910	51	0.65	11	19.29
1911	70	0.91	10	14.28
1912	52	0.67	6	11.54
1913	24	0.31	3	12.50
1914	54	0.70	13	24.07
1915	68	0.88	14	20.59
1916	43	0.55	9	20.93
1917	26	0.33	3	11.53
1918	34	0.43	6	17.64
1919	262	3.37	32	12.21
1920	428	5.50	60	14.02
1921	541	6.93	56	10.37
1922	379	4.86	42	11.08
1923	440	5.68	23	5.18
1924	217	2.85	12	5.40
1925	265	3.50	6	2.19
1926	469	6.10	18	3.75
1927	344	4.55	9	2.52
1928	385	6.37	19	4.75
1929	369	4.81	32	8.46
1930	627	7.86	59	10.00
1931	288	3.66	24	8.61
1932	85	1.08	17	20.00
1933	109	1.32	14	12.83
1934	109	1.32	25	22.10
1935	56	0.71	7	12.50
1936	25	0.31	8	32.00
1937	80	0.99	17*	21.20

Note:—The Infectious Disease (Notification) Act, 1899, was adopted on 7th February, 1890.

* Includes *two* deaths of cases notified in 1936. Omitting these, the fatality rate would be 18.7.

The incidence (per 1,000 of population) and the case-fatality rates of diphtheria from 1890 to the present year are set out in Table 16. The incidence is represented graphically in Figure II from 1915 to 1937. The epidemic nature of the disease from 1919 onwards becomes strikingly apparent as does the decline which followed the introduction of immunisation in 1929. In Figure I the *mortality* (i.e., the number of deaths per 1,000 of population) is graphically compared with that for the country generally.

In a large proportion of cases the reports received transpired not to be diphtheria. The actual number was 61 (approximately 43 per cent. of all notifications received). The age distribution of these cases was as follows :—

0–2 years	3	cases
2–4 ,,	10	,,
4–6 ,,	4	,,
6–8 ,,	7	,,
8–10 ,,	2	,,
10–15 ,,	13	,,
15–20 ,,	9	,,
Over 20 years	13	,,
Total	61	,,

DIPHTHERIA IMMUNISATION.

There was a falling-off in the number of attendances as compared with the previous year. The total number dealt with amounted to 1,337 (as compared with 2,221 in 1936), of whom 212 failed to complete the course of treatment. The diminution in attendances was particularly marked in the first half of the year but there was a great improvement in the latter half. Of the 960 children who received immunising injections and completed the full course, 705 were under five years of age. Of 266 children who were submitted to the *primary* Schick test, 165 were found to be negative.

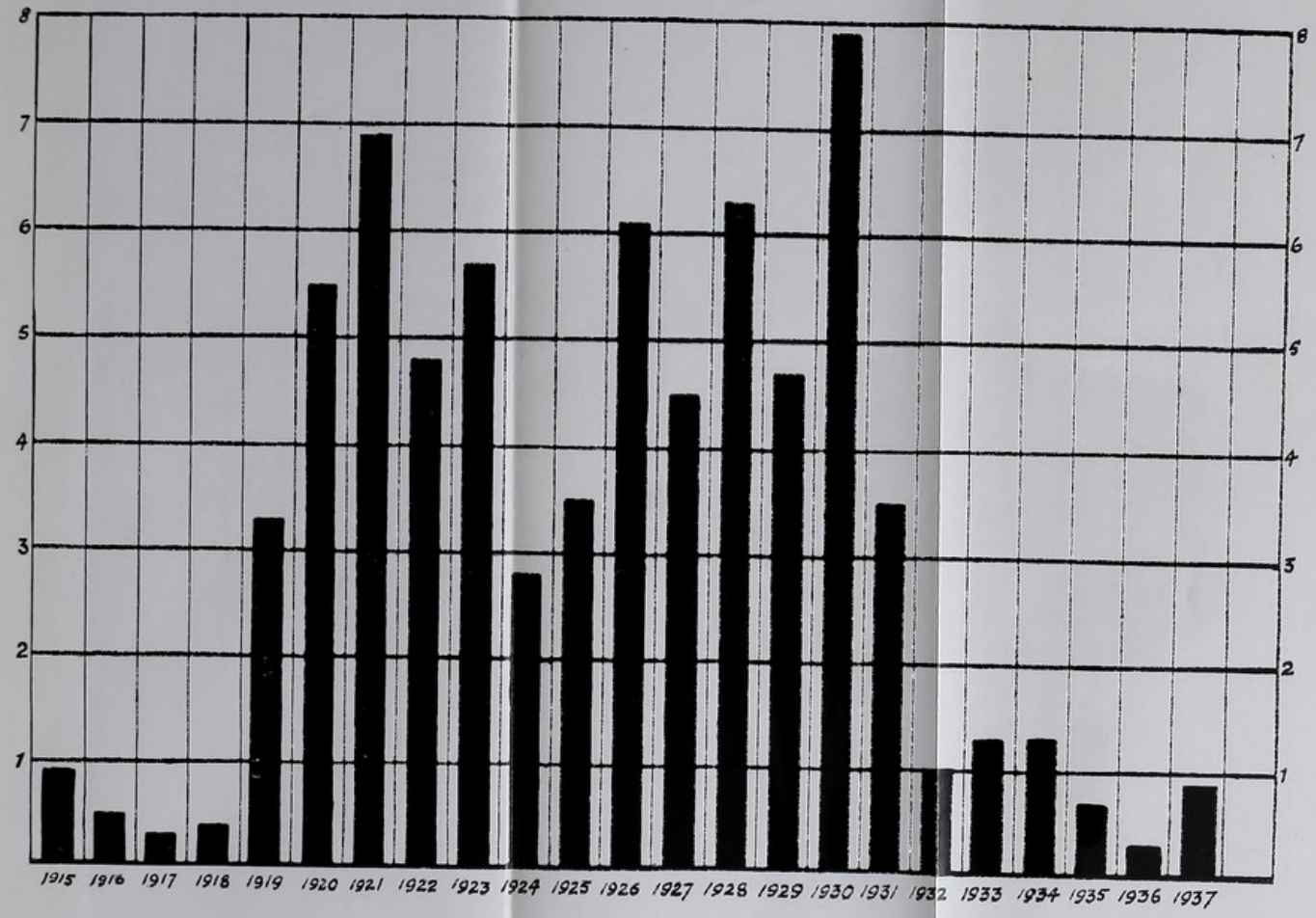
Table 17.—Attendance at Diphtheria Prevention Clinic 1929-1937.

Year	Primary Schick Negative	Completed Full Course	Total	Not Completed Course
1929	—	1,802	1,802	—
1930	154	2,857	3,011	505*
1931	324	1,777	2,101	436
1932	91	422	513	208
1933	159	592	751	61
1934	826	1,716	2,542	432
1935	173	1,118	1,291	8
1936	458	1,741	2,199	22
1937	165	960	1,125	212
Totals	2,350	12,985	15,335	1,884

* Includes figures for *both* 1929 *and* 1930.

FIG. II.

DIPHTHERIA CORK CITY. INCIDENCE PER 1,000 POPULATION FROM 1915.



The figures for primary Schick tests in this table do not, of course, represent the *total* number of such tests performed but merely the number that proved *negative*. They are stated here for the purpose of estimating the number of children who have passed through our hands and who may be regarded as presumably immune. The number of primary tests has been reduced to a minimum. It is now confined to children over seven years. The great bulk of our cases are now under this age, so that the necessity for the primary test is comparatively rare.

Table 18.—Primary Schick Tests performed during 1937.

Age Group	Number of Cases	Positive	Negative	Proportion Positive
0–5 years	1	—	1	—
5–10 ,,	155	68	87	43.8 per cent.
10 and over	110	33	77	33.0 ,,
Totals ...	266	101	165	37.9 per cent.

In the five year group only one child was submitted to the test. Of the other two the only significant variation in the proportion cases was in that of 10 years and over in which 33 per cent. were returned as positive (as compared with 15.5 per cent. in 1936 and analagous figures in previous years), but the number of cases in this group (110) is too small to draw any conclusions. In the table which follows the results of all primary tests since 1929 are analysed.

Table 19.—Primary Schick Tests, 1929–37. Analysis, showing proportion positive in each year.

Year	Number Tested	Positive	Negative	Proportion Positive
1929–30	1170	916	254	78.2 per cent.
1931	598	274	324	45.8 ,,
1932	301	210	91	69.7 ,,
1933	435	276	159	63.4 ,,
1934	1474	648	826	44.0 ,,
1935	309	136	173	44.0 ,,
1936	626	168	458	26.8 ,,
1937	266	101	165	38.0 ,,

Apart from record purposes this table is of little value as, obviously, the proportion of *positive* reactions will depend almost entirely on the age constitution of the groups of children tested and as this factor will fluctuate widely from year to year, so also will the results vary from one year to another. In this respect the next table is much more informative as the results in the different years have been analysed in accordance with the age groups of the children.

Table 20.—Primary Schick Tests, 1929–37. Analysis of proportion positive each year in different age groups.

Age Group	Proportion POSITIVE (expressed as percentages)							
	1929–30	1931	1932	1933	1934	1935	1936	1937
0–5 years	—	—	88.4	79.7	65.8	66.6	66.6	—
5–10 ,,	—	—	60.1	63.3	44.2	49.5	41.5	43.8
10 and over	—	—	37.7	28.9	27.5	30.3	15.5	33.0
Whole Group	78.2	45.8	69.7	63.4	44.0	44.0	25.2	37.9

This year, owing to the fact (already referred to) that only one child under five years was tested, no results can be adduced in this group. In the next group (155 cases) there is no significant variation and the remarks applied to the 10 and over group in regard to the smallness of the number of cases tested apply here also. The number tested is not such as to justify any observations.

The number of attendances in the different age groups is shewn in the following figures.

(1) Treatment Incomplete—		
0–5 years	157	
5–10 years	50	
10 and over	5	
	——	212
(2) Treatment Complete—		
0–5 years	705	
5–10 years	224	
10 and over	31	
	——	960
Total number treated		1,172
Number negative on Primary Schick Test....		165
Total		1,337

It will be noted that the number who failed to complete treatment is definitely increased. This was to be expected in view of the changed technique in which, instead of a single injection of 1 cubic centimeter of alum precipitated toxoid, two injections of 0.1 c.c. and 0.5 c.c. respectively were administered. This method was devised by Dr. Chesney of Poole and has been used very extensively and successfully by him and other workers. Dr. Chesney conceived the idea that this method would fulfil a double function, the first small injection would act as a primary stimulus whereby on administering some weeks later a second moderately small injection a greatly enhanced effect is produced. This has been proved to be so. In addition, the first small dose also

picks out those children who are sensitive to toxoid and likely to react severely to a larger dose. For this reason he called it the "detector" dose and any children reacting to it receive their second injection with a different material (preferably floccules). A very high degree of protection has been achieved by Dr. Chesney by this method and his findings have been amply confirmed by ours as shown in the next table. 98.6 per cent. of the children tested were negative. This is practically identical with the figures obtained by us in 1936 and 1935 when using the single-dose method. The question therefore arises as to why one should use two doses when one dose produces equally good results. The answer to this is that there is some evidence that the two-dose method induces immunity of a more durable character. Speaking personally, I cannot say that I am altogether convinced that this evidence is absolutely complete, based as it is on laboratory estimations of antitoxin content of human and animal bloods. To my mind the real test is in the protection of the individuals against clinical diphtheria which only experience in the field will prove.

There is a further advantage to be claimed for the two-dose method in that the total amount administered in any injection is considerably less than that used in the single dose and consequently any reactions which may arise are correspondingly lighter in character. This, however, is offset by the necessity of *two* injections and, although we do not record a very great number of defaulters, still they are an appreciable proportion whereas with the single dose method, in the natural order of events, defaulters are a negative quantity and the maximum amount of prophylactic is administered at the first visit. The majority of people resent subcutaneous medication and a very strong case will have to be put up before multiple injections will supplant the single dose, especially where large masses of children are concerned.

Table 21.—Secondary Schick Tests, 1930–1937.

Year	Total	Negative	Positive	Proportion **Negative**
1930	805	752	53	94.6 per cent.
1931	1166	991	175	85.2 ,,
1932	913	858	55	92.8 ,,
1933	893	801	92	89.0 ,,
1934	1105	1058	47	95.7 ,,
1935	1405	1388	17	98.8 ,,
1936	1272	1259	13	98.9 ,,
1937	732	722	10	98.6 ,,
Totals	8291	7829	462	94.5 per cent.

Type of Prophylactic.

From the foregoing it will be inferred that the principal prophylactic used was alum precipitated toxoid (A.P.T.) Toxoid antitoxin floccules (T.A.F.) was used for children who yielded a positive Moloney reaction and to those who reacted to the detector dose.

SCARLET FEVER.

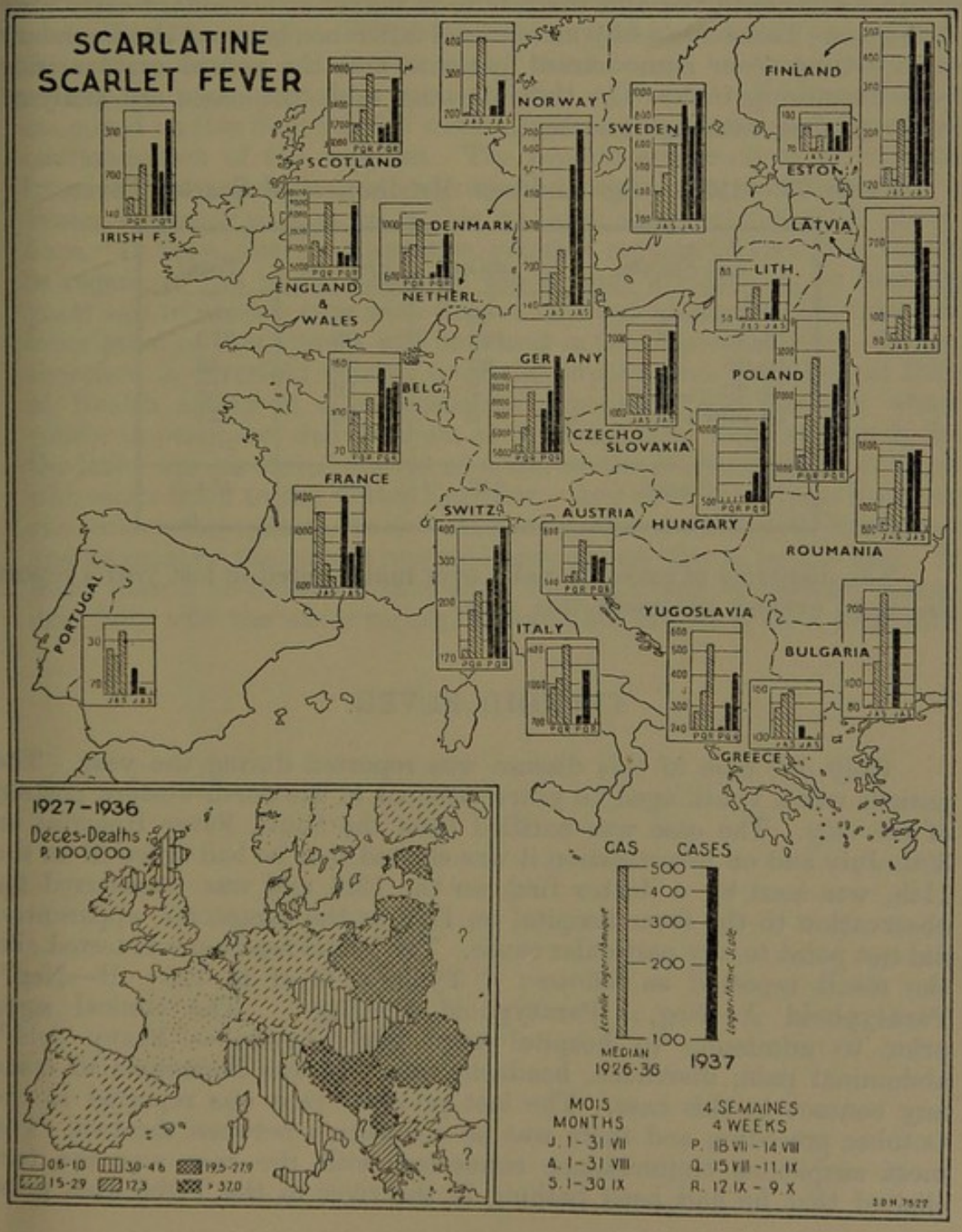
This disease continued in epidemic proportions throughout the year. 454 cases were notified—a slight increase in the number in 1936, when 437 were reported. As recorded in last years report this epidemic made its appearance in the last weeks of July, 1936, and reached its maximum intensity in the following September after which, with the exception of a few minor peaks, it abated considerably. During 1937 the incidence was more uniform, the number of cases reported in the first quarter was 121, in the second 121, there was a reduced incidence in the third quarter when 83 cases occurred and in the last quarter of the year the notifications rose to the figure of 129. The maximum incidence occurred during the week ended 3rd April, when nineteen cases were reported. There has been a slight increase in the fatality rate. Ten deaths were recorded, equivalent to a rate of 2.2 per cent. Although somewhat higher than recent years the fatality rate remains low as compared with former times when rates over 30 per cent. were reached. A rather unusual feature of these deaths is that they include two adults, both females, one aged 31 and the other 39 years. In one case the scarlet fever was complicated by diphtheria. The following table, which first appeared in last year's report is reproduced and is of interest in showing epidemics of past years with associated fatality rates. It shows well the very marked decline in virulence which has characterised the disease in the past fifty years.

Table 22.—Incidence and Case Fatality in Scarlet Fever *Epidemics* in Cork City.

Year	No. of Cases	No. of Deaths	Fatality Rate
1879	386	65	16.8 per cent
1880	616	202	32.7 ,,
1881	103	30	29.1 ,,
1884	158	27	17.2 ,,
1885	143	48	33.2 ,,
1894	304	15	4.9 ,,
1900	401	22	5.5 ,,
1901	288	17	5.9 ,,
1914	230	9	3.9 ,,
1915	245	12	4.9 ,,
1916	112	6	5.3 ,,
1926	278	6	2.1 ,,
1927	205	6	2.8 ,,
1928	208	4	1.9 ,,
1929	216	3	1.4 ,,
1930	238	8	3.3 ,,
1933	181	1	0.5 ,,
1934	118	2	1.5 ,,
1936	437	7	1.6 ,,
1937	454	10	2.2 ,,

It has been impossible to trace any one or more specific factors responsible for the epidemic prevalence of scarlet fever. All the usual channels have been explored, food, milk, water, movements of patients and so on without obtaining positive results. To account for such epidemic rises two theories have been advanced. One assumes that

there is a periodic cyclic increase in the virulence of the organism whereby it acquires an increased invasiveness so that large numbers of people who in ordinary circumstances would be resistant to it are no longer so and develop the disease. The other presupposes an alteration in the "epidemic constitution" of the populace whereby it becomes more susceptible to the presence of the causative microbe. Whatever be the real explanation there is no doubt that there has been a general and widespread increase in scarlet fever and that this city is no exception. This is shown very clearly in the following diagram (reproduced from the Weekly Epidemiological Record, Health Section of the League of Nations, 28/10/1937).



It will be seen that throughout Europe there has been a very marked increase in which practically all countries have participated. The figures are in excess of the median (or expected numbers) in the Scandinavian countries, Poland, Roumania, Germany, Austria, France and Ireland. The logarithmic scale has been used so as to bring out the proportional variation of cases reported, since the absolute figures vary widely from one country to another. Equal heights of the bar correspond to equal percentages of increase. The inset map shows the mean death rate from scarlet fever based on deaths recorded during the period 1927–36. The rates are based per 100,000 population.

The policy adopted in 1936 of encouraging home treatment where possible was continued and the results in regard to secondary cases were analogous. There was really no material difference between the secondary cases arising from home-nursed patients and the return cases arising from hospital patients. In the following table the cases are analysed in accordance with age and sex.

Table 23.—1937.—Age and sex distribution of Scarlet Fever.

Age Group	Males	Females	Total
0–5 years	89	73	162
5–10 ,, ...	120	93	213
10–15 ,, ...	22	24	46
15–20 ,, ...	2	10	12
20 and over	5	16	21
Total	238	260	454

The disparity of excess females over males noted in last year's report has been evened out more this year.

TYPHOID FEVER.

Only one case of this disease was reported during the year. The patient was a youth aged 16 years, resident in the north-western portion of the city. The case was notified from the South Fever Hospital on 30th July and on investigation it was elicited that he had fallen ill on the 11th, was seen by a doctor first on the 13th and was transferred for observation to the fever hospital on 17th as the symptoms, apparently, did not point to any particular cause. The Widal reaction was tested and the result reported as follows: "Typhous O—1 in 125; H—Neg.; Paratyphoid A—Neg.; Paratyphoid B—Neg." The clinical signs prior to admission to hospital were fairly typical—"heavy cold" abdominal pain, diarrhoea, headache, etc. It was impossible to trace any contact in this case. The last previous case was reported in the October preceding and there was no connection between the two. The most suspicious circumstance connected with the case was the fact elicited that he had been bathing in the river in the Tivoli area prior

to the attack. As the river receives the sewage of the whole city and the immediate rural area this seems to have been the most likely source of infection and in view of the danger to be apprehended from this practice a public warning was issued in the press. There were no secondary cases, the patient eventually made a complete recovery and was discharged from hospital after two negative results from bacteriological examination of the urine and faeces.

In the next table is set out statistical information in relation to typhoid fever which shews the reduction which has been maintained over the past nine years. Our experience in this respect, in conjunction with occurrences in other areas within recent years emphasizes the prime importance of water in the spread of typhoid and the necessity for fully controlling the supply. The measures adopted in this area are set out in the section dealing with water and I think it will be agreed that every reasonable precaution has been adopted. The fact that samples are examined on five days in each week affords ample warning of any possible contamination of the supplies. The reports are received at this office from the bacteriological laboratory and copies are transmitted to the Water Engineer so that he is able to check the working of his plant at once. In turn, the Engineer also supplies reports of the daily findings in regard to the plant, based on the system worked out by him some years ago in conjunction with the bacteriological reports (an interesting description of this system will be found in the Water Section). There is, therefore, a threefold control over the supply with the Medical Officer of Health acting in a co-ordinating capacity. The Sanitary Officers collect the samples, deliver them at the laboratory and the reports from the latter are (as stated above) received by the Medical Officer of Health, who sends them to the Water Engineer. Any deviations from the normal can, under this system, be detected at once and dealt with immediately and in practice the results reported have shewn this to be the case. It is more than a co-incidence that since the time that steps were taken to deal fully with the water supply, typhoid has ceased to be a problem.

Table 24.—Incidence and Case Fatality of Enteric Fever in Cork City from 1881 to 1937.

Year	Cases	Incidence per 1,000	Deaths	Fatality Rate
1881	66	0.82	4	6.5
1882	37	0.46	4	10.8
1883	45	0.56	11	24.4
1884	48	0.61	13	27.0
1885	43	0.55	9	20.9
1886	180	2.57	42	23.3
1887	100	1.30	20	20.0
1888	66	0.86	9	13.6
1889	37	0.48	9	24.3
1890	113	1.50	12	10.6
1891	165	2.33	17	10.3
1892	104	1.37	17	18.3
1893	78	1.03	14	17.9
1894	43	0.57	13	30.2
1895	132	1.74	16	12.1
1896	14	1.00	24	25.5
1897	51	0.70	9	17.6
1898	62	0.81	13	20.9
1899	47	0.62	8	17.0
1900	50	0.70	5	10.0
1901	51	0.67	5	9.8
1902	49	0.64	5	10.2
1903	27	0.35	5	18.5
1904	50	0.64	8	16.0
1905	58	0.76	8	13.8
1906	48	0.66	5	10.4
1907	44	0.57	4	9.1
1908	88	1.02	16	18.2
1909	74	0.95	15	20.2
1910	54	0.70	13	24.0
1911	32	0.41	5	15.6
1912	26	0.33	6	23.0
1913	29	0.38	6	20.7
1914	50	0.64	4	8.0
1915	32	0.41	5	15.6
1916	42	0.54	6	14.3
1917	43	0.55	3	6.9
1918	42	0.54	8	19.0
1919	12	0.15	1	8.3
1920	244	3.13	13	5.3
1921	21	0.26	4	19.0
1922	6	0.07	2	33.3
1923	7	0.09	1	14.2
1924	11	0.14	2	18.1
1925	27	0.34	5	18.5
1926	11	0.14	2	18.2
1927	10	0.12	2	20.0
1928	17	0.21	2	11.7
1929	6	0.08	1	16.6
1930	0	....	....	....
1931	1 (a)	0.01	1	100.0
1932	1 (a)	0.01	1	100.0
1933	2 (a)	0.02	....	(b)
1934	1	0.01	....	....
1935	3	0.03	....	....
1936	2	0.02	....	....
1937	1	0.01	....	....

(a) Infection in all these cases was incurred outside the City.
(b) Two deaths were recorded in Cork Mental Hospital (Co. Area) of inmates who formerly resided in the City.

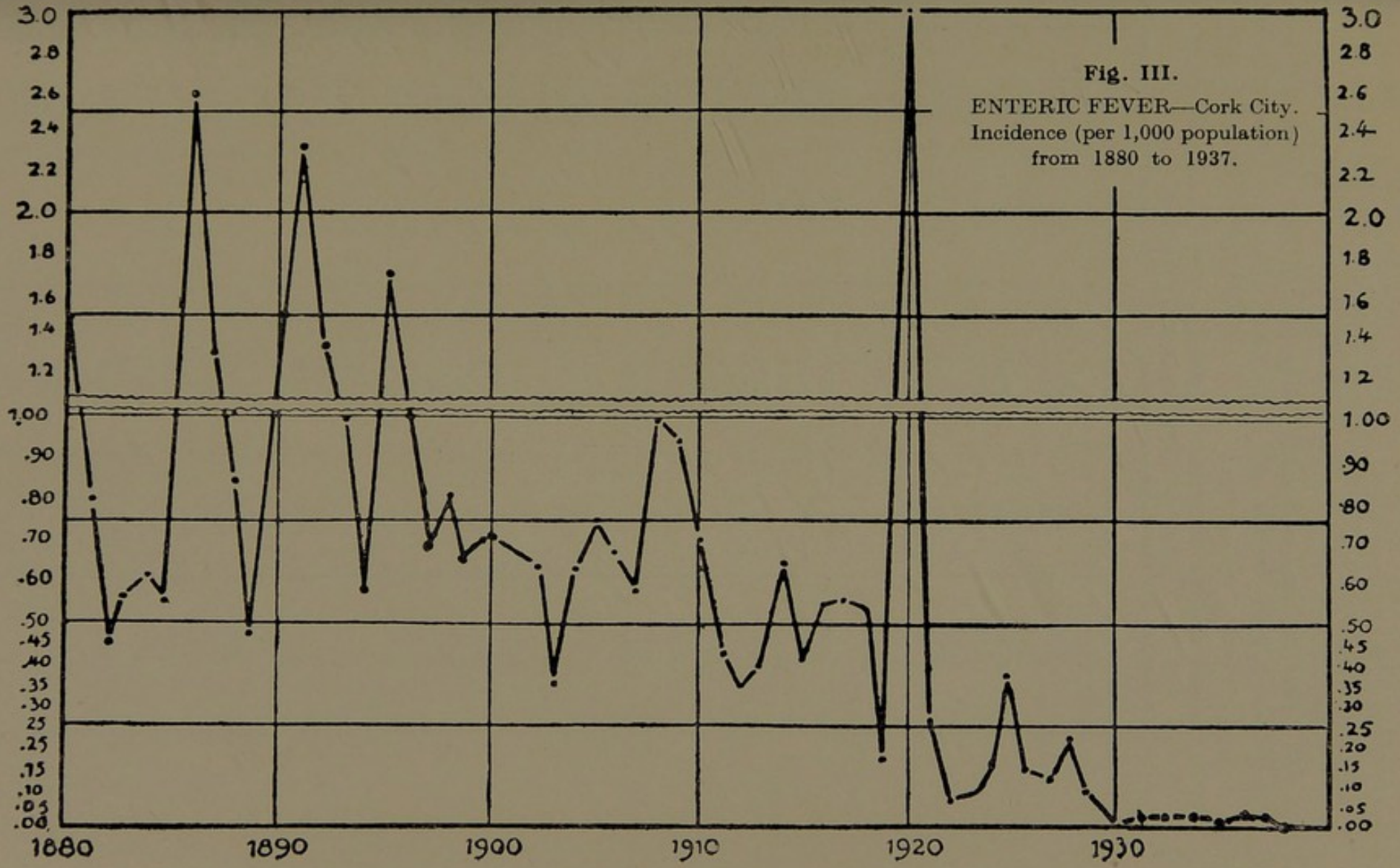


Fig. III.

ENTERIC FEVER—Cork City.
Incidence (per 1,000 population)
from 1880 to 1937.

TYPHUS.

For the eighth year in succession there has been no case. As a matter of interest the table relative to this disease, first published in 1935, is reproduced in this report.

Table 25.—Incidence and Case Fatality of Typhus Fever in Cork City from 1881 to 1937.

Year	Cases	Incidence per 1,000	Deaths	Fatality Rate
1881	1406	17.42	88	6.2
1882	683	8.57	54	7.9
1883	844	10.66	46	5.4
1884	456	5.65	37	8.1
1885	159	2.03	21	3.2
1886	83	1.06	17	18.0
1887	67	0.86	12	17.9
1888	72	0.93	21	27.7
1889	48	0.63	5	10.4
1890	54	0.71	7	12.9
1891	24	0.30	5	20.8
1892	162	2.28	23	14.1
1893	92	1.20	7	7.6
1894	25	0.33	2	8.0
1895	29	0.38	8	31.0
1896	22	0.29	7	31.8
1897	30	0.39	3	10.0
1898	61	0.80	11	18.0
1899	9	0.10	6	66.6
1900	28	0.36	4	14.3
1901	13	0.17	2	15.38
1902	6	0.07	....	....
1903	7	0.09	....	....
1904	11	0.14	1	9.1
1905	9	0.11	2	22.2
1906	6	0.07	4	66.6
1907	10	0.13	6	60.0
1908	23	0.30	....	26.1
1909	18	0.24	5	27.7
1910	8	0.10	3	37.5
1911	10	0.13	....	....
1912	1	0.01	....	....
1913	5	0.06	2	40.0
1914	1	0.01	1	100.0
1915	....	....	....	....
1916	1	0.01	1	100.0
1917	3	0.04	1	33.3
1918	1	0.01	1	100.0
1919	15	0.19	3	20.0
1920	2	0.03	....	....
1921	1	0.01	1	100.0
1922	....	....	....	....
1923	1	0.01	1	1 0.0
1924	1	0.01	....	....
1925	....	....	....	....
1926	3	0.04	1	33.3
1927	4	0.05	....	....
1928	1	0.01	....	....
1929	1	0.01	1	100.0

There has been no case since 1929.

Some interesting facts may be deduced from this table, the chief of which is, perhaps, that typhus obviously is a declining disease (if not actually a dead one) in this area. However much one would like to be convinced of the latter surmise it can scarcely be regarded as tenable. It is difficult, if not impossible, to advance any definite explanation for the disappearance of typhus. One would like to think that it is due to the disappearance of the intermediate host, the house, but unfortunately facts controvert any such assumption. Several theories may be advanced. One would relate to the improved housing conditions of the working classes. These are, of course, still far from ideal but there is no doubt that they must have been far worse as is evidenced on the one hand by the numbers of houses erected by the local authority in former years and, on the other, the large number of houses that were demolished and are now represented as open spaces in various parts of the city. Conditions must have been very bad indeed in the eighties, as is seen by reference to the table. Another explanation would rest on the theory of alteration in the "epidemic constitution" of the population already referred to and if it be the true one it is a matter of apprehension. Other factors appear to be necessary for the spread of typhus in epidemic proportions—on the Continent in recent times and in our own country in the forties it has been associated almost invariably with famine, warfare, unemployment and general social misery. In other words conditions which tend to bring about mass under-nourishment of the population. It would seem then that under normal conditions of food supply and adequate nourishment of the population typhus is unable to establish itself.

The question arises as to the possibility of typhus re-appearing in this city. It must be admitted that there is such a possibility given the conditions referred to above for it must be borne in mind that there are foci of infection still in the country from which cases might possibly be introduced. Such foci exist in the western parts of this county, they exist in the County of Kerry and in Galway and Mayo and generally along the western seaboard. It is significant that all these endemic areas are characterised by the unproductive nature of the soil and low economic standards producing conditions of under-nourishment in the inhabitants. While such conditions persist in any portion of the country we must always be on the alert in regard to the introduction of typhus to areas hitherto free and it is on this account that the paper which follows has been reproduced. It relates to a case, resident in the county area, which occurred in the practice of Dr. R. C. Cummins and, as there was a history of a visit, within the incubation period, to a city tenement, the case was also reported to this department. Through the courtesy of Dr. Cummins, his article (which appeared in the *Irish Journal of Medical Science*, January, 1938) is reproduced in full, together with comments on the epedemiological features of the case.

A CASE OF SPORADIC TYPHUS, WITH SOME NOTES ON THE DISEASE.*

Typhus appears to be a vanishing disease in Ireland. There were only 139 cases reported in Éire in the last ten years, and only three in 1935. There has been no case in Cork City for eight years, none in Cork County for four. It is, therefore, only after mature consideration and as careful investigation as was found possible that a solitary case, occurring and apparently originating in Cork City, is advanced as a case of typhus. Moreover, sporadic cases are more likely to be anomalous, both in their clinical and laboratory manifestations.

Fifty years ago epidemics of typhus were even more common than those of influenza. Its signs and symptoms would have been too familiar to the profession to place them on record. Most of our generation, however, have seldom seen typhus, and in another twenty years it may so far have passed out of medical recollection as to be described as a new disease, should it occur. This actually took place in New York when Brill's disease was first described as an unknown fever. A little later, however, some of the cases were examined by a Polish doctor of experience, who pronounced them as typhus.

Though typhus is enjoying a hard-earned rest in Ireland, after upwards of three centuries of unremitting warfare, its menace always remains. Where there is unemployment, starvation, misery, revolution, there typhus raises one of its numerous hydra heads. And the origin of its sudden reappearance in a community calls for patient investigation and anxious speculation.

During the years of the Russian terror and famine, to quote a recent incident, from 1917 to 1923, it was estimated by Tarassawitch that thirty million cases of typhus occurred in European Russia alone, and that three million died.

Conditions of famine could recur in Ireland.

Yet one other reason for recording these notes is to draw attention to the tremendous advances that have been made in our knowledge of typhus in the last twenty years.

The patient referred to in this memorandum was an architect, aged 54 years. Ten days exactly, before his illness commenced on July 29th, 1937, he visited a slum tenement building in Henry Street, Cork, in the course of his work. He spent a considerable time in the building, as he had to report on its condition.

Ten days later his illness commenced abruptly with a shivering attack, a sharp pain in his back, and a temperature of 100° F. It was regarded as a mild attack of influenza by Dr. O'Mahony, of Passage, his medical attendant. Two days later a further shivering fit occurred, and his temperature rose from 100° F. to 104° F. On the fourth day some spots appeared, which raised Dr. O'Mahony's suspicion. He was seen in consultation on the evening of the sixth day, when the following symptoms and signs were observed :—His appearance was noticeably dusky. His eyes were suffused, bloodshot, and he had a wild distraught appearance. His tongue was dry and covered with a thick brown fur.

A macular rash showing numerous papules, in certain areas coalescing, was present on the backs of the hands, limbs and trunk. It was absent from the face. It was most marked on the chest and back, where it had a dusky appearance and showed numerous scattered petechiae, resembling fleabites. A marked subcuticular mottling was present.

His manner was excited, and he had talked incessantly and rather incoherently, and plucked at the bedclothes continuously. He had assumed a dorsal decubitus. Temperature 120° F., pulse 100, of moderate tension.

A sample of blood was taken, and so definite was the impression formed that he was transferred at once to the North Fever Hospital, and his case was reported to both the County and the City authorities as one of typhus.

On the seventh day his temperature fell abruptly to normal. A pronounced and peculiar " mousy " smell was noticed for at least three days. The conjunctival congestion disappeared rapidly. The rash darkened and, with the subcuticular mottling, faded during this period. His tongue required a week to clean. Prostration appeared to be out of proportion to the shortness of the fever. Convalescence was uninterrupted, but slow.

His blood was again examined on the tenth day and on the twentieth day from the commencement of illness, by Dr. W. O'Donovan, and on the last occasion his

* Address to Cork Clinical Society, October 29th, 1937.

results were confirmed by independent examination by Major Boyd, R.A.M.C., Millbank. The results were :—

Agglutination	Weil-Felix Test	Paratyphoid B.	A.	Typhoid
6th day	O	1 in 250	O	O
10th and 20th day	1 in 25 & 1 in 50 (slightly)	1 in 250	O	O

The agglutination against Paratyphoid B. was at first regarded with suspicion, but the persistent low titre and absence of fluctuation indicated clearly that it could only have been associated with inoculation during the war, about 1916.

Dr. O'Donovan and several other specialists were unanimous that the negative Weil-Felix test did not exclude typhus. Prof. Wilson, of Belfast (who originated the test), kindly wrote, in reply to my letter : " If the clinical manifestations are those of typhus, do not allow a negative test to deter a positive diagnosis. The serum may agglutinate some other strain of B. proteus." (It had been tested against three).

Dr. O'Meara (of Burroughs Wellcome's Research Department) confirming, in addition stated that " the test was more reliable in endemic than sporadic cases."

Dr. MacCormack, L.G.B. expert, informed me that he had dealt with several sporadic cases with negative test, and also with an epidemic in which the first case was Weil-Felix negative, the seven cases which followed were all positive.

General MacArthur was most interested in the origin, and suggested that it had been carried by a rat flea from an infected rat.

A reconsideration of the clinical signs and symptoms, in view of these opinions, was necessary, and the importance of the case from the public health aspect more fully apprehended.

In every particular the signs just recorded were found to correspond with the classical description of Murchison, of a moderately severe case of typhus.

The abrupt onset from good health, the suffused eyes, the dusky, congested face, the appearance and distribution of the rash and the subcuticular mottling ; the parrot tongue, and the mousy smell not appearing until after the critical fall of the temperature, as is noted to be the case by Murchison ; the nervous symptoms, carphalogia, and mild delirium (one of the doctors who visited him in a white coat he thought to be a clown sent for his entertainment !) ; finally, the termination by crisis, and the prostration that followed.

This clinical syndrome is eloquent of typhus. No other fever presents an identical picture. It corresponds with, and is more marked than other epidemic cases observed by us in the past.

One is driven to the conclusion that it was a case of typhus, with a negative Weil-Felix test, and its origin became a matter of interested speculation.

A careful inspection of the patient's diary indicated that he had not been exposed to any risk of infection differing from the rest of the community, excepting the one visit, ten days before, which is coincident with the average incubation period of typhus. Dr. Saunders, Medical Officer of Health, investigated 10 Henry Street. He was unable to find any evidence of human contact, even though 40 individuals were under observation for three weeks. It may be mentioned that this slum area used to be a hot-bed of typhus, in the old epidemic days.

In the absence of evidence of human origin, the only alternative that remains is rat origin, and it becomes necessary in dealing with this supposition, to refer to the views on the origin of typhus and allied diseases, which recent research have disclosed.

In 1909 Nicolle connected the louse with typhus, and from this momentous observation the new era in typhus research commenced. It began with an intensive study of the louse. In parenthesis, it is amazing to observe, in the pages of Murchison, how close this great physician was, to deducing the louse connection.

As early as 1873, for instance, he advises hot baths for all patients on admission, disinfecting of their clothing, with carbolic acid, Condy's fluid or chloride of lime, and baking of their beddings on discharge. For attendants (*inter alia*) : " frequent

changes of underclothing and personal cleanliness." He records of an epidemic in the London Fever Hospital : " The resident medical officers, matrons, porters, nurses have one and all invariably been the subject of fever, and the laundresses, whose duty it is to wash the patients' clothes are so invariably and frequently attacked that few women will undertake this duty." This reference to the laundresses is most significant. How was it that the danger was so great that they feared the work ? Undoubtedly louse carried infection. And this is only one of numerous similar references.

But Murchison overlooked the louse, and it is possible that the almost universal infestation of our ancestors with vermin, from the highest to the lowest, obscured his vision.

Lest this statement be doubted, it must be borne in mind that lice and vermin were regarded as being generated from human perspiration, and were accepted as one of the ills to which the human race was heir. In fact, a special code of deportment with reference to irritation, and scratching in public, was taught to young ladies in the past. The periwig, which figures so attractively in aristocratic portraits of a certain period, and which, curiously enough, has survived as a relic in the law courts, was worn mainly for the purpose of minimising irritation from pediculi capitis ; it could itself be cleansed, and it enabled the natural hair to be cut short.

Pepys refers to this point in his famous diary " . . . Thence to Westminster to my barber's, to have my periwigg, which he lately made for me, cleansed of its nits, which vexed me cruelly that he should put such a thing into my hands."

Down to the last generation almost, this infestation was general. A distinguished Cork physician of the past told me that a well-known and cultured citizen, whom I can just recall, used to visit him twice a year for a number of years, for the purpose of having his beard " deloused " (to use an army term.)

It is stated that the first bath tub was exported to America in 1840, and it was only in consequence of the advance of medical knowledge that personal cleanliness began to be considered seriously, as the last century advanced slowly to a termination.

Amongst primitive people lice are still regarded with the utmost complacency, almost veneration. The Arabs have a proverb : "A well-cultivated head indicates a brain full of ideas."

Murchison, baffled in his search for the ultimate cause of typhus, was driven to the conclusion that it originated *de novo*, but only in special conditions of squalor and overcrowding, that having once been generated in these circumstances he proved again and again that it spread rapidly by contagion, amongst *all* classes. In his historic review of typhus epidemics, which has become a medical classic, he has demonstrated many important aspects of the disease, which in the light of modern knowledge have a direct bearing on our investigation.

Take for example the trial of prisoners ; in the old days, this was often a matter of great danger owing to the unspeakable condition of the prisons. This danger was illustrated by the Black Assizes, six of which are described in detail.

The first occurred in 1577, the notorious and oft quoted Black Assize of Oxford. A certain Rowland Jencks, a book binder, was taken with others to Oxford Castle from a noisome and stinking prison or " dungeon," where they had been herded. A nasty pestilential smell, it is recorded, arose from the prisoners, through the crowded court. When judgment was passed on Jencks to have his ears cut off for treason, what was described as " an infectious damp or breath " ascended. Many seemed to be taken ill on the spot. The Chief Baron, the sergeant-at-law, two sheriffs, one knight, five Justices of the Peace and most of the jury were infected, of whom several died in a few days. There followed a fulminating epidemic. "Above 600 sickened in one night, and the day after 100 more, 510 persons perished." Murchison regarded the fever as typhus. The prisoners' supporters regarded it as a judgment of God ; his enemies, that it was due to Jencks' devilish machinations. But Jencks himself, in spite of the mutilation, escaped infection, and survived 30 years, and established himself on the Continent.

The sixth and last Black Assize described, was at the Old Bailey in 1750. One hundred prisoners were tried. The court was crowded to excess. Many were sensibly affected by a very noisome smell. Within a week many were seized with a malignant fever, typhus. More than 40 died, including the Lord Mayor, two judges, an alderman, an under-sheriff and several of the jury.

Again it was noted that neither the prisoners under trial nor any in the jail were suffering at the time from typhus.

These two accounts indicate very clearly that those constantly exposed to

infection develop some degree of immunity. The occasional visitor to an endemic area is probably more liable to infection than the habitué (as was the case with our patient). An occasional small inoculation may be protective, as is the case with certain bacterial diseases.

The Oxford Assize also suggests that in certain conditions the infection of typhus can be airborne, and this is the view that physicians of the last generation held.

Reverting to the louse : The Pediculis Capitis has been traced back to early Egyptian mummies ; it was present on the scalps of the ancient pre-Colombean Incas ; it is present on all aboriginal races. It varies in type with race. The Negro shelters a black variety, the Chinaman a yellow. The Japanese has a variety all his own. But the different varieties can inter-breed, and the modern American enjoys a hybrid, between the Ethiopian, Caucasian, and the original American mummy type.

The Pediculis Corporis is thought to have differentiated out when mankind took to wearing clothing. It has modified its habits by attaching itself and its nits to the clothing, and there it remains, except when feeding. And though it remains a type distinct from Pediculis Capitis, with distinct habits, etc., yet according to Zinsser the two varieties can be made to inter-breed in the laboratory, and in nature they sometimes do, as he naively puts it : " on the occasional mésalliances, resulting from the meeting of young people about the neck band ! "

All varieties of lice are subject to infection with typhus and can infect human beings but, unlike human beings, they invariably die in a matter of fourteen days, if they become infected. If one ponders on this morbid subject, in a macabre, rather than a scientific manner, could one but bestow a human psychology to the louse, one can conceive no greater tragedy than his, that his host, the whole little world that his parasitism has confined him to, should itself contract typhus. His food and drink are poisoned at the fount, he is condemned irreparably to a painful and horrible death. There is no escape, and this inevitable death of the louse brings us to the second great advance in typhus research, the discovery of the cause. Da Rocha Lima found in the cells lining the alimentary tract of the louse, small bacillus-like bodies, which he named after an American investigator (Dr. Ricketts, who died of Typhus) Rickettsiae bodies, and the additional name Prowazeki after an Austrian, who died in the same manner. He considered them the infective agent, and this is now generally accepted even though at least five different varieties are present in the alimentary tract of the louse, mostly extra-cellular.

In the course of time other members of this group of intracellular bodies were found to be responsible for a number of allied fevers, of which the best known are : the river fever of Japan, Rocky Mountain fever and Trench fever.

But to return to typhus, where research has been carried further. It has been proved that the rat can act as a natural reservoir, and the rat flea can transmit the disease. Further, it has been shown that a human reservoir can persist (as was the case in Brill's disease) and this human reservoir (a recovered typhus case) can, in suitable circumstances, infect lice and initiate an epidemic in a lice-infested community. A rat, or rat flea, initiated case, can also originate a lice-borne epidemic (borne by human lice to other humans).

Certain differences have been observed between the human strain and the rat-borne strain of Rickettsiae ; while it is possible to train either strain to stimulate the other in the laboratory, each invariably reverts to type.

This brings us near to the probable solution of the problem we have been investigating, viz., the occurrence of a case presenting the symptoms and signs of typhus, with a negative Weil-Felix test. The solution probably then depends on the existence of at least two strains of Rickettsiae, each causing typhus, and each probably responding differently to this " non-specific " agglutination test. The variation of strain, and of reaction, would depend on habituation in different mammals, the rat and man, with occasional mutual interchange. A sporadic case of typhus occurring in a district not known to be a human endemic area is almost certainly carried by a flea from a rat, and probably will yield a negative Weil-Felix test. Epidemic cases following the sporadic case, as suggested by Dr. MacCormack's experience, become positive.

It must be emphasised that just as human endemic areas exist, so rat endemic areas have also been actually located by following up certain sporadic cases, in America, in the Mediterranean basin, and elsewhere. It must also be realised that in one district, both rat and human Rickettsiae strains may co-exist, each in their own carriers, rat and man, creating a dual endemic area, and thus confusing ultimate

diagnosis. Variability of severity of epidemics may owe its origin in part to this factor, but here we are encroaching on only partially explored regions.

Some further points of significance are :—

(1) The rat flea throws off typhus in about a month.

(2) The rat itself suffers so slightly that there is no incentive for his fleas to leave him. It is accidental if they do, and find a human host.

(3) The human being, as compared with the rat, suffers severely and often dies.

(4) As has been mentioned, the louse, unlike the rat flea, suffers most severely of all, and invariably dies, but is said to transmit the disease to its offspring. The louse has a smaller range of carrying than a rat flea. It cannot hop, or live as long away from its host, but it possesses qualities of dogged persistence and patient diligence that make it far more dangerous than the flea in relation to epidemic spread. It can even be carried by flies.

In view of these observations, and as far as the means of investigation at our disposal have permitted, one is justified in stating that the case described is one of sporadic typhus. If this is accepted, the logical inference to be drawn has already been indicated. It must almost certainly be of rat origin, *the rat strain of Rickettsiae.*

It gives prominence to the facts (1) *that rat endemic areas exist in Ireland,* independent of human endemic areas ; with Ireland's terrible typhus history this could hardly be otherwise. (2) *That a rat endemic area probably exists in Cork.* (3) That persistence in the rat, through the centuries, has been the primal source of the ever re-kindling epidemics of typhus that have scourged mankind.

It raises the question whether a special research laboratory might not with advantage be set up to deal with these and kindred subjects. It would enable more exact diagnosis, assist in localising epidemics and, should a big epidemic ever recur, it would become necessary to prepare prophylactic typhus vaccine, as has been done elsewhere. A specially equipped and endowed laboratory would be necessary, possessing facilities which do not at present exist in Éire, and it would enable other specialist laboratory work to be done that cannot at present be undertaken.

The final facts we wish to emphasise are : (4) We should be ever on the watch for mild cases of typhus. Cases may occur, which are undiagnosed. (5) Too blind a reliance on the Weil-Felix test is to be deprecated, particularly in sporadic cases.

Lastly, all this additional knowledge has given the human race tremendous capacity in dealing with typhus, and in comprehending the causes which were at work in the terrible visitations of the past. Our ancestors fought and suffered with their hands tied. Epidemic after epidemic broke over them. The Rickettsiae sheltering in the rat, unseen and unknown, followed in the wake of armies, altered kingdoms, and decimated whole nations. Siege and warfare, starvation and unemployment, overcrowding and misery, were the soils on which this terrifying ally of human suffering battened. It followed in the wake of Napoleon's armies all over Europe, and finally destroyed them, in the ghastly debacle of his retreat from Moscow. The Crimea was a shamble, and even in the Great War typhus played an important part. The huge epidemic of typhus in Serbia, in its early phases, prevented a southern thrust of the Central Powers until it was too late. Typhus helped to crumble up the shattered Russian army in its retreat, and it was only by the persistent " delousing," and other sanitary measures, that it was kept from the Western Front. And this was one of the real achievements of the Great War. More lice were destroyed than ever before in the world's history. Hecatombs of lice were sacrificed to Moloch ; this prolonged the war by helping to prevent typhus. It was a paradox indeed, but one paid for in blood and sorrow !

The disease has a melancholy interest to us Irishmen. For three centuries at least it swept through the country, scourge after scourge, till its culmination in the Great Famine. During this period Ireland appears to have been the great endemic centre of the West. Few nations have suffered as we suffered, and it is fit and proper that we should realise the travail and the torture that our ancestors endured. In 1846 the following appeal, written by a Cork citizen, was sent to the Duke of Wellington. It is recorded because it brings us face to face with stark realities, and shows us in our own country what typhus and famine can actually be.

" To His Grace,

" Field-Marshall, The Duke of Wellington.

My Lord Duke,

" Without apology or preface, I presume so far to trespass on Your Grace as to state to you, and, by the use of Your illustrious name, to present to the British

Public, the following statement of what I have myself seen within the last three days :—

"Having for many years been intimately connected with the western portion of the County of Cork, and possessing some small property there, I thought it right, personally, to investigate the truth of the several lamentable accounts which had reached me of the appalling state of misery to which that part of the country was reduced. I accordingly went on the 15th instant to Skibbereen, and to give the instance of one townland which I visited, as an example of the state of the entire coast district, I shall state simply what I saw there. It is situated on the eastern side of Castlehaven Harbour, and is named South Reen, in the parish of Myross. Being aware that I should have to witness scenes of frightful hunger, I provided myself with as much bread as five men could carry, and on reaching the spot I was surprised to find the wretched hamlet deserted. I entered some of the hovels to ascertain the cause, and the scenes that presented themselves were such as no tongue or pen can convey the slightest idea of. In the first, six famished and ghastly skeletons, to all appearance dead, were huddled in a corner on some filthy straw, their sole covering what seemed a ragged horse-cloth and their wretched legs hanging about, naked above the knees. I approached in horror, and found by a low moaning they were alive, they were in fever—four children, a woman, and what once had been a man. It is impossible to go through the details, suffice it to say, that in a few minutes I was surrounded by at least 200 of such phantoms, such frightful spectres as no words can describe. By far the greater number were delirious, either from famine or from fever. Their demoniac yells are still ringing in my ears, and their horrible images are fixed upon my brain. My heart sickens at the recital, but I must go on. In another case—decency would forbid what follows, but it must be told—my clothes were nearly torn off in my endeavours to escape from the throng of pestilence around, when my neckcloth was seized from behind by a grip which compelled me to turn. I found myself grasped by a woman with an infant, *just born*, in her arms, and the remains of a filthy sack across her loins—the sole covering of herself and babe. The same morning the police opened a house on the adjoining lands, which was observed shut for many days, and two frozen corpses were found lying upon the mud floor *half-devoured by the rats*.

"A mother, herself in fever, was seen the same day to drag out the corpse of her child, a girl about twelve, perfectly naked, and leave it half covered with stones. In another house, within 500 yards of the cavalry station at Skibbereen, the dispensary doctor found seven wretches lying, unable to move, under the same cloak—one had been dead many hours, but the others were unable to move either themselves or the corpse. To what purpose should I multiply such cases ? If these be not sufficient, neither would they hear who have the power to send relief and do not, even 'though one came from the dead' . . . "

The remainder of the appeal is irrelevant to our purpose. It was signed " N. M. Cummins, J.P.," and written from "Ann Mount, Cork, December 17th, 1846."

Since these unhappy times, in addition to the knowledge of the part played by vermin and rats and the means of combating them, a further weapon has been forged by science in the long struggle with typhus. In 1933 a prophylactic vaccine was prepared by Weigl in Poland. He overcame the difficulty that the Rickettsiae bodies would grow only on living cells by infecting lice artificially by way of the anus. The living culture tube, the alimentary tract of each louse, was removed. The product of 200 lice was suspended and injected, three times at intervals of a week, in each individual. 2,755 were thus wholly immunised, though constantly exposed.

A similar vaccine has been prepared from infected wood ticks, and employed successfully as a prophylactic agent against Rocky Mountain Fever.

In 1932 Zinsser and Castenada in Mexico reduced the resistance of rats by exposure to *x*-ray, and inoculated the peritoneal cavity. The vaccine was made from the exudate. 8,000 were successfully immunised in a typhus epidemic.

These bodies, like some of the ultra-microscopic viruses, can be grown on living tissue culture. From these, vaccines will possibly be made, as has been done with yellow fever. Research goes on inexorably.

Much was done in the past, and a great tribute must be paid to Murchison. *Much has been accomplished* in the last 28 years by a host of self-effacing workers too numerous to mention.

Much remains to be done before the final page is written in the history of the epic struggle between mankind and the infecting agent of typhus. The end is not yet.

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The importance of Dr. Cummins' extremely interesting paper lies in the possibilities which it opens up for us if his conclusions are to be taken as proved. The theory of the possibility of the transfer of typhus by the rat flea is not a new one, of course. It has been alluded to in his annual reports for Co. Mayo by Dr. Hourihane and it is well known that some of the tropical forms of typhus (as mentioned by Dr. Cummins) are so spread, especially the Malayan and Japanese river forms. These are endemic forms of typhus and the reason they do not become epidemic is believed to lie in the fact that the host (the rat) does not die from typhus (as he does from plague) and consequently is not deserted by the fleas infesting him. While the rôle of the rat flea has been definitely established in connection with the spread of *some* forms of typhus and the possibility of its assuming a similar rôle in this country must always be borne in mind, nevertheless it must be stated that no such rôle has been *proved* in connection with the present case nor with any previously reported in this country.

Neither can it be held that the particular tenement mentioned in the paper has been definitely implicated. The connection has been one purely of hypothesis and was arrived at only by a process of exclusion. On the other hand it has been definitely established that there has been no illness even remotely resembling typhus in any of the inhabitants of the tenement either before or since the case arose. We have been thrown back therefore on the theory of the existence of the rat resevoir in which generations of typhus-infected fleas have been bred over a great many years without a human transfer. Such a theory is, naturally, extremely difficult to support in view of the innumerable opportunities of such transfer to the inhabitants themselves, the sanitary inspectors who have frequently visited the tenement, nurses, social service workers and others who would from time to time have access to it. That none of these persons contracted typhus is perfectly clear since there has been a complete absence of the disease from the city for a period of over eight years. In these circumstances I think it may be fairly held that, wherever the patient contracted his disease, it is scarcely likely that he did so in that particular house. I had the opportunity (through the courtesy of Dr. Cummins) of seeing the case and there is little or no doubt that it was typhus fever and its importance for us arises from the fact that it proves that typhus may again make its appearance here without any warning whatever. That the case is of more than local importance is apparent from the reference to it in a recent issue of *The Lancet* (February 26th, 1938) from which the following interesting paragraph is taken.

ENDEMIC TYPHUS.

Two cases of typhus fever, of which one (in Bristol) is described on another page of our present issue and one (in Cork) in the January number of the *Irish Journal of Medical Science*, raise again the question of the reservoir that maintains this dread disease between its epidemics. The infection in the Bristol case may, it is true, have been imported from abroad and the arguments for its foreign origin are duly set out by Dr. Allan Gray and his colleagues. But the Cork case seems to have been indigenous and to have appeared after eight years' absence of typhus from that city.

Extensive researches have been made of late, especially in Russia, in Poland, and among the Arab population in Tunisia, to fix responsibility for the persistence of the pathogenic rickettsia during periods when no trace of the actual human disease can be detected. Unlike enteric fever, which almost certainly depends entirely on the human chronic carrier for its continued existence, typhus has no such refuge ; the rickettsias, present in abundance in the blood and tissues during the fever, disappear rapidly and completely as convalescence proceeds. The possibility of subclinical cases arising during the intervals between outbreaks has been suggested, and (as with measles, rubella, and mumps) this is a reasonable hypothesis. Yet all the observations are against it. Subclinical cases of typhus infection are not uncommon during epidemics and can be detected both by the development of serum reactions—Weil-Felix and direct rickettsia agglutination (Weigl's reaction)—and by the isolation of the virus from the blood. But in such cases the amount of virus in the blood is small and it disappears rapidly ; lice fed on the patients with subclinical (as opposed to clinical) typhus seldom or never become infected. Furthermore during inter-epidemic times, even in a population subject to regular winter outbreaks, no subclinical case has ever been detected. Polish, Russian, and French observers are at one in denying to the subclinical human infection any rôle in the propagation or persistence of the disease. Nor is there reason to think that the virus is harboured in its lean years by the lice themselves. The life of an infected louse is usually less than a fortnight, though one observer (Mosing) notes survival in full infectivity for 45 days at 32° C.—a period which might well suffice to maintain a smouldering endemicity in poorly supervised communities. But there is no transmission from louse to louse and, though infection to a second generation through the egg has been alleged, the general opinion now is that this does not take place. The discovery of the rat rickettsia infections and their occasional transmission to man, producing mild forms of typhus fever (Brill's disease, Mexican typhus, ship typhus), has suggested that the rat may be the original reservoir, and that in favourable circumstances, such as frequent transmission to specially susceptible human subjects, the rat rickettsia may rise in virulence, become capable of infecting *Pediculus humanus* in natural conditions, and thus set up the cycle of the classical typhus. In Tunis, however, rat rickettsiosis is extremely common but typhus in epidemic form non-existent, whereas in the neighbouring country true typhus is always present but no rat typhus can be found. This speaks strongly against such a transformation, at least as a happening common enough to account for the rebirth of human typhus year after year.

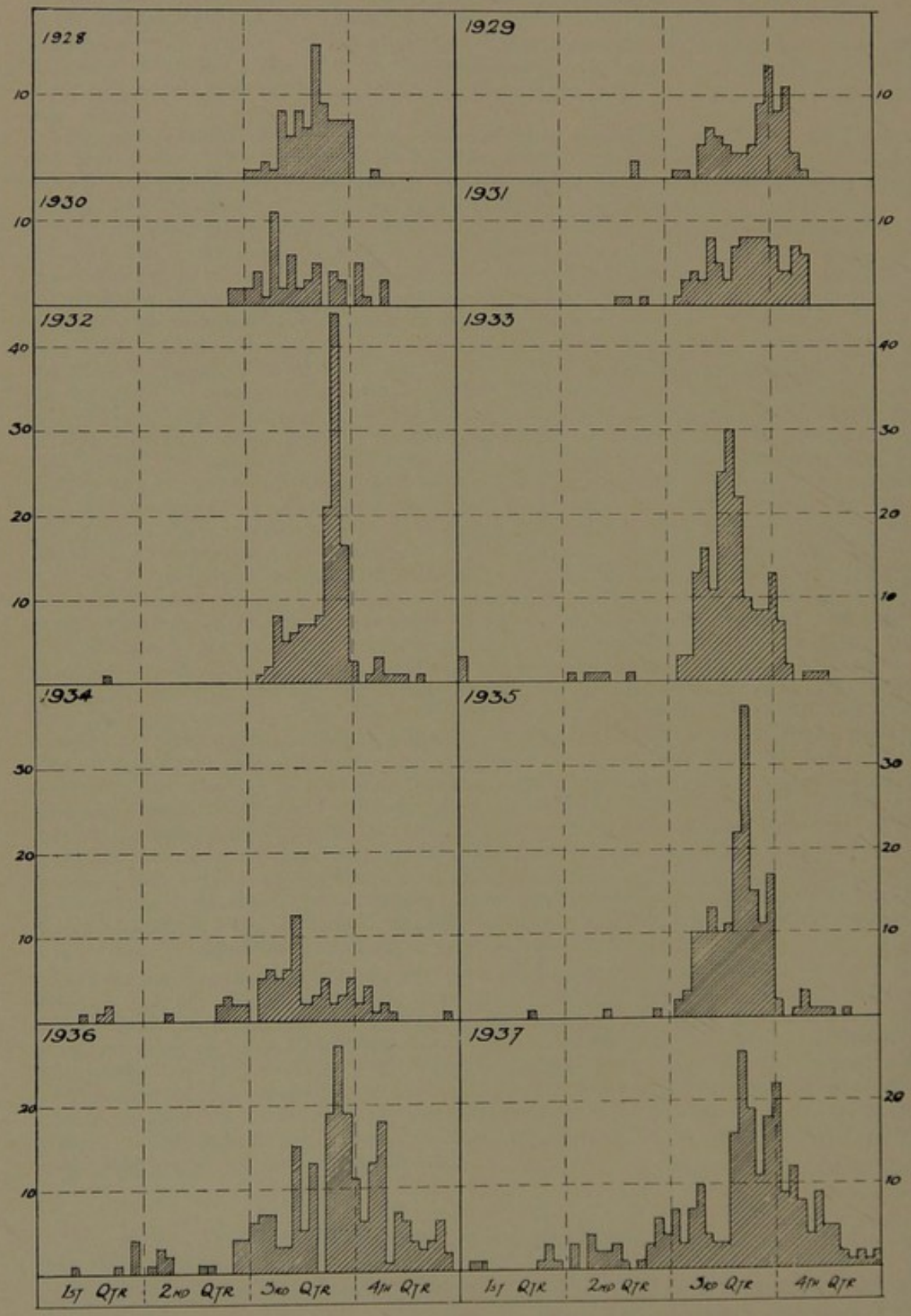
One factor, to which both Giroud and Mosing attach great importance, is the effect of fatigue, famine, and other diseases in lowering the resistance of the human subject and, more important, in raising the amount of virus circulating in the blood which facilitates louse infection. It is possible that the final extinction of typhus, as of tuberculosis and leprosy, may come through the world-wide amelioration of the conditions of human life. It is certain that as long as human agglomerations can be found semi-starved and huddled together, as in some regions of Asia, Africa, and South America, so long will the threat of invasion with typhus fever hang over the rest of humanity.

EPIDEMIC DIARRHOEA.

246 cases were reported during the year and 52 deaths were recorded, yielding the high fatality rate of 21.1 per cent. In the previous year there were 261 cases and the fatality rate was 15.7 per cent. There has been an unwelcome prevalence of this disease since 1935 and it has

Fig. IV.

NOTIFICATIONS OF EPIDEMIC DIARRHOEA 1928–'37.



contributed very materially to our infant mortality figures in these periods. As in former years the maximum incidence was in the third quarter. Investigation was along the lines indicated in previous years and the findings (in regard to the mode of feeding) have been practically identical, as will be seen from the following table.

Manner	1935	1936	1937
Breast Milk	18	7	18
Cow's Milk	128	198	204
Dried Milk	6	5	8
Untraced	26	51	16
Totals	178	261	246

Once again the enormously increased risk to artificially fed children has been manifest. Not only is the risk of incurring the disease greater but it is more severe when contracted. This is shewn by the fact that practically all the deaths occurred amongst children who were fed on cow's milk. The various factors concerned have been adequately dealt with in last year's and previous reports and it is not necessary to go over the same ground again. Whether *all* the cases notified as epidemic diarrhoea are truly epidemic in character is to be doubted. The main bulk of true epidemic diarrhoea occurs in the warm months, that is to say, late summer and early autumn, when climatic conditions are favourable to the spread of the disease. It has been noticed, however, that of recent years there has been a tendency for physicians to notify isolated cases of diarrhoea in increasing numbers at other periods of the year. At such times diarrhoea is much more likely to be due to dietetic errors than to be of a truly infectious nature. In order to put this matter to a test, the figures for a number of years were examined and arranged in order of the weeks in which they were reported. From the information so obtained a diagram (Figure IV.) was planned in which this tendency is clearly shown. It may be inferred therefore that quite a considerable proportion of the notified cases are not really infectious diarrhoea at all. This is borne out to by an examination of the record cards from which in at least 36 cases occurring in 1937, there was definite clinical evidence that the condition was not epidemic and it is probable that if all the cases could have been kept under close observation a good many more of them would yield similar information. Statistically, at any rate, there is definite evidence that quite a substantial number can hardly be regarded as true epidemic diarrhoea.

Whether epidemic or otherwise, however, it is apparent that diarrhoea is all too prevalent among the infant population and that the main predisposing factor in its causation is the adoption of artificial feeding in place of breast feeding, a practice which is now seemingly of universal proportions and one to be very much deplored. It is a matter on which it is very difficult to obtain reliable information. No doubt in many

cases the mothers are unable to provide the necessary nutriment but, on the other hand, there is plenty of evidence to show that there is a growing reluctance to provide breast feeding on the part of many women well able to do so. It is a foolish and inexcusable practice which inflicts a large amount of needless suffering and swells the infant mortality rates very considerably.

As in previous years, an examination of the records as to the distribution of mild and severe cases, showed a great preponderance of the latter among the artificially fed children and especially among those fed on cow's milk. Practically all the deaths occurred amongst artificially fed infants. Indeed only three deaths were recorded as having occurred amongst breast-fed babies and investigation into these showed that in at least two of the three the cause of death was probably wrongly attributed to epidemic diarrhoea. In one instance there was a clear and definite history of the child having been taken to visit a relative in the last stages of tuberculosus infection. The child was suffering from whooping cough at the time and the mother was definite in saying that from that time onward he seemed to decline and that his illness terminated in wasting and diarrhoea. It seems clear, in this instance, that massive tuberculosus infection took place to which the condition of whooping cough predisposed, so that the child was unable to offer any resistance. In the other case the child suffered from congenital heart disease and the history of the case suggested that this was the cause of death rather than enteritis.

Of the fifty-two recorded deaths, in forty-five instances the children were under one year of age and since all deaths of infants under this age are investigated, it is possible to assess the factors contributing them. This investigation was first carried out in relation to deaths in 1935 and the comparative figures are shown for that and the two subsequent years, of the forty-five deaths examined, in seven instances the infants were illegitimate, so that it was not possible to secure complete details in regard to family history and kindred matter. The result of the investigation into these forty-five deaths were as follows :—

1. Feeding—	1937	1936	1935
Breast Fed	3	2	7
Artificial	42	32	42
Total	45	34	49

2. Nature of *Artificial Feeding*—			
Cow's Milk	32	20	37
Mixed Feeding	1	4	—
Dried Milk	9	8	5
Total	42	32	42

	1937	1936	1935
3. Condition at Birth—			
Normal	28	17	32
Weakly	17	17	17
Total	45	34	49
4. Economic Circumstances—			
Comfortable	2	1	2
Moderate	11	15	33
Indigent	27	18	14
Total	40	34	49
5. Efficiency of Mother—			
Good	2	4	6
Moderate	22	20	20
Bad	16	10	23
Total	40	34	49

The influence of artificial feeding is at once apparent. So far as *deaths* from epidemic diarrhoea are concerned it is, as in the case of *attack*, the prime determining factor, so that we are definitely forced to the conclusion that so long as increasing numbers of mothers continue to feed their babies by such methods so long may we expect high morbidity and mortality figures in regard to epidemic diarrhoea and kindred ailments, especially where the sanitary circumstances are bad, as they undoubtedly are in many areas in the city where we have the juxtaposition of small crowded houses, piggeries, stables and slaughter houses. Artificial feeding, at any time dangerous, becomes a menace under such circumstances. It is mainly, if not entirely, in urban areas that the fashion of artificial feeding prevails, as a factor in rural districts it may be regarded as almost negligible. It is not to be wondered, therefore, that for the large urban areas (i.e., of populations over 10,000) for the year 1936 the infant mortality rate was 102.5 per 1,000, while the corresponding rate for all rural districts was only 53.8 per 1,000.* Such figures as these tend to make one pause as to the respective merits of urban and rural civilization and the reputed merits of the former. There seems to be no doubt whatever, though, that while urban populations continue to carry on rural callings in densely populated areas and while their children are at the same time exposed to the dangers of artificial feeding, the results will continue to be disastrous.

CEREBRO-SPINAL MENINGITIS.

Three cases of this disease were notified, one of whom subsequently died. In addition, two deaths were registered as due to the condition in connection with which the cases had not been previously notified. There

* Figs. from the Registrar-General's Report for 1936.

were therefore at least five cases of the disease during the year and three deaths. Bacteriological confirmation was available in three instances and in the other two diagnosis was based on clinical manifestations alone. Reference to Table 26 shows that the occurrence of cerebro-spinal meningitis has been sporadic in this area. Three cases were notified in 1936, none for five years prior to that when one case was notified. There is then a gap of two years until 1927 when again one case was reported, and one also in 1926. Between 1919 and 1926 no cases were notified, but in the years preceding 1919 notifications were comparatively frequent. It seems quite probably that cerebro-spinal fever is endemic here and that some of the cases, in the past, have been mistaken for tuberculous meningitis and that if examination of the cerebro-spinal fluid had been made in all cases probably a proportion of them would have yielded the meningo-coccus. Overcrowding appears to be essential for the epidemic spread of this disease and owing to the extreme delicacy of the organism it is unable to survive long outside the human body and it is to this latter quality that we may probably attribute our freedom from epidemics of the disease. In the cases investigated, overcrowding was a definite factor in each instance.

PUERPERAL FEVER.

Six cases were reported during the year (as compared with twelve in 1936, eleven in 1935 and thirteen in 1934). In one of the cases (which occurred in a local maternity hospital) the patient came from the County of Kerry and was found on admission to be suffering from albuminuria. Strictly speaking, this case should not have been allocated to the city area. In another case, the temperature rose on the 11th day after the nurse had ceased attendance and was only maintained for two days. This was a very doubtful case. In the remaining four cases (all of which occurred in home-nursed cases) the disease did not assume a serious form and all recovered. There were no deaths from puerperal fever during the year. The part played by this disease in influencing maternal mortality is shewn in Table 41. Excepting 1934, the deaths from this condition have been very few for a number of years.

INFLUENZA.

Fifty-five deaths were registered as due to influenza during the year of which number forty-eight were definitely associated with the epidemic outbreak of the disease in the early months of the year. This epidemic was fully treated in last year's report and it is therefore unnecessary to deal with it further now, except to refer again to the very marked effect which it has had in the general mortality rate for the year. The mortality figures for Cork during the peak of the epidemic were out of all proportion to those of other parts of the country, reaching the phenomenal total of 50.4 per 1,000 during the week ended 16th January, 1937, and 45.2 per 1,000 in the second next week. The nearest approach to this was 36.0 per 1,000 in Dublin in the week ended 6th February.

OTHER INFECTIOUS DISEASES.

Notifications in regard to other infectious diseases during the year were as follows :—

Erysipelas	26
Whooping Cough	28
Measles	88
Ante Primary Pneumonia	21
Ante Influenzal Pneumonia	45
Poliomyelitis	1
Varicella	218

Table 25a.—Showing the number of Articles Disinfected during the year 1937.

	No. of Beds	No. of Mattresses	No. of articles of Bedding	No. of articles of Wearing Apparel	Miscellaneous Articles	Total No. of Articles
January	12	63	350	79	79	583
February	17	42	318	42	31	450
March	10	42	378	80	26	536
April	15	92	676	87	34	904
May	11	57	365	160	46	639
June	7	24	196	65	12	304
July	14	44	305	16	20	399
August	14	39	265	11	14	343
September	13	52	325	71	39	500
October	14	103	580	69	40	806
November	18	57	464	64	24	627
December	11	46	308	49	35	449
	156	661	4530	793	400	6540

Table 26.—Yearly Summary of Infectious Diseases, 1879–1937.

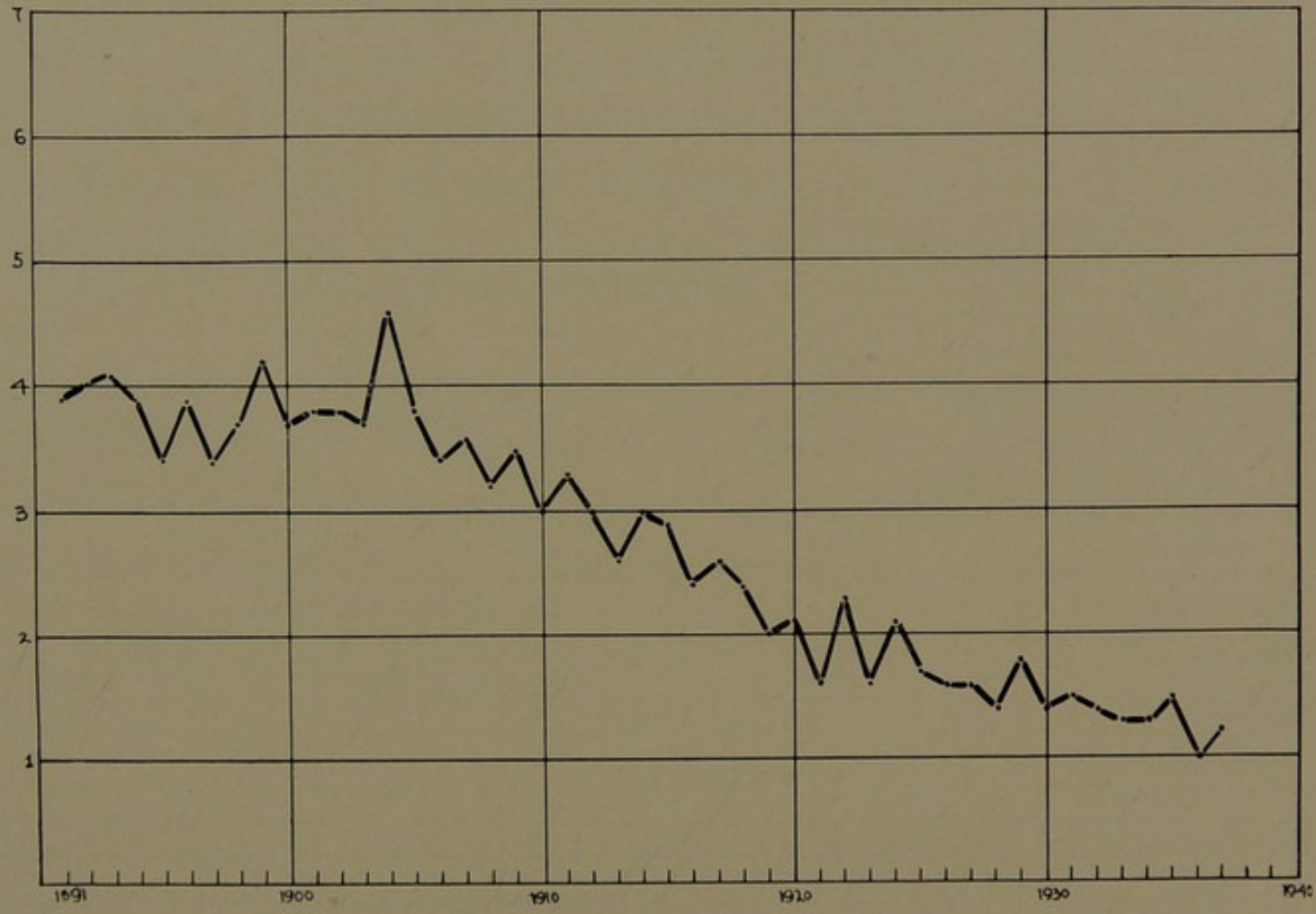
Year	Small Pox	Typhus	Typhoid or Enteric Fever	Simple Continued Fever	Scarlatina	Puerperal Fever	Membraneous Croup	Diphtheria	Erysipelas	Measles	Diarrhœa	Chicken Pox	Cerebro-Spinal Meningitis	Poliomyelitis	Other Zymotic or Infectious Diseases	Encephalitis Lethargica	Pneumonia: Acute Primary	Pneumonia: Acute Influenza
1879	—	337	91	335	386	—	—	2	30	269	107	—	—	—	13	—	—	—
1880	—	756	117	420	616	—	—	9	37	282	48	—	—	—	1	—	—	—
1881	—	1406	66	364	103	—	—	—	31	240	5	—	—	—	1	—	—	—
1882	—	683	37	239	25	—	—	3	11	146	3	—	—	—	—	—	—	—
1883	—	844	45	164	105	—	—	6	—	109	1	—	—	—	—	—	—	—
1884	—	456	48	221	158	—	—	2	14	106	3	—	—	—	—	—	—	—
1885	1	159	43	94	143	—	—	2	17	35	—	—	—	—	—	—	—	—
1886	—	83	180	70	86	—	—	1	14	24	—	—	—	—	—	—	—	—
1887	—	67	100	46	17	—	—	4	25	182	1	—	—	—	—	—	—	—
1888	—	72	66	40	55	—	—	7	25	232	—	—	—	—	—	—	—	—
1889	—	48	37	24	90	—	—	9	12	—	—	—	—	—	—	—	—	—
1890	—	54	113	36	128	5	3	20	27	3	2	—	—	—	—	—	—	—
1891	1	24	165	46	64	3	3	37	27	2	—	—	—	—	—	—	—	—
1892	1	162	104	53	19	—	3	11	45	74	1	—	—	—	1	—	—	—
1893	—	92	78	26	91	3	—	18	70	4	2	—	—	—	—	—	—	—
1894	—	25	43	29	301	5	6	14	65	11	2	—	—	—	—	—	—	—
1895	—	29	132	23	53	3	1	6	45	2	—	—	—	—	—	—	—	—
1896	—	22	94	29	69	6	—	7	54	3	2	—	—	—	—	—	—	—
1897	—	30	51	23	34	7	4	21	35	9	—	—	—	—	1	—	—	—
1898	—	61	62	30	30	6	7	18	20	2	—	—	—	—	—	—	—	—
1899	—	9	47	14	22	2	10	18	60	23	—	—	—	—	—	—	—	—
1900	—	28	50	27	401	2	2	23	36	—	—	—	8	—	1	—	—	—
1901	—	13	51	29	288	3	12	26	38	—	—	—	8	—	—	—	—	—
1902	—	6	49	16	119	4	1	8	49	8	—	7	3	—	—	—	—	—
1903	3	7	27	16	51	2	6	17	58	5	—	49	1	—	—	—	—	—
1904	1	11	50	33	29	4	3	29	43	2	—	39	4	—	—	—	—	—
1905	1	9	58	47	35	7	8	18	50	7	—	33	4	—	—	—	—	—
1906	—	6	48	31	23	10	1	37	48	8	—	49	3	—	2	—	—	—
1907	—	10	44	44	50	6	4	37	42	4	413	63	8	—	—	—	—	—
1908	—	23	88	55	114	4	6	40	26	379	524	14	1	—	1	—	—	—
1909	—	18	74	42	119	10	4	66	25	44	514	21	—	—	22	—	—	—
1910	—	8	54	24	38	4	6	51	26	14	159	16	—	—	—	—	—	—
1911	—	10	32	22	39	4	13	70	31	433	352	1	1	—	—	—	—	—
1912	—	1	26	17	93	6	5	52	29	53	71	7	—	—	—	—	—	—
1913	—	5	29	13	81	4	10	24	28	254	320	2	—	—	—	—	—	—
1914	—	1	50	12	230	11	15	54	38	161	188	8	—	—	—	—	—	—
1915	—	—	32	4	245	2	8	68	44	160	177	10	6	—	—	—	—	—
1916	—	1	42	9	112	8	11	43	41	86	139	13	6	1	—	—	—	—
1917	—	3	43	6	46	1	9	26	24	28	83	8	3	—	—	—	—	—
1918	—	1	42	10	21	2	18	34	16	750	121	19	4	—	—	—	—	—
1919	—	15	12	3	16	4	21	262	18	3	85	26	2	—	—	—	—	37
1920	—	2	244	8	70	6	3	428	18	9	54	30	—	—	—	—	—	—
1921	—	—	21	1	14	4	8	541	17	2	105	28	—	—	—	—	—	—
1922	—	—	6	—	29	1	5	379	14	324	19	29	—	—	—	—	—	—
1923	—	1	7	1	44	1	4	440	45	10	35	30	—	—	—	—	—	—
1924	—	1	12	—	41	3	3	217	30	5	30	54	—	—	—	—	—	—
1925	—	—	27	—	81	4	9	265	35	94	142	117	—	—	—	1	—	5
1926	—	4	11	2	278	4	11	469	34	534	108	59	—	—	—	1	—	—
1927	—	4	10	1	205	14	11	344	25	7	76	76	1	1	—	3	—	—
1928	—	1	17	—	208	7	15	385	24	6	79	64	1	—	—	—	—	12
1929	—	1	6	—	216	6	4	369	24	226	78	80	—	—	—	2	—	7
1930	—	—	—	1	238	6	5	588*	38	241	59	72	—	—	—	1	—	3
1931	—	—	1	—	98	1	1	288	19	3	85	71	1	—	—	1	49	41
1932	—	—	1	—	80	9	1	85	13	242	178	99	—	—	—	2	28	7
1933	—	—	2	—	181	9	—	109	24	49	189	79	—	—	—	1	3	2
1934	—	—	1	—	118	10	—	109	28	126	80	158	—	—	—	—	2	1
1935	—	—	3	—	52	11	1	56	24	300	178	53	—	—	—	—	5	2
1936	—	—	2	—	437	12	1	24	18	233	261	69	3	—	—	—	14	14
1937	—	—	1	—	454	6	—	79	26	88	246	218	5	1	—	—	21	45

* See footnote to Table 11 *re* Notification of Diphtheria in 1930.

Fig. V.

PULMONARY TUBERCULOSIS. DEATH RATES PER 1.000 POPULATION

FROM 1891 TO PRESENT TIME



Section IV.—Tuberculosis

The death rate from pulmonary tuberculosis for the year was 1.20 per 1,000 of the population. The following table shows the death-rates each year from 1891 to 1937.

Table 27.—Deaths and Death rates Pulmonary Tuberculosis.

Year	No. of Deaths	Rate per 1,000 pop.	Year	No. of Deaths	Rate per 1,000 pop.
1891	295	3.93	1915	211	2.88
1892	303	4.04	1916	189	2.46
1893	314	4.18	1917	202	2.63
1894	296	3.94	1918	187	2.43
1895	261	3.48	1919	156	2.04
1896	299	3.98	1920	159	2.07
1897	260	3.46	1921	125	1.64
1898	283	3.77	1922	176	2.30
1899	320	4.26	1923	130	1.34
1900	281	3.74	1924	164	2.09
1901	289	3.80	1925	134	1.71
1902	287	3.79	1926	126	1.60
1903	279	3.67	1927	129	1.60
1904	352	4.63	1928	109	1.39
1905	294	3.86	1929	141	1.79
1906	261	3.43	1930	114	1.45
1907	278	3.65	1931	124	1.56
1908	245	3.22	1932	111	1.40
1909	264	3.47	1933	106	1.35
1910	233	3.06	1934	104	1.34
1911	252	3.29	1935	115	1.46
1912	231	3.01	1936	85	1.06
1913	202	2.62	1937	96	1.20
1914	231	3.01			

The rate, though somewhat higher than that of the previous year, is (excluding that year) the lowest recorded. The decline noted last year was so sharp that obviously it could not be regarded as an indication of the rate of decline in the disease and consequently it was only to be expected that there would have been some increase this year. The total number as recorded in the above table is 96 (as compared with 85 in the previous year. There was also a slight increase in the number of deaths from non-pulmonary tuberculosis (22 as compared with 20 in 1936). The total number of deaths from all forms of tuberculosis was therefore 116 (as compared with 105 in 1936). It is satisfactory to be able to record that the mortality figures for tuberculosis as issued in the preliminary returns of the Registrar-General show that this City once more occupies the lowest place (in conjunction with Limerick this year)

of the four County Boroughs. It will be interesting to note, with the progress of time, whether the increased provisions for the housing of the working classes will cause a continued and accelerated decline in the mortality rates from tuberculosis and, if so, to determine when this influence became effective. There are so many other factors concerned in the spread of this disease that it would be a profound mistake to place too much reliance on the eradication of any one of them which, naturally enough, is the tendency in regard to overcrowding. No doubt overcrowding is a potent factor in the spread of the disease but when one remembers the ideal of a separate bedroom for every tuberculous patient the difficulty becomes at once apparent. No housing scheme could ever hope to embrace such an ideal and the best that can be looked for (apart from institutional segregation of the patients) is an increased spacing-out of the people in their houses so as to impart an increased barrier to infection.

While the figures shewn in table 27 are instructive in illustrating the steady decline in pulmonary tuberculosis over the past forty-seven years, they afford no information as to the age-groups at which mortality is heaviest and how it is distributed between the sexes at the various age-groups. Such information is instructive as it helps us to visualise some of the factors which play a determining part in the mortality from tuberculosis. Through the courtesy of the Registrar-General I am able to produce the following table in which deaths have been distributed according to age and sex. Unfortunately it is not possible to go back further than 1923, in which year the deaths registered were for the first time distributed for statistical purposes to the area of residence of the deceased. They form, however, an interesting record for this area which will increase in value in future years.

Table 28.—Cork City. Deaths from Pulmonary Tuberculosis.

Year	Sex	All Ages	Under 1 year	1–5	5–15	15–25	25–35	35–45	45–55	55–65	65 and over
1923	M	70	—	2	4	16	12	17	14	4	1
	F	66	—	2	4	13	19	14	8	4	2
1924	M	80	—	2	1	13	16	20	16	9	3
	F	73	—	—	2	17	23	16	7	5	3
1925	M	59	1	3	2	10	17	15	8	3	—
	F	77	1	2	5	23	20	13	6	4	3
1926	M	65	1	2	4	14	14	16	7	5	2
	F	60	—	—	5	11	19	12	9	2	2
1927	M	62	1	1	1	1	15	22	10	4	1
	F	72	—	4	3	16	18	16	10	4	1
1928	M	49	—	1	1	11	10	11	10	4	1
	F	67	—	1	4	15	21	12	7	7	—
1929	M	65	—	2	—	16	14	16	11	2	4
	F	80	—	—	2	24	24	17	7	2	4
1930	M	58	—	—	1	16	16	14	9	2	—
	F	46	—	1	2	9	14	10	5	3	2
1931	M	62	—	1	—	12	16	11	13	8	1
	F	61	—	1	4	15	17	14	6	3	1
1932	M	58	—	—	1	7	22	15	8	4	1
	F	54	—	1	3	14	21	5	7	3	—
1933	M	52	—	—	—	8	17	14	11	1	1
	F	53	—	—	—	18	12	10	9	3	1
1934	M	53	—	—	2	6	13	16	12	3	1
	F	50	—	—	1	14	12	16	3	3	1
1935	M	58	1	1	—	10	9	20	13	4	—
	F	54	—	—	2	11	18	9	11	3	—
1936	M	38	—	—	2	7	11	15	8	5	—
	F	34	—	1	—	6	8	7	5	6	1
1937	M	56	—	—	—	9	10	13	13	8	2
	F	40	—	—	2	10	9	10	4	5	—

The number of new patients examined at the Tuberculosis Dispensary during the year amounted to 251, of whom 178 were adults and 73 children. 84 of the adults and 17 of the children were found to be suffering from tuberculosis in one form or another and appropriate treatment was afforded.

As in former years the proportion of new cases dealt with at the Tuberculosis Dispensary who presented signs of advanced disease was disproportionately high. 53 per cent. of such were found to be in Stage III. and 38 per cent. in Stage II.; in other words, no less than 91 per cent.

of the new cases were suffering from definitely established disease when they came under our notice. These figures are on a par with those of former years and while they continue at this very unsatisfactory level, effective treatment can scarcely be said to be available for them. This matter has been dwelt upon in former reports and it will suffice to reiterate that the main factor concerned would appear to be the reluctance of the patient to put himself under medical care at a sufficiently early stage of his illness. The actual classification of cases is shown in the following table.

Table 28a.—Showing the proportion of early, moderately advanced and advanced cases attending the Tuberculosis Clinic for the first time (1930 to 1938).

TYPE	1930	1931	1932	1933	1934	1935	1936	1937
Stage I. (Early)	15%	8%	9%	6%	14%	13%	6%	9%
Stage II. (Moderately Advanced)	36%	50%	38%	39%	28%	30%	43%	38%
Stage III. (Advanced)	49%	42%	53%	55%	58%	57%	51%	53%

The number of cases admitted to sanatorium during the year was as follows :—

	Males	Females	Total
Insured	25	3	28
Uninsured	20	9	29
Children	—	—	—
Total	45	12	57

The number of patients discharged from sanatorium during the year was as follows :—

	Males	Females	Total
Insured	31	6	37
Uninsured	17	6	23
Children	—	—	—
Total	48	12	60

Advanced cases who are not likely to derive benefit from sanatorium treatment who cannot receive adequate treatment in their own homes are admitted to St. Patrick's Hospital. The following cases were admitted during the year :—

	Males	Females	Total
Insured	43	4	47
Uninsured	17	10	27
Total	60	14	74

The following cases died or were discharged from the Institution :—

	Males	Females	Total
Insured	45	3	48
Uninsured	16	11	27
Total	61	14	75

One female child and one male child were admitted to Cappagh Open-air Hospital, Dublin. During the same period two females were discharged These were all cases of joint tuberculosis requiring prolonged treatment under open-air conditions for which there are no facilities in the city at present. The need of such an institution to serve the city and the south of Ireland generally is great, and it is to be hoped that suitable premises for this purpose may be acquired in the near future. Such a hospital could also serve as a convalescent home for delicate and pre-tuberculosis children, for which there is also a great need.

In addition to those sent to Cappagh, 19 patients were admitted to the local infirmaries. Of these, 5 were adults and 14 children. The latter were mostly gland cases requiring surgical treatment. A few were admitted for supervision pending transfer to Cappagh. Fifteen patients, 6 adults and 9 children, were discharged from the hospitals.

SPUTUM EXAMINATIONS.

Examinations of specimens of sputum is carried out in the laboratory attached to the Tuberculosis Clinic. 511 such specimens were examined during the past year, of which 73 were found to contain tubercle bacilli while 438 were negative. Of the 511 specimens examined 135 were submitted by medical practitioners. The following table shows the number of specimens examined, and the results obtained during the past seven years.

Year	Total	Positive	Negative
1931	375	90	285
1932	440	94	346
1933	502	118	384
1934	519	121	398
1935	512	94	418
1936	467	93	374
1937	511	73	438
Totals	3326	683	2643

In all cases attending the clinic, sputum examination is a routine procedure, and pocket flasks are issued to all those who are found to be positive. A register is kept of such cases and attention in regard to prevention is concentrated on them. Forty-five flasks were issued during the year.

The number of notifications received during the year was 166. Prior to 1930 such notifications were for the period from the 1st April to 31st March following. Notifications for previous years were as follows :—

1925–26	110
1926–27	108
1927–28	73
1928–29	116
1929–30	179
1930 (April–Dec.)....	133
1931	196
1932	136
1933	164
1934	112
1935	154
1936	154
1937	166

In the following table notifications, from the year 1930, have been analysed as to age and sex distribution.

Table 29.—Notifications of Tuberculosis distributed according to Sex and Age.

Year	Total	Sex	All Ages	Under 5 yrs	5–15	15–45	45–60	60 and up
1930	133	M	77	4	11	50	11	1
		F	56	5	11	37	2	1
1931	196	M	114	9	24	64	15	2
		F	82	7	19	53	3	—
1932	136	M	71	5	11	42	11	2
		F	65	1	6	48	7	3
1933	159	M	89	5	10	59	14	1
		F	70	5	8	48	8	1
1934	112	M	43	1	6	26	9	1
		F	69	4	10	41	9	5
1935	154	M	83	7	14	43	14	5
		F	71	5	15	40	7	4
1936	154	M	76	9	10	33	16	8
		F	78	3	12	55	6	2
1937	166	M	91	5	10	47	25	4
		F	75	2	10	52	5	6

X-RAY EXAMINATION.

One hundred and seven X-Ray examinations were carried out during the year. This form of examination is utilised for the most part in connection with cases presenting doubtful diagnostic features. All cases of bone and joint disease are subjected to X-Ray examination as routine. The method is also availed of very largely in connection with artificial pneumothorax treatment not only for the purpose of

estimating, in the first instance, whether cases are suitable or not but, at a later stage, to judge the progress which they are making.

It is scarcely possible to exaggerate the importance of such examinations in the early detection of pulmonary tuberculosis for (as stated above) most, if not all, cases could be detected by this means at the very earliest stages before the disease had become open and before it had spread from one lung to the other. The importance of this latter fact is related to the probability of effecting a cure by artificial pneumothorax and since this operation extends the greatest available hope to the individual sufferer, the importance of such examinations becomes at once apparent. It is hoped in the near future to extend the number and scope of such examinations and make them available for the medical profession in cases in which the ordinary fees cannot be paid.

The number of visits made by the Tuberculosis Nurse was 654. As was pointed out in previous reports, a great deal of importance is attached to this particular branch as very often the advice tendered may be useful in limiting the spread of infection. Hitherto these efforts were to a very great extent nullified by the conditions under which a great number of our cases have lived. As pointed out before, a great many of these families have existed under the most miserable conditions of overcrowding and sanitation which, undoubtedly, have contributed very materially to the high rate of prevalent mortality and which have nullified to a large extent the efforts which have been made to improve the figures. The present schemes for rehousing the working classes will almost certainly ameliorate these conditions and should be reflected in later tears in improved statistics as regards tuberculosis. The question of rehousing is dealt with in the appropriate section and it will suffice to mention here that large numbers of families have already been transferred from dark insanitary dwellings in narrow streets and alleys to decent new houses laid out to catch the maximum amount of sunlight and with ample provision for external and internal ventilation. Apart from the physical benefits accruing from this change the still greater mental improvement in the outlook of the people themselves should play a very important part in reducing morbidity and mortality from these diseases, and in this way prove, in the long run, an actual saving in expenditure.

Table 30.—Showing particulars of patients who received sanatorium treatment during the year.

	Under treatment on 1st Jan. 1937	New cases admitted during the year	Cases discharged during the year	Under treatment on 31st Dec. 1937	No. of Cases treated during the year
Insured Males	7	25	28	4	32
„ Females	4	3	6	1	7
Uninsured Males	2	16	17	1	18
„ Females	—	9	6	3	9
Ex-Service men	—	4	3	1	4
Male Children ...	—	—	—	—	—
Female children ...	—	—	—	—	—
Totals ...	13	57	60	10	70

Table 31.—Particulars of patients treated in St. Patrick's Hospital during 1937.

	Under treatment on 1st Jan. 1937	New cases admitted during the year	Cases discharged during the year	Under treatment on 31st Dec., 1937	No. of Cases treated during the year
Insured Males	7	32	32	7	39
,, Females	—	4	3	1	4
Uninsured Males ...	4	17	16	5	21
,, Females	4	10	11	3	14
Ex-Servicemen ...	3	11	13	1	14
Male children	—	1	—	1	1
Female children ...	—	2	2	—	2
Totals	18	77	77	18	95

Table 32.—Particulars of cases treated in the North Infirmary during 1937.

	Under treatment on 1st Jan. 1937	New cases admitted during the year	Cases discharged during the year	Under treatment on 31st Dec., 1937	No. of Cases treated during the year
Male children	—	2	—	—	—
,, adults	2	—	4	—	4
Female children	—	1	—	—	—
,, adults	—	—	1	—	1
Totals	2	3	5	—	5

Table 33.—Particulars of cases treated in the South Infirmary during 1937.

	Under treatment on 1st Jan. 1937	New cases admitted during the year	Cases discharged during the year	Under treatment on 31st Dec., 1937	No. of Cases treated during the year
Male children	—	3	2	1	3
,, adults	—	1	—	1	1
Female children	—	7	6	1	7
,, adults	—	1	1	—	1
Totals	—	12	9	3	12

Table 34.—Particulars of cases treated in St. Mary's Open-Air Hospital Cappagh, Co. Dublin.

	Under treatment on 1st Jan. 1937	New cases admitted during the year	Cases discharged during the year	Under treatment on 31st Dec., 1937	No. of Cases treated during the year
Female children	4	1	2	3	5
Male children	—	1	—	1	1
Totals	4	2	2	4	6

Table 35.—Particulars of cases treated in Victoria Hospital during 1937.

	Under treatment on 1st Jan. 1937	New cases admitted during the year	Cases discharged during the year	Under treatment on 31st Dec., 1937	No. of Cases treated during the year
Male children	1	3	3	1	4
Female children	—	—	—	—	—
Totals	1	3	3	1	4

Table 36.—Particulars of cases treated at St. Joseph's Hospital, Mount Desert, during 1937.

	Under treatment on 1st Jan. 1937	New cases admitted during the year	Cases discharged during the year	Under treatment on 31st Dec., 1937	No. of Cases treated during the year
Insured Males	2	26	18	10	28
,, Females	2	11	9	4	13
Uninsured Males	2	12	12	2	14
,, Females	3	17	19	1	20
Male children	—	—	—	—	—
Female children	—	—	—	—	—
Totals	9	66	58	17	75

Table 37.—Particulars of cases treated at Coole Open-Air Hospital, Co. Westmeath.

	Under treatment on 1st Jan., 1937	New cases admitted during the year	Cases discharged during the year	Under treatment on 31st Dec., 1937	No. of Cases treated during the year
Male Children	4	1	1	4	5
Total	4	1	1	4	5

Table 38.—Return of number of patients treated under the Tuberculosis Scheme, during the year ended 31st December, 1937.

	Pulmonary Tuberculosis			Non-Pulmonary Tuberculosis			Total
	Children under 15 years	Other Persons		Children under 15 years	Other Persons		
		Males	Females		Males	Females	
1.—*Insured Patients*:							
(i) No. remaining under treatment							
(a) On 1st. Jan., 1937	—	99	29	—	5	3	136
(b) On 31st Dec., 1937	—	89	37	—	1	2	129
(ii) No. of new patients treated during year	—	35	13	—	—	2	50
(iii) No. of cases under observation at close of year 1937	—	19	10	—	—	—	29
2.—*Other Patients*:							
(i) No. remaining under treatment							
(a) On 1st Jan., 1937	2	40	46	67	5	7	167
(b) on 31st Dec., 1937	2	38	41	66	7	11	165
(ii) No. of new patients treated during year	2	17	19	20	2	4	64
(iii) No. of cases under observation at close of year 1937 ...	25	11	22	4	—	—	62

ARTIFICIAL PNEUMOTHORAX.

Three new cases received artificial pneumothorax treatment during 1937. The inductions were carried out by the Tuberculosis Officer, one at the Cork District Hospital and two at St. Joseph's Hospital. The subsequent management was carried out at the Pneumothorax Clinic attached to the Tuberculosis Department. Routine X-Ray examinations are made at the North Infirmary by arrangement with Dr. Fielding, Radiologist. The number of cases treated during the year was fourteen, of whom nine are still undergoing treatment. 280 re-fills were given and 65 X-Ray examinations were made in connection with the treatment.

Section V.

Maternity and Child Welfare.

(A) INFANT MORTALITY.

The number of deaths of infants under one year of age amounted to 187, which is equivalent to an infant mortality rate of 102.8 per 1,000 live births. The corresponding figures last year were 154 and 80 per 1,000 respectively. The figure this year is the highest since 1926 (when the mortality rate was 130) and must be looked upon as very disappointing. The principal contributory causes were as follows :—

Premature birth and congenital debility	50 (44)
Diarrhoea and enteritis (under 1 year)	45 (34)
Broncho-pneumonia	30 (25)
Convulsions	19 (12)
Marasums	10 (7)

All these conditions show a definite increase on the corresponding figures for the previous year (which are shewn in brackets) and the total increase of 22 accounts for the major proportion of the difference (33) in the sum total of infant deaths in 1937 as compared with 1936.

In examining this question from the point of view of the controllable diseases one naturally looks to diarrhoea and broncho-pneumonia first. Premature birth and congenital debility do not lend themselves readily to examination from the epidemiological point, nor can any really constructive suggestion be put forward as to the reduction of deaths from such causes since we really know little or nothing as to the factors underlying such deaths although they continue year after year to take first place in the list of the causes of infant mortality. Neither can we hope for very much result in regard to convulsions. Convulsions, of course, is not to be regarded as a disease in itself but, rather, the manifestation of some underlying condition and an examination of the death returns makes it abundantly clear that in the vast majority of cases the certifying doctor was unable to determine what such underlying causes were. A suggestion may be advanced that in the majority of cases the determining factor is some dietetic indiscretion acting upon an unstable nervous system and producing the neuro-muscular spasm known under the generic term of convulsions. If this be so (and there seems to be no reason to doubt it in the majority of cases) we are

thrown back upon the necessity for breast feeding in every possible instance. The more one goes into the causes of disease and death in infants the more one is impressed by this outstanding factor and consequently I have found it necessary to emphasize the importance of breast feeding again and again in these reports and it will be necessary to refer to it again in connection with the deaths from gastro-enteritis.

Apart from prematurity, the two main factors in infant mortality are diarrhoea and broncho-pneumonia. In connection with the former, one's mind naturally turns to the epidemic of gastro-enteritis (reported in the section on infectious disease) and associates the increased number of deaths with the increased incidence of this disease, but on examining the deaths in regard to the dates of occurrence a very curious position is revealed. The epidemic made its appearance definitely in the third quarter of the year and continued into the early weeks of the fourth quarter. Cases of the disease, of course, were notified throughout the year (there were in fact only two weeks in which none were reported) and allusion is made to this fact in the previous section in connection with the view that many of these cases are not truly epidemic diarrhoea but rather, again, the result of dietetic errors. Now while the maximum incidence of diarrhoea was in the autumn the numbers of deaths registered were greatest in the first and last quarters. In the first quarter there were 12, in the second 8, in the third 9 and in the last quarter 15. It is apparent therefore that the increased number of deaths from diarrhoea cannot be attributed to the epidemic and we are thrown back upon the factor of improper feeding and the enormous preponderance of artificially fed babies who figure in the mortality tables lead us to the inevitable conclusion that this is the one factor above all others which determines the death of infants from this condition. Of the 45 deaths from gastro-enteritis in infants under one year, no less than 42 were artificially fed babies. Sufficient has been said about this matter in the section already referred to and in previous reports and it will suffice now to remark that artificial feeding is a highly dangerous precedure which should only be adopted under necessity by persons of a relatively high degree of educational attainment and a keen sense of the importance of attention to hygienic details. It is extremely doubtful if we will ever achieve such a degree of development for the whole population and since there seems to be a general abandonemnt of the natural method of feeding it is greatly to be feared that we must expect high figures in our mortality tables for many years to come.

Table 39.—Infant Mortality, Cork City, Éire, and England and Wales from 1881 to 1937.

Year	Cork	Éire	E. & W.	Year	Cork	Éire	E. & W.
1881	124	89.4		1910	96	89.1	105
1882	127	94.9	139				
1883	109	95.0		1911	139	91.3	130
1884	110	91.9		1912	107	82.1	95
1885	120	91.3		1913	136	93.1	108
1886	110	93.9	145	1914	119	81.0	105
1887	123	93.6		1915	132	85.2	110
1888	139	96.0	136	1916	105	81.3	91
1889	125	92.0	144	1917	108	84.0	96
1890	106	91.6	151	1918	118	80.2	97
				1919	100	84.4	89
1891	138	91.4	149	1920	79	77.5	80
1892	150	99.9	148				
1893	132	99.8	159	1921	76	72.6	83
1894	150	97.4	137	1922	93	68.9	77
1895	131	98.0	161	1923	66	66.4	69
1896	106	91.0	148	1924	87	71.6	75
1897	152	104.0	156	1925	74	67.9	75
1898	131	105.2	160	1926	130	74.4	70
1899	133	103.2	163	1927	87	70.8	70
1900	120	105.3	154	1928	76	67.9	65
				1929	81	70.4	74
1901	139	95.5	151	1930	77	68	60
1902	127	95.2	133				
1903	112	92.2	132	1931	71	69	66
1904	118	95.8	145	1932	89	71	65
1905	131	90.2	128	1933	89	65	64
1906	133	88.0	132	1934	72	63	59
1907	139	88.5	118	1935	84	67	57
1908	134	91.2	120	1936	80	74	59
1909	125	87.3	109	1937	103	72	58

In Table 40 is set out a comparative statement of infant mortality in Cork, Dublin, Belfast, Limerick and Waterford from 1920 to 1937.

Table 40.—Infant mortality in Cork and other Irish Cities from 1920 to 1937 inclusive.

Year	Cork	Dublin*	Belfast†	Limerick*	Waterford*
1920	79	152	132	109	96
1921 ...	76	143	115	113	102
1922 ...	93	120	94	108	94
1923 ...	66	117	101	128	78
1924 ...	87	119	107	90	93
1925 ...	74	117	104	91	106
1926 ...	130	118	112	146	115
1927 ...	87	122	101	104	82
1928 ...	76	103	103	120	110
1929 ...	81	107	112	118	108
1930 ...	77	98	78	104	84
1931 ...	71	94	90	120	91
1932 ...	89	102	111	91	131
1933 ...	89	83	102	126	103
1934 ...	72	79	80	77	88
1935	84	93	112	109	117
1936	80	114	102	95	89
1937	103	106	94	70	96

* Figures obtained from Annual Summary of Registrar General.
† Figures obtained from Superintendent Medical Officer of Health.

(B) NOTIFICATIONS OF BIRTHS.

The Acts bearing on this subject are the Notification of Births Acts, 1907, which was adopted by the Corporation in September, 1922, and the Notification of Births (Extension) Act, 1915. These Acts place an obligation on certain individuals to notify to the Medical Officer of Health within thirty-six hours, births which have occurred in the area, The object of the Acts is to enable the Local Authority to afford advice and assistance to parents on the care and upbringing of children.

The general procedure in connection with the notification of births was outlined in my Report for the year 1932. The total number of such notifications received in 1937 amounted to 1,818. The number of births *registered* during the same period, according to the Annual Summary of the Registrar-General was 1,706. It is obvious therefore that there is a very high degree of notification in this area.

(C) MATERNAL MORTALITY.

There were no deaths recorded under this heading during the year.

The ante-natal clinic is held on Wednesday mornings. Routine urine examinations and blood-pressure readings are made and pelvimetry is carried out in cases of primiparae. Cases where it is expected that confinement will not be normal are referred to Erinville Hospital. The provision of milk at reduced rates to expectant mothers has helped the attendances and serves in general to popularise ante-natal supervision as well as providing an addition to the dietary of the expectant mother of considerable value to the growing foetus.

Table 41.—The number of deaths of women directly attributable to or associated with pregnancy or childbirth during each of the years 1924–37, together with the rate per 1,000 births during each of these years, for the City of Cork. (Corrected for Births and Deaths in public institutions).

Year	Deaths from Puerperal Septic Diseases		Deaths from accidents of Pregnancy or Childbirth		Total Deaths from Puerperal Septic Diseases and accidents of Pregnancy or Childbirth		Deaths from causes associated with Pregnancy or Childbirth (not included in foregoing)		Total Deaths caused by, or associated with Pregnancy or Childbirth	
	No.	Rate per 1000 Births	No.	Rate per 1000 Births	No.	Rate per 1000 Births	No.	Rate per 1000 Births	No.	Rate per 1000 Births
1924....	5	2.55	6	3.05	11	5.60	1	0.51	12	6.11
1925....	5	2.54	5	2.54	10	5.08	1	0.51	11	5.59
1926....	3	1.66	8	4.42	11	6.08	—	—	11	6.08
1927....	5	2.74	6	3.28	11	6.02	—	—	11	6.02
1928....	3	1.64	9	4.92	12	6.56	1	0.55	13	7.11
1929....	—	—	4	2.24	4	2.24	—	—	4	2.24
1930....	1	0.46	3	1.37	4	1.83	—	—	4	1.83
1931....	1	0.52	7	3.63	8	4.10	—	—	8	4.10
1932....	1	0.55	8	4.28	9	4.95	—	—	9	4.95
1933....	1	0.54	8	4.32	9	4.85	1	0.54	10	5.40
1934....	5	2.60	2	0.52	7	3.60	—	—	7	3.60
1935....	1	0.51	5	2.56	6	3.08	—	—	6	3.08
1936....	1	0.52	4	2.08	5	2.60	—	—	5	2.60
1937....	—	—	—	—	—	—	—	—	—	—

In Table 42 (overleaf) is set out the comparative maternal mortality for Cork, Dublin, Belfast, Limerick and Waterford County Boroughs, and for the whole country.

Table 42.—Maternal Mortality in different areas from 1920 to 1937 inclusive.

Year	Whole Country		Cork City		City of Dublin		Belfast		Limerick County Borough		Waterford County Borough	
	No. of deaths	Rate per 1000 births	No. of deaths	Rate per 1000 births	No. of deaths	Rate per 1000 births	No. of deaths	Rate per 1000 births	No. of deaths	Rate per 1000 births	No. of deaths	Rate per 1000 births
1920	326	4.8	13	5.8	55	6.0	95	7.7	3	2.9	2	2.7
1921	336	5.5	8	4.0	53	6.5	53	4.7	1	1.0	3	5.1
1922 ...	370	6.3	7	3.6	61	7.1	55	5.1	12	11.8	—	—
1923	328	5.3	4	1.9	46	5.5	58	5.3	16	5.6	3	4.9
1924	330	5.2	12	6.1	46	5.0	46	4.4	1	0.9	4	5.9
1925 ...	312	5.0	11	5.6	42	4.9	29	2.8	3	2.8	4	6.4
1926	329	5.4	11	6.1	31	3.5	57	5.5	5	4.8	—	—
1927	291	4.8	11	6.0	23	2.8	36	3.7	5	4.8	3	4.7
1928 ...	318	5.4	13	7.1	31	3.5	43	4.6	5	4.5	2	3.0
1929	283	4.9	4	2.2	30	3.4	43	4.8	7	6.2	1	1.6
1930	294	5.0	4	1.8	43	4.1	44	4.6	4	3.7	3	4.6
1931	272	4.7	8	4.1	29	2.1	54	5.7	4	3.5	3	4.5
1932 ...	235	4.9	9	4.9	33	3.1	49	5.5	8	4.0	6	8.6
1933 ..	255	4.4	10	5.4	22	2.1	42	5.2	7	7.1	2	2.8
1934	304	5.2	7	3.6	41	3.7	57	6.3	2	1.9	—	—
1935	272	4.6	6	3.0	38	3.3	54	6.0	6	5.5	4	4.0
1936	273	4.7	5	2.6	42	3.5	57	6.2	2	2.0	3	4.5
1937	181	3.2	—	—	30	2.6	56	6.1	3	3.0	6	8.6

The above figures were obtained from the Annual Reports of the Registrar-General for Saorstat Eireann with the exception of those for the year 1937 (which were taken from the Annual Summary for that year) and those for Belfast, from 1922 onwards, which were kindly supplied by Dr. C. S. Thompson, Superintendent Medical Officer of Health. All figures include deaths from sepsis arising from abortion and miscarriage.

(D) SUPERVISION OF MIDWIVES.

1. Number of Midwives in Practice :—	
Certificate of C.M.B.	49
Other recognised certificates	40
Total	89
2. Number of midwives according to type of practice :—	
Attached to public institutions	6
Conducting only private maternity or nursing homes	9
Dealing with less than five cases per year	10
Monthly nurses	24
Others	40
Total	89
3. Number of visits of inspection of midwives	265
4. Disinfection of appliances	7
5. Reasons for summoning Medical help :—	
Abnormal presentation	24
Obstructed and delayed Labour	74
Post partum haemorrhage	6
Ante partum haemorrhage	7
Rise of Temperature	4
Discharge from baby's eyes	—
Thrombosis	1
Retained and adherent placenta	12
Ruptured perineum	20
6. Notification of still births	73
7. Notifications of artificial feeding	31
8. Notifications of having laid-out dead bodies	6
9. Suspensions for twenty-four hours on account of contact with cases of infectious disease	7
10. Notification of liability to be a source of infection....	4
11. Notifications of deaths	20

Six cases of puerperal fever were notified during the year. These cases are reviewed under the section for infectious diseases, and it is unnecessary to refer to them further here.

It was unnecessary to undertake any legal proceedings against midwives during the year.

(E) WORK OF THE MATERNITY AND CHILD WELFARE SCHEME.

The following is a summary of the work carried out during the year by the staff of the Centre. (The figures in brackets represent the corresponding attendances during 1936)—

Attendances of children under one year :—		
(a) New Cases	2137	(2073)
(b) Old Cases	3522	(4487)
Attendances of Mothers with Children	8412	(8326)
Cases seen by the Medical Officer :—		
(A) Under one year		
(1) New Cases	1059	(1070)
(2) Old Cases	2302	(3000)
(B) One to two years		
(1) New Cases	809	(762)
(2) Old Cases	491	(749)
(C) Two to five years		
(1) New Cases	422	(423)
(2) Old Cases	327	(542)
(D) Expectant Mothers		
(1) New Cases	354	(501)
(2) Old Cases	343	(619)
Analysis of cases dealt with by the Medical Officer :—		
Consultations on infant feeding	923	(905)
Diseases of respiratory system	178	(185)
,, new born	3	(5)
,, reproductive system	—	(2)
,, urinary system	18	(24)
,, nervous system	2	(1)
,, circulatory system	5	(7)
,, alimentary system	875	(818)
,, skin	145	(189)
,, ears	56	(38)
,, eyes	28	(23)
Exanthemata	23	(19)
Mental defects	5	(2)
Congenital defects	1	(1)
Orthopoedic defects	5	(3)
Rickets	1	(2)
Avitaminosis	22	(31)
Number of cases dealt with	2290	(2255)
Number of attendances	5410	(6546)
Ante-natal work—		
Number of cases dealt with	354	(501)
Number of attendances	697	(1120)
Return of Health Visitors' work—		
(A) Under one year		
(1) Primary visits	1802	(1768)
(2) Secondary visits	3492	(3533)

(B) One to two years		
(1) Primary visits	1174	(1221)
(2) Secondary visits	1092	(1367)
(C) Two to five years		
(1) Primary visits	932	(960)
(2) Secondary visits	2867	(2913)
(D) Expectant Mothers		
(1) Primary visits	591	(600)
(2) Secondary visits	610	(659)

The attendances at the clinic continue to steadily increase and are now assuming embarassing proportions, calling for all the energy and tact of the nurses and voluntary workers to deal with them, and in this connection we will have to consider the establishment of outlying centres in the near future to deal with the growing districts now springing up on the outskirts of the City.

The following cases were dealt with at the artificial sunlight clinic during the year :—

Avitaminosis	31
Debility	15
Rickets	6
Non-Pulmonary Tuberculosis	10
Post-exanthemata	5
Anaemia	5
Number of cases treated	72
Number of exposures	660

Section VI.—Control of Food Supplies

The following report has been contributed by Mr. S. R. J. Cussen, Chief Veterinary Officer :—

(A) SUPERVISION OF MILK.

MILK SECTION.

The Milk and Dairies Act, 1935.

This Act came into force on the 1st January, 1937, with the exception of certain sections dealing with the sale of milk under Special Designations. The object of the Act is to improve the methods of production and the handling of milk generally, and to safeguard it against infection and contamination. It incorporates many of the provisions of the 1908 Order, as well as including many new provisions which modern requirements have shown to be necessary.

If loyally administered I have no doubt it will go a long way in achieving the object for which it was intended. If on the other hand, there is any laxity on the part of those responsible for enforcing its provisions at the source, then it will be as great a farce as its predecessor. It may be premature to comment on the results so far achieved owing to the short time the Act is in force. There is one very noticable improvement and that is in the methods of distribution, the provisions relating to the proper equipment are well observed. With regard to the quality of the milk, the only improvement I have noticed is a slight decrease in the dirt content as revealed by the " Minit Test."

The principle new provisions introduced in the Act are as follows :—

The word Milk has a comprehensive definition and includes whole milk, skimmed or separated milk, cream or buttermilk.

The sale of milk on unregistered premises and by unregistered persons is prohibited.

Each vehicle used by a dairyman for distribution of milk in a district in which he has no other premises must be registered.

The Sanitary Authority are empowered to refuse the registration of a dairyman if satisfied that he is not a fit and proper person to carry on the business of dairyman, or if his premises are not suitable for the sale of milk. They can cancel the registration of any dairyman if satisfied that he is no longer a fit and proper person to carry on the business of a dairyman or if he is convicted of an offence under the Milk and Dairies Act or of an offence under the Food and Drugs Acts, 1875 to 1935, or where registration was procured by fraud, or by misrepresentation whether fradulent or innocent. They can cancel registration of any premises if satisfied that there are no longer suitable for the sale of milk.

There are certain persons excluded from the operation of the Act:— (a) An employer who supplies milk to his employee under his contract of service. (b) Such persons as restaurant keepers, etc., who sell milk only for consumption on the premises. (c) Suppliers to creameries which hold Special Designation Licences for the sale of pasteurised milk. At the moment there are no creameries that hold Designation Licences, in view of the fact that there is no Milk Designation Order in force, therefore suppliers to creameries come within the scope of the Act at present.

A farm is excluded from which milk not exceeding one gallon in any one day is occasionally sold to persons for consumption by them and their families.

Sampling Officers may be appointed by the Sanitary Authority with the consent of the Minister, and these officers may take, without payment, samples of milk for bacteriological examination at any place in the district for which they are appointed, and at any time before such milk is delivered to the consumer. The Medical Officer of Health of the district within which milk from a Dairy outside the district is sold may arrange for the taking of a sample of such milk by the M.O.H. of the district in which the dairy is situated, and furthermore he can prosecute the dairyman from whom the sample was taken if the milk does not conform to the prescribed standard.

The sale of dirty or contaminated milk is prohibited.

Any milk that has an offensive taste or smell or which on being tested is found to contain visible offensive matter or a number of bacteria greater than 500,000 per c.c. shall be deemed to be contaminated. This was the first occasion in which legislation was introduced making it a criminal offence to sell dirty or contaminated milk for human consumption. This is a very important innovation, and it should prove very helpful in improving the supply in places like Cork, where the consuming authorities have no supervision over the production of 99% of their milk supply. It has been our experience in the past that dairymen failed to take notice when dirt in the milk was demonstrated to them at the time of sampling, as subsequent samples proved, because they were aware that we had no power to proceed against them. In the future we intend enforcing this provision relating to dirty or contaminated milk with the hope of diminishing the dirt content and indirectly improving the methods of production.

A rather comprehensive set of regulations came into force at the same time as the Act. Certain provisions relating to structural conditions and equipment were deferred until the first of July, 1937. Dairymen were thus given a period of six months in which to comply with the requirements and prepare for registration.

Applications for registration in the Register of Dairymen were received from persons :—

(1) Who are resident outside the Borough, and who use vans for the purpose of their business.

(2) Who are resident inside the Borough, and
  (a) Who sell milk in shops.
  (b) Who sell cream only.

(3) Who keep cows for the production of milk.

(1) Applications were received from 261 persons who use vans for the purpose of their business. All applicants were notified to bring their vans and equipment for inspection. The first general inspection took place in December, 1936, the object of this early start was obvious, it gave these people an opportunity of learning how they were affected by these enactments, and gave them ample time to make good any defects in vehicle and equipment before the licensing time arrived. 290 vans were inspected, a large number of which passed for registration at the first inspection. Some that were unsightly in appearance, and in bad repair were put back, the owners after being advised as to the improvements necessary were asked to report for final inspection in the course of a few months. Eventually 289 vans had been inspected and registered, in only one case was it necessary to refuse registration.

(2*a*) As soon as the first general inspection of milk vans was finished, inspection of milk shops was undertaken. There were 341 applications received in respect of 348 shops. 197 of these were passed for registration at the first inspection. 67 applications were withdrawn, the owners, having regard for the amount of milk sold, considered the outlay in structural alterations and renovations too great. 84 applications were refused in respect of premises on the grounds of unsuitability. The usual Refusal Orders were issued. With few exceptions the owners were given the option of putting their premises in order, and applying for registration afresh as soon as the requirements of the Corporation were carried out. Eventually 29 persons complied, and after reinspection the premises were registered.

The total number of shops registered is 226.

The total number of persons registered is 219.

(2*b*) There were 16 applications received from persons who sell cream only. These applications were grocers and provision merchants. Registration was granted in each case.

Total number of shops registered for the sale of Cream only is 19.

(3) Applications for registration were received from seven persons who keep cows for the production of milk. Registration was granted to five of these. Two were refused as their byres, milk houses and equipment did not conform to the requirements, in the course of a few months, however, these carried out the requirements of the Corporation and were registered.

The number of inspections made of premises where milk was produced and sold was as follows :—

Milk Shops	3,670
Milk Vans	727
Cowsheds	123

Generally these were found in a satisfactory state of cleanliness. There were a few cases where the provisions of the Milk and Dairies Regulations were not observed and it was necessary to take legal proceedings against the persons concerned. 78 persons were prosecuted, and fines to the total amount of £12 8s. 0d. were imposed. The fines varied from 1/– to a maximum of 7/6. The small fines imposed in these cases seemed to have little or no effect as a deterrent, because offenders were prosecuted for the same offence in more than one occasion.

The number of cows kept for the production of milk is very small, being only 65. These were inspected quarterly and surprise visits were made between the ordinary routine visits. Each cow is clinically examined, particular attention is paid to the udder. A sample of milk is taken from any cow that shows the slightest induration of the gland substance, this is examined microscopically for the presence of pathogenic bacteria. In addition to the individual sample there is taken a sample representing the udder secretion of all animals constituting the herd, which is used for guinea pig inoculation.

Five notices were served on dairymen for failing to comply with the requirements of the Milk and Dairies Regulations.

The number of samples taken for Bacteriological examination was as follows :—

Ordinary Market Milk	206
Grade "A"	73
Grade "A" (T.T.)	21
Pasteurised	3
Total	303

The tests applied were as follows :—

1.—The Sedimentation (or dirt) Test.
2.—The Microscopic Test
3.—Determination of bacteria of faecal origin.
4.—Determination of Pathogenic Bacteria.
5.—The Reductase Test.

1.—The Sedimentation Test.

This test has been fully described in previous reports. Briefly it consists in forcing a quantity of milk under pressure through a cotton wool pad held in a metal container shaped like a bottle. Dirt suspended in the milk is separated by the pad and a rough standardisation can be made according to the appearance of the pad after the test. The results of the tests were as follows :—

	Ordinary Market Milk	Grade "A"	Grade "A" (T.T.)	Pasteurised
Very Clean	5	31	12	1
Clean	31	29	9	2
Fairly Clean	80	12	–	–
Dirty	70	1	–	–
Very Dirty	20	–	–	–
	206	73	21	3

It is interesting to note that during the year there were two prosecutions instituted against persons for offering for sale dirty milk. The Test used to demonstrate the presence of dirt was the " Minit Test " as described above. The pad containing the dirt deposit was used in evidence in support of the prosecution. The first prosecution was successfully brought under Section 59 but the second failed, the District Justice being of opinion that where a test had to be applied to demonstrate the presence of dirt, a sample should be taken in the prescribed manner. Below is an extract from the Press, giving the findings of the Justice in the case in question.

" The Justice said he found the milk in question in this case dirty. This did not arise by reason of an act of the defendants who so received the milk from the producer, and in fact the process to which the defendants submitted the milk before sale materially lessened the quantity of dirt it contained, even though this was done he thought the milk could still be described as dirty milk. It might happen that milk exposed for sale was obviously visibly contaminated or dirty, a successful prosecution under Section 59 could then be brought without any sample of milk being taken, or it may be that the milk exposed for sale could have been submitted to examination or test necessary to establish the fact that it was dirty or contaminated. In such case he thought the inspector should take a sample under Section 54 and as directed by Section 57. This seemed to him (the Justice) to be borne out by paragraph 6 (2) of the Regulations of 1936.

The Statute was clear, and Section 57 was inserted to safeguard other vendors of milk. In the present case the milk was not visibly dirty, and it was necessary therefore to establish contamination. The procedure under Section 57 was not followed and he held accordingly that the defendants were entitled to rely on this and to have the summons dismissed. He marked the summons ' D.O.M.' "

It was generally understood that the " Minit Test " could be used for the detection of extraneous matter in milk without having to go through the formalities of having samples taken as laid down in the Milk and Dairies (Milk Sampling) Regulations, 1936, and that a successful prosecution could be brought under Section 59. The decision of the District Justice has upset this calculation.

This creates a rather unfortunate position, because in 99 out of every 100 cases it is necessary to submit milk to some form of test to demonstrate the presence of dirt, as what would constitute visible dirt, hairs, hayseed, etc., being removed by efficient straining. To my mind it was lack of foresight on the part of those who drafted the Act, that some form of simple test for dirt was not prescribed, that could be carried out on the spot by the Sampling Officer. Sampling of milk, in order to test for contamination, is going to be an expensive item, each sample will cost 8/6 approximately.

This dirt test has been applied every year since the first development of our laboratory service and the results to date are shown in the following table :—

Table 43.—Results of Dirt Test over the period 1930–37.

Year	No. of Samples	Very Clean	Clean	Fairly Clean	Dirty	Very Dirty
1930	412	8	72	118	156	58
1931	408	23	61	82	139	103
1932	630	4	27	108	265	226
1933	485	3	27	105	221	129
1934	339*	—	19	51	148	121
1935	223*	—	7	21	103	92
1936	227*	3	21	43	106	54
1937	206*	5	31	80	70	20
Totals	2930	46	265	608	1208	803

* Ordinary market milk.

There has been a reduction in the number of dirty samples since the Milk and Dairies Act came into force as reference to the next table will show :—

Table 44.—Proportion of Samples classified as "Dirty," 1930–37.

Year	No. of Samples	Dirty	Proportion of Total
1930	412	214	51.9 per cent.
1931	408	242	59.3 ,,
1932	630	491	77.9 ,,
1933	485	350	72.2 ,,
1934	339	269	79.3 ,,
1935	223	195	87.4 ,,
1936	227	160	70.9 ,,
1937	206	90	43.6 ,,
Total	2,930	2,011	68.6 ,,

Even though there has been a reduction in the number of dirty samples, there is still room for further improvement. It is to be feared that no reasonable effort is being made to enforce the provisions of the Milk and Dairies Regulations relating to the production of milk.

2.—Microscopic Examination.

The main object of this examination is the detection of the so-called "Acid Fast" group of micro-organisms, of which the Tubercle Bacillus is a member. In eight samples acid fast bacilli were detected, streptococci in nine and pus in eleven. Pus in milk indicates

suppuration of the udder. In the event of positive findings in either of these directions our results are reported to the County Health Authority for action. This has been the procedure for some years past.

Table 45.—Results of Microscopic Examinations, 1930-37.

Year	No. of Samples	Acid-fasts	Streptococci	Pus Cells	Free from Suspicious Organisms
1930	412	29	7	12	364
1931	408	16	29	19	344
1932	630	40	3	2	585
1933	492	32	3	—	457
1934	520*	5	10	—	505
1935	382	—	17	10	325
1936	314	4	11	4	299
1937	303	8	9	11	275
Totals	3461	134	89	58	3154

*This figure includes both Grade "A" and ordinary market milk. In the previous tables the corresponding figure refers to ordinary milk only. In *all* tables the figures for the four previous years refer to ordinary milk only. A distinction has to be made for 1934 as in that year examination of Grade "A" samples was instituted and the results kept separate from those for ordinary milk.

3.—Determination of Bacteria of faecal origin.

Two types of bacteria are looked for, viz., Bacillus Coli and Anaerobic Sporeforming Bacteria. These organisms are mainly associated with animal excreta. Their presence in milk may be taken to show carelessness in production. A full description of the tests for these organisms has been given in previous reports.

Table 46.—Result of Tests for the presence of organisms of Faecal origin, 1937.

Quality	No. of Samples	Coli Present	Spore-formers Present	Proportion free from Coli and Spore-formers
Grade "A" (T.T.)	21	4	1	76.2 per cent
Grade "A"	73	—	4	94.5 ,,
Pasteurised	3	—	—	100 ,,
Ordinary	206	25	74	63.1 ,,
Totals	303	29	79	71.9 ,,

23 samples contained both Coli and Spore-formers.

4.—Determination of Presence of Pathogenic Bacteria.

This matter has been partly alluded to under the heading of microscopic examination. The presence of streptococci in milk is to be regarded as of pathogenic significance from the point of view of the liability of such milk to cause septic sore throat. They were present in nine samples, including two Grade "A" (T.T.) and one Grade "A." In dealing with Pathogenic Bacteria our chief concern was the Tubercle Bacillus, which is transmissible to man in infected milk. The biological test is the only reliable one in detecting Tubercle in milk. As pointed out in last year's report it was our aim to build up a large herd of guinea pigs to carry out this test in a comprehensive scale. In 1935 we lost our entire herd of guinea pigs as the result of a fire that occurred in the guinea pig house.

Table 47.—Biological Test for the presence of Tubercle Bacilli in Milk.

No. of G. Pig	No. of Sample	Date of Inoculation	Date of Postmortem	Result	Observations
1	1c	8/1/37	10/3/37	N	Herd Sample
2	2c	,,	,,	N	,,
3	3c	,,	,,	N	,,
4	4c	,,	8/3/37	N	,,
5	5c	,,	,,	N	,,
6	6c	13/1/37	23/1/37	Died	,, Pneumonia
7	7c	,,	13/3/37	N	,,
8	8c	,,	25/1/37	Died	,, Pneumonia and
9	9c	,,	23/3/37	N	,, Pleurisy
10	10c	10/2/37	28/1/37	Died	,, Pneumonia and
11	11c	,,	2/4/37	N	,, Pleurisy
12	12c	13/2/37	8/4/37	N	Group Sample
13	36	11/3/37	7/4/37	Died	Market Milk, Pneumonia and
14	37	,,	14/5/37	N	,, Pleurisy
15	129	20/8/37	22/11/37	N	,,
16	130	,,	,,	N	,,
17	131	,,	,,	N	,,
18	132	,,	,,	N	,,
19	146 & 152	26/8/37	,,	N	,,
20	157	27/8/37	,,	N	,,
21	287	22/11/37	22/1/38	N	,,
22	288	,,	,,	N	,,
23	289	,,	,,	N	,,
24	290	,,	27/1/38	N	,,
25	291	,,	,,	N	,,
26	292	,,	,,	N	,,
27	293	27/11/37	,,	N	,,
28	294	,,	,,	N	,,
29	295	,,	,,	N	,,
30	296	,,	,,	N	,,
31	297	,,	,,	N	,,
32	298	,,	,,	N	,,
33	13c	7/12/37	8/2/38	N	Sample from individual cow

Table 48.—Bacteriological Examination of Grade "A" (T.T.) Milk.

Sample No.	Dirt Test	Reductase Test "Grade"	Coli-form Bacilli	Spore-forming Bacilli	Microscopical Test			
					Acid Fast	Strep-tococci	Pus	Blood
3	V. Clean	1	—	—	—	—	—	—
67	Clean	2	+	—	—	—	—	—
70	V. Clean	2	+	—	—	—	—	—
73	,,	1	—	—	—	—	—	—
74	Clean	1	—	—	—	—	—	—
76	,,	2	+	—	—	—	—	—
79	,,	3	—	—	—	—	—	—
80	,,	1	—	—	—	—	—	—
82	V. Clean	1	—	—	—	—	—	—
85	Clean	3	—	—	—	—	—	—
90	V. Clean	1	—	—	—	+	+	—
93	,,	1	—	—	—	+	+	—
119	Clean	1	—	—	—	—	—	—
122	Clean	1	—	—	—	—	—	—
178	V. Clean	1	—	—	—	—	—	—
181	,,	1	—	—	—	—	—	—
189	,,	1	—	—	—	—	—	—
192	,,	1	—	—	—	—	—	—
206	,,	2	—	—	—	—	—	—
209	,,	1	+	+	—	—	—	—
239	Clean	1	—	—	—	—	—	—

Table 49.—Bacteriological Examination of Grade "A" Milk.

Sample No.	Dirt Test	Reductase Test "Grade"	Coli-form Bacilli	Spore-forming Bacilli	Microscopical Test			
					Acid Fast	Strep-tococci	Pus	Blood
1	Clean	1	—	—	—	+	+	—
2	,,	1	—	—	—	—	—	—
4	F. Clean	1	—	—	—	—	—	—
5	Clean	1	—	—	—	—	—	—
36	V. Clean	1	—	—	—	—	—	—
37	F. Clean	1	—	—	—	—	—	—
65	Clean	1	—	—	—	—	—	—
66	F. Clean	1	—	—	—	—	—	—
68	V. Clean	1	—	—	—	—	—	—
69	,,	1	—	—	—	—	—	—
71	,,	1	—	—	—	—	—	—
72	,,	1	—	—	—	—	—	—
75	,,	1	—	—	—	—	—	—
77	Clean	1	—	—	—	—	—	—
78	,,	1	—	—	—	—	—	—
81	V. Clean	1	—	—	—	—	—	—
83	Clean	2	—	—	—	—	—	—
84	V. Clean	1	—	—	—	—	—	—
79	F. Clean	1	—	—	—	—	—	—
91	,,	2	—	—	—	—	—	—
92	Clean	2	—	—	—	—	—	—
118	,,	1	—	—	—	—	—	—
120	,,	1	—	—	—	—	—	—
121	,,	1	—	—	—	—	—	—

Table 49—Bacteriological Examination of Grade "A" Milk—contd.

Sample No.	Dirt Test	Reductase Test "Grade"	Coli-form Bacilli	Spore-forming Bacilli	Microscopical Test			
					Acid Fast	Strep-tococci	Pus	Blood
177	V. Clean	1	—	—	—	—	—	—
179	F. Clean	2	—	—	—	—	—	—
180	V. Clean	1	—	+	—	—	—	—
188	Clean	1	—	—	—	—	—	—
190	,,	1	—	—	—	—	—	—
191	V. Clean	2	—	—	—	—	—	—
205	,,	1	—	—	—	—	—	—
207	,,	1	—	—	—	—	—	—
208	Clean	1	—	—	—	—	—	—
228	V. Clean	1	—	—	—	—	—	—
229	Clean	1	—	—	—	—	—	—
230	,,	1	—	—	—	—	—	—
231	,,	1	—	—	—	—	—	—
232	,,	1	—	—	—	—	—	—
233	,,	1	—	—	—	—	—	—
234	V. Clean	1	—	—	—	—	—	—
235	,,	1	—	—	—	—	—	—
236	V. Clean	1	—	—	—	—	—	—
237	Clean	1	—	—	—	—	—	—
238	,,	1	—	—	—	—	—	—
241	,,	1	—	—	—	—	—	—
254	,,	1	—	—	—	—	—	—
255	F. Clean	2	—	—	—	—	—	—
256	Clean	2	—	—	—	—	—	—
257	F. Clean	2	—	—	—	—	—	—
258	Clean	1	—	—	—	—	—	—
259	F. Clean	2	—	—	—	—	—	—
260	Clean	1	—	—	—	—	—	—
267	V. Clean	1	—	—	—	—	—	—
268	F. Clean	1	—	+	—	—	—	—
269	V. Clean	1	—	—	—	—	—	—
270	Clean	1	—	—	—	—	—	—
271	V. Clean	1	—	—	—	—	—	—
272	,,	1	—	—	—	—	—	—
273	Dirty	1	—	+	—	—	—	—
280	V. Clean	1	—	—	—	—	—	—
281	F. Clean	1	—	—	—	—	—	—
282	V. Clean	1	—	—	—	—	—	—
283	,,	1	—	+	—	—	—	—
284	,,	1	—	—	—	—	—	—
285	Clean	1	—	—	—	—	—	—
286	F. Clean	2	—	—	—	—	—	—
299	V. Clean	1	—	—	—	—	—	—
300	,,	1	—	—	—	—	—	—
301	,,	1	—	—	—	—	—	—
302	,,	1	—	—	—	—	—	—
303	,,	1	—	—	—	—	—	—
304	,,	1	—	—	—	—	—	—
305	,,	1	—	—	—	—	—	—

Table 50.—Bacteriological Examination of Ordinary Milk.

Sample No.	Dirt Test	Reductase Test "Grade"	Coli-form Bacilli	Spore-forming Bacilli	Microscopical Test			
					Acid Fast	Strep-tococci	Pus	Blood
6	V. Dirty	1	—	+	—	—	—	—
7	Dirty	1	—	—	—	—	—	—
8	F. Clean	1	—	—	—	—	—	—
9	,,	1	—	+	—	—	—	—
10	V. Dirty	1	+	+	—	—	—	—
11	F. Clean	1	+	+	—	—	—	—
12	,,	1	—	—	—	—	—	—
13	,,	1	—	—	—	—	—	—
14	V. Dirty	1	—	—	—	+	+	—
15	Dirty	1	+	+	—	—	—	—
16	F. Dirty	1	—	—	—	—	—	—
17	V. Dirty	2	+	+	—	—	—	—
18	Dirty	1	—	—	—	—	—	—
19	V. Dirty	1	—	—	—	—	—	—
20	F. Clean	1	—	+	—	—	—	—
21	Dirty	1	—	—	—	—	—	—
22	,,	1	—	—	—	—	—	—
23	F. Clean	1	—	—	—	—	—	—
24	Dirty	1	—	+	—	—	—	—
25	V. Dirty	1	+	+	—	+	+	—
26	Dirty	1	—	+	—	—	—	—
27	V. Dirty	1	—	+	—	—	—	—
28	Dirty	1	—	—	—	—	—	—
29	,,	1	—	+	—	—	—	—
30	,,	1	—	+	—	—	—	—
31	,,	1	—	+	—	—	—	—
32	,,	1	—	—	—	—	—	—
33	,,	2	—	+	—	+	+	—
34	,,	1	—	+	—	—	—	—
35	,,	1	—	—	—	—	—	—
38	F. Clean	1	—	—	—	—	—	—
39	Dirty	2	—	—	—	—	—	—
40	,,	1	—	+	—	—	—	—
41	,,	1	—	—	—	—	—	—
42	F. Clean	1	—	—	—	—	—	—
43	,,	1	—	+	—	—	—	—
44	Clean	1	—	—	—	—	—	—
45	,,	1	—	—	—	—	—	—
46	Dirty	3	—	+	—	—	—	—
47	V. Dirty	1	+	+	—	—	—	—
48	Dirty	1	—	+	—	—	—	—
49	,,	2	+	+	—	—	—	—
50	F. Clean	1	+	+	—	—	—	—
51	V. Dirty	2	—	+	—	—	—	—
52	F. Clean	1	—	+	—	—	—	—
53	,,	1	—	—	—	—	—	—
54	Dirty	1	—	—	—	—	—	—
55	F. Clean	1	—	—	—	—	—	—
56	,,	1	—	—	—	—	—	—
57	,,	1	—	+	—	—	—	—
58	Clean	1	—	+	—	—	—	—
59	Dirty	1	—	—	—	—	—	—
60	,,	2	—	—	—	—	—	—
61	,,	2	—	—	—	—	—	—
62	,,	2	—	—	—	—	—	—
63	,,	4	+	—	—	—	—	—
64	,,	2	—	—	—	—	—	—

Table 50—Bacteriological Examination of Ordinary Milk—contd.

Sample No.	Dirt Test	Reductase Test "Grade"	Coli-form Bacilli	Spore-forming Bacilli	Microscopical Test			
					Acid Fast	Strep-tococci	Pus	Blood
86	Clean	1	—	—	—	—	—	—
94	F. Clean	1	—	+	—	—	—	—
95	,,	1	—	—	—	+	+	—
96	Dirty	2	—	—	—	—	—	—
97	Clean	1	—	+	—	—	—	—
98	F. Clean	1	—	—	—	+	+	—
99	,,	1	—	—	—	—	—	—
100	,,	2	—	—	—	—	—	—
101	,,	2	—	—	—	—	—	—
102	,,	2	—	+	—	—	—	—
103	,,	3	—	+	—	—	—	—
104	,,	2	—	—	—	—	—	—
105	,,	3	—	+	—	—	—	—
106	Clean	2	—	+	—	—	—	—
107	F. Clean	2	—	+	—	—	—	—
108	Dirty	3	—	+	—	—	—	—
109	Clean	2	—	—	—	—	—	—
110	,,	2	—	+	—	—	—	—
111	F. Clean	2	—	+	—	—	—	—
112	Dirty	3	—	+	—	—	—	—
113	Dirty	3	—	+	—	—	—	—
114	Dirty	4	—	—	—	—	—	—
115	F. Clean	3	—	—	—	—	—	—
116	Dirty	3	—	+	—	—	—	—
117	,,	1	—	—	—	—	—	—
123	F. Clean	2	—	—	+	—	—	—
124	,,	2	—	—	—	—	—	—
125	,,	2	—	—	—	—	—	—
126	,,	2	—	—	—	—	—	—
127	Dirty	2	—	+	—	—	—	—
129	F. Clean	2	—	—	—	—	—	—
130	,,	2	—	—	—	—	—	—
131	,,	3	+	+	—	—	—	—
132	Clean	2	—	+	—	—	—	—
133	F. Clean	2	—	—	—	—	—	—
134	Clean	2	—	—	—	—	—	—
135	F. Clean	2	—	—	—	—	—	—
136	,,	2	—	+	—	—	—	—
137	,,	1	—	—	—	—	—	—
138	Dirty	3	+	+	—	—	—	—
139	,,	2	—	—	—	—	—	—
140	,,	2	—	+	—	—	—	—
141	V. Clean	2	—	—	—	—	—	—
142	V. Clean	2	+	—	—	—	—	—
143	Clean	2	—	—	—	—	—	—
144	Clean	2	—	—	—	—	—	—
145	F. Clean	1	—	+	—	—	—	—
146	,,	1	—	—	+	—	—	—
147	V. Dirty	2	—	+	—	—	—	—
148	Clean	2	—	—	—	—	—	—
149	V. Clean	2	—	—	—	—	—	—
150	F. Clean	1	—	—	—	—	—	—
151	Clean	2	—	—	—	—	—	—
152	F. Clean	2	—	—	+	—	—	—
153	Dirty	2	—	—	—	—	—	—
154	F. Clean	2	—	—	—	—	—	—
155	,,	2	—	—	—	—	—	—

Table 50—Bacteriological Examination of Ordinary Milk—contd.

Sample No.	Dirt Test	Reductase Test "Grade"	Coli-form Bacilli	Spore-forming Bacilli	Microscopical Test			
					Acid Fast	Strep-tococci	Pus	Blood
156	Dirty	2	—	—	—	—	—	—
157	,,	2	—	—	+	—	—	—
158	F. Clean	2	—	—	—	—	—	—
159	,,	2	—	—	—	—	—	—
160	Dirty	3	—	—	—	—	—	—
161	F. Clean	2	—	—	—	—	—	—
162	Dirty	2	—	—	—	—	—	—
163	Clean	2	—	—	—	—	—	—
164	F. Clean	2	—	—	+	—	—	—
165	Clean	2	—	—	—	—	—	—
166	Clean	1	—	—	—	—	—	—
167	F. Clean	2	—	+	—	—	—	—
168	,,	2	—	—	—	—	—	—
169	Clean	2	—	—	+	—	—	—
170	Dirty	2	—	+	—	—	—	—
171	,,	2	—	+	—	—	—	—
172	,,	1	—	—	—	—	—	—
173	F. Clean	2	—	—	—	—	—	—
174	,,	2	—	—	—	—	—	—
175	Dirty	2	—	+	—	—	+	—
176	V. Dirty	2	—	—	—	—	—	—
182	F. Clean	3	+	+	—	—	—	—
183	Clean	2	—	—	—	—	—	—
184	Dirty	2	—	—	—	—	—	—
185	,,	2	—	—	—	—	—	—
186	,,	1	+	+	—	—	—	—
187	V. Dirty	2	—	+	—	—	—	—
193	Clean	1	—	—	—	—	—	—
194	F. Clean	2	—	—	—	—	—	—
195	Dirty	1	—	—	—	—	—	—
196	F. Clean	2	+	+	—	—	—	—
197	,,	1	+	+	—	—	+	—
198	Clean	1	+	+	—	—	—	—
199	F. Clean	1	+	+	—	—	—	—
200	,,	1	—	—	—	—	—	—
201	,,	2	—	—	—	—	—	—
202	F. Clean	2	+	+	—	—	—	—
203	,,	1	—	+	—	—	—	—
204	,,	2	—	+	—	—	—	—
210	Dirty	2	—	—	—	—	—	—
211	F. Clean	2	—	—	+	—	—	—
212	Clean	2	—	—	—	—	—	—
213	Dirty	3	—	+	—	—	—	—
214	Clean	2	—	—	—	—	—	—
215	,,	2	—	—	—	—	—	—
216	Dirty	2	—	—	+	—	—	—
217	V. Dirty	2	+	+	—	—	—	—
218	F. Clean	1	—	—	—	—	—	—
219	Clean	2	—	—	—	—	—	—
220	,,	1	—	—	—	—	—	—
221	F. Clean	2	—	+	—	—	—	—
222	Clean	1	—	—	—	—	—	—
223	Dirty	1	—	—	—	—	—	—
224	Clean	1	—	—	—	—	—	—
226	Dirty	1	+	+	—	—	—	—
227	Clean	3	—	—	—	—	—	—
242	F. Clean	2	—	—	—	—	—	—

Table 50—Bacteriological Examination of Ordinary Milk—contd.

Sample No.	Dirt Test	Reductase Test " Grade "	Coli-form Bacilli	Spore-forming Bacilli	Microscopical Test			
					Acid Fast	Strep-tococci	Pus	Blood
243	Dirty	2	—	—	—	—	—	—
244	,,	2	—	—	+	—	—	—
245	,,	1	—	—	—	—	—	—
246	F. Clean	2	—	—	—	—	—	—
247	F. Clean	2	—	—	—	—	—	—
248	V. Dirty	2	—	+	—	—	—	—
249	,,	1	—	—	—	—	—	—
250	F. Clean	2	—	—	—	—	—	—
251	Dirty	1	—	—	—	—	—	—
252	F. Clean	2	—	—	—	—	—	—
253	Clean	1	—	—	—	—	—	—
261	Dirty	2	—	—	—	—	—	—
262	V. Clean	1	—	—	—	—	—	—
263	F. Clean	2	—	—	—	—	—	—
264	V. Dirty	2	+	+	—	—	—	—
265	F. Clean	2	—	—	—	—	—	—
266	V. Dirty	2	—	—	—	+	+	—
274	,,	1	—	—	—	—	—	—
275	Clean	1	—	—	—	—	—	—
276	Dirty	2	—	+	—	—	—	—
277	,,	2	—	+	—	—	—	—
278	,,	4	+	+	—	—	—	—
279	,,	1	—	—	—	—	—	—
287	F. Clean	1	—	—	—	—	—	—
288	,,	1	+	—	—	—	—	—
289	V. Dirty	2	+	+	—	—	—	—
296	Dirty	1	—	—	—	—	—	—
291	,,	2	—	—	—	—	—	—
292	F. Clean	2	—	—	—	—	—	—
293	Clean	1	—	—	—	—	—	—
294	Dirty	1	—	—	—	—	—	—
295	F. Clean	1	—	—	—	—	—	—
296	,,	1	—	—	—	—	—	—
297	Dirty	1	—	—	—	—	—	—
298	V. Dirty	3	+	+	—	—	—	—

Table 51.—Bacteriological Examination of Pasteurised Milk.

Sample No.	Dirt Test	Reductase Test " Grade "	Coli-form Bacilli	Spore-forming Bacilli	Microscopical Test			
					Acid Fast	Strep-tococci	Pus	Blood
128	Clean	1	—	—	—	—	—	—
225	V. Dirty	1	—	—	—	—	—	—
240	V. Clean	1	—	—	—	—	—	—

We replaced the animals from an outside source, but unfortunately an epidemic disease broke out that caused a very high mortality, reducing the stock considerably, so much so that in 1937 the number of tests performed was thirty-three, these were applied to eleven herd, one group, one individual, and twenty samples of market milk. The test matured in each case with Negative Results.

5.—The Reductase Test.

As pointed out in last year's report, the modified method as introduced by Wilson was used. The main modification consists in inverting the tubes at half-hourly intervals during the course of the test in order to keep the cream, in which a reducing enzyme is concentrated, and the micro-organisms in a homogeneous suspension.

The test is carried out by adding 1 c.c. of standard solution of methylene blue to 10 c.c's of milk. A marked blue colour develops at once in the milk. The tubes are then placed in a water bath and maintained at a temperature of between 100° F and 104° F. The tubes are examined at half-hourly intervals. Complete discolorization of the whole column of milk or complete decolorization up to within five M.M. of the surface is regarded as the end point. Any tube at the time of examination shows obvious signs of reduction is not inverted, but left until the end point is reached. As the result of the action of bacteria present in the milk the mixture gradually loses its colour, and the speed at which this takes place serves as an index of the bacterial contamination of the milk.

In order that the results could be more readily understood by the ordinary individual, the standards as suggested by O. Jensen and Barthel in connection with the old method are adopted. These are :—

Grade I.—When no change of colour takes place in 5½ hours in Summer, and 6½ hours in Winter—Bacteria less than 500,000 per c.c.

Grade II.—No change in two hours, but a change in 5½ or 6½ as the case may be—500,000 to 4,000,000 per c.c.

Grade III.—No change in 20 minutes but a change in 2 hours—4,000,000 to 20,000,000 per c.c.

Grade IV.—Change of colour in 20 minutes or less—Over 20,000,000.

The results of the tests carried out are shown in the following tables :—

Tuberculin Testing.

The Tuberculin Test was applied to 174 cows and 54 Heifers in connection with four herds approved under our Scheme. The results were as follows :—

Herd	No. of Cows	No. of Heifers	No. of Reactors		Proportion
			Cows	Heifers	
1	21	35	5	–	8.9 %
2	35	14	7	2	18.4 %
3	71	5	29	1	39.4 %
4	47	–	11	–	23.4 %
Total	174	54	52	3	23.4 %

B. MEAT INSPECTION.

The Slaughter of Animals Act, 1935.

This Act came into force in all urban sanitary districts on the 3rd of August, 1937. It had already been in force in the County Boroughs of Dublin and Dunlaoghaire.

The Act has for its object the proper treatment of animals in slaughter houses. The use of a humane slaughtering instrument for the slaughtering of animals, and the licensing of persons using such instrument.

The Act applies to the slaughtering of cattle, sheep, goats, pigs, horses, asses and mules. At the moment the compulsory use of the humane slaughtering instrument does not apply to the slaughter of pigs.

With regard to the treatment of animals in slaughter houses, every occupier of a slaughterhouse shall provide a sufficient quantity of wholesome drinking water for animals awaiting slaughter, and a sufficient quantity of food if the animals are kept for any period longer than 24 hours.

No person shall slaughter an animal in sight of another animal, and unnecessary, avoidable, or excessive pain, or suffering to an animal in the manner of slaughter is prohibited.

No person, unless he is a registered Veterinary Surgeon or the holder of a slaughter licence, shall slaughter an animal in a slaughter house, and no person shall slaughter or render unconscious an animal otherwise than by means of an approved instrument. An approved instrument is one that the make and class of which is certified in writing by the Minister for Agriculture to be suitable for the slaughter of a particular class of animal.

The duty of licensing slaughtermen is placed on the Sanitary Authority. Any person over 18 years of age may be granted a licence provided he resides or carries on business, or is employed in the Sanitary District, and is a fit and proper person to be engaged in the slaughter of animals. The licence fee is 5/–. The licence once granted is valid for a period of one year from the date of issue, and the holder is entitled to slaughter in any district in which the Act is in force. The Sanitary Authority may refuse, suspend, or revoke a slaughter licence if they are satisfied that the holder is not a fit and proper person or ceased to be a fit and proper person to be engaged in the slaughter of animals. An appeal against a Refusal, Suspension, or Revocation lies with the District Court.

All persons engaged in the slaughtering of animals within the Borough are licenced for the purpose. The number of persons holding licences is 36. The act has been strictly enforced, particularly in regard to the use of the humane slaughtering instrument. The provisions of the Act

are observed in a satisfactory manner by all concerned. In the beginning there was occasion to prosecute seven slaughtermen for failing to use the humane slaughtering instrument, and fines of 1/–, 3/6, and 5/– were imposed. Total amount £1 8s. 0d. When the slaughtermen discovered that the use of the humane instrument would be insisted upon the old instruments of slaughter were soon discarded.

Once again I would emphasise the great need for a Public Abattoir or a Central Meat Inspection Depot, where all meat could be inspected and stamped before being exposed for sale. There is approximately 55% of beef and 53% of the mutton supply of the City slaughtered outside our jurisdiction,this receives little or no inspection at the place of slaughter, and may or may not be seen by our inspectors in the butchers' shops. If it is seen, it receives only a cursory examination, which is not sufficient to safeguard against the danger of infection transmitted to man by diseased meat.

There are two slaughter houses within the Borough, where roughly 14% of the total beef and 17% of the total mutton supply of the city is slaughtered, the only premises where meat receives a detailed inspection by the Corporation Veterinary Inspectors. These premises are Registered under the Fresh Meat Act, and no animal can be slaughtered therein unless the Veterinary Inspector is present. The premises referred to are Messrs. Cork Farmers' Union Abattoir and John Waugh's.

The number of premises within the Cork Urban Sanitary District where meat and meat products are prepared for human consumption is as follows :—

Slaughter Houses :—

Licenced (under Public Health Act, 1878)	—
Registered (being in use before the 1878 Act)	1
Registered under the Fresh Meat Act	2

Bacon Factories :—

Where pigs only are slaughtered for production of Bacon	2
Where pigs are slaughtered for Bacon and Pork	1
Where Cattle and Sheep are slaughtered in addition to Pigs for Bacon and Pork	1
Sausage Factories	12
Triperies	7

Number of Inspections made of premises where meat is prepared and sold :—

Slaughter Houses	5,326
Sausage Factories	2,512
Triperies	1,770
Meat Markets	745
Butcher Shops	3,278
Pork Shops	563

In addition to the above, the following inspections were made of provision shops, fish shops, fruit shops and hawkers' stands :—

Provision Shops	5,287
Fish Shops	508
Fruit Shops	3,507
Hawkers' Stands	673

The number of Notices served to abate nuisances and remedy defects in Slaughter Houses and Triperies—16.

The following Tables show the results of inspection of meat in Slaughter Houses and Bacon Factories, and also the amount of meat surrendered by owners, and seized by the Inspectors :—

Table 52.—Carcases condemned for Tuberculosis in Slaughter Houses and Bacon Factories.

Species of Animal	Number slaughtered	Affected		Totally Condemned		Partially Condemned	
		Number	Per-centage	Number	Per-centage	Number	Per-centage
SLAUGHTER HOUSES							
Cattle	1,039	180	17.32	14	1.3[illegible]	166	15.97
Calves	13	2	15.38	—	—	2	15.38
Sheep	7,530	—	—	—	—	—	—
Pigs	3,042	348	11.43	9	.29	339	11.14
BACON FACTORIES							
Pigs	189,171	33,187	17.54	389	.20	32,798	17.34

Table 53.—Carcases condemned for diseases other than Tuberculosis in Slaughter Houses and Bacon Factories.

Species of Animal	Number slaughtered	Affected		Totally Condemned		Partially Condemned	
		Number	Per-centage	Number	Per-centage	Number	Per-centage
SLAUGHTER HOUSES							
Cattle	1,039	3	.28	2	.19	1	.09
Calves	13	—	—	—	—	—	—
Sheep	7,530	13	.17	5	.07	8	.10
Pigs	3,042	64	2.10	9	.29	55	1.81
BACON FACTORIES							
Pigs	189,171	2,690	1.42	109	.06	2,581	1.36

Table 54.—Quantity of Meat condemned for Tuberculosis and other diseases in Slaughter Houses and Bacon Factories.

Variety	Quantity Examined	Tuberculosis Quantity Condemned	Per-centage	Other Diseases Quantity Condemned	Per-centage
	SLAUGHTER HOUSES				
	lbs.	lbs.		lbs.	
Beef	519,500	10,134	2	1,004	.2
Veal	1,040	20	2	—	—
Mutton	451,800	—	—	291	.06
Pork	243,360	3,027	1	769	.3
	BACON FACTORIES.				
Pork	30,267,360	299,756	.9	19,458	.06

Table 55.—Quantities of Offals Condemned for Tuberculosis and other diseases in Slaughter Houses and Bacon Factories.

Offals	TUBERCULOSIS									
	Slaughter Houses								Bacon Factories	
	Beef		Veal		Mutton		Pork		Pork	
	No.	Wt. lbs.	No.	Wt. lbs.	No.	Wt. lbs.	No.	Wt. lbs.	No.	Wt. lbs.
Heads	90	1980	—	—	—	—	169	1690	17835	214020
Lungs	280	1400	2	5	—	—	270	270	25770	25770
Hearts	140	700	1	2	—	—	135	67½	12885	6442½
Stomachs	38	1140	—	—	—	—	128	128	11651	11651
Intestines	39	1080	—	—	—	—	196	1568	19401	155208
Spleens	—	—	—	—	—	—	19	4¾	1498	374½
Livers	44	528	—	—	—	—	128	384	11651	34953
Kidneys	8	6	—	—	—	—	3	1½	159	79½
Udders	1	14	—	—	—	—	1	6	—	—
Other Organs	—	—	—	—	—	—	—	—	—	—
	OTHER DISEASES									
		lbs.		lbs.		lbs.		lbs.		lbs.
Heads	—	—	—	—	—	—	—	—	—	—
Lungs	3	15	—	—	10	10	525	525	29725	29725
Hearts	—	—	—	—	—	—	40	20	2185	1092½
Stomachs	—	—	—	—	—	—	1	1	—	—
Intestines	—	—	—	—	—	—	1	8	29	232
Spleens	—	—	—	—	—	—	—	—	—	—
Livers	72	864	—	—	240	480	111	333	11854	35562
Kidneys	—	—	—	—	—	—	—	—	254	127
Udders	—	—	—	—	—	—	—	—	—	—
Other Organs	—	—	—	—	—	—	—		—	—

The amount of meat seized and surrendered during the year was as follows :—

Variety of Meat	AMOUNT SEIZED IN SHOPS		AMOUNT SURRENDERED	
	T.B.	N.T.B.	T.B.	N.T.B.
	lbs.	lbs.	lbs.	lbs.
Beef	187	—	7161	3525
Pork	—	13	—	71
Poultry	3¼	—	2	13
Rabbits	—	—	—	118

PROSECUTIONS.

For offences against the Public Health Acts :—

For the sale of unsound meat—8 prosecutions. Fines amounting to £3 7s. 6d. were imposed.

For offences against the Corporation Bye-Laws—6 prosecutions, and fines amounting to £1 4s. 6d. were imposed.

Table 55.—Showing number of carcases inspected and the quantity of meat including Offals condemned in Slaughter Houses other than those registered under the Fresh Meat Act.

Class of Animal	Number of Carcases Examined	Condemned		
		Wholly	Partially	Quantity of Meat and Offals
				lbs.
Cattle	1108	4	96	7838
Calves	146	—	—	—
Sheep	5486	—	—	228
Pigs	1	—	—	—

(C) FOOD AND DRUGS ACTS.

MILK.

Appended herewith is the Report of the City Analyst (Mr. D. J. O'Sullivan, M.Sc., F.I.C.)

Table 56a.—Showing the number of samples of Milk submitted for Analysis during the year 1937 and the results thereof.

Quarter ended	No. of Samples	Genuine	Adulterated
March 31st, 1937	165	142	23
June 30th, 1937	200	153	47
Sept. 30th, 1937	150	145	5
Dec. 31st, 1937	156	155	1
Totals	671	595	76

Table 57.—Showing results of proceedings against vendors of adulterated samples and fines imposed.

Extent and form of adulteration	Fines Imposed		Observations
	Fines	Costs	
Deficient in Milk Fat 16%	7/6	15/8	
,, ,, 6%	2/6	15/8	
,, ,, 6%	3/6	15/8	
,, ,, 6%	3/6	15/8	
,, ,, 6%	2/6	15/8	
,, ,, 6%	2/6	15/8	
,, ,, 8%	2/6	15/8	
,, ,, 15%	10/–	15/8	
,, ,, 6%	3/6	15/8	
,, ,, 16%	5/–	15/8	
,, ,, 11%	5/–	15/8	
,, ,, 5%	1/–	15/8	
,, ,, 13%	5/–	15/8	
,, ,, 6%	2/6	15/8	
,, ,, 8%	3/6	15/8	
,, ,, 10%	3/6	15/8	
,, ,, 11%	5/–	15/8	
,, ,, 6%	2/6	15/8	
,, ,, 6%	—	15/8	
,, ,, 11%	2/6	17/8	
,, ,, 5%	2/6	15/8	
,, ,, 6%	Nil	15/8	
,, ,, 6%	2/6	17/8	
,, ,, 6%	With drawn		
,, ,, 13%	5/–	15/8	
,, ,, 15%	10/–	17/8	
,, ,, 13%	2/6	15/8	
,, ,, 6%	2/6	15/8	
,, ,, 15%	5/–	15/8	
,, ,, 8%	3/6	15/8	
,, ,, 8%	5/–	15/8	
,, ,, 6%	3/6	15/8	
,, ,, 6%	3/6	15/8	
,, ,, 8%	2/6	15/8	
,, ,, 8%	3/6	15/8	
,, ,, 6%	3/6	15/8	
,, ,, 6%	3/6	15/8	
,, ,, 6%	—	—	Dismissed
,, ,, 6%	3/6	15/8	
,, ,, 6%	5/–	15/8	

BUTTER.

Table 58.—Showing number of Samples of Butter submitted for analysis during the year and the results thereof.

Quarter ended	No. of Samples	Genuine	Adulterated
March 31st, 1937	41	40	1
June 30th, 1937	46	46	—
Sept. 30th, 1937	39	39	—
Dec. 31st, 1937	47	47	—
Totals	173	171	1

Table 59.—Showing results of proceedings against vendors of adulterated samples and fines imposed.

Extent and form of adulteration	Fines	Costs
Butter 1.5% excess water	Dismissed	

MARGARINE.

Table 60.—Showing the number of samples of Margarine submitted for analysis during the year and the results thereof.

Quarter ended	No. of Samples	Genuine	Adulterated
March 31st, 1937	16	16	—
June 30th, 1937	14	14	—
Sept. 30th, 1937	14	14	—
Dec. 31st, 1937	14	14	—
Totals	58	58	—

SPIRITS.

Table 61.—Showing the number of samples of Spirits submitted for analysis during the year and the results thereof.

Quarter ended	No. of Samples	Genuine	Adulterated
March 31st, 1937	6	6	—
June 30th, 1937	4	4	—
Sept. 30th, 1937	4	3	1
Dec. 31st, 1937	12	11	1
Totals	26	24	2

Table 62.—Showing the number of miscellaneous samples submitted for analysis during the year and the results thereof.

Quarter ended	No. of Samples	Genuine	Adulterated
March 31st, 1937	65	65	—
June 30th, 1937	83	83	—
Sept. 30th, 1937	58	58	—
Dec. 31st, 1937	108	108	—
Totals	314	314	—

Table 63.—Showing details in regard to miscellaneous samples examined during the year.

Miscellaneous	Mar. 31st.	June 30th.	Sept. 30th.	Dec. 31st.
Cheese	7	6	6	5
Jam	5	4	3	7
Stout	2	11	6	19
Flour	8	7	7	7
Bass	3	4	—	—
Sugar	10	8	8	11
Sausages	1	2	1	3
Easter Egg	1	—	—	—
Dried Fruit	3	—	—	3
Drugs	1	—	1	4
Rice	9	13	9	12
Cake	6	8	4	8
Tea	4	5	3	4
Lard	1	1	—	1
Vinegar	1	3	—	2
Cream	1	2	2	3
Minerals	1	—	1	2
Wine	1	2	1	4
Bread	—	2	—	—
Peas	—	1	—	—
Cocoa	—	4	2	5
Raspberry	—	—	1	—
Sauce	—	—	1	—
Ice Cream	—	—	1	—
Dripping	—	—	1	1
Salt	—	—	—	2
Sweets	—	—	—	—
Oatmeal	—	—	—	—
Orange Peel	—	—	—	1
Total	65	83	58	108

The figures in the tables have, from the point of view of adulteration, little real significance as they disclose only a routine ; and, in this sense, they might, with advantage, be " taken as read." But they do express, in the variety of the samples, the wide choice of foodstuffs available to the public. It is in this choice and its wise use that the modern interest in food lies and that constitutes the problem of nutrition.

For anybody interested in this aspect the publication during the year of the Final Report of the Mixed Committee of the League of Nations* must be counted as a happy circumstance. It is a document whose chief merit lies in its comprehension looking, as it does, at the historical, health, agricultural and economic aspects of food supply and consumption ; and summarising succintly, on the scientific side, the results of all the experimental work that has been carried out during the past half century. The English edition is written in a suave and readable style reminiscent of the best publications of His Majesty's Stationery Office.

*Nutrition : Final Report of the Mixed Committee of the League of Nations on the Relation of Nutrition to Health, Agriculture and Economic Policy. Geneva, 1937.

In intension the Report can hardly be called so happy. Taking as a quantitative basis "an agreed international scale of the caloric requirements of the two sexes at different ages of life" it finds that this confusion must be further compounded with the idea of quality. The definition offered for this attribute does not proceed from any deliberations of the Committee as a whole but consists in the acceptance of the views of the distinguished American scientist, Professor E. V. McCollum of Baltimore, as propounded in his "Newer Knowledge of Nutrition." But this theory of Professor McCollum has been built upon a foundation of vitamins and the observed results of their uses in controlled doses and circumstances. It is strictly scientific and inductive in character. Again, the Committee as a whole is not so sure of even the number of its vitamins "of which about ten have been differentiated" (p. 61). The influence of the discovery of a further one or more is not predictable.

A too-ready acceptance of the theory, unleavened by a common wisdom, has, one must think, allowed it to be pushed to an extreme. Its working is instanced in the case of the "Oslo breakfast" for school children, consisting of "uncooked protective foods . . . served to the children before the day's work" (p. 43). More specifically "of milk, bread or biscuits, and raw fruit or vegetables. It has the important advantage of requiring no preparation at the school" (p. 43). A question jumps into the mind:—on a winter morning? Surely, at such a season, it would not be a free choice but a penance for the sake of science.

If account be taken of this factor of choice, implying a certain enjoyment, the main recommendation of the Report—that National Nutrition Committees be established—can be modified with advantage.

"We are now more than ever convinced of the necessity for bringing together scientists, economists, agricultural experts, consumers representatives, teachers and administrators in National Nutrition Committees. If, as we hope, our own deliberations have been in some degree useful, it is largely due to the fact that the Mixed Committee has grouped together persons who have viewed the problem of nutrition from different angles—whether of health, or labour, agriculture, economics and finance, social welfare, co-operation or administration. It is our firm conviction that through National Committees adequately representative of the various elements that go to constitute this complex problem the most useful progress can be made."

The agricultural experts may be specified as practical farmers rather than mathematical bureaucrats and the National Committees must include in personnel what the Mixed Committee itself seemed to lack (p. 9)—a cook. Not necessarily a Latry or an Escoffier, but one who understands that his art is to compel choice, psychologically and not scientifically—*un homme de bon sens*.

Section VII.—Water Supply

A full description of the sources of supply and method of purification, in the form of a paper read by the Water Engineer, Mr. J. Riordan, B.E., is appended to this section. This paper was read before the Institute of Civil Engineers for Ireland in December, 1937, and comprises a full and complete description of the plant and its operation. For this reason it is unnecessary to repeat the introductory remarks which have hitherto marked this section of the report.

BACTERIOLOGICAL EXAMINATIONS.

In the report for 1931 I outlined the procedure adopted in connection with the examination of the supply at the bacteriological laboratories of University College, Cork, by Dr. W. J. O'Donovan. In the year 1928 Dr. O'Donovan undertook a detailed and systematic examination in which a very large number of samples were studied. Our subsequent procedure has been based on his findings of that year and his recommendations have resulted in a supply of a consistently high degree of purity. In 1937, as in former years, samples were collected and examined on five days during each week. The procedure included an estimate of the number of bacteria growing at 37° C. in 24 hours. The total number of samples examined amounted to 253. The average number of bacteria in 1 c.c. was 2.70 and the number of samples sterile in 1 c.c. was 103.

Such routine examination of water supplies is of the utmost importance as it affords an adequate check on the efficacy of purification methods and directs attention at once to any possibility of danger arising. The results achieved are not, perhaps, dramatic, but none the less they take their place in the ranks of achievement in the field of preventative medicine. A glance at our statistical tables for typhoid fever reveals at once the enormous improvement which has taken place since the installation of adequate plant for dealing with purification of our supply. Water-borne diseases have entirely disappeared and such cases of typhoid as have arisen have been definitely proved not to be attributable to the water. Considering the vital importance of water to the existence of the community, the sense of security arising from a supply of known purity is very great indeed, and in this respect it may truthfully be said that the funds invested in the erection of the new plant are not only a very sane form of insurance but also a valuable investment.

In the following tables are summarised the results of the various examinations carried out during the year (and previous years) at the Bacteriological Laboratories, U.C.C., by Dr. W. J. O'Donovan.

Table 64.—Summary of results of routine examinations of water during 1937.

Total Routine Samples of Tap Water	Bacillus Coli Test					Average daily No. of Bacteria per c.c.	No. of Samples sterile in 1 c.c.
	100 c.c's —ive	100 c.c's +ive	50 c.c's +ive	10 c.c's +ive	1 c.c. +ive		
253	235	11	6	0	1	2.70	103

As stated above, the examinations carried out during the year included an estimation of the numbers of bacteria growing at 37° C. in 24 hours. The findings are set out in the following table and compared with those of 1932 (in which year the figures were first computed) and of 1933 and 1934.

Table 65.—Average number of bacteria per cubic centimetre growing at 37° C. from daily sample for each month.

Month	1932	1933	1934	1935	1936	1937
January	14.00	1.82	1.17	2.91	1.23	4.09
February	0.81	1.04	1.65	2.70	1.25	2.80
March	1.66	1.18	1.28	1.65	0.95	1.45
April	4.66	1.50	1.45	1.05	1.60	1.18
May	4.57	1.82	3.47	2.73	1.90	0.70
June	5.41	4.15	21.21	2.10	1.95	0.23
July	44.09	19.27	18.47	2.95	5.00	3.68
August	20.31	14.62	7.41	5.23	1.85	1.00
September	2.18	2.77	1.70	8.95	3.43	2.78
October	4.66	2.14	4.00	7.94	1.41	6.43
November	4.72	1.36	4.18	4.42	2.75	2.81
December	2.24	3.89	4.00	1.22	3.90	5.40

Table 66.—Comparative results of examinations of tap water made during each of the years from 1928 to 1937.

Year	Total number of samples examined	BACILLUS COLI TEST.				
		100 c.c's −ive	100 c.c's +ive	50 c.c's +ive	10 c.c's +ive	1 c.c. +ive
1928	245	187 (76.3%)	10 (4.0%)	32 (13.1%)	14 (5.7%)	2 (0.8%)
1929	251	153 (60.9%)	44 (17.5%)	40 (15.9%)	9 (3.6%)	5 (2.0%)
1930	268	216 (80.6%)	15 (5.6%)	14 (5.6%)	13 (4.5%)	10 (3.7%)
1931	260	242 (93.0%)	9 (3.5%)	9 (3.5%)	— —	— —
1932	260	245 (94.2%)	3 (1.2%)	12 (4.6%)	— —	— —
1933	253	244 (96.4%)	4 (1.6%)	4 (1.6%)	1 (0.4%)	— —
1934	261	249 (95.4%)	4 (1.5%)	6 (2.3%)	2 (0.8%)	— —
1935	252	235 (93.2%)	3 (1.2%)	7 (2.8%)	5 (2%)	2 (0.8%)
1936	252	244 (96.8%)	2 (0.8%)	5 (2%)	1 (0.4%)	— —
1937	253	235 (92.9%)	11 (4.3%)	6 (2.4%)	0 —	1 (0.4%)

Appended herewith a brief report from Dr. O'Donovan in connection with the bacteriological examinations made by him during the year.

The filtration and chlorination as shown by the B. Coli test and bacteriological count were consistently effective. An uncountable plate culture from the tap at the City Hall in 1st July is excluded. This was undoubtedly an error in sampling technique.

The result from the sample taken from the tap in Vicar Street on 26th October (which provides the solitary case of B. Coli in 1 c.c.) might also be regarded as due to error, a sample being found perfect on 28th. Excluding this the highest B. Coli content was three per 100 c.c., found on six occasions ; the next highest, two per 100 c.c., on one occasion and one per 100 c.c. found on two occasions. These figures were estimated by McCrady's tables based on Greenwood and Yule's formula (Ministry of Health Report No. 71), the method of multiple series of equal volumes being adopted as routine for the B. Coli estimation from the time of appearance of lactose fermenting organisms in June.

The organisms isolated in the course of confirmation tests on the eighteen occasions on which presumptive B. Coli tests were carried out were :—

Bact. Coli—faecal type I.	....	9 occasions
Intermediate type I.	....	3 ,,
Aerogenes type I.	....	2 ,,
Aerogenes type II.	....	1 ,,
Other types	....	3 ,,

Detailed results of the examinations carried out by Dr. O'Donovan are shewn in the next two tables. Hitherto these results were shewn in one table only but, as pointed out by Dr. O'Donovan above, there was a change in technique, late in June, after the appearance of lactose fermenting organisms in the samples and this has necessitated an additional table this year.

The following is the paper (referred to in the introduction of this section) taken from the *Bulletin of the Inst. of Civil Engineers of Ireland*, No. 1—1937–38, lxiv. 21–46 and reproduced by kind permission of the Editors.

PURIFICATION OF WATER AT CORK WATERWORKS.*

By M. J. Riordan, B.E., A.M.I.C.E.I.

SUMMARY.

This paper deals with :—

(1) Purification of polluted water drawn from the river Lee and filtered in Candy rapid gravity sand filters.

(2) The filters and their operation.

(3) The difficulties encountered and the methods by which they were overcome.

At times the nature of the raw water made coagulation difficult. In overcoming these difficulties, experiments were made with double coagulation, change of point of application of chemicals, change of dose with variation of raw water, quality, and control of the process by a pH recorder. The experiments and their successful results are illustrated by analyses.

(4) The problem of cleaning filters efficiently.

(5) Sterilisation by Chloramine.

(6) Daily routine.

(7) Specimens of record forms.

GENERAL LAYOUT.

The Cork Waterworks is situated on the river Lee a half mile west of the city boundary. It consists of the following :—

(1) Pumping plant for lifting purified water to service reservoirs on the adjacent hillside. From these reservoirs the city is supplied by gravitation.

(2) The purification plant in which raw river water is filtered and in which both filtered river water and auxiliary supply from gravel beds are subjected to Chloramine treatment.

Note.—The general layout of works is shown in Fig. 1.

*A Paper presented to the Institution for discussion at the Ordinary General Meeting held on December 6th, 1937.

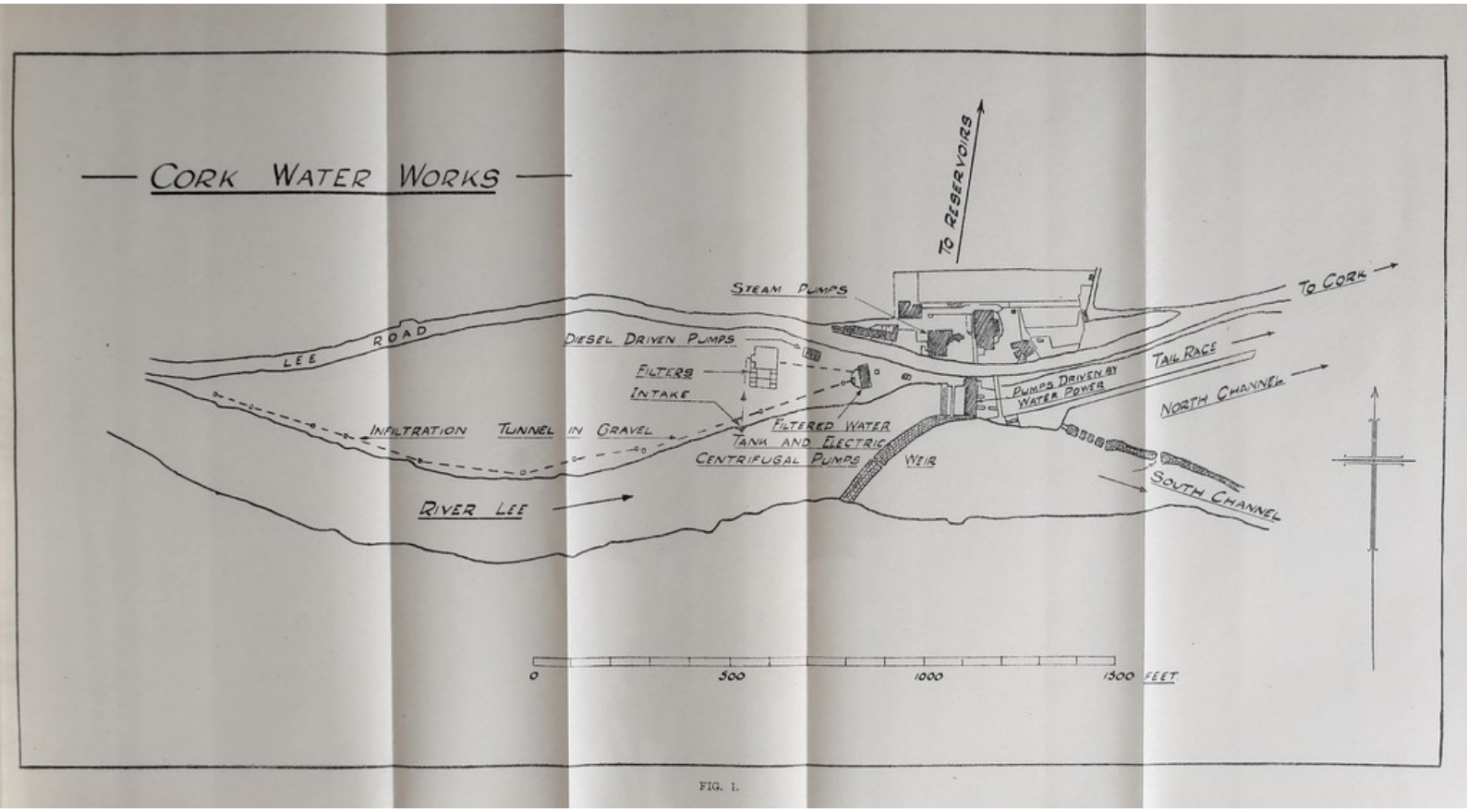
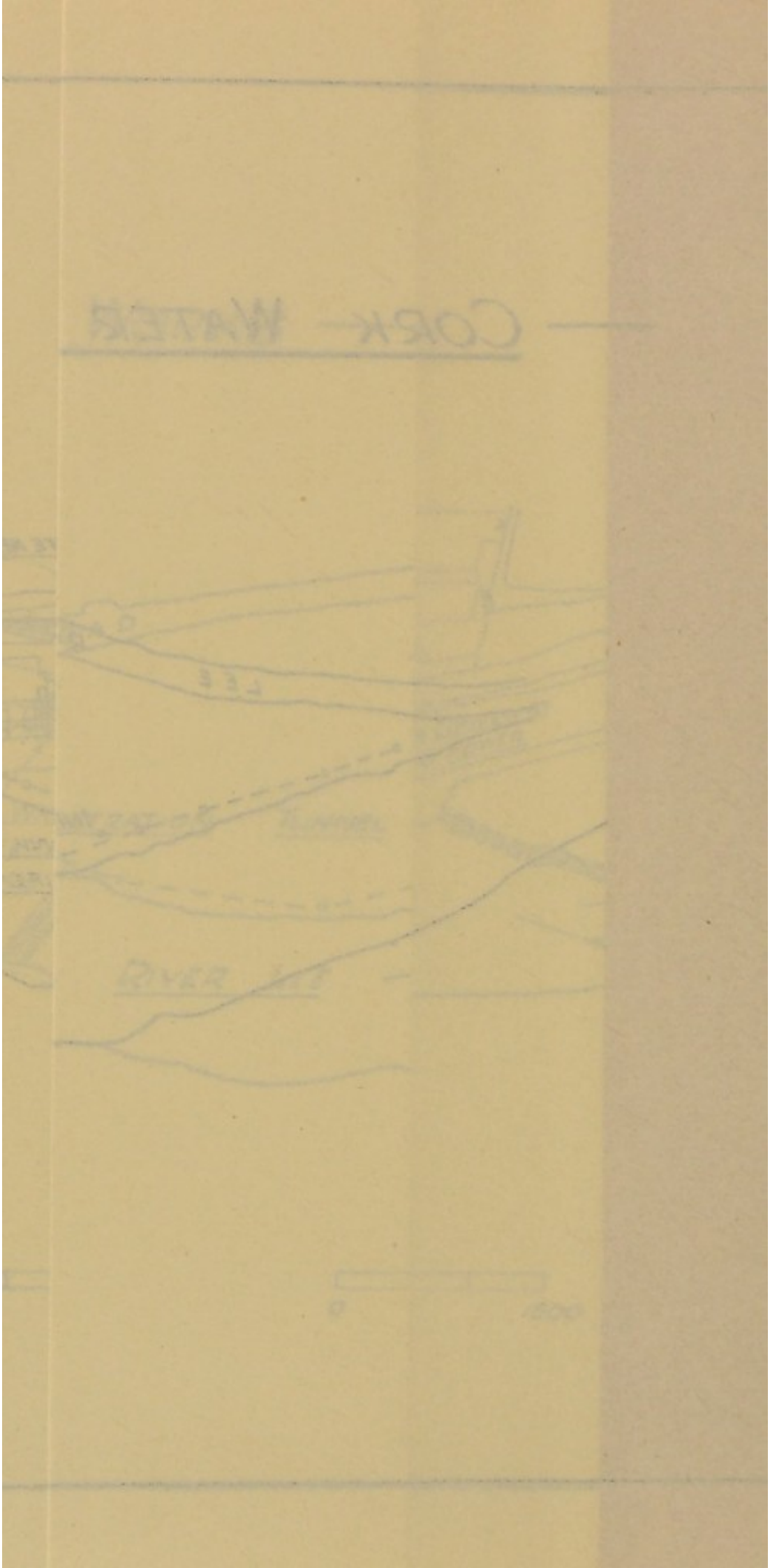

CORK WATER WORKS
TO RESERVOIRS
STEAM PUMPS
TO CORK
LEE ROAD
DIESEL DRIVEN PUMPS
TAIL RACE
FILTERS
INTAKE
PUMPS DRIVEN BY WATER POWER
NORTH CHANNEL
INFILTRATION TUNNEL IN GRAVEL
FILTERED WATER TANK AND ELECTRIC CENTRIFUGAL PUMPS
WEIR
SOUTH CHANNEL
RIVER LEE
0
500
1000
1500 FEET

FIG. 1.



Pumping Plant.

The pumping plant which has been developed over a period of nearly 100 years consists of :—

(*a*) Five water turbine-driven pumping units, utilising a head of six feet, having a total capacity of 5¼ million gallons per day under favourable conditions.

(*b*) Three sets of three-throw ram pumps driven by triple expansion steam engines, installed in 1904, having a total capacity of 4½ million gallons per day.

(*c*) Two sets of three-throw ram pumps driven by Diesel engine, installed in 1927, having a total capacity of a million gallons per day.

(*d*) Three electrically driven centrifugal pumps installed in 1936, having a total capacity of 6 million gallons per day.

The gradual growth of the Works and the installation of extra pumping plant at long intervals explains the scattered position of the various buildings shown on Fig. 1.

Formerly the main supply was drawn from a tunnel in gravel beds close to the river. This tunnel discharged, and still discharges, into what is now called the filtered water tank and is really the sump from which all the pumps draw. Up to 1928 the supply from the tunnel was supplemented when necessary by admitting raw water from the river, through an intake which is now out of commission.

Filtration Plant.

The filtration plant, constructed in 1928 and extended in 1934, is situated to the west of the filtered water sump and its intake for drawing water from the river is 137 yards up stream from the old raw water intake.

Purification is divided into four stages :—

(*a*) Coarse screening at the river intake. The screen has an area of 27.7 sq. ft. and is constructed of 1″ iron bars placed at 3″ centres in a concrete setting.

(*b*) Fine screening at the filter house through box screens, which are constructed of ⅛″ mesh, each having a cubic capacity of 29 cu. ft. and surface area of 29.8 sq. ft. As they are arranged in duplicate, one can be withdrawn for cleaning by placing the other in commission.

(*c*) Filtration through Candy rapid gravity sand filters.

(*d*) Sterilisation of both the filtered and tunnel waters by the chloramine process.

It is with the operation of the purification plant that this paper deals and further reference to the pumping plant is unnecessary.

Sources of Supply.

(*a*) Gravel beds which yield a pure water. A horizontal tunnel is driven through gravel beds for a length of 600 yards. Its distance from the river bank varies from about 3 feet at its commencement to

about 12 feet at its centre. At the extreme end away from the works is situated a well which is about 16 feet deep ; and the tunnel starts in the wall of this well at a depth of 14 feet. From this point the tunnel is laid at a fall of 1/300 to discharge into the main Filtered Water suction tank. The tunnel is circular in section, and is formed for the first 100 yards of its course of earthenware pipes 2 feet in diameter with numerous perforations around its circumference. The remaining 500 yards consist of a circular tunnel 3 feet in diameter built of bricks laid dry. With the exception of the invert the entire tunnel is pervious. At intervals of 100 yards the tunnel is intersected by wells, each about 12 feet in diameter and about 20 feet deep. They were constructed to augment the flow, but they also serve as settlement tanks. The water taken from this tunnel is first quality water ; it is chlorinated and is delivered into the filtered water suction tank. Its pH value is usually about 6.8 and its colour has a reading of 3 to 5 on the Hazen scale, which means that it is really colourless.

This source of supply has been frequently analysed and results have been satisfactory. In wet weather the yield is about 3½ million gallons per day, while in dry weather it is about 2¼ million gallons per day, which is less than half the total maximum demand.

(*b*) *The River Lee :* This gives a polluted water. The remainder of the supply is drawn direct from the river Lee, which can always supply considerably more than the requirements.

The probable extreme dry weather flow has been estimated to be in the region of 20 million gallons per day. Under the conditions of a low flow which obtained this Autumn (1937), when 3 million gallons per day was being drawn from the river, there was still sufficient water to operate two turbines giving a useful pumping power of 80 H.P., which is equivalent to a flow of 90 million gallons per day. The amount of water obtainable is therefore limited solely by the capacity of the filter plant.

When in good condition the river varies from a clear to a light brown colour, and has a pH value of 7.2, temporary hardness of 5 parts per million, and the amount of oxygen absorbed in parts per 100,000 is only 0.1. This water is in good condition for treatment. When it is in bad condition the water varies from a yellow to a brown colour. The pH value varies between 6.6 and 6.9. The temporary hardness is 1.2 parts per 100,000. The oxygen absorbed is any figure up to 0.7 parts per 100,000. Water in this condition is difficult to treat.

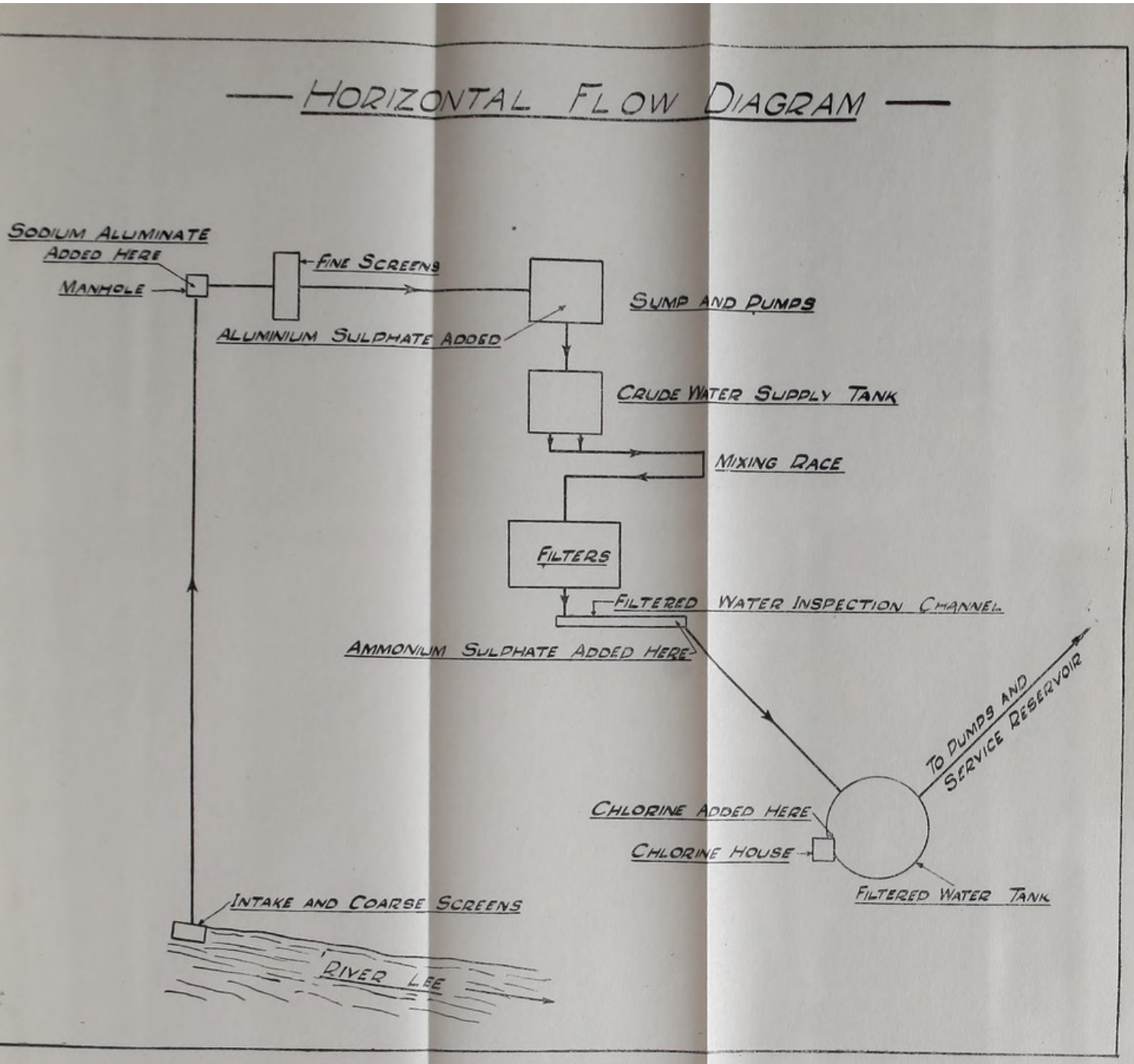
Treatment.

All the river water is treated in Candy rapid gravity filters. Briefly the treatment is as follows :—

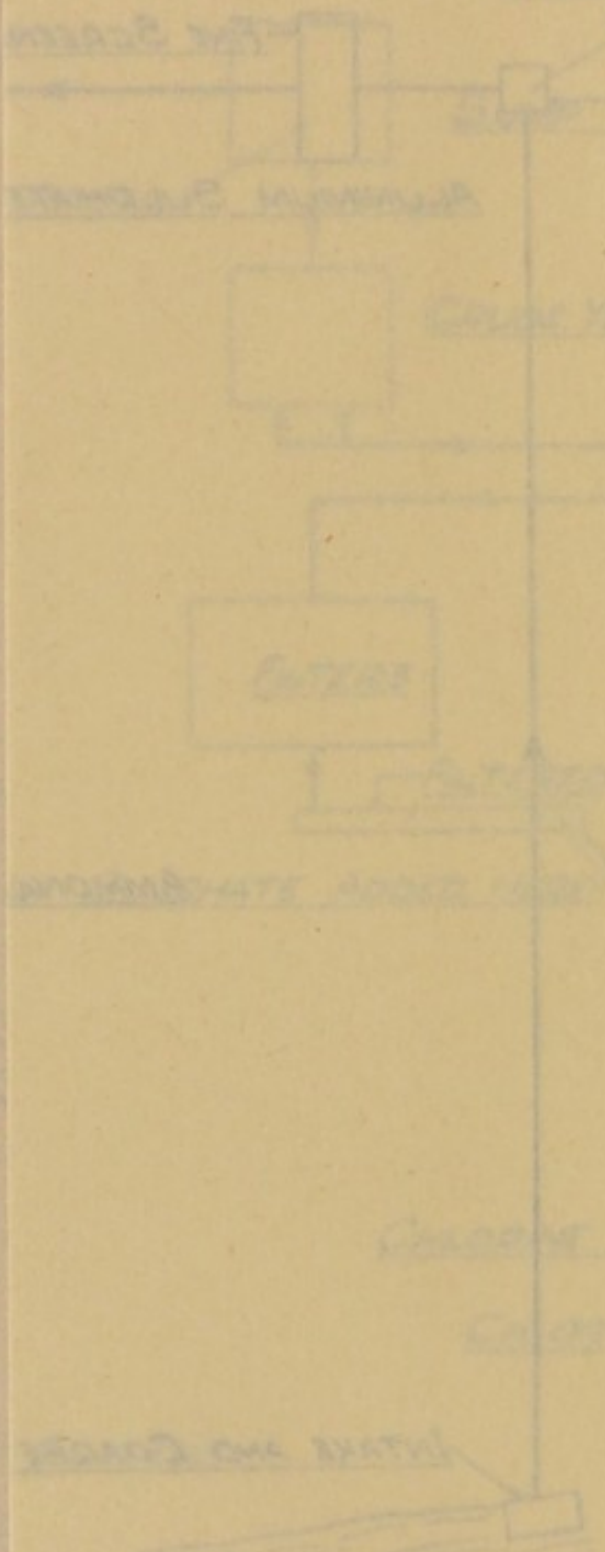
(*a*) Removal of large floating masses by fine and coarse screens.

(*b*) Removal of fine suspended impurities and colouring matter by filters.

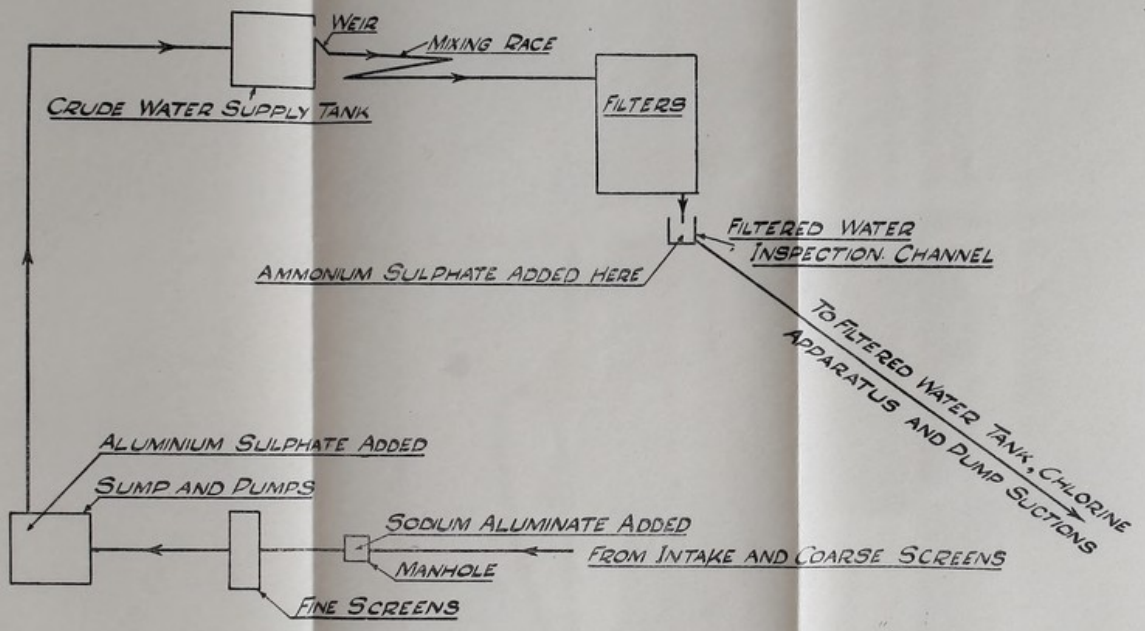
Flow diagrams Nos. 2 and 3 show the sequence of flow of water through the plant. The water is drawn from the river intake (18.0 O.D.) through a 24″ concrete main, whence it flows through the fine screens situated at the entrance to the filter house into the crude water suction



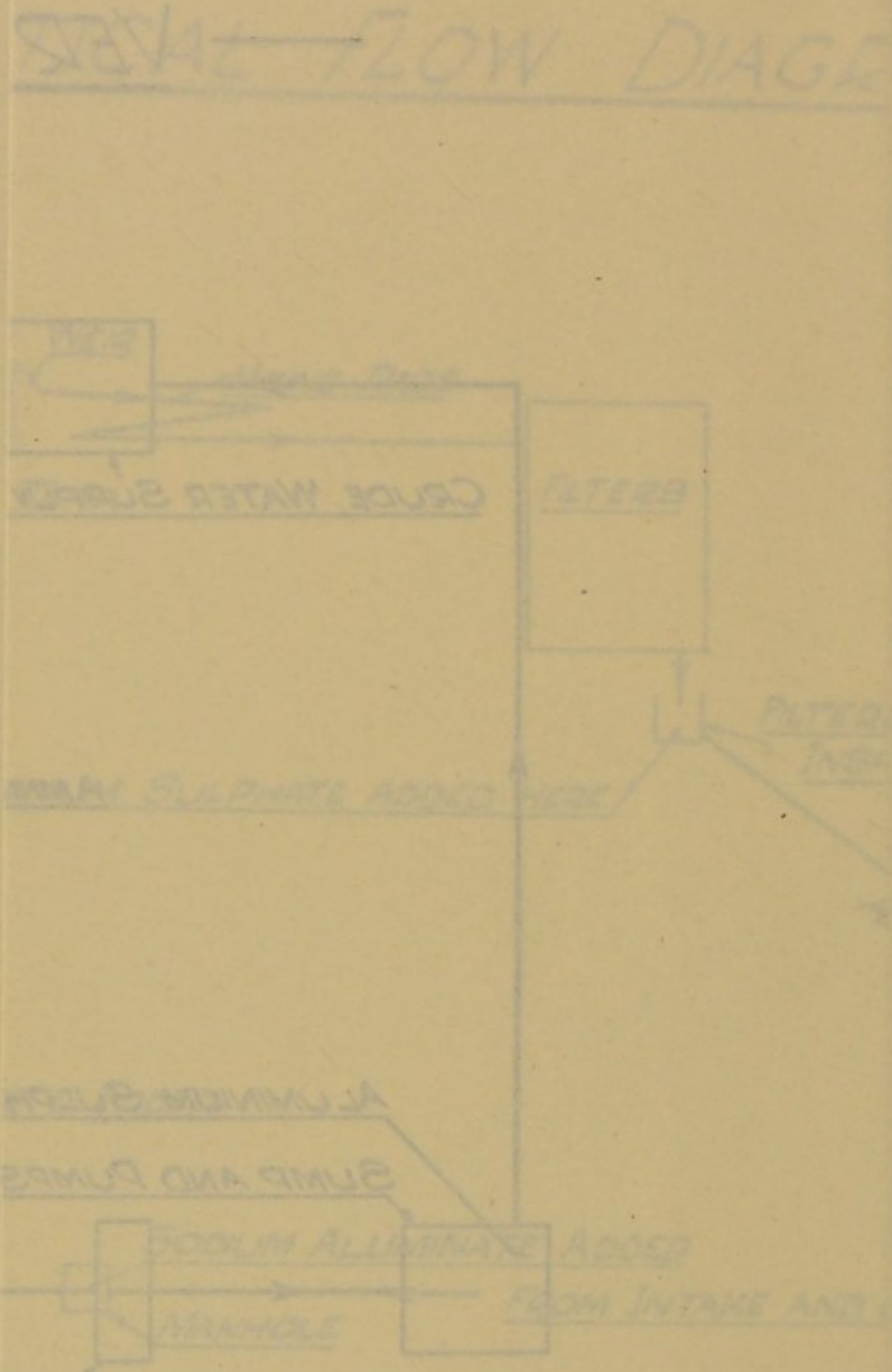
FLOW DIAGRAM No. 2.



VERTICAL FLOW DIAGRAM



FLOW DIAGRAM No. 3.



sump. From there it is pumped to an overhead tank (which commands the filter beds), from which it flows over a rectangular weir, through a channel on the filter beds. The weir measures the quantity of water and also serves as a control on the proportion of alumina added. The channel between the weir and filters is fitted with baffles to give a turbulent flow, and acts as a mixing race to ensure a thorough and uniform distribution of the coagulant with the water. Having passed through the filters the water gravitates to the filtered water sump where it mixes with the water from the tunnel as described above. The total supply is treated with chloramine. This process consists of adding ammonia and chlorine in the order in which they are named. The ammonia is added in the form of ammonium sulphate solution at the main filtered water outlet in the Candy plant, and the chlorine gas at the entrance to the filtered water tank.

GENERAL DESCRIPTION OF CANDY PLANT.

Alumina Apparatus.

This consists of :—

(1) a tank at floor level.

(2) an overhead tank.

(3) proportioning apparatus.

The operation is as follows :—

The lower tank is charged with a weighed quantity of alumina and the overhead tank filled with water. The water is now circulated from the upper to the lower tank and pumped up again until all the alumina is dissolved. The upper tank is now ready for work. The overhead tank is called a storage tank and that at floor level is called a dissolving tank. The pair of tanks is duplicated, so that while the alumina solution is being drawn from one storage tank, it is in the course of preparation in the other pair and an immediate change over may be effected when necessary.

Proportioning.

The alumina solution flows by gravity from one of the storage tanks into a small box, the discharge being float controlled. Installed in this box is a tube with a vertical cut, which forms a miniature weir. Uniform distribution of the dosage is obtained by feeding the solution from the miniature weir through a feed pipe, which discharges into the crude water suction sump.

The purpose of the apparatus is to ensure that the discharge of the alumina solution varies in direct proportion to the quantity of water flowing over the main weir. A control is fitted to facilitate rapid change of the rate of dosage.

Filters.

These consist of eight units, four being placed on each side of a distribution channel. Each tank is rectangular in section and has a

floor area of 288 square feet and is capable of filtering 72 gallons per square foot per hour. The difference in level between the incoming water and the level of the water in the filtered water outlet is 10 feet.

Control of Filters.

As the water leaves the distribution channel it first passes through a module which is a form of balanced piston valve that can be set to pass any desired quantity of water within its range. The object of the module in this particular case is to prevent a filter bed from being over-loaded, which would otherwise occur when some of the other units are temporarily shut down for washing purposes. On leaving the module the water flows over a small rectangular weir on to the filter bed. To ensure that each bed will receive an equal quantity of water, each of these weirs is set at exactly the same level.

Sand used in Filters.

Each bed has a total depth of sand of 3 feet 6 inches comprising three layers, each 4 inches thick of gravel and coarse sand, and 2 feet 6 inches of fine sand. The grading is as follows :—

Coarse gravel, $\frac{1}{2}''$ to $\frac{1}{4}''$.
Medium, $\frac{1}{4}''$ to $\frac{1}{10}''$.
Coarse sand, $\frac{1}{10}''$ to $\frac{1}{20}''$.
Fine Sand, $\frac{1}{20}''$ to $\frac{1}{30}''$.

The material is water worn and does not disintegrate.

Construction of Filter Floor.

The filtering material is laid on the floor of the tank, which consists of rows of earthenware pipes 3 inches diameter, laid in concrete at a distance of 6 inches apart centre to centre, all draining into a central longitudinal sunk drain channel. These pipes butt against each other and are 12 inches long, except where they bridge over the central channel, where they are 18 inches long. There is a flat on the top and under side of each pipe, in the top are 1 inch holes spaced 6 inches apart. Brass nozzle plates into which Candy patent nozzles are screwed, are cemented into these holes. The spaces between the rows of drain pipes are filled in with concrete up to the level of the nozzle plates. The entire floor is studded with mushroom headed nozzles, four to each square foot of floor area.

DIFFICULTIES.

In purifying water with R.G. filters difficulties are most likely to be encountered in connection with :—

(*a*) Coagulation which could be divided into sub-titles, such as :—

(1) materials required
(2) floc formation control
(3) reaction and colour removal, and

(*b*) Washing filters.

Coagulation.

Coagulation may be defined as the agglomeration of impurities, such as colour and suspended matter, into particles large enough to ensure their retention on the surface of the filter bed. The chemical most commonly used both in England and Ireland is sulphate of alumina, which in itself is not a coagulant. But when an alkali is added to a solution of aluminium sulphate, the aluminium hydroxide has the property of neutralising the negatively charged colour colloids. If the reaction is completely effective the whole of the alumina in the sulphate of alumina is precipitated and none is left in solution. Aluminium hydroxide, however, has the property of being soluble in acid and alkali, so that, if excess of alkali is added, the floc which is at first precipated begins to re-dissolve and its coagulating action is proportionally impaired. Conversely, if insufficient alkali is added, the acidity of the aluminium sulphate is sufficient to retain the alumina in solution, and only partial or no precipitation occurs. Added as a solution to the water to be coagulated, the filter alum reacts with the bicarbonate alkalinity of the water as follows :—

$$3Ca(HCO_3)_2 + Al_2(SO_4)_3 = 3CaSO_4 + 2Al(OH)_3 + 6CO_2$$

From this equation it can be seen that the reaction is accompanied by a reduction of the temporary hardness, followed by an increase in the permanent hardness and the liberation of free CO_2, giving a more corrosive water.

The dose of alum necessary to form a floc varies with the turbidity, organic matter, mineral content, pH value, and colour of the water. As these change rapidly in a river like the Lee it is necessary to employ a control under which effective coagulation will be ensured at all times. The hydrogen iron concentration (pH) determination is a satisfactory index for ensuring correct coagulation. It has been proved that after the addition of a coagulant the acid-alkaline balance is definitely established and does not change with the varying physical conditions of floc formation.

Many investigations have been carried out by water chemists to determine the correct pH value for effective floc formation with sulphate of alumina. Baylis found that a pH value between 5.7 and 6.6 gave the best results for a soft and slightly turbid water ; while Hadfield found that a pH value between 7.2 and 7.4 gave the best results for a fairly hard turbid water. The author found that the optimum pH value for the Lee water lies between 6.2 and 6.8. Under normal conditions by keeping the pH between these limits it had been found possible to produce a filtrate having a clarification reading of 5 on the Hazen scale, which for practical purposes may be regarded as colourless. Also there is no waste of coagulant as the amount of residual alumina found in the filtrate rarely exceeds 0.1 p.p.m. This indicates the effectiveness of this method of control.

Unfortunately the river Lee is subject to rapid changes, which at one time caused considerable difficulty in securing satisfactory coagulation. At the end of a dry period a brief fall of heavy rain is sufficient to cause a flood from a dirty catchment area and washes down decayed organic

matter as well as acid peaty matter from the moorland area. This results in a deficiency in the lime content of the water and a lowering of the pH value to 6.6 or less. At this stage the water has a yellow or brown colour. Heavy doses of alumina will not completely remove this colour, because the addition of heavy doses depresses the pH value of the chemically treated water to a point well below the optimum range. Consequently, owing to excessive acidity, a considerable portion of the alumina remains in solution. This is proved by the residual alumina figure present in the filtrate, which is sometimes as much as .5 or .6 p.p.m. The author had considerable trouble from the above conditions in 1934 and was partly successful in overcoming them by the addition of lime water, adding sufficient to boost up the pH value to 6.8. The difficulty experienced, which prevented the complete success of the treatment, was that the slightest overdose of lime had the effect of fixing the colour in the water, the resulting filtrate being nearly as bad as the raw water as far as colour was concerned. If a pH recorder had been available at that time, it might have been possible to obtain a more accurate control of the lime dosage, with a corresponding improvement in the colour reduction.

Double Coagulation.

This difficulty, as well as others, was overcome by the introduction of sodium aluminate, a material which has proved itself of considerable value under suitable conditions. As it contains about $3\frac{1}{2}$ times as much soluble alumina as filter alum, only a small dose is necessary. About 1/20 or less of the filter alum dose is sufficient. Thus for a dose of 2 grains per gallon of filter alum the sodium aluminate dose is about 0.1 grain per gallon and is fed to the water as a 1% solution at a point prior to the addition of the filter alum. At the Cork plant several experiments were carried out to determine the optimum sodium aluminate dose and the most suitable point of application. It was found that for waters having a pH of 6.9 to 7.1 a constant dose of 0.075 grains per gallon gave satisfactory results, the dose of filter alum being altered to suit variations in turbidity and colour. For waters having a pH value between 6.8 and 6.6 a sodium aluminate dose of 0.1 grains per gallon was effective.

Point of Application.

It was decided to inject the sodium aluminate solution into a manhole situated just outside the entrance to the crude water pump sump. This gave the sodium hydroxide time to form before it came into contact with the aluminium sulphate solution, which is injected in the pump sump itself and at the suction of the crude water pumps. The chemical reaction which takes place on the addition of sodium aluminate is as follows :—

$$Na_2Al_2O_4 + 2CO_2 + 4H_2O = 2NaHCO_3 + 2Al(OH)_3$$

With two coagulants available (one acid, the other alkali) a greater range of optimum pH values is obtained and considerable savings in chemicals result. Two examples are given below in Table I, one using sodium aluminate in conjunction with sulphate of alumina, the other

using sulphate of alumina alone. It will be observed that although both waters have similar characteristics it was possible to reduce the colour from 90 to 5 on the Hazen scale by using 0.1 grs. of sodium aluminate and 2.3 grs. of sulphate of alumina. As sodium aluminate costs 6.3 times as much as sulphate of alumina the above dose expressed in terms of sulphate of alumina is 2.93 grs. per gallon, whereas it required 3.8 grs. when using alumina alone to effect a colour reduction from 90 to 12. It will also be noticed that residual alumina was present in the filtrate to the amount of 0.2 p.p.m.

Table I.

Marked A 24/10/37	Raw Water	Chemically Treated Water	Filtrate
Dissolved Co_2	0.3	1.1	.4
pH	6.8	6.0	6.4
Total Alkalinity	1.8	0.9	0.9
Colour (Hazen Scale)	90		5
Alumina Dose, grs. p. gl.	2.3		
Sodium A dose	0.1		
Residual Alumina	0.05		0.05
Marked B 24/7/37 Dissolved Co_2	.4	1.4	.7
pH	6.8	5.9	5.9
Total Alkalinity	1.5	0.8	0.8
Colour (Hazen Scale)	90		12
Alumina Dose	3.8		
Sodium Dose	0		
Residual Alumina	0.05		0.2

Table II shows the results of analyses of raw and filtered water on October 1st, 1937, when the river was in flood after a dry period. The raw water was very bad, having a very low pH value (6.7) and the oxygen absorbed being 0.68 parts per 100,000. The improvement is remarkable, especially the improvement in ammonia content, oxgyen absorbed,

colour and turbidity. It is notable that the residual alumina in the filtered water is extremely low. The author never obtained such good results with a similar water when using sulphate of alumina alone.

Table II.

WATER ANALYSIS CERTIFICATE.

	Parts per 100,000 Raw Water	Filtered Water
1. Total Solids	8.1	7.4
2. Hardness as Calcium Carbonates		
Temporary	1.0	0.4
Permanent	3.2	3.7
3. Chlorine	1.2	1.2
Equivalent to Sodium Chloride		
4. Nitrogen as :		
Nitrates	0.13	0.13
Nitrites	Nil	Nil
5. Ammonia :		
Free	0.001	0.000
Albuminoid	0.034	0.007
6. Oxygen Absorbed :		
From Permangate in 3 hrs.	0.68	0.07
7. Colour (Hazen Scale)	100	5
8. pH Value	6.7	5.9
9. Turbidity	18.1	1.2
10. Residual Alumina	—	0.01

Dose of sulphate of alumina used	2.3 grs.	per gal.
Dose of sodium aluminate used	0.1	,,

Advantages of Sodium Aluminate.

The aluminium hydroxide obtained from the hydrolysis of the sodium aluminate has a negative charge as distinct from the positive charge of the sulphate of alumina, and thus the removal of both positive and negative types of colour is effected. Also floc formation is more rapid, and since the chemical consumption is reduced the filter beds require less wash water for cleaning.

Reaction Period.

With the absence of reaction tanks, as in the Cork plant, it is difficult to obtain good floc formation when dealing with water drawn direct from the river, owing to the fluctuations in the quality of the raw water. The author noticed that it was impossible to obtain a visible floc with a certain type of water *e.g.* one having an extremely low turbidity of 1.0 degree on the Hellige Turbidimeter and a colour of about 25 on the Hazen scale.

The reasons are the absence of fine particles in suspension, the impurities existing as colloids, and the fact that sufficient time to allow the necessary chemical reaction to take place does not elapse while the water is flowing from the point of application of the chemical to the filter beds. The actual time taken is only 120 seconds. Of course the filter beds themselves act as reaction tanks to a certain extent; although the floc is not visible in the water entering the beds its presence can be observed during washing out periods. It was noticed that this type of water required a proportionally larger dose of alumina to effect a good colour reduction, than a more turbid water. For instance, a water having a turbidity of 1.0 and colour of 24, pH 7.4 required a dose of 2.3 grains of alum per gallon to reduce the colour to 5 Hazen, whereas a water having a turbidity of 1.4, colour 40, pH. 7.1 required a dose of 2.1 to reduce the colour to 5 Hazen.

A certain inprovement was effected by changing the point of application of the chemical from the weir to the crude water suction sump. This ensured that the chemical got a thorough mixing as well as giving an increase of 60 seconds in reaction period. The author carried out a few simple laboratory experiments to determine what reaction period was necessary to obtain good floc formation and found that 2 hours detention gave good results. The following water having a colour 35 Hazen, turbidity 1.2, pH 7.0 required 2.3 grs. of alumina to give a colour reduction to 7 after 10 minutes reaction, which is the reaction period of the plant, whereas with the same water with 2.0 grs. of sulphate of alumina and 2 hours detention gave a colour reading of 5 Hazen. With a suitable detention, the following advantages should accrue :—effective control of floc formation under all conditions, reduction in the dose of sulphate of alumina, increased rate of filtration and longer filter runs. While the Cork plant functions well, as far as the provision of a first class filtrate is concerned, the inclusion of a reaction tank in the original scheme would certainly have made its operation easier and more economical. Manufacturers now seem to be fully aware of the necessity for the provision of such tanks as most of the recent installations dealing with river water are provided with them. The modern tendency is towards increased filtration rates, and these cannot be obtained without paying more attention to the preparation of the raw water, so that filter beds will act as filters and not as a combination of sedimentation tanks and filter beds.

As stated, effective coagulation is due largely to pH control and until recently pH value at Cork was obtained by means of a comparator. As it was necessary to check this value frequently, the comparator method at times is inconvenient ; for example, during the night shift.

So it was decided to install a new type of pH recorder, which had recently come on the market. This instrument gives a continuous record of the pH value of the chemically treated water and any change in the condition of the water is shown within two seconds of its occurrence. The chart has an effective pen travel of 10 inches and a standard speed of 1 inch per hour. As the length of the chart is 120 inches it lasts for 5 days. The valuable feature about this instrument is that it enables the attendant on duty to maintain the optimum pH value night or day by increasing or decreasing the chemical dosage as required. Incidentally it serves as an excellent check on the efficiency of the attendant.

Filter Beds.

At frequent intervals beds must be examined to ensure that they are in good condition and to detect the initial appearance of mud deposits on them. These deposits generally appear as irregular mounds varyiug from 1 to 2 feet in diameter. Their deleterious effect can be seen during washout periods, by observing the delayed agitation of the areas in question. This trouble can be usually overcome by the application of a second washing. In extreme cases the following procedure is adopted:—while the air flush is in operation the surface of the bed is given a thorough raking and at the same time a turn or two of the upwash valve is opened. This treatment is continued for 5 or 6 minutes, the air is shut off, and the upwash turned to its normal rate for from 7 to 10 minutes. This usually effects a considerable improvement. Sometimes cracks are observed on the surface of the beds, these being due to dirty sand grains compacting together and under certain conditions of loss of head shrinkage occurs. When these cracks are spread uniformly over the bed they usually penetrate for an inch or so, and do no particular harm, except to admit the water at a level slightly below the top of the sand. Occasionally, extended openings are found at the side walls, caused by an accumulation of mud bound with floc, forming an impervious mass. When the bed settles, due to the effect of under water shrinkage, this mass is pulled away from the wall, leaving a crack $\frac{1}{2}''$ to $1''$ in width. The bottom of this crack adheres to the wall and does permit the water entering it to percolate through. This is proved by the fact that when upwashing the bed, the air and upwash water, while breaking through surrounding areas fail to penetrate through the crack. Treatment similar to that already described, except that the cracks are given a good rodding as well, has been found to give satisfactory results.

Effect of Turbidity.

As may be expected, when filtering a turbid water a considerable amount of mud is deposited on the surface of the bed. During the time the bed is in commission this mud becomes impregnated with the gelatinous floc. Upwashing at the normal rate does not complete by removal this type of mud, which instead of flowing towards the washout weir settles over the bed in patches. The reason for this is that the velocity of the wash water (particularly at the back of the bed) is not sufficient to prevent the mud from re-settling when it has been disturbed by the initial rush of upwash water. It was noticed, that after the initial rush of water had come through, and the lighter

deposits swept over the waste weir, little benefit was obtained by permitting a prolonged flow. With this end in view, a second upwash pump was put into operation, which enabled the wash water rate to be doubled. The method of operation was to open the wash valve fully for 1½ minutes (after first giving 5 minutes air), then close the valve to give a discharge of 6 or 7 gls./sq. ft./min. for 3 or 4 minutes. While this method gave a much cleaner bed wash, it was found that a considerable number of the patches still remained.

A further improvement was obtained by fitting a spray at the back of the bed. This spray consisted of a 1 inch pipe, with ⅛" holes drilled at 6 inch centres. It was placed up against the back wall of the filter and suspended about 1 inch above the top of the sand, with the nozzles arranged to spray in a horizontal direction.

Application of Results.

The bed was washed in the ordinary way, except that when the initial rush of upwash water had come through and begun to flow over the waste weir the spray was turned on. This had the effect of giving the wash water a decided increase in velocity right from the back of the bed (where it was most wanted).

A cleaner bed was obtained with a saving of about 1,000 gallons of wash water. It was very noticeable that the area of bed which came under the direct influence of the spray was completely free from mud. The author is of the opinion that a still greater improvement could be affected by arranging a spray so that it could be moved up and down the full length of the bed.

It is intended that this experiment will be tried when more urgent work has been completed.

DAILY ROUTINE.

Plant.

The plant runs continuously throughout the week and is operated by three attendants, each working an eight hour shift. In practice it has been found that when the filtrate is maintained at a constant colour value of 5 on the Hazen scale the quality of the water is invariably first class. The fact that each filter has been provided with a white tiled outlet, clearly visible from the control platform, enables the attendant to keep the colour of the filtrate under constant observation. Frequent reference is also made to the pH recorder and the chemical dosage is altered if the record shows signs of leaving the specified range. Change of dose is not made in a haphazard fashion, as the attendant is instructed to get into touch with the laboratory where he will be informed of the correct dose to apply.

Laboratory.

One member of the staff is detailed to prepare the statistics of the previous day's plant performance, and these are examined by the Resident Engineer before they are filed for future reference. At 8.30 a.m. each day samples of the crude, chemically treated, and filtered water

are taken and tested in the laboratory for the following :—pH value, total alkalinity, CO_2, colour, turbidity. The filtered water is also tested for residual alumina.

These facts are necessary to ensure the production of water of consistent purity, by the most economical means. As may be expected, the quality of the crude water varies almost daily ; consequently, it is necessary to be in a position to alter the chemical dose quickly to suit conditions. Normally this does not present any difficulty, as a record has been kept of the various types of water dealt with and the treatment required for them. If, however, any difficulty is experienced in obtaining effective dosage a few trial samples are made up in the laboratory, reproducing plant conditions as nearly as possible. In this way it has been found possible to arrive at an effective dose. The pH range and chemical dose are phoned to the filter attendant on duty, and at 10.30 a.m. the filtrate is again tested to ensure that everything is in order.

Reservoirs.

Samples of water are obtained from both service reservoirs each morning and tested for residual chlorine, using the well known ortho-tolodine method. A residual from .05 to .08 has been found to indicate satisfactory results. A perusal of the log book and various flow charts (see Appendix) each morning by the resident engineer, enables him to determine the efficiency of plant operation over the 24 hours and to investigate any unusual occurrence in operation during that time.

Sterilisation by Gaseous Chlorine.

It is reasonable to assume that even the most efficient filter beds will not completely remove impurities such as bacteria and products having objectionable taste or smell. Therefore some additional treatment is necessary to ensure at all times, the provision of a bacteriologically pure water. Gaseous Chlorine can be employed for this purpose, in three different ways :—

(*a*) simple chlorination ;

(*b*) super chlorination, followed by de-chlorination.

(*c*) Ammonia-chlorine.

The most suitable method of treatment can only be decided upon, after due consideration has been given to the individual characteristics of the water to be treated.

Generally speaking the following rules apply :—

(*a*) *Simple chlorination* for most normal types of water which are low in organic content and free from fluctuations in quality.

(*b*) *Super chlorination* for highly polluted water having low organic content and where only a short contact period is available. It is also very suitable for water containing original taste due to algal growth.

(*c*) *Chloramine* for surface waters of high organic content and which are subject to rapid fluctuation in quality. Also for waters which develop a taste on the addition of the normal doses of chlorine required for effective sterilisation.

Treatment at Cork.

Up to 1934 the total supply of filtered water was sterilised, after filtration, by simple chlorination. The river Lee lent itself fairly well to this treatment for the greater portion of the year, when a not excessive dose of chlorine produced effective sterilisation.

However, at times, it had been found necessary to increase considerably the chlorine dosage, owing to the increase of organic content in solution of the water. This organic matter, though of non-bacterial origin, readily absorbed the chlorine, thus reducing the amount available for sterilisation. Also the necessarily increased dose gave rise to an appreciable "iodoform" taste. Apart from this, chlorine sterilises rapidly, but does not protect against the possibility of re-infection.

Elimination of Trouble.

A solution of ammonium sulphate of strength 0.1 parts per million is added at constant rate at the main filter water outlet, in the Candy plant, thus ensuring a thorough mixing before it reaches the filtered water suction tank. Here the water is further treated with a solution of chlorine water of strength 0.4 p.p.m. After a series of tests the chloramine ratio of 4 to 1 was found to be the most satisfactory, as it consistently gave the recommended chlorine residual of 0.2 p.p.m.

Advantages.

The advantages which may be claimed for this system are as follows :

(1) The chloramines formed by the addition of chlorine to a weak solution of ammonia are more stable in dilute solution than chlorine alone and consequently, retain their germicidal powers over longer periods. This reduces the possibility of re-infection after treatment and is particularly advantageous when service reservoirs are open, as in Cork.

(2) Dilute chloramine solutions are weak oxidising agents, and therefore, unlike chlorine alone, cause no deviation by the oxidation of organic impurities.

(3) The bactericidal power of chlorine is increased 3 to 6 times by the addition of ammonia, thus giving an ample factor of safety against any sudden increase in the bacterial content of the water.

(4) Solutions of Chloramine give no "taste" with phenols, consequently the troubles which arise from this source when chlorine alone is used, are eliminated.

Bacteriological Examination.

A sample of tap water is taken daily from different locations by a member of the M.O.H's staff and submitted to the bacteriological laboratory at University College, Cork, for examination. This ensures an adequate check, independent of local control, on the efficiency of the purification process, and enables the slightest deterioration in the purity

of the water to be rectified without delay. Table III summarises the results of the examination carried out during the year 1936 at the Bacteriological Laboratories, U.C.C., by Dr. W. J. O'Donovan.

Table III.

Total Routine Samples of Tap Water	Bacillus Coli Test					Average daily number of Bacteria per cc.	Number of Samples sterile in 1 cc.
	100 cc's Negative	100 cc's Positive	50 cc's Positive	10 cc's Positive	1 cc's Positive		
252	244	2	5	1	0	2.28	46

The procedure included an estimate of the number of bacteria growing at 37 degrees C. in 24 hours. The average number of bacteria in 1 c.c. was 2.28 and the number of samples sterile in 1 c.c. was 46. 96.8% of the samples were negative for B. Coli in 100 c.c's, and no B. Coli was found in 1 c.c. samples. These results indicate the efficiency of the chloramine process.

Cost.

Table 4 gives current cost per day for 2½ million gallons.

Table IV.

Materials used.	£	s.	d.
576 lbs. Sulphate of Alumina @ ½d.	1	4	0
20 ,, Sodium Aluminate @ 4d.	0	6	8
20 ,, Chlorine Gas @ 3d.	0	5	0
25 ,, Ammonium Sulphate @ 1d.	0	2	1
44 gls. Fuel Oil @ 5d.	0	18	4
1¼ ,, Lubricating Oil @ 2/-	0	2	6
Attendant's Wages	1	10	3
	£4	8	10

This is equivalent to £1 15s. 4d. per million gallons.

The results of the bacteriological examinations carried out during the year are set out in detail in the following table.

Table 67—1937—Detailed Results of Bacteriological Examination of Water Samples

EXPLANATION OF ABBREVIATIONS—AG=Acid and Gas; A=Acid Only; A?G=Acid with trace of Gas; O=No Reaction; F=Flourescence; Pos=Typical Colonies; +=Indol Reduced; L=Lactose Peptone Water; G=Glucose Peptone Water; S=Saccharose Peptone Water; I=Indol Mld=Mould.

Date	SOURCE	McCONKEY'S BROTH							Organisms per c.c.	McC's Slope	L	G	S	I	Dulcite	Milk	REMARKS
		50 c.c.	30 c.c.	20 c.c.	10 c.c.	5 c.c.	1 c.c.	0.1 c.c.									
1937																	
Jan. 1...	1 Alfred Street ...	0	0	0	0	0	0	—	2								
,, 4...	Mann's Lane ...	0	0	0	0	0	0	—	2								
,, 5...	78 South Main Street ...	0	0	0	0	0	0	—	1								First Quality Water
,, 6...	14 Industry Place ...	0	0	0	0	0	0	—	Nil								
,, 7...	2 Moore Street ...	0	0	0	0	0	0	—	Nil								
,, 8...	11 Dean Street ...	0	0	0	0	0	0	—	3								
,, 11...	54 Gt. Wm. O'Brien St. ...	0	0	0	0	0	0	—	1								
,, 12...	8 Sunnyside, Western Rd ...	0	0	0	0	0	0	—	1								
,, 13...	3 Arch Lane, Blarney St. ...	0	0	0	0	0	0	—	1								First Quality Water
,, 14...	5 Wandesford Street ...	0	0	0	0	0	0	—	1								
,, 15...	22 Abbey Street ...	0	0	0	0	0	0	—	24								
,, 18...	6 Grattan Hill ...	0	0	0	0	0	0	—	Mld								
,, 19...	12 Chapel Street ...	0	0	0	0	0	0	—	31								
,, 20...	22 Gillabbey Street ...	0	0	0	0	0	0	—	Mld								First Quality Water
,, 21...	27 Grattan Street ...	0	0	0	0	0	0	—	Mld								
,, 22...	31 Coach Street ...	0	0	0	0	0	0	—	6								

Table 67—1937—Detailed Results of Bacteriological Examination of Water Samples—contd.

Date	SOURCE	McCONKEY'S BROTH							Organisms per c.c.	McC's Slope	L	G	S	I	Dulcite	Milk	REMARKS
		50 c.c.	30 c.c.	20 c.c.	10 c.c.	5 c.c.	1 c.c.	0.1 c.c.									
1937																	
Jan. 25...	9 Margaret Street ...	0	0	0	0	0	0	—	6								
„ 26...	Audley House, St. Patrick's Hill	0	0	0	0	0	0	—	5								
„ 27...	23 St. Patrick's Quay ...	0	0	0	0	0	0	—	Mld								First Quality Water
„ 28...	61 Blarney Street ...	0	0	0	0	0	0	—	0								
„ 29...	23 Marlboro Street ...	0	0	0	0	0	0	—	2								
Feb. 1...	Edenmore, Western Rd. ...	0	0	0	0	0	0	—	5								
„ 2...	4 Vicar Street ...	0	0	0	0	0	0	—	5								
„ 3...	13 Step Lane (North) ...	0	0	0	0	0	0	—	2								First Quality Water
„ 4...	44 MacCurtain Street ...	0	0	0	0	0	0	—	2								
„ 5...	24 Boyce's Street ...	0	0	0	0	0	0	—	1								
„ 8...	8 Liberty Street ...	0	0	0	0	0	0	—	13								
„ 9...	5 Sheares' Street ...	0	0	0	0	0	0	—	5								
„ 10...	47 Cove Street ...	0	0	0	0	0	0	—	0								First Quality Water
„ 11...	Mill Lane, Pope's Quay ...	0	0	0	0	0	0	—	3								
„ 12...	27 MacCurtain Street ...	0	0	0	0	0	0	—	2								
„ 15...	11 North Abbey Street ...	0	0	0	0	0	0	—	0								
„ 16...	22 Hanover Street ...	0	0	0	0	0	0	—	0								
„ 17...	10 Home Ville, Westn Rd ...	0	0	0	0	0	0	—	3								First Quality Water
„ 18...	6 Green Street ...	0	0	0	0	0	0	—	5								
„ 19...	69 Commons Road ...	0	0	0	0	0	0	—	2								
„ 22...	Lodge, Rathmore House ...	0	0	0	0	0	0	—	3								
„ 23...	25 Blarney Street ...	0	0	0	0	0	0	—	Mld								
„ 24...	28 Grattan Street ...	0	0	0	0	0	0	—	1								First Quality Water
„ 25...	4 St. Mary's Villas, Western Rd	0	0	0	0	0	0	—	2								
„ 26...	7 South Terrace ...	0	0	0	0	0	0	—	2								

Table 67—1937—Detailed Results of Bacteriological Examination of Water Samples—contd.

Date	SOURCE	McCONKEY'S BROTH 50 c.c.	30 c.c.	20 c.c.	10 c.c.	5 c.c.	1 c.c	0.1 c.c.	Organisms per c.c.	McC's Slope	L	G	S	I	Dulcite	Milk	REMARKS
1937																	
Mar. 1...	68 Madden's Buildings ...	0	0	0	0	0	0	—	9								
„ 2...	1 Little William Street ...	0	0	0	0	0	0	—	4								
„ 3...	12 Ryan's Buildings ...	0	0	0	0	0	0	—	2								First Quality Water
„ 4...	8 Wandesford Street ...	0	0	0	0	0	0	—	1								
„ 5...	25 Grattan Street ...	0	0	0	0	0	0	—	0								
„ 8...	7 Arch Lane, Blarney St. ...	0	0	0	0	0	0	—	0								
„ 9...	54 Barrack Street ...	0	0	0	0	0	0	—	2								
„ 10...	10 Spring Lane ...	0	0	0	0	0	0	—	2								First Quality Water
„ 11...	West View, Washington St. ...	0	0	0	0	0	0	—	Mld								
„ 12...	Mechanics Hall, Grattan St. ...	0	0	0	0	0	0	—	5								
„ 15...	4 Little Cross Street ...	0	0	0	0	0	0	—	1								
„ 16...	St. Gubnait's, The Lough ...	0	0	0	0	0	0	—	1								
„ 17...	No Examination ...	—	—	—	—	—	—	—	—								First Quality Water
„ 18...	8 Abbey Street ...	0	0	0	0	0	0	—	0								
„ 19...	19 Devonshire Street ...	0	0	0	0	0	0	—	0								
„ 22...	4 James Street ...	0	0	0	0	0	0	—	0								
„ 23...	1 MacCurtain Street ...	0	0	0	0	0	0	—	0								
„ 24...	37 Washington Street ...	0	0	0	0	0	0	—	0								First Quality Water
„ 25...	8 Rock Cottages ...	0	0	0	0	0	0	—	0								
„ 30...	78 South Main Street ...	0	0	0	0	0	0	—	1								
„ 31...	40 Gerald Griffin Avenue ...	0	0	0	0	0	0	—	1								First Quality Water
April 1...	3 Eglington Place ...	0	0	0	0	0	0	—	3								
„ 2...	176 Lower Glanmire Rd. ...	0	0	0	0	0	0	—	3								

Table 67—1937—Detailed Results of Bacteriological Examination of Water Samples—contd.

Date	SOURCE	McCONKEY'S BROTH							Organisms per c.c.	McC's Slope	L	G	S	I	Dulcite	Milk	REMARKS
		50 c.c.	30 c.c.	20 c.c.	10 c.c.	5 c.c.	1 c.c.	0.1 c.c.									
1937																	
April 5...	St. Gobnait's, The Lough ...	0	0	0	0	0	0	—	3								
„ 6...	78 South Main Street ...	0	0	0	0	0	0	—	1								
„ 7...	25 Blarney Street ...	0	0	0	0	0	0	—	2								
„ 8...	65 Grand Parade ...	0	0	0	0	0	0	—	0								First Quality Water
„ 9...	9 Gerald Griffin Street ...	0	0	0	0	0	0	—	1								
„ 12...	Iveragh, Western Road ...	0	0	0	0	0	0	—	0								
„ 13...	2 Hackett's Terrace ...	0	0	0	0	0	0	—	1								
„ 14...	8 Liberty Street ...	0	0	0	0	0	0	—	2								
„ 15...	Laboratory Tap ...	0	0	0	0	0	0	—	0								First Quality Water
„ 16...	9 Upper Winter's Hill ...	0	0	0	0	0	0	—	1								
„ 19...	2 Barrack Street ...	0	0	0	0	0	0	—	1								
„ 20...	16 Wrixon's Lane ...	0	0	0	0	0	0	—	0								
„ 21...	Muskerry Villas, Westn Rd. ...	0	0	0	0	0	0	—	5								
„ 22...	4 Alfred Street ...	0	0	0	0	0	0	—	0								First Quality Water
„ 23...	7 Little Cross Street ...	0	0	0	0	0	0	—	2								
„ 26...	8 Sunnyside, Western Road ...	0	0	0	0	0	0	—	0								
„ 27...	Gillaghugh Cottages ...	0	0	0	0	0	0	—	0								
„ 28...	Drummy's Lawn ...	0	0	0	0	0	0	—	0								
„ 29...	35 MacCurtain Street ...	0	0	0	0	0	0	—	1								First Quality Water
„ 30...	2 Sheares' Street ...	0	0	0	0	0	0	—	0								
May 3...	16 Liberty Street ...	0	0	0	0	0	0	—	1								
„ 4...	8 Winter's Hill ...	0	0	0	0	0	0	—	1								
„ 5...	2 Prosperity Square ...	0	0	0	0	0	0	—	0								
„ 6...	8 Burke's Avenue ...	0	0	0	0	0	0	—	0								First Quality Water
„ 7...	268 Old Youghal Road ...	0	0	0	0	0	0	—	0								

Table 67—1937—Detailed Results of Bacteriological Examination of Water Samples—contd.

Date	SOURCE	McCONKEY'S BROTH							Organisms per c.c.	McC's Slope	L	G	S	I	Dulcite	Milk	REMARKS
		50 c.c.	30 c.c.	20 c.c.	10 c.c.	5 c.c.	1 c.c.	0.1 c.c.									
1937																	
May 10...	4 Prospect Row ...	0	0	0	0	0	0	—	0								
,, 11...	35 Washington Street ...	0	0	0	0	0	0	—	0								
,, 12...	Keohane's Lane ...	0	0	0	0	0	0	—	0								First Quality Water
,, 13...	6 Sullivan's Quay ...	0	0	0	0	0	0	—	0								
,, 14...	2 St. Patrick's Terrace ...	0	0	0	0	0	0	—	1								
,, 18...	12, Mahony's Avenue ...	0	0	0	0	0	0	—	0								
,, 19...	3 Little Hanover Street ...	0	0	0	0	0	0	—	0								
,, 20...	25 Grattan Street ...	0	0	0	0	0	0	—	0								First Quality Water
,, 21...	46 Boyces Street ...	0	0	0	0	0	0	—	2								
,, 24...	6 Green Street ...	0	0	0	0	0	0	—	0								
,, 25...	6 School Lane ...	0	0	0	0	0	0	—	1								
,, 26...	149 Ballyhooly Road ...	0	0	0	0	0	0	—	2								First Quality Water
,, 27...	8 Homeville, Western Rd. ...	0	0	0	0	0	0	—	1								
,, 28...	29 Wycherley's Terrace ...	0	0	0	0	0	0	—	3								
,, 31...	3 Barrett's Buildings ...	0	0	0	0	0	0	—	2								
June 1...	53 Barrack Street ...	0	0	0	0	0	0	—	0								
,, 2 ..	82 Gt. Wm. O'Brien St. ...	0	0	0	0	0	0	—	0								First Quality Water
,, 3...	Marlboro Lodge, Sidney Place...	0	0	0	0	0	0	—	1								
,, 4...	31 Sheares' Street ...	0	0	0	0	0	0	—	0								
,, 7...	8 Liberty Street ...	0	0	0	0	0	0	—	0								
,, 8...	7 Donoghue's Lane ...	0	0	0	0	0	0	—	1								
,, 9...	6 Vicar Street ...	0	0	0	0	0	0	—	0								First Quality Water
,, 10...	39 Roman Street ...	0	0	0	0	0	0	—	2								
,, 11...	18 St. Patrick's Hill ...	0	0	0	0	0	0	—	1								
,, 14...	8 Moore Street ...	0	0	0	0	0	0	—	0								
,, 15...	22 Hanover Street ...	0	0	0	0	0	0	—	0								
,, 16...	10 Winter's Hill ...	0	0	0	0	0	0	—	0								First Quality Water
,, 17...	20 Abbey Street ...	0	0	0	0	0	0	—	0								
,, 18...	14 Walsh's Lane ...	0	0	0	0	0	0	—	0								
,, 21...	44 MacCurtain Street ...	0	0	0	0	0	0	—	0								
,, 22...	11 Grattan Street ...	0	0	0	0	0	0	—	0								
,, 23...	16 Homeville, Western Road...	0	0	0	0	0	0	—	0								First Quality Water
,, 24...	60 Blarney Street ...	0	0	0	0	0	0	—	0								
,, 25...	Anglesea Place ...	0	0	0	0	0	0	—	0								

Table 68.—Detailed Results of Examinations of Water Samples by the multiple fraction method of B. coli estimation (by McCrady's tables based on Greenwood and Yules formula)

Date	SOURCE	McCONKEY'S BROTH				Presumptive B. Coli per 100 c.c.	Agar Count per c.c. 370 c.	COLON GROUP CONFIRMATIONS								REMARKS
		50 c.c.	10 c.c.	1 c.c.	0.1 c.c.			Milk	Sacch.	Dulcite	Indol.	V.P.	M.R.	Citrate	Gelatin	
1937																
June 28...	16 Gt. William O'Brien Street ...	AG	0/5	0/5	—	0	0	AC	0		0	0	+	+		Intermediate Type I.
,, 29...	28 Grattan Street ...	AG	0/5	0/5	—	0	0	AC	0		+	0	+	0		Faecal Type I.
,, 30...	35 Hanover Street ...	0/5	0/5	0/5	—	0	0									Supply Satisfactory
July 2...	20 Fort Street ...	0/5	0/5	0/5	—	0	0									
,, 5...	36 Sunset Place, Ballyhooly Rd.	0	0/5	0/5	—	—	0									
,, 6...	11 Pope's Quay ...	0	2/5	0/5	—	2	9	AC	0		+	0	+	0		Faecal I.
,, 7...	41 Grattan Street ...	0	0/5	0/5	—	0	2									
,, 8...	7 Liberty Street ...	AG	0/5	0/5	—	1	2	AC	0		+	0	+	0		Faecal I.
,, 9...	Arcadia, Glanmire Road ...	0	0/5	0/5	—	0	1									
,, 12...	11 Grenville Place ...	AG	0/5	0/5	—	1	1	AC	0		+	0	+	0		Faecal I.
,, 13...	11 Maylor Street ...	AG	2/5	0/5	—	5	4	Not	colon	group	orga	nisms				
,, 14...	239 Blarney Street ...	0	0/5	0/5	—	0	3									
,, 15...	78 Oliver Plunkett Street ...	0	0/5	0/5	—	0	2									
,, 16...	1 Bridge Street ...	AG	0/5	0/5	—	1	5	A	AG		0	+	0	+		Aerogenes I. Gen. inference. Satisfactory.
,, 19...	1 Dominick's Terrace ...	0	0/5	0/5	—	0	1									
,, 20...	3 Sheares' Street ...	0	0/5	0/5	—	0	0									
,, 21...	50 Shandon Street ...	0	0/5	0/5	—	0	0									
,, 22...	12 North Abbey Street ...	AG	0/5	0/5	—	1	—									
,, 23...	67 Grand Parade ...	AG	1/5	0/5	—	3	2	Not	colon	group	orga	nisms				
,, 26...	4 Bishop's Street ...	AG	1/5	0/5	—	3	2	—	0	0	0	+	0	0	—	= 10 c.c. late lactose.
,, 27...	6 St. Mary's Villas, Western Rd.	0	0/5	0/5	—	0	0									
,, 28...	3 Pope's Quay ...	AG	1/5	0/5	—	3	2	A	0	0	0	0	+	0	—	Faecal II.
,, 29...	Lavatory Tap ...	AG	1/5	0/5	—	3	0	0	AG	0	+	0	+	0	—	Faecal I.
,, 30...	79 Shandon Street ...	AG	1/5	0/5	—	3	32	—	0	—	+	0	+	0	—	Faecal I.

Table 68—Detailed Results of Examinations of Water Samples by the multiple fraction method of B. Coli estimation—contd.

Date	SOURCE	McCONKEY'S BROTH				Presumptive B. Coli per 100 c.c.	Agar Count per c.c. 370 c.	COLON GROUP CONFIRMATIONS								REMARKS
		50 c.c.	10 c.c.	1 c.c.	0.1 c.c.			Milk	Sacch.	Dulcite	Indol.	V.P.	M.R.	Citrate	Gelatin	
1937																
Aug. 3...	199 Old Youghal Road ...	0	0/5	0/5	—	0	1									
,, 4...	8 St. Bridget Street ...	0	0/5	0/5	—	0	1									
,, 5...	28 Washington Street West ...	0	0/5	0/5	—	0	2									
,, 6...	50 Shandon Street ...	0	0/5	0/5	—	0	2									
,, 9...	22 Cattle Market Lane ...	0	0/5	0/5	—	0	0									
,, 10...	105 Old Youghal Road ...	0	0/5	0/5	—	0	1									
,, 11...	46 Tower Street ...	0	0/5	0/5	—	0	2									
,, 12...	22 Peter Street ...	0	0/5	0/5	—	0	0									
,, 13...	14 Knapp's Square ...	0	0/5	0/5	—	—	1									
,, 16...	2 Kerry Yard ...	0	0/5	0/5	—	0	0									
,, 17...	35 Cornmarket Street ...	AG	0/5	0/5	—	1	0	AC	AG	—	0	+	0	+	—	Aergenes II.
,, 18...	2 St. John's Terrace ...	0	0/5	0/5	—	0	1									
,, 19...	3 Nicholas Church Lane ...	AG	1/5	0/5	—	3	2	AC	0	—	+	0	+	0	—	Faecal I.
20...	4 Alverna, Mardyke ...	0	0/5	0/5	—	0	0									
,, 23...	12 Pope's Quay ...	0	0/5	0/5	—	0	1									
,, 24...	13 Washington Street ...	0	0/5	0/5	—	0	2									
,, 25...	175 Old Youghal Road ...	0	0/5	0/5	—	0	0									
,, 26...	24 Nicholas Street ...	0	0/5	0/5	—	0	0									
,, 27...	1 Anne Street ...	0	0/5	0/5	—	0	5									
,, 30...	27 Sharman Crawford Street ...	0	1/5	0/5	—	1	0	AC	AG	—	0	0	+	+	—	Intermediate I.
,, 31...	64 Kearney's Lane ...	0	0/5	0/5	—	0	0									
Sept. 1...	55 Hanover Street ...	0	0/5	0/5	—	0	3									
,, 2...	1 King's Terrace ...	0	0/5	0/5	—	0	6									
,, 3...	71 MacCurtain's Buildings ...	0	0/5	0/5	—	0	1									

Table 68—Detailed Results of Examinations of Water Samples by the multiple fraction method of B. Coli estimation—contd.

Date	SOURCE	McCONKEY'S BROTH				Presumptive B. Coli per 100 c.c.	Agar Count per c.c. 370 c.	COLON GROUP CONFIRMATIONS								REMARKS
		50 c.c.	10 c.c.	1 c.c.	0.1 c.c.			Milk	Sacch.	Dulcite	Indol.	V.P.	M.R.	Citrate	Gelatin	
1937																
Sept. 6...	7 Vicar Street ...	0	0/5	0/5	—	0	4									
,, 7...	64 Shandon Street ...	0	0/5	0/5	—	0	2									
,, 8...	48 North Main Street ...	0	0/5	0/5	—	0	8									
,, 9...	2 Clifton Ter., Montenotte Park	AG	0/5	0/5	—	1	2	AC	AG	—	0	+	0	+	—	Aergenes I.
,, 10...	2 Clifton Ter., Montenotte Park	0	0/5	0/5	—	0	7									
,, 13...	Drummy's Lawn ...	0	0/5	0/5	—	0	0									
,, 14...	20 Abbey Street ...	0	0/5	0/5	—	0	6									
,, 15...	21 Blarney Street ...	0	0/5	0/5	—	0	1									
,, 16...	87 Oliver Plunkett Street ...	0	0/5	0/5	—	0	1									
,, 17...	Montenotte Park Stores ...	0	0/5	0/5	—	0	1									
,, 20...	34 South Mall ...	0	0/5	0/5	—	0	1									
,, 21...	12 Pope's Quay ...	0	0/5	0/5	—	0	0									
,, 22...	11 Dean Street ...	0	0/5	0/5	—	0	2									
,, 23...	21 St. Finbarr's Street ...	0	0/5	0/5	—	0	1									
,, 24...	8 Liberty Street ...	0	0/5	0/5	—	0	1									
,, 27...	10 St. Vincent's Terrace ...	0	0/5	0/5	—	0	0									
,, 28...	5 Garfield Terrace ...	0	0/5	0/5	—	0	3									
,, 29...	50 Shandon Street ...	0	0/5	0/5	—	0	3									
,, 30...	50 College Road ...	0	0/5	0/5	—	0	6									
Oct. 1...	21 Cove Street ...	0	0/5	0/5	—	0	5									
,, 4...	Mutton Lane, Patrick Street...	0	0/5	0/5	—	0	2									
,, 5...	396 Blarney Street ...	0	0/5	0/5	—	0	2									
,, 6...	30 Wycherley's Terrace ...	0	0/5	0/5	—	0	1									
,, 7...	50 Shandon Street ...	0	0/5	0/5	—	0	3									
,, 8...	27 St. Finbarr's Place ...	0	0/5	0/5	—	0	0									

Table 68—Detailed Results of Examinations of Water Samples by the multiple fraction method of B. Coli estimation—contd.

Date	SOURCE	McCONKEY'S BROTH				Presumptive B. Coli per 100 c.c.	Agar Count per c.c. 370 c.	COLON GROUP CONFIRMATIONS								REMARKS
		50 c.c.	10 c.c.	1 c.c.	0.1 c.c.			Milk	Sacch.	Dulcite	Indol.	V.P.	M.R.	Citrate	Gelatin	
1937																
Oct. 11...	22 Hanover Street ...	0	0/5	0/5	—	0	1									
,, 12...	367 Blarney Street ...	0	0/5	0/5	—	0	0									
,, 13...	Laboratory Tap ...	0	0/5	0/5	—	0	0									
,, 14...	25 Henry Street ...	0	0/5	0/5	—	0	1									
,, 15...	12 Pope's Quay ...	0	0/5	0/5	—	0	2									
,, 18...	2 Fort Street ...	0	0/5	0/5	—	0	0									
,, 19...	14 Fort Street ...	0	0/5	0/5	—	0	0									
,, 20...	8 Paul Street ...	0	0/5	0/5	—	0	3									
,, 21...	8 Sunnyside, Western Road ...	0	0/5	0/5	—	0	0									
,, 22...	37 Hanover Street ...	0	0/5	0/5	—	0	1									
,, 25...	50 Shandon Street ...	0	0/5	0/5	—	0	3									
,, 26...	3 Vicar Street ...	AG	5/5	5/5	—	1800+	109	AC	AG	—	0	0	+	+	—	
,, 27...	23 Grattan Street ...	0	0/5	0/5	—	0	2									
,, 28...	3 Vicar Street ...	0	0/5	0/5	—	0	4									
,, 29...	63 Blarney Street ...	0	0/5	0/5	—	0	1									
Nov. 1...	36 Gould Street ...	0	0/5	0/5	—	0	0									
,, 2...	5 Widderling's Hill ...	0	0/5	0/5	—	0	3									
,, 3...	5 Coleman's Lane ...	0	0/5	0/5	—	0	2									
,, 4...	2 Crosse's Green ...	0	0/5	0/5	—	0	0									
,, 5...	39 Old Marlet Place ...	0	0/5	0/5	—	0	4									
,, 8...	1 Rosary Villas, Mardyke ...	0	0/5	0/5	—	0	0									
,, 9...	Drummy's Lawn ...	0	0/5	0/5	—	0	2									
,, 10...	87 South Main Street ...	0	0/5	0/5	—	0	0									
,, 11...	3 Thomas Street ...	0	0/5	0/5	—	0	1									
,, 12...	27 Sullivan's Quay ...	0	0/5	0/5	—	0	0									
,, 15...	5 Anne Street ...	0	0/5	0/5	—	0	0									
,, 16...	2 Blair's Hill ...	0	0/5	0/5	—	0	1									
,, 17...	50 Shandon Street ...	0	0/5	0/5	—	0	4									
,, 18...	11 Brown Street ...	0	0/5	0/5	—	0	1									
,, 19...	16 Fort Street ...	0	0/5	0/5	—	0	3									

Table 68—Detailed Results of Examinations of Water Samples by the multiple fraction method of B. Coli estimation—contd.

Date	SOURCE	McCONKEY'S BROTH				Presumptive B. Coli per 100 c.c.	Agar Count per c.c. 370 c.	COLON GROUP CONFIRMATIONS								REMARKS
		50 c.c.	10 c.c.	1 c.c.	0.1 c.c.			Milk	Sacch.	Dulcite	Indol.	V.P.	M.R.	Citrate	Gelatin	
1937																
Nov. 22...	59 St. Finnbarr's Road ...	0	0/5	0/5	—	0	1									
,, 23...	69 Wolfe Tone Street ...	0	0/5	0/5	—	0	3									
,, 24...	24 Dominick Street ...	0	0/5	0/5	—	0	2									
,, 25...	4 Peter's Church Avenue ...	0	0/5	0/5	—	0	2									
,, 26...	20 Friar's Walk ...	0	0/5	0/5	—	0	6									
,, 29...	1 Muskerry Villas ...	0	0/5	0/5	—	0	0									
,, 30...	47 College Road ...	0	0/5	0/5	—	0	22									
Dec. 1...	12 Pope's Quay ...	0	0/5	0/5	—	0	0									
,, 2...	4 Rock Cottages ...	0	0/5	0/5	—	0	0									
,, 3...	59 Oliver Plunkett Street ...	0	0/5	0/5	—	0	0									
,, 6...	4 Bishop Street ...	0	0/5	0/5	—	0	0									
,, 7...	22 Washington Street West ...	0	0/5	0/5	—	0	0									
,, 8...	10 Merchant's Quay ...	0	0/5	0/5	—	0	2									
,, 9...	2 Liberty Street ...	0	0/5	0/5	—	0	0									
,, 10...	2 Cross Street ...	0	0/5	0/5	—	0	5									
,, 13...	69 Barrack Steeet ...	0	0/5	0/5	—	0	0									
,, 14...	50 Sheares' Street ...	0	0/5	0/5	—	0	7									
,, 15...	1 Grattan Street ...	0	0/5	0/5	—	0	4									•
,, 16...	4 Vincent's Place, Blarney St....	0	0/5	0/5	—	0	1									
,, 17...	45 Grattan Street ...	0	0/5	0/5	—	0	1									
,, 20...	32 Sheares Street ...	0	0/5	0/5	—	0	0									
,, 21...	12 Pope's Quay ...	0	0/5	0/5	—	0	0									
,, 22...	105 North Main Street ...	0	0/5	0/5	—	0	3									
,, 23...	72 Shandon Street ...	0	0/5	0/5	—	0	2									
,, 29...	42 Sheares' Street ...	0	0/5	0/5	—	0	0									
,, 30...	25 St. Finnbarr's Place ...	0	0/5	0/5	—	0	0									
,, 31...	50 Shandon Street ...	0	0/5	0/5	—	0	0									

Table 69—Particulars and Results of Water Treatment, 1937

DATE	Gallons Pumped (Millions	CHEMICALS USED				ANALYTICAL DATA								REMARKS
						Raw Water			Filtered Water					
		Alumina (Grs. per Gallon)	Soda Aluminate (Grs. per Gallon)	Chlorine (Parts per Million)	Ammonium Sulphate (Parts per Million)	pH	Colour	Turbidity	pH	Colour	Turbidity	Residual Alumina	Residual Chlorine	
													Low Level Reservoir / High Level Reservoir	
1/1/37 ...	4.1	1.33	—	0.4	0.1	7.0	15		6.8	4	—	0.1	0.07 / 0.07	
2/1/37 ...	4.3	1.39	—	0.4	0.1	7.0	15		6.8	3	—	0.1	0.07 / 0.08	
3/1/37 ...	3.8	1.9	—	0.4	0.1	7.0	20		6.8	5	—	0.1	0.07 / 0.07	
4/1/37 ...	4.4	1.33	—	0.4	0.1	7.0	15		6.8	4	—	0.1	0.07 / 0.08	
5/1/37 ...	4.6	1.17	—	0.4	0.1	7.1	20		6.8	4	—	0.1	0.07 / 0.07	
6/1/37 ...	4.4	1.7	—	0.4	0.1	7.0	25		6.8	5	—	0.1	0.07 / 0.08	
7/1/37 ...	4.3	1.7	—	0.4	0.1	7.0	25		6.8	5	—	0.1	0.07 / 0.08	
8/1/37 ...	4.5	1.75j	—	0.4	0.1	7.1	37		6.5	3	—	0.1	0.7 / 0.07	
9/1/37 ...	4.2	1.39	—	0.4	0.1	7.0	30		6.6	3	—	0.1	0.07 / 0.07	
10/1/37 ...	3.7	1.9	—	0.4	0.1	7.0	20		6.8	4	—	0.1	0.08 / 0.08	
11/1/37 ...	4.4	1.39	—	0.4	0.1	7.1	25		6.8	4	—	0.1	0.08 / 0.08	
12/1/37 ...	4.4	1.06	—	0.4	0.1	7.0	20		6.8	3	—	0.1	0.07 / 0.08	
13/1/37 ...	4.5	1.7	—	0.4	0.1	7.0	35		6.4	5	—	0.1	0.07 / 0.07	
14/1/37 ...	4.7	1.33	—	0.4	0.1	7.0	30		6.6	4	—	0.1	0.07 / 0.07	
15/1/37 ...	4.1	1.39	—	0.4	0.1	7.0	25		6.4	5	—	0.1	0.06 / 0.06	
16/1/37 ...	4.2	1.9	—	0.4	0.1	7.0	50		6.8	5	—	0.1	0.06 / 0.06	
17/1/37 ...	3.7	1.27	—	0.4	0.1	7.0	35		6.4	4	—	0.1	0.06 / 0.07	
18/1/37 ...	4.6	2.16	—	0.4	0.1	7.0	40		6.4	4	—	0.1	0.1 / 0.1	
19/1/37 ...	4.5	2.16	—	0.4	0.1	7.0	35		6.8	3	—	0.1	0.07 / 0.08	
20/1/37 ...	3.6	1.06	—	0.4	0.1	7.2	25		6.8	4	—	0.1	0.1 / 0.08	
21/1/37 ...	4.3	2.07	—	0.4	0.1	7.0	50		6.8	5	—	0.1	0.08 / 0.08	
22/1/37 ...	5.0		Not available										0.06 / 0.06	
23/1/37 ...	4.3	1.5				7.0	40		6.8	5	—	0.1	0.06 / 0.06	
24/1/37 ...	3.5		Not available											
25/1/37 ...	4.4		Not available											
26/1/37 ...	4.7	1.9		0.4	0.1	7.0	30		6.4	3	—	0.05	0.06 / 0.06	
27/1/37 ...	4.8	1.9	—	0.4	0.1	7.0	40		6.8	4	—	0.1	0.1 / 0.07	
28/1/37 ...	4.6	1.7	—	0.4	0.1	7.0	30		6.8	4	—	0.1	0.08 / 0.07	
29/1/37 ...	4.4	1.9	—	0.4	0.1	7.0	25		6.6	4		0.5	0.1 / 0.08	
30/1/37 ...	4.3	1.39	—	0.4	0.1	7.0	25		6.6	4	—	0.05	0.1 / 0.1	
31/1/37 ...	3.8	1.93	—	0.4	0.1	7.0	40		6.8	3	—	0.05	0.08 / 0.08	
1/2/37 ...	4.7	1.6	0.1	0.4	0.1	6.8	30		6.4	4	—	0.05	0.07 / 0.08	
2/2/37 ...	4.4	1.28	—	0.4	0.1	7.0	25		6.4	4	—	0.05	0.07 / 0.07	
3/2/37 ...	2.9		Not available											
4/2/37 ...	4.3	1.6	—	0.4	0.1	7.0	35		6.8	5	—	0.1	0.1 / 0.1	

Not available

Table 69—Particulars and Results of Water Treatment, 1937—continued

DATE	Gallons Pumped (Millions	CHEMICALS USED				ANALYTICAL DATA								REMARKS
						Raw Water			Filtered Water					
												Residual Chlorine		
		Alumina (Grs. per Gallon)	Soda Aluminate (Grs. per Gallon)	Chlorine (Parts per Million)	Ammonium Sulphate (Parts per Million)	pH	Colour	Turbidity	pH	Colour	Turbidity	Residual Alumina	Low Level Reservoir	High Level Reservoir	
5/2/37 ...	5.1	1.5	—	0.4	0.1	7.0	25		6.4	4	—	0.5	0.1	0.08	
6/2/37 ...	4.4	1.45	—	0.4	0.1	7.0	25		6.6	4	—	.05	0.8	0.1	
7/2/37 ...	2.7	1.12	—	0.4	0.1	7.0	20		6.6	4	—	.05	0.1	0.1	
8/2/37 ...	4.8	1.9	0.1	0.4	0.1	6.8	50		6.4	4	—	0.1	0.1	0.1	
9/2/37 ...	4.6	1.6	0.1	0.4	0.1	6.8	40		6.4	5	—	0.1	0.1	0.1	
10/2/37 ...	4.9	1.28	—	0.4	0.1	7.0	30		6.8	4	—	0.1	0.1	0.08	
11/2/37 ...	5.0	1.45	—	0.4	0.1	7.0	30		6.8	5	—	0.1	0.08	0.08	
12/2/37 ...	4.6	1.93	—	0.4	0.1	7.0	30		6.8	5	—	0.1	0.1	0.08	
13/2/37 ...	4.8	1.5	—	0.4	0.1	7.0	25		6.7	4	—	0.1	0.07	0.08	
14/2/37 ...	4.0	1.5	—	0.4	0.1	7.0	25		6.6	4	—	0.05	0.07	0.08	
15/2/37 ...	4.4	1.28	—	0.4	0.1	7.0	25		6.8	4	—	0.1	0.08	0.08	
16/2/37 ...	5.0	1.5	0.1	0.4	0.1	6.8	50		6.4	4	—	0.5	0.08	0.1	
17/2/37 ...	4.7	1.93	—	0.4	0.1	7.0	30		6.8	5	—	0.1	0.08	0.08	
18/2/37 ...	4.6	1.53	—	0.4	0.1	7.0	30		6.6	4	—	0.05	0.08	0.07	
19/2/37 ...	4.7	1.61	—	0.4	0.1	7.0	30	Not available	6.6	3	—	0.05	0.1	0.08	
20/2/37 ...	4.2	1.5	—	0.4	0.1	7.0	25		6.6	4	—	0.05	0.08	0.08	
21/2/37 ...	3.9	1.28	—	0.4	0.1	7.0	25		6.6	4	—	0.05	0.07	0.08	
22/2/37 ...	4.8	1.28	—	0.4	0.1	7.0	30		6.6	4	—	0.05	0.08	0.1	
23/2/37 ...	4.6	1.7	—	0.4	0.1	7.0	35		6.4	4	—	0.05	0.08	0.1	
24/2/37 ...	4.6	1.5	—	0.4	0.1	7.0	35		6.6	4	—	0.05	0.08	0.08	
25/2/37 ...	4.7	1.9	—	0.4	0.1	7.0	40		6.4	4	—	0.05	0.08	0.08	
26/2/37 ...	4.4	1.9	—	0.4	0.1	7.0	40		6.4	4	—	0.05	0.07	0.07	
27/2/37 ...	4.3	1.9	—	0.4	0.1	7.0	40		6.4	4	—	0.05	0.07	0.07	
28/2/37 ...	4.0	1.7	—	0.4	0.1	7.0	30		6.4	4	—	0.05	0.08	0.08	
1/3/37 ...	4.9	1.5	—	0.4	0.1	7.0	20		6.4	3	—	0.1	0.1	0.1	
2/3/37 ...	4.6	1.45	—	0.4	0.1	7.0	20		6.4	3	—	0.05	1.15	1.85	
3/3/37 ...	4.7	1.45	—	0.4	0.1	7.0	20		6.4	3	—	0.1	0.1	0.1	
4/3/37 ...	4.6	1.45	—	0.4	0.1	7.0	15		6.6	3	—	0.1	0.1	0.1	
5/3/37 ...	4.7	1.33	—	0.4	0.1	7.0	15		6.7	4	—	0.1	0.15	0.15	
6/3/37 ...	4.3	1.12	—	0.4	0.1	7.0	15		6.7	3	—	0.1	0.15	0.15	
7/3/37 ...	3.9	1.27	—	0.4	0.1	7.0	20		6.6	3	—	0.1	0.1	0.1	
8/3/37 ...	4.7	1.06	—	0.4	0.1	7.0	15		6.8	3	—	0.1	0.1	0.1	
9/3/37 ...	4.8	2.16	—	0.4	0.1	7.0	15		6.7	3	—	0.05	0.1	0.1	
10/3/37 ...	4.5	1.45	—	0.4	0.1	7.0	15		6.7	3	—	0.05	0.1	0.1	
11/3/37 ...	4.5	1.45	—	0.4	0.1	7.0	30		6.8	5	—	0.1	0.08	0.08	

Table 69—Particulars and Results of Water Treatment, 1937—continued

DATE	Gallons Pumped (Millions	CHEMICALS USED				ANALYTICAL DATA								REMARKS
						Raw Water			Filtered Water					
		Alumina (Grs. per Gallon)	Soda Aluminate (Grs. per Gallon)	Chlorine (Parts per Million)	Ammonium Sulphate (Parts per Million)	pH	Colour	Turbidity	pH	Colour	Turbidity	Residual Alumina	Residual Chlorine	
													Low Level Reservoir / High Level Reservoir	
12/3/37 ...	4.7	1.27	—	0.4	0.1	7.0	30		6.8	5	—	0.1	0.08 / 0.1	
13/3/37 ...	4.3	1.06	—	0.4	0.1	7.0	25		6.7	4	—	0.1	0.07 / 0.08	
14/3/37 ...	4.0	1.9	—	0.4	0.1	7.0	15		6.8	4	—	0.1	0.1 / 0.1	
15/3/37 ...	4.6	1.7	—	0.4	0.1	7.0	15		6.8	4	—	0.1	0.1 / 0.1	
16/3/37 ...	3.9	2.5	—	0.4	0.1	7.0	20		6.8	5	—	0.1	0.08 / 0.1	
17/3/37 ...	4.6	2.16	0.1	0.4	0.1	6.8	40		6.4	3	—	0.1	0.1 / 0.1	
18/3/37 ...	5.0	1.33	—	0.4	0.1	6.8	40		6.4	4	—	0.1	0.08 / 0.1	
19/3/37 ...	4.7	1.75	—	0.4	0.1	7.0	35		6.4	4	—	0.1	0.08 / 0.08	
20/3/37 ...	4.3	1.7	—	0.4	0.1	7.0	50		6.4	4	—	0.1	0.08 / 0.1	
21/3/37 ...	3.9	1.6	—	0.4	0.1	7.0	35		6.4	4	—	0.1	0.08 / 0.1	
22/3/37 ...	4.9	1.9	—	0.4	0.1	7.0	25		6.4	4	—	0.1	0.1 / 0.1	
23/3/37 ...	5.0	1.33	—	0.4	0.1	7.0	20		6.4	4	—	0.1	0.08 / 0.08	
24/3/37 ...	4.6	1.61	—	0.4	0.1	7.0	15		6.6	4	—	0.1	0.08 / 0.1	
25/3/37 ...	4.9	1.33	—	0.4	0.1	7.0	15		6.7	4	—	0.1	0.08 / 0.1	
26/3/37 ...	4.5	1.45	—	0.4	0.1	7.0	20		6.8	3	—	0.1	0.12 / 0.12	
27/3/37 ...	4.4	1.5	—	0.4	0.1	7.0	20		6.8	4	—	0.1	0.1 / 0.1	
28/3/37 ...	3.9	1.28	—	0.4	0.1	7.0	15		6.8	4	—	0.1	0.1 / 0.1	
29/3/37 ...	4.2	1.5	—	0.4	0.1	7.0	15		6.8	4	—	0.1	0.1 / 0.12	
30/3/37 ...	4.5	1.12	—	0.4	0.1	7.0	15		6.8	4	—	0.1	0.1 / 0.1	
31/3/37 ...	4.5	1.45	—	0.4	0.1	7.0	20		6.8	4	—	0.1	0.1 / 0.1	
1/4/37 ...	4.2	2.16	—	0.4	0.1	6.8	50	Not available	6.4	5	—	0.1	0.08 / 0.1	
2/4/37 ...	4.6	1.9	—	0.4	0.1	7.0	40		6.4	4	—	0.1	0.08 / 0.08	
3/4/37 ...	4.4	2.16	—	0.4	0.1	6.8	40		6.4	4	—	0.1	0.08 / 0.08	
4/4/37 ...	3.9	1.28	—	0.4	0.1	6.8	30		6.4	4	—	0.1	0.1 / 0.1	
5/4/37 ...	4.8	1.7	—	0.4	0.1	7.0	25		6.6	5	—	0.1	0.1 / 0.12	
6/4/37 ...	4.8	1.9	—	0.4	0.1	7.0	30		6.6	4	—	0.1	0.08 / 0.08	
7/4/37 ...	4.7	2.16	—	0.4	0.1	7.0	35		6.4	4	—	0.1	0.08 / 0.08	
8/4/37 ...	4.8	2.16	—	0.4	0.1	6.8	50		6.2	5	—	0.1	0.08 / 0.08	
9/4/37 ...	4.6	1.9	—	0.4	0.1	7.0	35		6.4	4	—	0.1	0.07 / 0.06	
10/4/37 ...	4.4	1.9	—	0.4	0.1	6.8	50		6.4	5	—	0.1	0.08 / 0.08	
11/4/37 ...	4.0	2.9	—	0.4	0.1	6.8	35		6.2	4	—	0.1	0.08 / 0.08	
12/4/37 ...	4.7	1.9	—	0.4	0.1	6.8	30		6.4	4	—	0.1	0.07 / 0.08	
13/4/37 ...	4.8	1.9	—	0.4	0.1	7.0	20		6.6	4	—	0.1	0.08 / 0.08	
14/4/37 ...	4.7	1.61	—	0.4	0.1	7.0	20		6.6	4	—	0.1	0.07 / 0.08	
15/4/37 ...	4.6	1.9	—	0.4	0.1	7.0	20		6.8	5	—	0.1	0.07 / 0.07	

Table 69—Particulars and Results of Water Treatment, 1937—continued

DATE	Gallons Pumped (Millions	CHEMICALS USED				ANALYTICAL DATA								REMARKS
						Raw Water			Filtered Water					
		Alumina (Grs. per Gallon)	Soda Aluminate (Grs. per Gallon)	Chlorine (Parts per Million)	Ammonium Sulphate (Parts per Million)	pH	Colour	Turbidity	pH	Colour	Turbidity	Residual Alumina	Residual Chlorin: Low Level Reservoir	Residual Chlorin: High Level Reservoir	
16/4/37 ...	4.6	2.78	—	0.4	0.1	7.0	35		6.8	5	—	0.1	0.08	0.07	
17/4/37 ...	4.2	2.25	—	0.4	0.1	7.0	35		6.6	4	—	0.1	0.07	0.07	
18/4/37 ...	4.0	2.16	—	0.4	0.1	7.0	30		6.8	4	—	0.1	0.08	0.08	
19/4/37 ...	4.7	2.16	—	0.4	0.1	7.0	25		6.6	4	—	0.1	0.08	0.08	
20/4/37 ...	4.8	2.34	—	0.4	0.1	7.0	30		6.6	4	—	0.1	0.07	0.07	
21/4/37 ...	4.8	2.34	—	0.4	0.1	6.8	50		6.4	4	—	0.1	0.08	0.08	
22/4/37 ...	4.8	2.9	—	0.4	0.1	7.0	35		6.2	4	—	0.1	0.08	0.1	
23/4/37 ...	5.0	1.75	—	0.4	0.1	7.0	30		6.6	4	—	0.1	0.08	0.08	
24/4/37 ...	4.5	1.91	—	0.4	0.1	7.0	25		6.6	5	—	0.1	0.08	0.1	
25/4/37 ...	4.1	1.75	—	0.4	0.1	7.0	20		6.6	5	—	0.1	0.07	0.07	
26/4/37 ...	5.0	1.9	—	0.4	0.1	7.0	20		6.8	5	—	0.1	0.07	0.08	
27/4/37 ...	5.0	2.37	—	0.4	0.1	7.0	20		6.6	4	—	0.1	0.08	0.1	
28/4/37 ...	4.9	1.9	—	0.4	0.1	7.0	20		6.6	4	—	0.1	0.08	0.08	
29/4/37 ...	4.9	1.9	—	0.4	0.1	7.0	20		6.8	5	—	0.1	0.07	0.08	
30/4/37 ...	5.0	2.07	—	0.4	0.1	7.0	15		6.8	5	—	0.1	0.07	0.07	
1/5/37 ...	4.6	2.07	—	0.4	0.1	7.0	15	4.0	6.8	5	.8	0.1	0.08	0.08	
2/5/37 ...	4.1	1.9	—	0.4	0.1	7.0	15	4.0	6.6	5	1.3	0.1	0.08	0.08	
3/5/37 ...	4.7	2.56	—	0.4	0.1	7.2	20	5.0	6.8	5	.7	0.1	0.1	0.1	
4/5/37 ...	5.0	1 9	—	0.4	0.1	7.2	15	1.2	6.8	5	1.0	0.15	0.08	0.08	
5/5/37 ...	4.8	2.07	—	0.4	0.1	7.2	15	1.2	6.8	4	0.5	0.1	0.08	0.08	
6/5/37 ...	5.2	1.06	—	0.4	0.1	7.2	15	1.2	6.8	4	0.7	0.1	0.07	0.07	
7/5/37 ...	5.1	2.37	—	0.4	0.1	7.2	20	2	6.8	5	1.0	0.1	0.08	0.08	
8/5/37 ...	4.7	1.45	—	0.4	0.1	7.2	20	2.2	6.8	5	0.9	0.1	0.07	0.08	
9/5/37 ...	4.4	1.75	—	0.4	0.1	7.2	20	1.9	6.8	5	1.4	0.1	0.07	0.08	
10/5/37 ...	5.3	1.9	—	0.4	0.1	7.0	35	2.4	6.8	5	1.3	0.1	0.06	0.06	
11/5/37 ...	5.1	1.93	—	0.4	0.1	7.0	40	2.5	6.8	5	1.6	0.1	0.06	0.06	
12/5/37 ...	5.1	1.45	—	0.4	0.1	7.0	35	1.6	6.8	5	1.2	0.1	0.06	0.07	
13/5/37 ...	5.4	2.07	—	0.4	0.1	7.0	25	1.8	6.8	5	1.4	0.1	0.07	0.07	
14/5/37 ...	5.6	2.37	—	0.4	0.1	7.0	20	1.6	6.8	5	1.2	0.1	0.07	0.07	
15/5/37 ...	4.5	1.93	—	0.4	0.1	7.0	15	1.6	6.8	5	1.3	0.1	0.07	0.07	
16/5/37 ...	4.2	2.37	—	0.4	0.1	7.2	15	1.4	7.0	5	1.0	0.1	0.08	0.1	
17/5/37 ...	4.6	1.45	—	0.4	0.1	7.2	15	1.2	7.0	5	1.0	0.1	0.08	0.1	
18/5/37 ...	4.9	1.61	—	0.4	0.1	7.2	15	1.6	7.0	5	1.3	0.1	0.08	0.1	
19/5/37 ...	4.6	1.6	—	0.4	0.1	7.2	15	3.0	7.0	5	1.8	0.1	0.08	0.1	
20/5/37 ...	4.8	1.6	—	0.4	0.1	7.4	15	2.0	7.0	5	1.6	0.1	0.07	0.07	

Not available

Table 69—Particulars and Results of Water Treatment, 1937—continued

DATE	Gallons Pumped (Millions)	CHEMICALS USED				ANALYTICAL DATA									REMARKS
						Raw Water			Filtered Water						
		Alumina (Grs. per Gallon)	Soda Aluminate (Grs. per Gallon)	Chlorine (Parts per Million)	Ammonium Sulphate (Parts per Million)	pH	Colour	Turbidity	pH	Colour	Turbidity	Residual Alumina	Residual Chlorine		
													Low Level Reservoir	High Level Reservoir	
21/5/37 ...	4.9	1.45	—	0.4	0.1	7.4	15	1.6	7.0	5	1.4	0.1	0.08	0.1	
22/5/37 ...	4.9	1.45	—	0.4	0.1	7.2	15	1.2	7.0	5	1.0	0.1	0.06	0.08	
23/5/37 ...	4.4	1.45	—	0.4	0.1	7.4	15	1.6	7.0	5	1.2	0.1	0.07	0.08	
24/5/37 ...	4.8	1.39	—	0.4	0.1	7.2	15	1.6	7.0	5	1.2	0.1	0.07	0.08	
25/5/37 ...	4.9	1.61	—	0.4	0.1	7.2	20	2.8	7.0	5	1.0	0.1	0.07	0.08	
26/5/37 ...	5.3	2.25	0.1	0.4	0.1	7.0	60	4.2	6.4	10	1.2	0.2	0.06	0.07	
27/5/37 ...	4.2	2.5	—	0.4	0.1	7.0	40	2.0	6.4	10	1.0	0.2	0.6	0.06	
28/5/37 ...	5.0	2.5	—	0.4	0.1	7.0	40	1.2	6.4	5	0.6	0.1	0.06	0.06	
29/5/37 ...	4.6	2.25	—	0.4	0.1	7.2	35	1.2	6.8	5	0.6	0.1	0.06	0.08	
30/5/37 ...	4.2	2.07	—	0.4	0.1	7.2	35	1.2	6.8	10	1.0	0.2	0.05	0.06	
31/5/37 ...	4.7	2.37	—	0.4	0.1	7.2	35	1.2	6.8	5	1.0	0.1	0.06	0.07	
1/6/37 ...	4.9	1.6	—	0.4	0.1	7.2	25	1.0	6.8	5	0.6	0.1	0.05	0.07	
2/6/67 ...	4.5	1.9	—	0.4	0.1	7.2	20	1.0	6.8	5	0.4	0.1	0.06	0.07	
3/6/37 ...	4.6	1.33	—	0.4	0.1	7.2	20	1.2	7.0	7	0.1	0.15	0.06	0.07	
4/6/37 ...	4.9	1.61	—	0.4	0.1	7.2	20	1.0	7.0	6	0.8	0.1	0.06	0.07	
5/6/37 ...	5.5	1.45	—	0.4	0.1	7.2	20	1.0	7.0	6	0.8	0.1	0.06	0.07	
6/6/37 ...	4.0	1.33	—	0.4	0.1	7.2	20	1.3	6.8	5	0.8	0.1	0.08	0.1	
7/6/37 ...	4.9	1.61	—	0.4	0.1	7.2	30	1.8	6.8	10	1.2	0.2	0.07	0.08	
8/6/37 ...	5.0	1.45	—	0.4	0.1	7.2	30	1.6	6.8	5	1.2	0.1	0.05	0.06	
9/6/37 ...	4.8	1.61	—	0.4	0.1	7.2	15	1.2	6.8	5	1.0	0.1	0.05	0.06	
10/6/37 ...	4.6	1.9	—	0.4	0.1	7.2	15	1.2	6.8	4	1.0	0.1	0.05	0.06	
11/6/37 ...	4.6	1.61	—	0.4	0.1	7.2	30	1.6	6.8	10	1.1	0.2	0.05	0.06	
12/6/37 ...	5.2	1.61	—	0.4	0.1	7.2	35	1.7	6.8	10	1.1	0.2	0.06	0.07	
13/6/37 ...	4.3	1.39	—	0.4	0.1	7.4	35	1.4	7.0	10	1.2	0.2	0.06	0.07	
14/6/37 ...	5.6	1.12	—	0.4	0.1	7.4	30	1.5	7.0	7	1.2	0.15	0.06	0.07	
15/6/37 ...	5.2	2.37	—	0.4	0.1	7.4	15	1.0	7.0	4	0.7	0.1	0.06	0.07	
16/6/37 ...	4.8	1.75	—	0.4	0.1	7.4	20	1.2	7.0	5	1.0	0.1	0.07	0.08	
17/6/37 ...	5.1	1.45	—	0.4	0.1	7.4	20	1.2	7.0	5	0.7	0.1	0.06	0.07	
18/6/37 ...	5.2	1.61	—	0.4	0.1	7.4	20	1.2	7.0	5	0.7	0.1	0.06	0.08	
19/6/37 ...	4.5	2.25	—	0.4	0.1	7.6	15	1.2	7.2	4	0.7	—	0.08	0.1	
20/6/37 ...	4.1	1.9	—	0.4	0.1	7.4	15	1.2	7.0	5	0.7	0.1	0.07	0.1	
21/6/37 ...	5.1	1.45	—	0.4	0.1	7.4	15	1.2	7.2	5	1.0	0.1	0.06	0.08	
22/6/37 ...	5.1	1.17	—	0.4	0.1	7.4	15	1.0	7.2	5	0.7	0.1	0.07	0.08	
23/6/37 ...	5.1	1.17	—	0.4	0.1	7.6	15	1.0	7.2	5	0.7	0.1	0.06	0.08	
24/6/37 ...	4.9	1.17	—	0.4	0.1	7.6	15	1.2	7.2	5	0.7	0.1	0.06	0.08	

Table 69—Particulars and Results of Water Treatment, 1937—continued

DATE	Gallons Pumped (Millions)	CHEMICALS USED				ANALYTICAL DATA									REMARKS
						Raw Water			Filtered Water						
													Residual Chlorine		
		Alumina (Grs. per Gallon)	Soda Aluminate (Grs. per Gallon)	Chlorine (Parts per Million)	Ammonium Sulphate (Parts per Million)	pH	Colour	Turbidity	pH	Colour	Turbidity	Residual Alumina	Low Level Reservoir	High Level Reservoir	
25/6/37 ...	4.9	1.17	—	0.4	0.1	7.6	15	1.2	7.2	5	0.9	0.1	0.06	0.08	
26/6/37 ...	4.9	1.17	—	0.4	0.1	7.6	15	1.2	7.2	5	0.7	0.1	0.06	0.07	
27/6/37 ...	4.6	1.17	—	0.4	0.1	7.6	15	1.2	7.2	5	0.7	0.1	0.07	0.08	
28/6/37 ...	5.4	1.17	—	0.4	0.1	7.6	15	0.9	7.2	5	0.7	0.1	0.07	0.08	
29/6/37 ...	4.7	1.17	—	0.4	0.1	7.4	15	0.9	7.2	5	0.7	0.1	0.06	0.07	
30/6/37 ...	4.8	1.17	—	0.4	0.1	7.6	15	0.9	7.2	5	0.7	0.1	0.06	0.08	
1/7/37 ...	5.0	1.17	—	0.4	0.1	7.6	15	1.0	7.2	5	0.7	0.1	0.06	0.07	
2/7/37 ...	5.3	1.28	—	0.4	0.1	7.4	20	1.2	7.2	5	0.7	0.1	0.05	0.06	
3/7/37 ...	4.4	1.43	—	0.4	0.1	7.4	20	1.2	7.2	5	0.7	0.1	0.06	0.07	
4/7/37 ...	4.3	2.44	—	0.4	0.1	6.8	80	8.2	6.4	5	1.2	0.1	0.06	0.07	
5/7/37 ...	5.2	1.9	.075	0.4	0.1	6.8	50	3.0	6.0	5	0.5	0.1	0.06	0.07	
6/7/37 ...	5.3	1.9	.075	0.4	0.1	6.8	35	1.4	6.2	5	1.2	0.1	0.05	0.06	
7/7/37 ...	5.1	1.9	.075	0.4	0.1	6.8	35	1.4	6.0	3	0.4	0.1	0.05	0.06	
8/7/37 ...	5.9	1.9	.075	0.4	0.1	6.8	30	1.2	6.2	3	0.4	0.05	0.05	0.06	
9/7/37 ...	5.2	1.6	.075	0.4	0.1	6.8	30	1.2	6.4	5	1.0	0.1	0.05	0.06	
10/7/37 ...	4.9	1.87	.075	0.4	0.1	7.0	30	1.4	6.4	5	1.0	0.1	0.05	0.06	
11/7/37 ...	4.1	1.75	.075	0.4	0.1	7.0	35	1.4	6.4	4	0.8	0.1	0.05	0.05	
12/7/37 ...	5.4	1.75	.075	0.4	0.1	7.0	30	1.2	6.4	5	1.0	0.1	0.05	0.05	
13/7/37 ...	5.4	1.75	.075	0.4	0.1	7.0	25	1.0	6.4	4	0.5	0.1	0.05	0.06	
14/7/37 ...	5.2	1.39	.075	0.4	0.1	7.0	25	1.0	6.4	5	0.7	0.1	0.05	0.06	
15/7/37 ...	5.5	1.9	.075	0.4	0.1	7.1	25	1.0	6.8	4	0.7	0.1	0.05	0.05	
16/7/37 ...	5.4	1.6	.075	0.4	0.1	7.0	25	1.0	6.8	4	0.7	0.1	0.05	0.06	
17/7/37 ...	5.0	2.07	—	0.4	0.1	7.0	25	1.0	6.7	3	0.5	0.1	0.05	0.06	
18/7/37 ...	4.2	2.07	—	0.4	0.1	7.0	30	1.1	6.8	5	0.7	0.1	0.05	0.06	
19/7/37 ...	5.2	1.9	—	0.4	0.1	7.2	25	1.0	6.8	5	0.7	0.1	0.05	0.06	
20/7/37 ...	4.9	2.03	—	0.4	0.1	7.1	25	1.0	6.8	5	0.7	0.1	0.05	0.05	
21/7/37 ...	5.0	1.6	0.1	0.4	0.1	7.2	25	1.0	6.8	5	0.8	0.1	0.05	0.06	
22/7/37 ...	5.2	1.8	—	0.4	0.1	7.2	25	1.0	6.8	5	0.7	0.1	0.05	0.06	
23/7/37 ...	5.5	1.8	—	0.4	0.1	7.1	25	1.2	6.8	5	1.0	0.1	0.06	0.07	
24/7/37 ...	5.0	2.9	0.1	0.4	0.1	6.8	90	6.0	6.4	5	1.4	0.1	0.05	0.07	
25/7/37 ...	4.3	2.7	0.1	0.4	0.1	6.8	70	6.0	6.2	4	1.3	0.1	0.05	0.06	
26/7/37 ...	5.1	2.35	0.1	0.4	0.1	6.8	40	1.1	6.2	5	0.6	0.1	0.05	0.06	
27/7/37 ...	5.2	1.7	—	0.4	0.1	7.0	37	1.0	6.4	4	0.5	0.1	0.05	0.06	
28/7/37 ...	5.3	1.7	—	0.4	0.1	7.0	30	0.9	6.7	5	0.6	0.1	—	0.06	
29/7/37 ...	4.8	1.9	—	0.4	0.1	7.1	27	0.7	6.8	5	0.5	0.1	—	0.06	

Table 69—Particulars and Results of Water Treatment, 1937—continued

DATE	Gallons Pumped (Millions)	CHEMICALS USED				ANALYTICAL DATA									REMARKS
						Raw Water			Filtered Water						
													Residual Chlorine		
		Alumina (Grs. per Gallon)	Soda Aluminate (Grs. per Gallon)	Chlorine (Parts per Million)	Ammonium Sulphate (Parts per Million)	pH	Colour	Turbidity	pH	Colour	Turbidity	Residual Alumina	Low Level Reservoir	High Level Reservoir	
30/7/37 ...	4.9	1.9	—	0.4	0.1	7.2	26	1.0	6.7	5	0.5	0.1	0.06	0.08	
31/7/37 ...	4.8	2.03	—	0.4	0.1	7.2	24	1.0	6.8	5	0.8	0.1	0.07	0.1	
1/8/37 ...	4.0	2.03	—	0.4	0.1	7.2	24	1.0	6.8	5	0.8	0.1	0.06	0.1	
2/8/37 ...	4.5	2.03	—	0.4	0.1	7.2	24	1.1	6.8	5	0.8	0.1	0.06	0.08	
3/8/37 ...	5.1	2.03	—	0.4	0.1	7.4	24	1.0	6.8	5	0.8	0.1	0.06	0.08	
4/8/37 ...	4.9	2.03	—	0.4	0.1	7.4	24	1.0	6.8	5	0.8	0.1	0.06	0.08	
5/8/37 ...	4.9	1.8	—	0.4	0.1	7.4	23	1.0	6.8	5	0.6	0.1	0.07	0.1	
6/8/37 ...	5.0	1.9	—	0.4	0.1	7.6	23	1.0	7.0	5	0.8	0.1	0.07	0.08	
7/8/37 ...	4.8	1.9	—	0.4	0.1	7.6	23	1.0	7.0	5	0.8	0.1	0.06	0.08	
8/8/37 ...	4.0	1.9	—	0.4	0.1	7.6	24	1.0	7.0	5	0.6	0.1	0.07	0.1	
9/8/37 ...	5.1	1.9	—	0.4	0.1	7.6	20	1.0	7.0	5	0.8	0.1	0.07	0.1	
10/8/37 ...	5.3	1.8	—	0.4	0.1	7.4	20	1.0	7.0	5	0.8	0.1	0.08	0.01	
11/8/37 ...	4.7	1.8	—	0.4	0.1	7.6	20	1.2	7.0	5	1.0	0.1	0.07	0.08	
12/8/37 ...	5.2	1.8	—	0.4	0.1	7.4	22	1.2	7.0	5	1.0	0.1	0.07	0.1	
13/8/37 ...	5.2	1.9	—	0.4	0.1	7.4	22	1.2	7.0	5	0.8	0.1	0.06	0.08	
14/8/37 ...	4.9	1.9	—	0.4	0.1	7.4	25	1.2	7.0	5	1.0	0.1	0.07	0.08	
15/8/37 ...	4.2	1.9	—	0.4	0.1	7.6	23	1.0	7.0	5	0.8	0.1	0.08	0.1	
16/8/37 ...	5.0	1.9	—	0.4	0.1	7.4	22	1.0	7.0	5	0.7	0.1	0.07	0.1	
17/8/37 ...	5.2	1.9	—	0.4	0.1	7.4	24	1.0	6.8	5	0.8	0.1	0.06	0.08	
18/8/37 ...	5.0	2.03	—	0.4	0.1	7.2	25	1.2	6.8	5	1.0	0.1	0.07	0.1	
19/8/37 ...	5.1	2.03	—	0.4	0.1	7.4	24	1.0	6.8	5	0.8	0.1	0.07	0.1	
20/8/37 ...	5.1	2.16	—	0.4	0.1	7.4	24	1.2	6.8	4	1.0	0.1	0.07	0.1	
21/8/37 ...	5.0	2.16	—	0.4	0.1	7.6	27	1.4	6.8	5	1.0	0.1	0.07	0.1	
22/8/37 ...	4.5	2.16	—	0.4	0.1	7.6	27	1.4	6.9	5	1.0	0.1	0.07	0.1	
23/8/37 ...	5.0	2.16	—	0.4	0.1	7.7	27	1.4	6.9	5	1.0	0.1	0.07	0.1	
24/8/37 ...	5.3	2.16	—	0.4	0.1	7.7	25	1.4	7.0	4	1.0	0.1	0.07	0.1	
25/8/37 ...	5.4	1.8	—	0.4	0.1	7.8	22	1.2	7.0	4	0.8	0.1	0.06	0.1	
26/8/37 ...	5.1	1.7	—	0.4	0.1	7.8	20	1.2	7.0	4	1.0	0.1	0.06	0.1	
27/8/37 ...	5.3	1.7	—	0.4	0.1	7.8	20	1.2	7.0	4	1.0	0.1	0.06	0.1	
28/8/37 ...	4.7	1.8	—	0.4	0.1	7.8	20	1.2	7.0	5	1.0	0.1	0.05	0.08	
29/8/37 ...	3.9	1.8	—	0.4	0.1	7.8	20	1.2	7.0	5	1.0	0.1	0.07	0.1	
30/8/37 ...	4.9	1.8	—	0.4	0.1	7.7	20	1.2	7.0	5	1.0	0.01	0.07	0.08	
31/8/37 ...	5.1	2.03	—	0.4	0.1	7.0	27	2.0	6.9	5	1.4	0.01	0.07	0.1	
1/9/37 ...	5.1	1.9	—	0.4	0.1	7.2	25	1.4	7.0	5	1.0	0.05	0.06	0.1	
2/9/37 ...	5.3	2.03	—	0.4	0.1	7.4	30	1.6	7.0	5	1.2	0.05	0.06	0.07	

Table 69—Particulars and Results of Water Treatment, 1937—continued

DATE	Gallons Pumped (Millions	CHEMICALS USED				ANALYTICAL DATA									REMARKS
						Raw Water			Filtered Water						
		Alumina (Grs. per Gallon)	Soda Aluminate (Grs. per Gallon)	Chlorine (Parts per Million)	Ammonium Sulphate (Parts per Million)	pH	Colour	Turbidity	pH	Colour	Turbidity	Residual Alumina	Residual Chlorine		
													Low Level Reservoir	High Level Reservoir	
3/9/37 ...	4.8	2.16	—	0.4	0.1	7.4	37	2.0	6.8	5	1.0	0.05	0.06	0.08	
4/9/37 ...	4.9	2.03	—	0.4	0.1	7.4	36	1.4	6.8	5	1.0	0.01	0.06	0.08	
5/9/37 ...	4.1	2.16	—	0.4	0.1	7.4	37	1.4	6.8	5	1.0	0.01	0.06	0.08	
6/9/37 ...	5.1	2.34	—	0.4	0.1	7.4	37	1.4	7.0	5	1.0	0.01	0.06	0.08	
7/9/37 ...	5.1	2.34	—	0.4	0.1	7.4	35	1.4	7.0	5	1.0	0.015	0.06	0.08	
8/9/37 ...	5.1	2.34	—	0.4	0.1	7.6	30	1.4	6.9	5	1.0	0.01	0.06	0.08	
9/9/37 ...	5.1	2.34	—	0.4	0.1	7.8	30	1.4	7.0	5	1.0	0.01	0.05	0.08	
10/9/37 ...	5.2	2.34	—	0.4	0.1	7.2	40	5.0	7.0	6	0.7	0.1	0.06	0.08	
11/9/37 ...	4.6	2.03	—	0.4	0.1	7.0	40	2.2	6.4	4	1.0	0.01	0.06	0.08	
12/9/37 ...	4.1	2.67	.075	0.4	0.1	7.0	50	2.2	6.7	8	1.4	0.15	0.07	0.1	
13/9/37 ...	5.0	2.16	.075	0.4	0.1	7.1	40	1.4	6.7	8	1.0	0.15	0.06	0.08	
14/9/37 ...	5.2	2.16	.075	0.4	0.1	7.1	37	1.2	6.7	6	0.7	0.1	0.06	0.08	
15/9/37 ...	4.9	2.07	.075	0.4	0.1	7.4	35	1.2	6.8	12	1.0	0.2	0.05	0.07	
16/9/37 ...	5.3	2.07	.075	0.4	0.1	7.3	30	1.2	6.8	6	0.7	0.1	0.06	0.1	
17/9/37 ...	5.2	2.16	0.1	0.4	0.1	7.0	40	4.0	6.8	6	1.4	0.1	0.05	0.07	
18/9/37 ...	4.7	2.7	0.1	0.4	0.1	6.8	60	4.0	6.0	6	1.0	0.1	—	0.07	
19/9/37 ...	4.2	2.7	0.1	0.4	0.1	6.9	40	1.6	6.4	6	1.0	0.1	0.05	0.08	
20/9/37 ...	5.3	2.56	0.1	0.4	0.1	7.1	38	1.2	6.4	6	1.0	0.1	0.05	0.08	
21/9/37 ...	5.3	2.23	0.1	0.4	0.1	7,0	38	1.4	6.4	6	0.8	0.1	0.1	0.08	
22/9/37 ...	5.0	1.93	0.1	0.4	0.1	7.0	36	1.2	6.4	5	1.0	0.05	0.1	0.1	
23/9/37 ...	5.1	1.93	0.1	0.4	0.1	7.0	38	1.7	6.4	6	1.4	0.1	0.12	0.1	
24/9/37 ...	5.0	1.91	—	0.4	0.1	7.0	40	2.2	6.5	6	1.4	0.1	—	—	
25/9/37 ...	4.6	2.19	—	0.4	0.1	7.0	37	1.4	6.5	5	1.0	0.1	0.05	0.08	
26/9/37 ...	4.3	2.25	—	0.4	0.1	7.0	36	1.4	6.4	6	1.0	0.1	0.06	0.08	
27/9/37 ...	4.9	2.25	—	0.4	0.1	7.0	37	1.4	6.5	6	1.2	0.1	0.06	0.08	
28/9/37 ...	5.1	2.25	—	0.4	0.1	7.0	37	1.4	6.5	8	1.0	0.1	0.06	0.08	
29/9/37 ...	5.1	2.25	—	0.4	0.1	7.0	35	1.4	6.5	6	0.7	0.1	0.05	0.07	
30/9/37 ...	4.8	2.16	—	0.4	0.1	7.0	30	1.4	6.7	5	1.0	0.1	0.06	0.1	
1/10/37 ...	5.1	2.37	0.1	0.4	0.1	6.7	100	18.0	5.8	5	1.2	0.1	0.05	0.07	
2/10/37 ...	4.9	2.25	0.1	1.4	0.1	6.8	70	7.0	5.6	5	1.0	0.1	0.05	0.06	
3/10/37 ...	4.6	1.9	0.1	0.4	0.1	6.8	45	2.3	6.4	6	1.0	0.1	—	—	
4/10/37 ...	4.9	1.9	0.1	0.4	0.1	6.8	38	1.4	6.4	6	1.0	0.1	0.05	0.07	
5/10/37 ...	5.2	1.7	0.1	0.4	0.1	7.0	35	1.4	6.6	6	1.2	0.1	—	—	
6/10/37 ...	5.1	1.6	0.1	0.4	0.1	7.0	30	1.4	6.5	5	0.7	0.1	0.06	0.07	
7/10/37 ...	5.1	1.6	.075	0.4	0.1	7.0	27	1.2	6.7	6	1.0	0.1	0.05	0.07	

Table 69—Particulars and Results of Water Treatment, 1937—(continued)

DATE	Gallons Pumped (Millions	CHEMICALS USED				ANALYTICAL DATA									REMARKS
						Raw Water			Filtered Water						
													Residual Chlorine		
		Alumina (Grs. per Gallon)	Soda Aluminate (Grs. per Gallon)	Chlorine (Parts per Million)	Ammonium Sulphate (Parts per Million)	pH	Colour	Turbidity	pH	Colour	Turbidity	Residual Alumina	Low Level Reservoir	High Level Reservoir	
8/10/37 ...	5.1	1.5	.075	0.4	0.1	7.1	25	1.2	6.8	5	1.0	0.1	0.05	0.07	
9/10/37 ...	4.7	1.5	.075	0.4	0.1	7.1	25	1.2	6.8	6	1.0	0.1	0.05	0.07	
10/10/37 ...	4.3	1.5	.075	0.4	0.1	7.1	25	1.2	6.8	5	1.1	0.1	0.05	0.05	
11/10/37 ...	5.2	1.5	.075	0.4	0.1	7.1	25	1.2	6.8	5	1.0	0.1	0.06	0.06	
12/10/37 ...	5.0	1.5	.075	0.4	0.1	7.0	25	1.2	6.8	5	1.0	0.1	0.08	0.08	
13/10/37 ...	5.1	1.5	.075	0.4	0.1	7.0	23	1.2	6.8	5	1.0	0.05	0.1	0.15	
14/10/37 ...	4.7	1.5	.075	0.4	0.1	7.0	23	1.2	6.8	4	1.0	0.05	0.08	0.15	
15/10/37 ...	5.0	1.8	—	0.4	0.1	7.2	20	1.2	6.8	4	0.8	0.05	0.1	0.12	
16/10/37 ...	4.7	1.7	—	0.4	0.1	7.1	20	1.0	6.8	4	0.5	0.05	0.08	0.12	
17/10/37 ...	4.2	1.6	—	0.4	0.1	7.1	20	1.0	6.8	4	0.5	0.05	0.1	0.12	
18/10/37 ...	5.2	1.5	—	0.4	0.1	7.1	18	1.0	6.8	4	0.5	0.05	0.1	0.12	
19/10/37 ...	5.2	1.5	—	0.4	0.1	7.2	18	0.7	6.8	5	0.5	0.05	0.1	0.12	
20/10/37 ...	5.3	1.5	—	0.4	0.1	7.2	18	1.0	6.9	5	0.8	0.05	0.1	0.12	
21/10/37 ...	5.2	1.5	—	0.4	0.1	7.1	18	1.0	6.9	5	0.8	0.05	0.1	0.12	
22/10/37 ...	4.8	1.5	—	0.4	0.1	7.1	18	1.0	6.9	5	0.7	0.05	0.1	0.12	
23/10/37 ...	4.6	1.7	—	0.4	0.1	7.0	20	1.4	6.8	5	0.7	0.05	0.1	0.15	
24/10/37 ...	4.6	2.37	0.1	0.4	0.1	6.8	90	10.0	6.4	5	0.7	0.05	0.08	0.1	
25/10/37 ...	4.6	2.49	0.1	0.4	0.1	6.8	80	4.0	6.4	8	0.7	0.15	0.08	0.1	
26/10/37 ...	5.2	2.7	0.1	0.4	0.1	6.8	90	6.0	6.4	5	1.0	0.05	0.05	0.07	
27/10/37 ...	5.2	2.7	0.1	0.4	0.1	6.8	70	4.0	6.2	5	1.0	0.05	0.07	0.07	
28/10/37 ...	4.8	2.37	0.1	0.4	0.1	7.0	60	2.2	6.4	5	1.0	0.05	0.06	0.07	
29/10/37 ...	5.0	1.93	0.1	0.4	0.1	7.0	38	2.0	6.5	5	1.0	0.05	0.07	0.1	
30/10/37 ...	4.9	1.9	0.1	0.4	0.1	7.0	38	1.5	6.5	5	1.0	0.05	0.1	0.1	
31/10/37 ...	4.4	1.8	0.1	0.4	0.1	6.9	40	2.0	6.4	5	1.0	0.05	0.12	0.12	
1/11/37 ...	5.1	2.16	0.1	0.4	0.1	6.7	90	7.0	6.4	5	1.0	0.05	0.2	0.15	
2/11/37 ...	4.9	2.07	0.1	0.4	0.1	6.8	60	3.0	6.2	5	1.2	0.05	0.1	0.1	
3/11/37 ...	4.9	1.9	0.1	0.4	0.1	6.8	40	1.5	6.2	5	1.0	0.05	0.12	0.1	
4/11/37 ...	4.7	2.25	0.1	0.4	0.1	6.8	80	5.0	6.4	5	1.0	0.1	0.12	0.1	
5/11/37 ...	5.3	2.25	0.1	0.4	0.1	6.7	90	4.0	6.2	5	1.0	0.05	0.1	0.1	
6/11/37 ...	5.1	2.07	0.1	0.4	0.1	6.8	50	2.6	6.2	5	1.0	0.05	0.08	0.08	
7/11/37 ...	4.0	1.9	0.1	0.4	0.1	6.8	37	1.8	6.4	5	1.2	0.05	0.1	0.08	
8/11/37 ...	5.0	1.9	0.1	0.4	0.1	6.8	37	1.8	6.4	5	1.0	0.05	0.1	0.12	
9/11/37 ...	5.0	2.37	0.1	0.4	0.1	6.8	70	4.0	6.4	5	1.0	0.05	0.1	0.1	
10/11/37 ...	4.9	2.37	0.1	0.4	0.1	6.8	40	2.0	6.4	6	1.2	0.1	0.12	0.1	
11/11/37 ...	5.0	2.07	0.1	0.4	0.1	6.8	35	1.2	6.4	4	0.8	0.05	0.1	0.1	

Table 69—Particulars and Results of Water Treatment, 1937—continued

DATE	Gallons Pumped (Millions	CHEMICALS USED				ANALYTICAL DATA									REMARKS
						Raw Water			Filtered Water						
		Alumina (Grs. per Gallon)	Soda Aluminate (Grs. per Gallon)	Chlorine (Parts per Million)	Ammonium Sulphate (Parts per Million)	pH	Colour	Turbidity	pH	Colour	Turbidity	Residual Alumina	Residual Chlorine		
													Low Level Reservoir	High Level Reservoir	
12/11/37 ...	5.0	1.9	0.1	0.4	0.1	6.8	25	1.4	6.4	4	0.8	0.05	0.12	0.12	
13/11/37 ...	4.6	1.7	0.1	0.4	0.1	6.8	25	1.4	6.4	5	1.0	0.05	0.12	0.12	
14/11/37 ...	3.9	1.6	0.1	0.4	0.1	6.8	20	1.2	6.4	5	0.7	0.05	0.12	0.12	
15/11/37 ...	4.7	1.6	0.1	0.4	0.1	6.8	20	1.2	6.4	5	1.0	0.05	0.12	0.1	
16/11/37 ...	4.2	1.6	0.1	0.4	0.1	7.0	20	1.2	6.5	4	0.7	0.05	0.1	0.1	
17/11/37 ...	5.1	1.45	0.1	0.4	0.1	7.0	20	1.7	6.8	5	0.7	0.05	0.12	0.1	
18/11/37 ...	5.3	2.37	0.1	0.4	0.1	6.8	90	7.0	6.2	4	1.0	0.05	0.08	0.08	
19/11/37 ...	5.0	2.55	0.1	0.4	0.1	6.7	70	4.0	6.2	5	1.0	0.05	0.1	0.08	
20/11/37 ...	4.7	2.07	0.1	0.4	0.1	6.8	40	1.4	6.2	5	1.0	0.05	0.1	0.08	
21/11/37 ...	4.1	1.9	0.1	0.4	0.1	6.8	37	1.4	6.4	5	1.0	0.05	0.1	0.12	
22/11/37 ...	4.8	1.9	0.1	0.4	0.1	6.8	30	1.6	6.4	5	1.0	0.05	0.15	0.15	
23/11/37 ...	4.9	1.9	0.1	0.4	0.1	7.0	35	2.0	6.4	5	1.2	0.05	0.1	0.1	
24/11/37 ...	5.0	1.9	0.1	0.4	0.1	6.8	40	2.4	6.4	5	0.8	0.05	0.12	0.12	
25/11/37 ...	4.9	1.9	0.1	0.4	0.1	6.8	37	1.4	6.4	5	1.0	0.05	0.07	0.07	
26/11/37 ...	5.0	1.7	0.1	0.4	0.1	6.8	25	1.2	6.4	5	0.7	0.05	0.1	0.1	
27/11/37 ...	4.8	1.6	0.1	0.4	0.1	6.8	23	1.2	6.4	5	0.7	0.05	0.08	0.1	
28/11/37 ...	4.3	1.6	0.1	0.4	0.1	6.8	20	1.2	6.5	5	0.8	0.05	0.1	0.12	
29/11/37 ...	4.9	1.6	0.1	0.4	0.1	7.0	22	1.4	6.7	5	1.2	0.05	0.12	0.12	
30/11/37 ...	5.2	1.6	0.1	0.4	0.1	7.0	35	2.0	6.7	5	1.2	0.05	0.1	0.1	
1/12/37 ...	5.0	2.37	0.1	0.4	0.1	6.8	80	3.0	6.4	5	1.0	0.05	0.07	0.08	
2/12/37 ...	4.9	2.25	0.1	0.4	0.1	6.8	50	2.0	6.4	5	1.0	0.05	0.08	0.07	
3/12/37 ...	5.0	2.25	0.1	0.4	0.1	6.8	38	1.8	6.4	5	1.0	0.05	0.07	0.07	
4/12/37 ...	4.4	1.9	0.1	0.4	0.1	7.0	35	1.2	6.4	5	0.8	0.05	0.08	0.08	
5/12/37 ...	2.8	1.9	0.1	0.4	0.1	6.9	37	2.0	6.4	5	1.0	0.05	0.1	0.15	
6/12/37 ...	4.6	1.9	0.1	0.4	0.1	6.8	40	2.2	6.4	5	1.0	0.05	0.15	0.15	
7/12/37 ...	4.9	1.7	0.1	0.4	0.1	7.0	37	2.0	6.7	5	1.0	0.05	0.08	0.07	
8/12/37 ...	4.9	1.7	0.1	0.4	0.1	7.0	30	1.4	6.8	5	1.0	0.05	0.08	0.08	
9/12/37 ...	4.9	2.07	—	0.4	0.1	7.0	25	1.2	6.4	5	1.0	0.05	0.08	0.08	
10/12/37 ...	6.0	1.8	—	0.4	0.1	7.0	25	1.4	6.8	5	1.0	0.05	0.08	0.1	
11/12/37 ...	5.6	1.45	—	0.4	0.1	7.0	30	2.4	6.8	5	1.4	0.05	0.05	0.07	
12/12/37 ...	5.0	1.61	—	0.4	0.1	7.0	37	2.6	6.8	5	1.0	0.05	0.07	0.08	
13/12/37 ...	5.2	1.61	—	0.4	0.1	7.0	37	4.0	6.8	5	1.0	0.05	0.07	0.08	
14/12/37 ...	5.1	1.9	—	0.4	0.1	7.0	39	2.3	6.8	5	1.0	0.05	0.06	0.08	
15/12/37 ...	5.2	1.8	—	0.4	0.1	7.0	37	1.7	6.8	5	1.0	0.05	0.07	0.08	
16/12/37 ...	5.1	1.67	—	0.4	0.1	7.0	35	2.0	6.8	5	1.2	0.05	0.08	0.12	

Table 69—Particulars and Results of Water Treatment, 1937—continued

DATE	Gallons Pumped (Millions	CHEMICALS USED				ANALYTICAL DATA									REMARKS
						Raw Water			Filtered Water						
		Alumina (Grs. per Gallon)	Soda Aluminate (Grs. per Gallon)	Chlorine (Parts per Million)	Ammonium Sulphate (Parts per Million)	pH	Colour	Turbidity	pH	Colour	Turbidity	Residual Alumina	Residual Chlorine		
													Low Level Reservoir	High Level Reservoir	
17/12/37 ...	5.0	1.6	—	0.4	0.1	7.0	35	2.0	6.8	5	1.0	0.05	0.08	0.1	
18/12/37 ...	5.0	1.54	—	0.4	0.1	7.0	30	1.4	6.8	5	1.0	0.05	0.08	0.08	
19/12/37 ...	4.4	1.54	—	0.4	0.1	7.0	27	1.4	6.8	4	1.0	0.05	0.08	0.1	
20/12/37 ...	4.4	1.33	—	0.4	0.1	7.0	27	1.4	6.8	5	1.0	0.05	0.1	0.1	
21/12/37 ...	5.2	2.25	0.1	0.4	0.1	6.8	80	10.0	6.4	5	1.2	0.05	0.1	0.1	
22/12/37 ...	5.0	1.67	0.1	0.4	0.1	6.8	50	4.0	6.2	4	1.2	0.05	0.07	0.07	
23/12/37 ...	4.9	2.37	0.1	0.4	0.1	6.8	90	6.0	6.2	5	1.2	0.05	0.07	0.07	
24/12/37 ...	4.7	1.9	0.1	0.4	0.1	6.8	40	2.0	6.2	4	1.0	0.05	0.08	0.08	
25/12/37 ...	4.0	2.13	0.1	0.4	0.1	6.8	50	2.0	6.2	4	1.0	0.05	0.08	0.08	
26/12/37 ...	4.1	1.9	0.1	0.4	0.1	6.8	38	2.0	6.2	4	1.2	0.05	0.08	0.08	
27/12/37 ...	4.2	1.9	0.1	0.4	0.1	6.8	35	1.4	6.2	4	0.8	0.05	0.08	0.08	
28/12/37 ...	4.7	1.9	0.1	0.4	0.1	7.0	30	1.2	6.4	4	0.9	0.05	0.08	0.1	
29/12/37 ...	4.7	1.7	—	0.4	0.1	7.0	25	1.2	6.4	5	0.9	0.05	0.08	0.1	
30/12/37 ...	4.7	1.6	—	0.4	0.1	7.0	23	1.2	6.4	4	0.8	0.05	0.08	0.1	
31/12/37 ...	4.6	1.6	—	0.4	0.1	7.0	20	1.2	6.4	4	1.0	0.05	0.08	0.08	

Table 70—Showing average consumption of Water per Head, per Day.

Month	1934	1935	1936	1937
January	39.6	38.5	47.6	42.7
February	40.0	40.2	44.1	43.1
March	39.1	40.1	44.0	41.8
April	39.9	41.2	44.4	41.6
May	39.2	41.2	46.5	45.1
June	42.1	43.6	47.1	45.9
July	42.8	46.8	47.1	45.9
August	40.6	48.1	46.4	46.3
September	41.4	46.5	44.5	45.7
October	38.6	43.5	44.8	45.0
November	39.0	43.4	44.1	43.1
December	40.2	35.2	43.8	42.7

NOTES ON THE FOREGOING TABLES.

1. 28th and 29th June—Residual chlorine in the high and low-level reservoirs immediately preceding, during and following these dates varied from .06 to .08 parts per million.
2. 6th July—Residual chlorine 0.5 to 0.7 parts per million.
3. 8th July—Residual chlorine .05 to .06 parts per million.
4. 12th July—Residual chlorine 0.5 to 0.6 parts per million.
5. 16th July—Residual chlorine .05 to .06 parts per million.
6. Week ending 23rd July. Bacteriologist's comments: "In view of the sporadic appearance of small numbers of colon organisms the question of increasing the chlorination might be considered. It will probably be necessary to do so if the weather gets warmer. General inference, satisfactory."
7. Week ending 30th July. Residual chlorine in reservoirs varied from .05 to .08 parts per million (.10 on one occasion). Bacteriologist comments: "Faecal type organisms still persisting in small numbers.
8. Week ending 20th August. Residual chlorine in reservoirs varied from .06 to .10 parts per million.
9. Week ending 3rd September. Residual chlorine varied from .06 to .10 parts per million.
10. Week ending 10th September. Residual chlorine varied from .06 to .08 parts per million.

Section VIII.—Sanitary Department

Table 71.—Return of Work performed by Sanitary Inspectors during 1937 :—

District	INSPECTION OF											SERVED	
	Houses and Yards	Tenement Houses	Tenement Rooms	Infected Dwellings	Common Lodging Houses	Milk Shops	Bakeries	Work Shops	Slaughter Houses	Factories	Outworkers	Justices Orders	Notices to abate nuisance
No. 1	5693	18	33	83	—	5	5	20	—	—	—	13	196
No. 2	5599	1259	3	149	7	1	13	54	2	—	—	15	438
No. 3	10750	1729	6281	240	87	580	68	417	139	—	—	10	408
No. 5	6414	3895	1876	47	88	1	119	108	1	—	—	5	313
No. 6	9952	1893	7365	89	106	530	21	250	6	—	—	18	490
No. 7	9426	488	2268	187	66	100	131	162	88	—	—	16	450
Female Inspector	—	—	—	—	—	—	192	4234	—	734	390	—	35
Totals	47834	9282	17826	795	354	1217	549	5245	236	734	390	77	2330

District No. 4 is divided for purposes of supervision between Districts No. 2 and 5
No separate records have been kept hitherto.
The number of inspections carried out by the Corporation Drain Tester was 4,169

Table 72.—Summary of Inspections, etc.

	No. of Inspections
Houses, yards, etc.	47,834
Tenement Houses	9,282
Tenement Rooms	17,826
Infected Dwellings	795
Common Lodging Houses	354
Bakeries	549
Workshops	5,245
Outworkers	390
Factories	734
Milk Shops	1,217
Slaughter Houses	236
Drains and W.C.'s Tested	4,169
Number of Notices to abate nuisances	2,330
Number of Justices' Orders	77
Number of prosecutions for Sanitary Offences	164
Amount of fines imposed in respect of same	£8 14 6

Table 73—Return of Work carried out by **Veterinary Staff** during the year :—

Slaughter Houses	5,280
Butcher Shops	3,313
Tripe Houses	1,685
Meat Markets	816
Milk Shops	3,736
Milk Vans	658
Cowsheds	127
Sausage Factories	2,466
Hawker's Stands	671
Provision Shops	5,330
Pork Shops	570
Fish Shops	505
Fruit Shops	3,234
Cold Stores	—
No. of Prosecutions Amount of Fines imposed }	See Section VI., Prosecutions

Section IX.—Port Sanitary Administration

Constitution of the Port Sanitary Authority.

The port was constituted a port sanitary district by the Local Government Board (Ireland) on 27th April, 1903. The Authority consists of twenty members chosen by the respective riparian authorities who elect representatives to the joint board as follows :—

By the Lord Mayor, Aldermen and Councillors of the County Borough of Cork	12
By the South Cork Board of Public Health	5
By the Urban District of Cobh	2
By the Urban District of Passage West	1

The South Cork Board of Public Health was substituted for the Cork County Board of Public Health as a constituent Authority by the Local Government and Public Health Provisional Order Confirmation Act, 1937, as from 1st April, 1937, on which date the provisions contained in the Order came into operation.

Apportionment of Expenses.

Cork County Borough contributes	62½ per cent. of the total
South Cork Board of Public Health	25 ,,
Cobh Urban District Council	10 ,,
Passage West Urban District Council	2½ ,,

Limits of Jurisdiction.

These are defined in Act 18 of the Cork Port Sanitary Order No. 3 as follows :—"The jurisdiction of the said Port Sanitary Authority shall extend to the whole of that part of the customs port of Cork that lies between Power Head and Cork Head in the County of Cork, together with the makers of the said port of Cork within such limits and all docks, basins, harbours, creeks, rivers, channels, bays and streams within the aforesaid limits and the places for the time being appointed as the customs boarding station or stations for such part of the said port and the places for the time being appointed for the mooring or anchoring of ships for such part of the said port under any regulations for the prevention of the spread of diseases issued under the authority of the statutes in that behalf."

Quarantine Anchorage.

Anchorage for vessels with cases of infectious disease on board is between the town of Cobh and the Spit buoy.

Cuskinny Intercepting Hospital.

The intercepting hospital is situated about two miles east of the town of Cobh and about half-a-mile from Cuskinny Strand on the northern

shore of the harbour. The hospital was built in the year 1880 by the old Cork Board of Guardians and was acquired by the Port Sanitary Authority in the year 1902 from the Commissioners of Public Works (Ireland) and since has been kept in good repair and condition. During the past year minor structural work was carried out in connection with the water supply tanks which ensures adequate supplies of water throughout the year. The function of the hospital is to deal with the more serious types of infectious disease (e.g. small pox, plague, cholera, typhus, etc) should any such cases arrive in the port necessitating hospital treatment or isolation. Infected vessels would moor at the quarantine anchorage, the patient being removed by motor launch and landed at Cuskinny Strand or some suitable slipway and transferred to the Authorities' ambulance for transport to the hospital. In point of fact it is many years since the hospital was called upon to deal with any cases and the likelihood of such cases arising in the future is not very great. The greatly increased speed of modern sea transport, together with the precautions taken at all sea ports throughout the world in regard to the prevention of infectious disease has greatly reduced the risk of such diseases being introduced to this port. While, however, any such risk exists, the hospital will have to be maintained unless adequate alternative measures are adopted for dealing with cases. Although no case has been admitted since 1918, arrangements can be put on foot for dealing with possible admissions at a moments notice as it has been the policy to maintain the hospital on this basis. The caretaker has fulfilled his duties in this respect in a praiseworthy manner.

Cargo Traffic.

The principal imports are coal, maize, wheat, timber, machinery, steel, phosphate, car parts, cement. The principal exports, cattle, pigs, sheep, bacon, butter and other dairy and agricultural products.

Table 74.—Return of Shipping entering the Port since 1927.

Year	Number of Arrivals			Tonnage		
	Foreign	Coastwise	Totals	Foreign	Coastwise	Totals
1927	238	1,484	1,722	257,022	480,987	738,009
1928	442	1,492	1,934	261,612	488,158	749,770
1929	260	1,567	1,827	283,759	525,231	808,990
1930	297	1,636	1,933	364,650	617,783	982,433
1931	272	1,566	1,838	345,430	647,327	992,757
1932	315	1,375	1,690	352,459	602,509	954,968
1933	399	893	1,292	371,757	462,047	833,804
1934	404	817	1,221	407,188	463,169	870,357
1935	285	1,015	1,300	323,631	525,062	848,693
1936	249	1,053	1,302	277,779	583,922	861,701
1937	250	1,098	1,348	300,730	594,396	895,126

Table 75.—Return of Imports and Exports, 1927–37.

Year	Imports (tons)	Exports (tons)
1927	779,528	73,771
1928	756,418	81,937
1929	815,347	86,246
1930	906,340	120,610
1931	861,782	85,704
1932	890,377	104,884
1933	710,149	89,319
1934	784,174	66,606
1935	743,939	63,219
1936	788,545	73,673
1937	829,704	78,530

The particulars contained in the above tables were kindly supplied by the Manager of the Cork Harbour Board.

Passenger Traffic.

Particulars have been compiled from figures supplied by the Shipping Companies.

(A).—Cobh.

Outward to Boston and New York	6,846
Inward from Boston and New York	8,055
Inward from Germany, France and England	197
Outward to Germany, France and England	199
Total	15,297

(B).—Cork.

Outward to England and Scotland	31,992
Inward from England and Scotland	28,881
Total	60,873

Total number of passengers landed and embarked at Cobh and Cork 76,170

Table 76.—Transatlantic liners and other craft not shipping or unshipping cargo 1927–37.

Year	Transatlantic Liners		Other Vessels	
	Number	Tonnage	Number	Tonnage
1927	359	3,808,336	94	128,682
1928	354	3,840,861	70	91,571
1929	329	3,543,533	79	77,515
1930	286	3,032,436	69	57,874
1931	226	2,489,770	66	29,795
1932	233	2,679,073	50	38,710
1933	230	2,833,435	50	34,949
1934	239	2,796,966	63	50,474
1935	231	2,864,252	93	48,973
1936	209	2,809,504	88	45,567
1937	222	2,934,838	63	51,591

Table 77.—Return of the number of vessels entering the port which were dealt with by the Department each month during 1937.

Month	Foreign	Coastwise	Total
January	18	79	97
February	17	80	97
March	19	75	94
April	24	90	114
May	16	76	92
June	20	74	94
July	26	76	102
August	17	71	88
September	21	69	90
October	20	82	102
November	19	71	90
December	15	72	87
Totals	232	915	1147

Water Supply.

Drinking and boiler water is obtained directly from the public supply through hydrants on the quays. There are upwards of 80 such hydrants available in this port and systematic sampling and bacteriological examination ensures a supply of first class quality. Two samples of water taken from vessels after arrival were submitted for examination to the University College Laboratory, one was found satisfactory and the second of doubtful purity. In the latter case notice was served on the master of the vessel and the tanks were emptied, cleansed and re-filled.

Procedure for granting Pratique.

Deepladen vessels arriving in the lower harbour and bound for Cork may be detained there for tide. Such vessels are boarded by an officer of the Customs and Excise, who puts the usual questions to the master in regard to the prevalence of illness on board and especially in relation to cholera, plague and yellow fever or as to the prevalence of same at any ports of call en route. If the answers are in the *negative*, free pratique is granted and the vessels allowed to proceed to her moorings. If any answers are in the affirmative, pratique is not granted until the vessel has been visited by the Port Medical Officer. Vessels of light draught able to proceed to the City at any state of the tide are hailed while passing Cobh and if the answers are satisfactory are allowed to proceed to Cork where they are boarded by the Customs Officer and the usual questions are put. In addition, instructions have been sent to all shipping agents for companies using the port of Cork that masters of vessels approaching the port with cases of infectious disease on board are to notify the Authority by wireless. Three such messages were received during the year, but each of them related only to cases of minor infectious disease.

Measures against Rodents.

(a) On Vessels.

All vessels from foreign ports are boarded immediately on arrival by the Port Sanitary Officer who, after satisfying himself as the documents relative to health and deratisation certificates proceeds to the examination of the vessel in regard to rat infestation, particular attention being paid to cargo surfaces as soon as the holds have been opened up. The various cargo compartments are searched for sick or dead rats, which, if found, are submitted at once for bacteriological examination. So far a positive result has not been obtained, but such a result would necessitate suspension of discharge of cargo. In addition, traps are laid in various parts of the ship and rats caught are submitted to examination. Precautions adopted to prevent migration of rodents ashore comprise the placing of rat guards on all mooring ropes and wires of all except cross-channel vessels. In addition, grain boats from the Argentine have to keep their gangways lime-washed daily and well lighted at night whilst alongside the quays.

(b) On Shore.

The Port Sanitary Officer reported to me that there was abundant evidence of heavy rodent infestation in the majority of mills and grain stores abutting the quays, besides being an offence against the Rat and Mice Destruction Act, 1919, this state of affairs is necessarily a source of anxiety to the Port Health Authorities, since a prevalence of rats in quayside stores would facilitate the spread of rodent plague ashore if once introduced from foreign shipping with the ever potential danger of its transfer to human beings. In order to reduce this risk, on the one hand, and on the other, in the interests of the proprietors themselves, it was decided to call a conference of all parties concerned to discuss the situation and the measures best adopted to meet it. This conference which was presided over by the Port Medical Officer was held in the

City Hall on 28th April, 1937, and was attended by representatives of all the principal mills. It was decided to enter into contracts with an Irish firm specialising in rat destruction for the systematic laying of baits in all the premises. The results of this anti-rat campaign have been really remarkable and have made themselves evident in three directions.

(1) The Port Sanitary Officer reports a very pronounced diminution in the *evidence* of rat infestation (dropping, feet marks, runs, etc.) Previously such evidence indicated a huge rat population in the various stores but in the later months of the year it was difficult to find any. (2) The marked reduction in the number of rats trapped in the later months as compared with the earlier. (3) The evidence tendered by the mill-owners as to the reduction in damage done to sacking, etc., the obvious reduction in the rats themselves.

The following extracts are taken from letters received from the mill-owners in reply to queries sent out by this department in regard to the effects observed by them in relation to the laying of baits.

(a) "The treatment has proved highly satisfactory . . . very few of the pests are seen about our premises. The treatment has controlled them to a remarkable degree."
(b) "So far we are thoroughly satisfied with the work, and our new grain stores appear to be completely free from rodents."
(c) "No one could sensibly contemplate going back to pre-poison days in this mill."
(d) "There has been a considerable reduction in rats and mice."
(e) "The number of rats has definitely been reduced . . . The most noticeable evidence of the reduction of the pest is the smaller amount of damage done to sacks in the store."

In addition to the collective campaign just referred to, systematic trapping of warehouses and stores has been carried out under the supervision of the Port Sanitary Officer. The following table shows the number and variety of rats caught each month. It will be noted that there was a distinct reduction in the latter months due, as referred to above, to the laying of baits in the premises.

Table 78.—Return of Rats trapped on shore each month and results of post-mortem examinations.

Month	No.	Variety			Post-Mortem Examinations
		M. Decumans	M. Alexandrinus	M. Rattus	
April	32	23	9	–	21
May	25	13	11	1	17
June	23	8	15	–	14
July	22	6	14	2	12
August	17	4	10	3	10
Sept.	14	4	10	–	8
Oct.	15	8	7	–	7
Nov.	16	13	3	–	7
Dec.	10	6	4	–	7
Totals	185	85	91	6	103*

*Post-Mortem findings were, in all cases, negative.

In addition to the numbers enumerated in the above table, twenty rats were trapped on board vessels and in each instance the post-mortem findings were negative. It will be noted that so far all rats trapped have been submitted to post-mortem examination. This examination has been carried out by the Port Medical Officer or the Chief Veterinary Officer and hitherto nothing has been revealed to indicate a suspicion of plague infection. In the event of any such indications being present further specimens would be submitted to the bacteriological department of University College. In view of the importance of the rat both from the economic point of view and from the aspect of disease prevention it is satisfactory to be able to record that systematic measures are now being adopted in this port to deal with the pest.

Venereal Disease.

Free treatment is afforded at the Corporation Clinic. Five seamen were treated during the past year. Three were suffering from gonorrhoea, one from soft chancre and the fifth was found not to be infected.

Psittacosis (Importation of Parrots Prevention) Act, 1930.

Six parakeets were destroyed under the provisions of the above Act.

Small Pox (Importation of Clothing, etc.) Temporary Regulations, 1927.

These Regulations still remain in force. 4 tons 17 cwts. of second-hand clothing and cleaning rags (mainly imported from Great Britain) were disinfected in the Corporation plant. Disinfection has been by high steam pressure. Certificates were issued in connection with same.

Public Health (Foreign Meat) (Ireland) Regulations, 1908.

There has been no importation of foreign meat of either Class I. or Class II. and no reports have been transmitted by the Customs Officer to the Medical Officer of Health in regard to meat unclassed.

Countries and Ports of Origin of Vessels arriving in this Port during 1937.

Argentine :—Buenos Aires, San Lorenzo, San Nicolas, Santa Fé, San Pedro, La Rosario.

Uruguaya :—Montevideo.

U.S.A.—New York, Boston, Seattle, Portland, New Orleans.

Australia :—Freemantle. Adelaide, Bunbury, Wallaroo.

Canada :—Montreal, Halifax, Sorel, St. John's, Vancouver.

West Africa :—Dakar.

Spain :—Haulva, Gijin.

Algeria :—Bena, Sfax.

European Ports :—Aalborg, Amsterdam, Antwerp, Archangel, Bergen, Bremen, Copenhagen, Danzig, Gothenberg, Hamburg, Helsingfors, Le Havre, Leningrad, Memel, Reval, Riga, Rotterdam.

Sanitary Defects and Nuisances dealt with during 1937.

Defective sanitary conveniences	5
,, side ports, deck prisms, etc.	11
,, stoves, stove pipes, etc.	5
,, bulkheads	1
,, floors	6
,, doors	2
,, spurling pipes	4
,, hawse pipes	2
,, steam radiators	6
Leaking decks	6
Verminous crew's quarters	40
Dirty crew's quarters	80
,, sanitary conveniences	81
Soil pipes leaking from conveniences into quarters	1
Inadequate lighting	3
,, ventilation	2
Miscellaneous defects (faulty food locker doors), etc.	11
Foul accumulations	5
Total	271

Number of Notices served during 1937.

Written Notices	26
Verbal Notices	261
Statutory Notices	1
	288

TABLE 82.—Temperature at Cork (in the Shade) for 55 years ending 1937.

YEAR	January	February	March	April	May	June	July	August	September	October	November	December	Mean Temperature of Year
	Max. Min. Mean	Max. Min. Mean	Max. Min. Mean	Max. Min. Mean	Max. Min. Mean	Max. Min. Mean	Max. Min. Mean	Max. Min. Mean	Max. Min. Mean	Max. Min. Mean	Max. Min. Mean	Max. Min. Mean	
	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	Degrees	
1883	54-32-41.7	54-28-42.0	55-25-41.0	66-32-48.0	69-35-50.7	69-44-57.7	70-47-58.5	71-47-60.0	65-41-56.5	61-35-52.0	57-33-44.8	55-27-42.0	49.6
1884	55-31-45.5	54-31-46.5	54-30-45.5	57-34-48.5	68-37-55.5	73-40-59.0	72-45-61.5	74-44-62.2	71-45-58.5	60-34-52.2	60-28-45.2	55-28-41.3	51.8
1885	54-27-41.7	50-27-43.5	54-30-43.5	62-30-48.2	61-34-52.0	72-42-59.2	80-43-62.0	74-46-60.5	65-36-55-2	57-35-46.7	58-31-46.7	54-25-39.5	49.9
1886	52-23-38.0	52-28-41.5	57-25-41.5	65-32-46.7	65-33-50.5	76-45-57.7	79-44-59.5	76-45-60.5	65-39-56.5	64-37-51.5	58-29-45.0	50-22-39.0	49.0
1887	54-30-43.0	54-27-43.5	58-25-42.0	62-26-44.5	70-35-52.5	81-47-62.5	80-47-64.2	76-42-60.7	69-39-55.0	61-28-48.2	54-24-42.0	55-26-39.7	50.0
1888	54-26-43.0	52-26-38.2	56-26-40.7	59-28-46.5	68-39-53.2	73-39-57.0	70-40-57.5	74-42-60.0	66-37-55.5	63-31-50.5	58-27-48.0	56-28-44.7	49.5
1889	58-26-43.0	57-27-42.2	59-29-44.7	58-32-46.7	68-40-48.0	77-46-58.0	77-45-60.9	72-43-58.7	70-38-57.2	59-32-48.2	60-29-48.2	56-29-44.2	49.9
1890	55-29-44.0	54-29-42.5	58-28-45.2	61-29-48.0	70-39-53.0	73-45-58.0	72-43-58.4	72-40-58 0	75-42-50.2	56-34-53.0	60-24-44.6	52-25-39.0	50.3
1891	53-23-40.3	56-31-45.7	61-22-42.1	60-31-46.9	73-34-50.0	78-40-58.6	75-44-59.0	73-40-58.0	71-39-56.5	61-29-48.5	53-28-42.6	55-26-44.0	49.4
1892	55-20-39.2	55-25-42.3	57-24-40.0	62-27-47.2	66-37-53.1	73-39-56.2	73-44-59.0	70-44-60.0	68-37-55.0	56-28-45.0	56-31-47.2	53-27-42.7	49.7
1893	53-21-40.5	53-24-42.5	60-34-47.5	67-31-51.5	69-43-56.5	80-46-59.8	74-46-61.2	77-45-61.7	71-33-55.2	63-31-49.0	59-30-43.0	53-26-42.5	50.9
1894	53-11-39.5	56-28-44.6	57-33-44.8	62-37-49.0	67-34-50.0	71-38-57.0	72-45-69.0	71-44-57.5	66-36-53.5	66-33-49.5	59-28-46.0	54-29-44.5	49.6
1895	47-23-36.5	48-22-34.5	63-27-44.0	61-31-48.2	70-33-53.0	74-40-58.7	70-44-58.7	70-43-59.0	71-46-58.9	62-28-46.0	56-30-45.0	54-26-42.5	48.7
1896	53-26-43.0	55-32-45.2	56-31-46.5	65-34-50.0	74-33-56.2	82-47-60.5	75-42-60.0	73-41-57.5	68-41-55.0	65-30-43.2	53-29-42.0	53-23-40.0	49.9
1897	50-22-37.5	56-32-46.0	55-31-44,0	58-29-46.0	70-35-51.0	75-41-59.0	77-43-61.0	80-45-59.5	67-38-53.2	61-37-52,2	58-32-47.2	53-29-44.0	50.1
1898	55-32-45.8	54-26-41,5	58-28-41.0	60 31 47.7	67 34 51.0	74-39-56.8	78-44-59.5	73-46-69.5	72-40-58.7	64-34-51.3	59-30-44.0	55-27-45.4	50.3
1899	53-26-40.1	52-29-43.0	64-22-43.0	63-29-46.6	65-34-50.6	78-41-59.5	76-45-60.0	76-46-62.3	71-31-54.1	60-29-47.9	55-39-47.2	51-24-40.0	49.5
1900	54-27-39.5	52-14-35.4	51-25-38.6	65-33-47.8	68-36-50.7	75-42-56.8	75-45-60.1	71-42-57.0	67-38-55.1	63-32-48.1	57-29-41.7	52-26-42.2	47.9
1901	49-24-37.8	49-22-35.8	51-34-38.9	59-39-45.0	68-34-51.9	72-37-54.2	76-46-60.2	75-41-57.5	67-39-54.0	61-31-47.0	54-19-41.2	51-26-37.5	46.8
1902	50-25-40,6	52-19-36.6	57-30-44.0	57-29-44.0	67-31-47.3	74-38-53.1	74-40-56.0	68-40-56.2	68 36-53,6	62-34-57.4	55-30-43.5	52-25-39.0	46.8
1903	50-22-39.5	52-29-42,7	52-29-41.1	57-27-43.7	69-36-50.4	70-35-54.0	74-43-56.6	68-40-54.3	64-36-52.4	60-28-46.2	55-24-41.0	48-22-37.0	46.4
1904	49-27-38.5	49-24-37.2	52-25-39.1	60-32-44.4	65-32-48.6	69-49-54,2	73-40-57.3	69-41-56.4	63-38-52.5	63-35-50.2	57-25-43.5	52-28-43.0	47.4
1905	51-29-42.0	55-23-41.6	53-30-42.6	58-33-46.4	68-36-52.6	75-42-58.0	76-45-60.0	70-42-55.5	68-39-53.6	62-26-45.0	52-23-39.0	50-30-43.3	48.3
1906	50-28-41.1	47-25-38.0	58-30-42.6	59-29-44.3	64-33-49.7	75-42-57.8	74-44-59.0	73-44-59.8	71-40-55.0	63-29-49.0	55-29-44.0	53-26-39.0	48-4
1907	49-18-39.6	52-25-38-4	57-32-45.8	64-30-45.4	65-35-48.7	68-49-53.5	78-41-58.6	68-43-57.0	68-38-57.0	60-28-45.9	52-28-49.8	49-27-39.5	47.5
1908	52-23-38.5	53-31-43.0	52-29-40.4	56-26-43.4	68-37-52.0	71-40-55.7	80-46-59.5	74-44-58.2	67-38-53.5	64-33-53.0	56-29-45.7	51-30-41.1	49.0
1909	51-28-40.3	52-22-39.6	56-23-40.6	61-31-46.8	66-33-51.0	69-41-54.0	71-45-58.6	79-43-59.7	65-37-52.3	64-26-49.0	55-20-38.2	50-24-38.3	47.4
1910	50-25-38.5	53-27-39.0	55-30-41.0	60.29-43.9	68-34-51.4	66-44-55.5	70-45-57.5	69-46-57.0	68-37-54.5	62-34-49.0	53-24-39.0	50-28-41.5	47.3
1911	50-27-39.2	53-22-39.7	56-29-40.3	59-27-40.9	70-37-52.2	72-45-56.7	79-44-61.0	73-45-60.2	73-39-54.3	57-31-48.0	53-26-39.9	49-27-39.3	48.0
1912	50-27-40.8	50-32-40.0	57-32-41.8	61-32-47.0	64-36 51.2	66-32-52.9	74-44-55.7	61-36-51.3	68-36-53.5	61-31-50.1	59-33-49.2	54-30-44.3	48.1
1913	52-27-40.6	54-32-43.6	55-34-45.0	59-29-44.7	64-36-49.5	75-38-54.0	74-47-55.9	74-40-58.8	72-44-57.6	61-32-51.5	60-34-48.9	56-33-45.6	49.6
1914	54-43-48.5	55-50-53.0	55-50-52.4	60-53-56.9	62-55-58.2	70-59-64.4	69-53-64.8	67-63-64.6	66-60-62.6	62-55-58.4	58-50-53.4	53-46-50.0	47.2
1915	50-37-43.5	45-25-35.0	58-35-46.5	50-35-42.5	62-40-51.0	64.40-52.0	62-42-52.0	65-43-54.0	62-40-51.0	55-37-46.0	48-28-38.0	40-28-34.0	44.9
1916	50-36-43.3	47-30-39.1	45-30-37.8	49-36-42.6	60-34-47.4	55-40-47.8	66-40-53.4	65-49-57.7	60-40-50.0	56-36-46.4	47-32-40.4	40-24-32.5	44.8
1917	52-22-36.0	50-24-35.0	52-28-39.25	59.30-41.5	70-32-50.25	66-40-52.25	68-40-55.4	70-46-58.12	66-26-51.25	56-36-40.8	58-30-44.5	56-26-38.4	45.7
1918	50-22-36.0	54-32-43.0	56-26-41.0	64-32-48.0	67-33-50.0	76-36-56.0	76-40-58.0	74-40-57.0	64-36-50.0	62-30-46.0	54-26-40.0	54-26-40.0	47.0
1919	54-24-36.0	50-26-39.0	50-24-37.8	56-30-43.2	72-34-51.2	68-36-51-0	74-40-56.0	80-40-57.5	64-34-49.7	62-36-44.6	56-14-34.5	54-28-41.0	46.0
1920	52-30-40.0	50-30-39.8	50-30-41.3	56-36-46.3	66-28-46.3	68-34-53.7	66-42-53.5	66-40-53.2	68-32-51.2	60-36-48.6	56-24-41.6	50-20-36.0	45.9
1921	60-25-44.7	50-24-36.2	50-24-37.5	58-26-41.5	70-34-48.4	76-32-55.0	80-40-60.0	74-38-54.2	64-32-48.2	62-28-47.4	46-20-39.7	50-28-41.2	46.2
1922	56-20-49.1	48-24-37.2	46-24-34.5	48-22-34.8	80-30-61.0	74-40.54.0	72-38-67.2	72-36-54.0	66-36-52.3	60-20-56.0	66-30-44.0	54-26-39.2	48.6
1923	54-27-43.4	55-29-43.6	56-30-45.1	58-31-46.2	65 33-49.3	65-33-49.3	79-48-62.2	78-42-59.6	69-37-53.4	61-30-49.5	58-20-38.8	53-25-43.0	49.2
1924	53-29-43.8	51-26-41.4	56-25-42.5	62-27-46.0	65-35-51.5	70-41-56.7	68-42-57.9	70-40-57.8	71-40-54.4	64-57-50.8	59-29-46.0	56-33-46.0	49.6
1925	55-31-44.4	55-28-41.8	60-29-43.8	57-30-45.6	62-34-50.3	81-44-59.5	75-45-60.2	74-43-60.2	68-35-53.3	69-32-52.5	59-24-41.2	56-21-39.5	49.4
1926	53-28-43.1	57-32-46.5	61-31-45.7	63-31-49.8	64-33-51.1	72-39-55.5	83-45-63.3	75-46-61.8	72-37-58.2	74-25-48.3	57-27-42.3	55-21-41.5	50.6
1927	60-28-42.3	57-26-44.1	57-27-45.9	65-29-48.4	72-36-53.5	70-38-54.5	74-50-61.1	76-46-59.9	70-36-54.5	65-35-52.2	61-23-43.5	62-26-40.8	50.1
1928	55-30-44.1	57-33-45.6	57-27-44.4	64-30-46.2	75-37-54.0	69-40-55.8	78-43-60.6	72-41-58.8	70-34-54.7	65-32-50.8	58-27-46.5	55-28-41.9	50.3
1929	54-23-39.8	56-28 43.5	69-26-46.3	65-33-47.9	75-31-52.4	71-41-56.7	75-42-59.8	72-44-59.6	74-59-58.9	63-31-49.5	59-24-44.8	56-27-42.7	50.2
1930	53-26-41.3	52-24-37.7	57-26-43.2	66-30-47.4	68-36-53.0	76-40-58.3	78-45-59.3	69-42-57.5	70-40-56.5	61-35-51.6	60-27-44.6	54-29-43.3	49.5
1931	53-27-41,2	55-30-42.2	56-25-43.5	64-34-48.3	65-35-52.7	72-43-58.4	71-43-59.5	76-37-59.4	65-23-49.8	61-29-45.8	58-27-44.5	58-27-44.6	50.1
1932	56-27-45.6	51-29-41.0	57-25-43.1	58-33-45.5	67-33-51.5	76-39-59.4	75-47-60.5	78-44-63.1	72-34-55.4	66-30-48.3	58-30-46.5	53-31-44.4	50.4
1933	56-23-39.1	58-24-41.7	60-33-46.3	61-30-49.2	68-41-54.4	72-47-60	82-47-63.7	81-45-62.6	78-35-60.1	67-34-51.0	58-25-43.4	51-26-40.4	51.0
1934	56-27-42.5	53-26-39.5	58-30-44.0	63-30-41.5	70-33-51.5	76-38-57.0	82-50- 6.0	71-38-54.5	72-38-55.0	63-33-48.0	55-29-42.0	55-33-44.0	48.3
1935	55-26-40.5	57-24-40.5	59-27-43.0	67-34-50.5	70-30-50.0	75-48-61.5	76-44-60.0	76-41-58.5	70-40-55.0	65-55-50.5	55-24-39.5	52-19-35.5	48.7
1936	54-29-41.5	53-30-41.5	58-30-44.0	60-30-45.0	73-35-54.0	75-39-57.0	70-44-57.0	80-44-62.0	72-34-53.0	65-34-49.5	57-27-42.0	55-27-41.0	48.9
1937	58-26-42.0	57-30-43.5	54-25-39.5	66-37-51.5	72-30-51.0	71-43-57.0	77-45-61.0	77-45-61.0	70-40-55.0	65-29-47.0	56-25-40.5	54-24-39.0	49.0

TABLE 83.—Showing Monthly Rainfall in Cork for 60 Years ending 1937.

Month.	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Jan. ...	2·28	8·32	1·70	1·39	3·91	6·63	6·18	4·01	3·09	4·80	5·42	2·82	6·00	2·30	3·35	5·98	6·15	5·73	1·14	3·27	2·51	4·53	3·55	5·68	1·86	8·38	5·81	3·59	5·83	1·27	2·83	1·80	3·07	0·80	5·01	7·40	1·93	3·46	2·04	3·97	4·94	4·64	5·94	2·57	6·44	1·92	8·04	5·64	9·18	4·75	5·39	2·23	7·07	1·67	5·19	3·58	4·67	0·84	7·51	9·04
Feb. ...	2·80	4·77	4·78	5·46	4·86	6·88	7·35	6·88	3·76	1·40	0·41	2·42	3·16	0·53	4·14	3·56	2·23	2·36	1·90	2·67	1·53	5·28	4·16	1·79	6·32	3·85	5·98	1·60	3·35	1·58	2·31	2·23	5·62	1·82	4·76	2·30	6·46	7·44	4·30	1·45	6·22	3·68	1·67	2·56	4·42	8·53	2·97	4·45	4·74	2·66	3·42	8·16	1·03	2·62	0·17	2·25	0·32	2·95	6·05	4·64
March ...	0·95	1·23	3·28	5·20	2·00	1·78	5·01	2·75	5·52	2·18	3·14	1·53	4·55	1·58	1·24	0·28	1·84	3·19	2·99	6·29	0·63	1·82	0·78	3·52	1·77	5·24	2·56	7·49	1·23	0·93	3·38	2·77	2·80	3·29	3·69	4·00	5·33	0·72	2·34	3·325	3·69	2·46	4·14	2·91	2·22	3·96	1·31	0·22	1·50	4·79	7·33	0·89	6·88	8·01	3·18	2·78	4·67	1·54	3·22	5·99
April ...	4·55	3·70	2·84	1·64	5·05	2·66	1·84	4·38	2·45	1·13	1·78	4·55	1·57	2·61	0·88	1·34	6·53	2·95	0·43	5·39	3·71	3·06	1·68	4·42	3·22	2·01	2·62	3·44	1·40	2·70	1·47	4·75	1·88	1·77	0·54	3·59	1·37	1·59	3·25	1·72	1·73	1·30	5·54	0·54	2·58	4·28	2·44	5·51	3·04	1·21	5·66	1·46	2·09	2·72	2·48	2·58	3·52	3·31	1·58	3·50
May ...	4·84	1·83	0·80	1·76	2·31	1·35	1·66	3·05	2·80	1·04	3·60	4·56	3·93	2·63	2·74	2·01	0·88	0·77	0·16	1·69	2·38	3·94	2·65	1·88	2·00	2·69	2·25	0·86	3·24	3·66	2·81	1·52	1·84	1·44	1·36	4·57	1·40	2·52	2·91	4·045	2·75	5·18	5·36	1·66	1·67	0·96	3·62	4·35	2·87	2·38	2·60	4·05	1·67	4·36	4·24	4·57	1·98	0·71	1·38	1·94
June ...	0·74	8·47	1·93	4·79	3·36	2·39	0·79	1·42	1·32	0·59	4·23	1·78	2·86	3·45	2·78	1·68	2·10	3·33	2·16	3·68	2·02	1·37	4·26	1·58	3·13	3·95	2·14	2·58	1·64	3·39	1·20	2·79	3·66	2·86	5·17	2·09	0·88	2·16	3·03	1·77	1·11	0·63	3·22	0·02	0·80	0·14	3·70	0·63	2·28	2·57	5·60	1·21	2·15	3·27	1·39	1·59	1·63	5·32	1·55	0·68
July ...	1·25	4·24	1·68	1·85	4·80	3·50	2·75	1·52	5·00	1·43	5·36	4·81	2·26	1·55	3·14	1·79	1·90	3·64	4·71	0·56	1·26	1·85	1·64	0·61	2·71	5·85	4·25	1·96	3·01	2·64	1·71	0·51	2·16	2·03	5·68	0·20	3·10	5·22	2·49	1·57	4·43	1·49	3·96	3·77	3·21	2·37	3·81	2·77	1·67	4·35	1·01	4·29	2·79	2·73	2·67	2·00	2·20	0·50	5·67	3·21
August...	5·06	2·84	1·07	4·95	3·20	4·12	0·86	4·07	2·78	2·9	3·34	1·11	2·28	3·99	7·73	5·42	2·63	4·93	1·45	4·52	4·26	2·71	3·04	2·31	3·43	4·40	2·99	6·33	1·49	2·24	2·63	0·42	4·73	2·59	3·21	2·27	3·78	2·22	3·76	6·54	2·53	3·13	2·28	3·59	3·91	5·38	2·15	3·03	2·50	3·68	3·04	2·16	5·36	4·74	2·28	1·64	3·31	2·68	0·58	1·68
Sept. ...	2·42	3·25	1·80	2·38	2·05	5·02	2·40	5·42	3·93	2·48	0·98	3·87	2·69	3·12	3·64	1·34	1·40	1·20	5·46	2·07	3·04	1·15	0·81	8·32	1·93	4·22	4·02	1·41	0·40	1·13	4·04	0·46	1·37	2·54	1·01	5·27	3·07	1·82	1·22	1·29	6·41	2·15	2·66	1·33	3·45	2·96	5·86	2·63	0·51	3·42	2·26	0·82	4·52	0·87	2·36	1·58	5·96	6·80	2·88	3·01
Oct. ...	2·97	0·59	2·49	3·99	4·90	2·85	1·72	2·14	6·15	2·75	2·94	3·87	1·40	6·79	3·27	2·35	6·29	2·67	3·25	5·42	7·79	1·73	5·88	2·59	1·22	6·14	2·83	1·03	4·38	5·00	2·88	6·58	4·32	3·98	2·52	6·61	1·51	5·64	9·23	3·51	3·39	0·51	3·96	2·90	1·96	4·81	4·22	5·31	2·87	3·48	6·41	3·22	5·12	1·17	3·79	2·09	3·50	2·10	1·53	2·48
Nov. ...	1·88	0·63	5·24	6·95	4·67	4·03	3·50	3·21	2·42	2·53	7·33	2·52	4·94	4·26	8·18	2·11	5·30	7·88	1·61	5·36	3·01	3·36	5·03	1·79	9·33	1·74	1·53	4·81	3·01	4·88	2·60	0·47	4·62	4·89	1·37	4·45	2·96	3·48	9·04	1·08	3·22	1·90	4·16	5·16	1·85	3·46	5·56	2·48	6·20	4·15	3·33	6·91	5·26	9·85	1·66	2·72	1·33	4·58	3·46	3·57
Dec. ...	2·24	1·76	3·13	5·50	4·87	1·06	3·84	2·04	4·77	3·22	7·60	3·53	3·92	6·27	3·94	5·29	3·08	10·93	6·56	4·35	3·44	15·11	6·52	5·64	3·37	4·90	3·01	6·34	1·91	6·04	3·68	4·26	4·31	6·84	3·16	1·41	10·73	6·36	2·94	2·66	7·12	4·58	5·22	1·84	4·34	2·27	7·48	4·13	0·48	8·43	5·61	10·78	3·97	2·25	8·17	1·66	8·92	4·89	4·85	2·47
Total	37·98	41·45	30·74	45·80	45·98	42·18	37·85	40·81	44·36	26·45	46·13	36·06	39·56	39·10	44·04	35·93	40·33	49·68	32·22	44·89	35·64	45·50	40·0	40·23	40·51	53·31	39·03	41·40	30·90	35·86	31·54	28·58	40·36	34·55	36·88	44·16	42·42	42·83	46·35	32·33	47·44	31·63	48·01	28·87	37·25	41·04	34·51	41·15	37·84	45·87	35·66	46·18	47·91	44·26	37·58	29·04	48·03	35·61	40·29	42·21
No. of Raindays	190	212	170	220	215	222	205	185	212	150	195	179	201	198	193	170	198	194	179	221	192	182	224	191	187	250	214	182	186	194	207	164	240	209	244	211	213	198	211	182	219	189	217	178	201	214	225	197	209	220	231	198	198	207	205	175	223	196	196	197

Greatest month's rainfall 13·72 inches in December, 1899. Least month's rainfall 0·14 inches in May, 1896, and 0·02 in June, 1921.

Greatest number of consecutive days with rain was 31, ending February 12th, 1918. Greatest number of days without rain (absolute drought) was 26, ending July 3rd, 1887.

Section X.—Meteorology

I am indebted to Prof. H. N. Walsh, University College, for the following particulars concerning the weather conditions during the year, and more especially for the trouble which he has gone to to bring up to date the Tables which follow.

Table 80.

Rainfall in inches for each quarter and for each year, 1901–1937.

Year	I.	II.	III.	IV.	Total
1901	10.07	7.62	10.75	10.12	38.56
1902	9.29	7.80	7.31	12.88	37.28
1903	16.89	8.80	14.95	12.13	52.77
1904	13.63	5.71	10.41	7.47	37.22
1905	11.70	6.59	9.82	9.14	37.25
1906	9.46	5.76	5.58	9.03	29.83
1907	4.06	10.10	7.40	16.02	37.58
1908	7.67	5.28	10.16	9.53	32.64
1909	7.61	9.94	2.62	9.74	29.91
1910	10.70	7.24	8.64	11.98	38.56
1911	5.94	6.89	7.87	18.47	39.17
1912	13.46	7.07	9.30	7.05	36.88
1913	13.92	10.32	7.73	12.49	44.46
*1914	13.72	3.60	9.85	15.20	42.42
1915	11.62	6.27	9.26	15.68	42.83
1916	8.68	9.19	7.37	21.11	46.35
1917	8.75	6.93	9.40	7.25	32.33
1918	14.75	5.59	13.37	13.73	47.44
1919	10.78	7.11	6.77	6.97	31.63
1920	11.75	14.12	8.90	13.24	48.01
1921	8.04	2.22	8.71	9.90	28.87
1922	13.08	5.45	10.57	8.15	37.25
1923	14.41	5.38	10.71	10.54	41.04
1924	12.32	9.76	11.82	17.66	51.56
1925	10.31	10.49	8.43	11.92	41.15
1926	15.42	8.19	4.68	9.55	37.84
1927	12.20	6.16	11.45	16.06	45.87
1928	1.14	13.86	8.31	17.35	55.66
1929	11.28	6.72	7.27	20.91	46.18
1930	14.98	5.91	12.67	14.35	47.91
1931	12.30	10.35	8.34	13.27	44.26
1932	8.54	8.11	7.31	13.62	37.58
1933	8.61	8.74	5.22	6.47	29.04
1934	9.66	7.13	11.49	13.75	42.03
1935	5.33	9.33	9.98	10.97	35.61
1936	16.77	4.51	9.13	9.88	40.29
1937	19.67	6.12	7.90	8.52	42.21

*Since 1914 the returns in Tables 65, 66, 67 and 68 are taken from observations made at University College, Cork.

The mean temperature for 1937 was 50.1° F. The warmest days were July 17th and 31st, and August 1st and 2nd, with a maximum shade temperature of 77° F. The warmest nights were July 5th and 7th and August 7th, with a minimum shade temperature of 45° F. The coldest days were March 17th and December 23rd and 25th, with a maximum shade temperature of 54° F. The coldest night was the 9th December, with a minimum shade temperature of 24° F.

SUNSHINE.

The total number of hours of bright sunshine received in 1930 was 1,478.1; in 1931 the amount was 1,313.8; in 1932 the amount was 1,282.5; in 1933 the amount was 1,465.8 hours; in 1934 the amount was 1,480.1 hours; in 1935, 1,442.0 hours; in 1936, 1,357.5 hours, and in 1937, 1,259.4 hours.

Table 81.

Mean Temperature (°F.) for each quarter and for each year from 1901 to 1937, inclusive.

Year	I.	II.	III.	IV.	Total
	°	°	°	°	°
1901	37.5	50.4	57.2	41.9	46.8
1902	40.4	48.1	55.3	43.3	46.5
1903	41.1	49.4	54.4	41.4	46.6
1904	38.3	49.1	55.4	45.6	47.1
1905	42.1	52.4	56.9	42.4	48.4
1906	40.6	50.6	57.9	44.0	48.3
1907	41.3	49.1	57.5	42.1	47.5
1908	40.6	50.4	57.0	46.6	48.6
1909	40.2	50.6	56.9	41.8	47.5
1910	39.5	50.3	56.3	43.2	47.4
1911	39.7	51.3	58.5	42.4	47.5
1912	40.9	50.4	53.5	47.9	48.2
1913	43.0	49.4	57.4	48.7	49.6
1914	40.3	51.4	56.7	43.5	48.1
1915	38.3	49.2	52.7	39.2	44.9
1916	40.0	45.9	53.7	39.7	44.8
1917	36.7	48.1	54.2	43.9	45.7
1918	40.0	51.3	55.0	42.0	47.0
1919	37.6	48.5	54.4	40.0	45.5
1920	40.3	48.9	52.6	42.0	45.9
1921	39.6	48.3	54.3	42.7	46.2
1922	40.2	49.9	57.8	46.4	48.6
1923	44.0	50.7	58.4	43.8	49.2
1924	42.6	51.4	56.7	47.6	49.6
1925	43.3	51.8	57.9	44.5	49.4
1926	45.1	52.1	61.1	44.0	50.6
1927	44.1	52.2	58.5	45.5	50.1
1928	44.7	52.0	58.0	46.4	50.3
1929	43.2	52.3	59.4	45.7	50.1
1930	40.7	52.9	57.8	46.5	49.5
1931	42.3	53.1	58.2	46.7	50.1
1932	43.2	52.1	59.7	46.4	50.4
1933	42.3	54.5	62.1	44.9	51.0
1934	42.4	52.8	59.8	47.6	50.6
1935	44.1	52.7	59.4	44.2	50.1
1936	42.8	52.6	59.9	47.1	50.5
1937	42.6	53.8	59.2	44.9	50.1

BAROMETER.

The mean reading for 1937 was 29.82 inches; the highest was 30.63 inches on the 31st December. The lowest was 28.70 inches on the 24th January. (Observations made at 9 a.m., G.M.T. only).

Section XI.—Housing

The total number of houses erected by the Corporation since 1922 amounts to 1,496, made up as follows :—MacCurtain's Villas, 76 houses ; McSwiney's Villas, 40 ; French's Villas, 30 ; Capwell Site, 148 ; Turner's Cross, 152 ; Turner's Cross Extension, 168 ; North-West (A) 252 ; North-West (B), 108 ; North-West (C), 78 ; North-West (D), 82 ; Commons Road (A) 170 ; Common's Road (B) 106 ; Greenmount, 86. In addition, the Corporation have leased upwards of 200 building sites at Turner's Cross, Friar's Walk and Ashburton to Public Utility Societies and private builders. Up to and including the 31st March, 1938, the assistance given to private persons and Utility Societies amounted to £13,210 in respect of 263 houses and 6 flats, as follows :—

(1) Under Section 6 of the Housing Acts, 1925–28, the sums paid by way of grants amounted to £4,685 in respect of 62 houses and 6 flats.

(2) Under the Housing Acts, sums paid by way of grants amounted to £8,325 in respect of 201 houses.

Small Dwellings Acquisition Act.

The sums advanced to borrowers and Utility Societies under this Act amounted to £161,472 10s. 0d. on 31st March, 1938. The sum of £103,125 was advanced to the occupiers of 192 houses built by Utility Societies and a sum of £58,347 10s. 0d. has been advanced to private persons to build or purchase the interest in their houses. The amount advanced in any case does not exceed 75 per cent. of the value of the house and the repayments may be spread over periods of 5, 10, 15, 20 or 25 years. These payments calculated at the rate of a 6 per cent. annuity, shall be made either monthly, quarterly, or half-yearly.

The total sum expended by the Corporation to date in providing dwellings in various parts of the City amounts to £787,652, and the number of houses built is 2,060.

The following note has been contributed by Mr. G. A. Byrne, B.E., M.R.San.I., Housing Superintendent.

Housing in Cork—1937.

The year under review saw very little progress in our efforts to provide housing accommodation for the people of the City. A strike extending over the Spring and Summer months brought all building work to a complete standstill, the schemes of 106 houses at Spangle Hill and 266 houses at Baker's Lane being left in an unfinished condition during this period. The Spangle Hill scheme has now been completed and rented as follows :—42 to deserving applicants from overcrowded and unsuitable habitations in the City, and 64 to persons dispossed from

houses closed or demolished under Sections 19 and 23 of the Housing Acts of 1931 and 1932, due to their unsanitary condition.

The following table shows the numbers and rents of the various houses built by the Corporation to date.

Location	No. of Houses	Weekly Rents (Including Rates)
Madden's Buildings	76	4/4 to 6/6
Ryan's ,, ...	16	2/4 to 5/–
Horgan's ,, ...	126	2/8 to 6/5
Roche's ,, ...	128	2/11 to 7/8
Corporation ,, ...	33	5/–
Sutton's ,, ...	46	5/9 to 6/7
Kelleher's ,, ...	50	5/7 to 7/5
Barrett's ,, ...	89	4/3 to 6/7
MacCurtain Villas	76	11/4 and 11/10
McSwiney's ,, ...	40	11/–
French's ,, ...	30	10/– and 10/6
Capwell	148	*8/6, 10/6 and 14/–
Turner's Cross	152	*8/–, 10/– and 13/–
Turner's Cross Extension....	168	11/6 and 12/6
Gurranabraher Nos. 1 and 2	277	†2/6 to 8/–
,, 3	83	8/6
,, 4	78	†2/6 to 8/6
,, 5	82	†3/6 to 9/6
Common's Road No. 1	48	9/6, 10/– and 13/6
,, 2	122	†3/6 to 9/6
,, 3	64	†3/6 to 12/6
,, 4	42	10/6 and 12/6
Greenmount No. 1	86	†2/6 to 8/–
Total	2060	

*Exclusive of Rates. †Differential Rents.

At the beginning of the year, the Corporation controlled directly 1929 of these dwellings inhabited by persons of the working classes and with the addition of the 106 houses mentioned above, less 7 houses bought out during the year in the Turner's Cross and Capwell Schemes, this left us at the end of the year in direct control of 2028 houses.

The work on the 266 houses at Baker's Lane is proceeding as fast as possible and these houses should be occupied by next August or September at the latest.

Tenders for the erection of a further 206 houses at Spangle Hill have been received and work on these should commence as soon as the contractor can complete the necessary bonds. Development work on

this scheme has been completed including the provision of the drainage system for a further 800 houses.

Plans have been prepared for a further lot of 206 houses at Baker's Lane and tenders for this work will shortly be sought. Development of this site has been completed and makes provision for a further lot of approximately 400 houses. This work included a sewerage system capable of dealing with 1,200 houses.

During the year, the M.O.H. recommended the clearance of St. Joseph's Court, Knapp's Square (areas 1 and 2) and Fitzgerald's Alley as unhealthy areas and Public Inquiries have been held by the Minister for Local Government and Public Health. With the permission of the owners, the tenants from Knapp's Square have already been rehoused at Spangle Hill.

" Official Representations " have been made and Closing Orders obtained by the M.O.H. on the following houses.

Kyrl's Quay—Nos. 22, 23 and 24.
Cockpit Lane—No. 14.
Little Hanover Street—No. 4.
Frenche's Quay—Nos. 1 and 1a.
Ward's Terrace—No. 4.
Watercourse Road—No. 24.
Evergreen Street—No. 12.
Sheares' Street—No. 50.
Barrack Street—No. 147.
Cattlemarket Avenue—No. 22.
Hanover Street—No. 37.

An appeal to the High Court was taken by owners of property in Pickett's Lane, upon which a Compulsory Purchase Order had been made. The Compulsory Purchase Order was confirmed, but a further appeal against the Order has been made to the Supreme Court, which has not yet given judgment.

A Compulsory Purchase Order has been made on 11 acres of land in possession of the Presentation Brothers at Greenmount for the purpose of clearing the titles of some of the head landlords.

A survey of the houses condemned and either demolished or closed since June 1934 shows that 468 houses in the City have been dealt with and that from these houses 732 families comprising 3,928 persons have been rehoused in Corporation houses. The following list shows the location of the condemned houses and the numbers of families and persons drawn from each area.

Street	Number of Houses	Number of Families	Number of Persons
Ashgrove Lane	2	2	6
Abbey Street	1	1	10
Barrack Street	1	1	5
Bleasby's Street	5	22	130
Broad Lane (Centre)	7	20	117
Bandon Road	2	3	9
Beale's Square	14	15	66
Ballymacthomas	15	16	105
Broad Lane (Blackpool)	10	10	53
Blackwell's Lane	3	3	18
Buckley's Lane	2	2	7
Bailey's Lane	23	57	289
Beecham's Lane	10	25	119
Corbett's Lane	15	18	98
Convent Place	2	2	9
Cremin's Lane	2	3	13
Cross Lane	1	1	5
Cornmarket Street	2	2	13
Cockpit Lane	6	7	43
Cattlemarket Avenue	5	19	108
Cattle Lane Row	1	1	6
Donovan's Lane	11	11	56
Dalton' Avenue	14	41	211
Drummy's Lawn	2	2	19
Evergreen Road	3	2	6
Evergreen Street	1	1	5
Farrell's Square	2	6	33
Fuller's Lane	13	14	81
Frenche's Quay	2	2	12
Greenmount Avenue	2	2	12
Grattan Street	5	14	88
Gillabbey Street	1	3	25
Glen Ryan Avenue	11	11	56
Great William O'Brien Street	4	9	54
Gould Street	1	1	8
Hanover Street	1	3	14
Hogan's Lane (1st and 2nd)	12	13	70
Harrington's Square	8	8	35
Knapp's Square	11	40	214
Kyrl's Quay	5	6	32
Kerry Yard	1	1	8
Keohane's Lane	2	2	17
Kearney's Avenue	21	23	117
Kyrl's Street	5	7	33
Lower Quarry Lane	6	6	51
Little Hanover Street	1	3	17
Malachy's Lane	2	2	12

Street	Number of Houses	Number of Families	Number of Persons
Moriarty's Lane	1	1	8
Morrisson's Lane	1	1	6
Pilsen's Lane	1	1	4
Pickett's Lane	21	22	132
Penrose Square	2	2	12
Regan's Lane	5	5	19
Regan's Alley	2	4	19
Rosemary Buildings	17	18	100
Queen's Place	3	3	14
Skeye's Lane	19	20	115
St. Mary's Square	12	11	54
St. Anne's Square	14	14	46
South Main Street	1	2	10
Step Lane	1	2	9
St. Paul's Avenue	2	4	23
St. Mary's Avenue	1	1	6
Sunday School Lane	1	4	13
Step Lane	1	1	8
Sheares' Street	2	3	18
Trimbath's Lane	19	21	130
Vincent's Avenue	13	13	52
Ward's Terrace	1	1	6
Watercourse Road	4	14	79
Wolfe Tone Street	24	66	360
Widderling's Hill	3	5	27
Waggett's Lane	2	2	5
Whitley's Place	2	2	9
Wolfe Tone Place	5	5	28
Nurses Well Lane	4	4	28
Green's Mills	8	15	73
Totals	468	732	3,928

The tenants from the above houses have been rehoused in the Schemes at Gurranabraher, Spangle Hill and Greenmount in addition to a number of families who were granted tenancy of new houses due to the overcrowding in and unsuitability of their old habitations. The following table shows the number of houses in these schemes and the effect on the City's population of these movements of families.

Location	Number of Houses	City Area		County Area	
		Families	Persons	Families	Persons
Gurranabraher	520	516	2,923	4	22
Commons Road	276	10	79	266	1,643
Greenmount	86	86	430	—	—
Totals	882	612	3,432	270	1,665

From this it will be seen that 270 families or 1,665 persons have been moved outside the City Area.

The South Cork Board of Public Assistance have up to the present made good to the unemployed amongst this number, the difference between the City and County rates of Unemployment Assistance. A concession has also been granted in so far as these men, although living outside the City are considered eligible for employment on the relief schemes being carried on inside the City.

The standard of cleanliness and neatness both in the houses and gardens continues to improve and there seems to be a general improvement in the health of the children in these areas.

The various Governments have recognised that the provision of houses for the working classes would overstrain the finances of the local Authorities and so they have subsidised the building of these houses by giving substantial grants to the Local Authority for each scheme completed. Where persons are dispossessed under Slum Clearance or kindred operations the amount of this subsidy is $\frac{2}{3}$ the yearly loan charges on the scheme, whilst for houses let to deserving applicants the subsidy is only $\frac{1}{3}$ the yearly loan charge.

This means that houses let to tenants of the first class can be rented at an average of 7/6 per week whilst similar houses rented to applicants would be rented about 11/6 per week. This presupposes that the inhabitants of a slum area are not so well to do as the average applicant for a Corporation house. While this is, in the main, true, still there are many persons in slum areas who are in comfortable circumstances and who would only be too glad to pay 11/6 per week for a decent house if it were available.

To give these persons houses at 7/6 per week would be applying the subsidy to assist persons not in need of such assistance. On the other hand, there are many people living in these areas who would be unable at any time to pay 7/6 or anything near it. By bringing in the system of differential rents we are enabled to apply the grant to those cases which most need it and withhold it from those who do not. We can even apply or withhold part of the grant and thus fix our rents not on the value of the house but on the rent paying capacity of the tenant. As the rent of the house can be varied from week to week in line with the income of the family, this method of renting acts as an Insurance that illness or unemployment will not necessarily mean the loss of the house or the need of moving to a cheaper locality.

The attached table gives an analysis of the incomes of the 709 families who are at present housed under differential rents.

SCHEME	NUMBER OF TENANTS WITH INCOMES AS FOLLOWS									No. of houses in Scheme
	Under 20/-	20/- to 30/-	30/- to 40/-	40/- to 50/-	50/- to 60/-	60/- to 70/-	70/- to 80/-	80/- to 100/-	Over 100/-	
Gurranabraher No. 5	22	21	11	10	7	2	1	3	5	82
" No. 4	12	10	12	7	11	8	7	8	3	78
" No. 2	5	4	3	—	5	6	—	—	2	25
" No. 1 and 1a	60	37	38	24	35	28	20	4	6	252
Greenmount	15	20	12	10	8	3	7	8	3	86
Commons Road No. 2....	30	24	19	16	12	11	4	4	2	122
" No. 3....	19	13	15	3	7	2	2	2	1	64
Totals	163	129	110	70	85	60	41	29	22	709

By comparing the previous table of incomes with the following analysis of the numbers paying rents of varying figures, one can easily see the advantages of the system.

NUMBER OF TENANTS PAYING RENTS AT

SCHEME	12/6	12/–	11/6	11/–	10/6	10/–	9/6	9/–	8/6	8/–	7/6	7/–	6/6	6/–	5/6	5/–	4/6	4/–	3/6	3/–	2/6	No of Houses in Scheme
Gurranabraher No. 5	–	–	–	–	–	–	18	–	3	5	4	4	1	4	–	2	2	15	21	3	–	82
,, No. 4	–	–	–	–	–	–	–	–	3	30	–	3	–	7	3	10	2	4	3	3	10	78
,, No. 2	–	–	–	–	–	–	–	–	–	11	–	3	1	2	–	1	1	–	2	2	2	25
,, 1 and 1a	–	–	–	–	–	–	–	–	–	79	3	10	9	17	9	21	7	22	14	23	38	252
Commons Rd. No. 2	–	–	–	–	–	–	28	1	4	7	3	5	3	7	9	5	10	8	32	–	–	122
,, No. 3	3	–	–	–	2	1	3	1	4	1	1	–	1	3	7	5	5	7	20	–	–	64
Greenmount	–	–	–	–	–	–	–	–	–	27	–	7	1	14	1	2	4	5	16	9	–	86
	3	–	–	–	2	1	49	2	14	160	11	32	16	54	29	46	31	61	108	40	50	709

Section XII.—School Medical Service.

(1)

Medical Inspection for the year ended 31st December, 1937.

Number of Children Inspected.

1.—*Particular Inspections*	4,764
(a) Routine	4,152
(1) Entrants	1,554
(2) Intermediates	1,550
(3) Leavers	1,048
(b) Special	612
2. *Other Inspections*, e.g., re-inspection of children referred for observation; of children treated for eye, ear, nose and throat defects since previous examination; of those who previously refused treatment of such defects and of those who signed for treatment by private practitioners	2,821

Table 84.—Return of Defects found by Medical Inspection for the year ended 31st December, 1937.

	Disease or Defect	Routine Inspections	Special Inspections
		Number of Defects	Number of Defects
Skin	Ringworm—Scalp	7	—
	Ringworm—Body	10	1
	Scabies	7	—
	Impetigo	35	1
	Other Diseases (non-Tuberculous)	11	1
Eye	Defective Vision (Strabismus excluded	400	163
	Strabismus	141	49
	Blepharitis	69	13
	Conjunctivitis	61	28
	Corneal Opacities	15	—
	Trachoma	2	3
	Other Conditions	39	27
Ear	Defective Hearing	19	10
	Otorrhoea	38	60
	Other Conditions	6	9
Nose and Throat	Enlarged Tonsils	367	105
	Adenoids	116	37
	Enlarged Tonsils and Adenoids	429	131
	Other Conditions	25	17
Miscellaneous	Enlarged Cervical Glands (non-Tuberculous)	62	13
	Septic Sores, Minor Injuries, etc.	80	4

Table 85.—Return of Defects found by Medical Inspection for the year ended 31st December, 1937.

	Disease or Defect	Routine Inspections	Special Inspections
		Number of Defects	Number of Defects
Heart and Circulation	Heart—Organic	28	26
	Heart—Functional	15	5
	Anaemia	49	16
Lungs	Bronchitis	56	27
	Other Diseases (non-Tuberculous)	11	18
Nervous System	Chorea	4	1
	Epilepsy	—	—
	Other Conditions	11	6
Tuberculosis	Pulmonary	—	—
	Glands	4	4
	Bones and Joints	1	—
	Other Forms	1	—
	Cases referred to Tuberculosis Clinics and retained for observation	7	3
Deformities	Infantile Paralysis	7	—
	Surgical Tuberculosis	—	2
	Rickets	2	1
	Congenital	12	1
	Other Forms	5	1
	Hernia	14	—
	Rickets	4	1
	Other Diseases and Defects	104	11

DENTAL DEFECTS.

Treated at Dental Hospital under the School Medical Service Scheme	Treated by Private Dentists	Total
1,237	28	1,265

Nature of Dental Treatment.

Extractions :—	
Temporary Teeth	3,746
Permanent Teeth	1,503
Total	5,249
Fillings :—	
Temporary Teeth	17
Permanent Teeth	623
Total	640
Scalings	145
Other Operations	38

General Anaesthetics have been administered to 288 children.

Children residing in the County and attending Schools within the Borough.

Referred to the County Medical Service for Treatment :—

No. referred for Nose and Throat Defects	122
No. referred for Eye Defects	80
No. referred for Ear Defects	3
No. referred for Dental Defects	342

Percentage of Principal Diseases and Defects found by Routine Medical Inspection

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Disease or Defect	Percentage
Defective Nutrition	10.9
Verminous Conditious	6.8
Skin (Non-Tuberculous Disease)	1.7
Teeth	60.3
Eye :—	
(a) Defective vision requiring refraction	18.1
(b) Other diseases or defects	4.5
Ear	1.5
Nose and Throat :—	
(a) Enlarged Tonsils and Adenoids	22.0
(b) Other conditions	0.6
Heart and Circulation	2.2
Lungs (Non-Tuberculous disease)	1.6
Tuberculosis	0.1
Nervous System	0.4
Deformities	0.6
Other diseases and defects	4.5

"Following up" of Children found to be suffering from Physical Defects.

In connection with children found to be suffering from physical defects :—

Number of children visited	2,876
Number of visits paid	3,423

In connection with those who refused treatment or failed to keep appointments given for treatment :—

Number of children visited	162
Number who consequently obtained treatment	48=29.6 %

Children suffering from Defective Vision.

Teachers were notified of children for whom glasses were prescribed. Special notifications were issued regarding myopes of over 3 and 5 Dioptres, according to the age of the child. The parents of the latter children were instructed by the Nurses or Medical Officer, on the preventive measures to be taken against eye strain. In cases where the myopia shows a tendency to progress the children are sent for refraction twice or thrice yearly, as considered necessary.

Myopic Defects :—	
Number of myopes refracted	84
Nature of Defect :—	
Myopia	30
Simple Myopic Astigmatism	6
Compound Myopic Astigmatism	20
Mixed Astigmatism	28
Degree of Myopia :—	
5 to 5 Dioptres	14
5 to 10 Dioptres	16
10 to 15 Dioptres	1

Table 86.—The Average Height and Weight of Children Inspected and Comparison with the Average Standard. (Baldwin and Woods Tables).

Table 86 BOYS.

Age last Birthday Years	No. of Children Examined	Average Height in ins.	Average Weight in lbs.	Average Standard Weight for Height	Percentage over or under Weight according to Standard
5	203	42	42	39	7.6% over
6	380	44	44	43	2.3% over
7	69	46	48	48	—
8	269	49	54	55	1.8% under
9	386	50	57	58	1.7% under
12	203	56	76	77	1.2% under
13	276	57	80	82	2.4% under

GIRLS.

Age last Birthday Years	No. of Children Examined	Average Height in ins.	Average Weight in lbs.	Average Standard Weight for Height	Percentage over or under Weight according to Standard
5	191	42	41	39	5.1% over
6	433	44	43	42	2.3% over
7	93	45	46	45	2.2% over
8	228	48	53	52	1.9% over
9	432	50	56	59	5.0% under
12	188	57	78	82	4.8% under
13	293	58	86	88	2.8% under

Rheumatic Children.

Investigation and classification of rheumatic suspects were made according to the method adopted in 1935.

The number of children examined as "routines" was 4,152, the number of suspects 226 and the number positive 118. The number of children examined as "specials" was 612, the number of suspects 137 and the number positive 121.

The following Tables give the number of positive cases classified under the various groups (details of which were given in 1935 Report) according to age and sex.

I.—ROUTINE EXAMINATIONS.

Table 87

GIRLS.

AGE GROUP	Number Examined	Number of Suspects	Number Rheumatic	Percentage Rheumatic	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
Entrants	802	43	14	1.7	–	5	–	1	5	1	2
Intermediates	794	77	45	5.7	2	7	1	6	22	4	3
Leavers	539	40	28	5.2	–	11	–	4	6	5	2
Total	2,135	160	87	4.1	2	23	1	11	33	10	7

Table 88 BOYS.

AGE GROUP	Number Examined	Number of Suspects	Number Rheumatic	Percentage Rheumatic	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
Entrants	752	15	3	0.4	1	1	–	–	1	–	–
Intermediate	756	35	17	2.2	–	3	3	4	2	1	4
Leavers	509	16	11	2.2	1	6	–	–	–	1	3
Total	2,017	66	31	1.5	2	10	3	4	3	2	7

Table 89. BOYS AND GIRLS.

Number Examined	Number of Suspects	Number Rheumatic	Percentage Rheumatic	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
4,152	226	118	2.8	4	33	4	15	36	12	14

The following gives the percentage of signs and symptoms found in rheumatic children and of their personal and family history as regards rheumatism.

Endocarditis	14.4
Carditis	6.8
Suspicious Heart Signs	40.7
Suspicious Nervous Signs and Symptoms	22.0
Suspicious Constitutional Signs and Symptoms	42.4
Unhealthy or Enlarged Tonsils....	61.9
Tonsils removed	14.4
Growing Pains and Sore Throats	30.5
Growing Pains	24.6
Recurrent Sore Throats	9.3
History of Acute Rheumatism	32.2
History of Chorea	17.8
History of Acute Rheumatism and Chorea....	2.5
Family History of Rheumatism	18.6

II. SPECIAL EXAMINATIONS.

Table 90.

	Number Examined	Number of Suspects	Number Rheumatic	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
Girls	310	84	73	3	16	1	3	22	15	13
Boys	302	53	48	5	15	2	4	6	5	11
Total	612	137	121	8	31	3	7	28	20	24

Table 91.—Enlarged Tonsils and Adenoids.

Operative Treatment.

Under the School Medical Service Scheme	By Private Practitioners	Total
440	33	473

Other Defects and Diseases of Nose and Throat.

Treated at Intern Department of Hospitals associated with S.M.S. Scheme	18
Treated at Extern Department of Hospitals associated with S.M.S. Scheme	11
Total number treated	29

TABLE 92. **Defective Vision.**

Submitted to Refraction		Glasses Prescribed			Change of Glasses not necessary	Glasses not Prescribed
Under the School Medical Service Scheme	By Private Practitioners	Under the School Medical Service Scheme	By Private Practitioners	Total		
592	17	555	17	572	35	2

Other Diseases and Defects of the Eye.

Treated at Intern Department of Hospitals associated with S.M.S. Scheme	14
Treated at Extern Department of Hospitals associated with S.M.S. Scheme	94
Treated at Intern and Extern Departments of Hospitals associated with S.M.S. Scheme	6
Total number treated	114

Ear Diseases and Defects.

Treated at Intern Department of Hospitals associated with S.M.S. Scheme	10
Treated at Extern Department of Hospitals associated with S.M.S. Scheme	84
Treated at Intern and Extern Departments of Hospitals associated with S.M.S. Scheme	5
Total number treated	99

Minor Ailments.

Treated at the School Clinic	1,130

Return of Defects found by Medical Inspection for the year ended 31st December, 1937.

Dental Defects.

	Number of Inspections	Number found to require Treatment
Routine	4,764	2,874
Special	239	239
Total	5,003	3,113

Defective Nutrition.

Percentage of mal-nourished children	10.9

Uncleanliness.

Percentage of verminous children—Boys and Girls	6.8
,, ,, ,, —Girls	9.2
,, ,, ,, —Boys	4.2

Table 93.—Percentage of Conditions of Uncleanliness.

	Head Nits Present	Head Pediculi Present	Body Pediculi Present
Girls	5.7	3.4	3.8
Boys	0.4	0.9	3.4

Unsatisfactory Clothing and Footgear.

Boys and Girls	15.8%
Girls	14.7%
Boys	17.0%

Review of Defects Treated under the School Medical Service Scheme.

Teeth—All treatments have increased in comparison with those for last year—extractions by 119, fillings by 69, scalings by 24 and other operations by 11.

Skin—276 cases were treated at the School Clinic.

Minor Injuries and Septic Sores—656 cases were treated at the School Clinic.

Ear—99 cases were treated at the Hospitals associated with the Scheme. The majority of those were otitis media ; the others included 4 cases of mastoiditis (2 of which had operative treatment) and 1 case of post auricular cyst.

Nose and Throat—440 cases of enlarged tonsils and adenoids were operated on, and 29 cases of other diseases of the nose and throat were treated at the Hospitals associated with the scheme. The latter included 20 cases of sinusitis (6 of which had operative treatment), 1 case each of enlarged turbinals and chondritis (both of which had operative treatment) and 4 cases of rhinitis.

Eye—*Defective Vision*—592 cases were refracted at the Hospitals associated with the scheme. Glasses were supplied by Messrs. George Prescott & Son, 74, Oliver Plunket Street for a period of five months and by Messrs. T. L. Egan & Co. Ltd., Lavitt's Quay for the remaining seven months. Free glasses were supplied to 453 children whose parents were in poor financial circumstances.

External Eye—114 cases were treated at the Hospitals associated with the scheme and 198 minor cases at the School Clinic. The former cases included 18 of squint (4 of which had tenotomy and 14 fusion training), 3 of cataract, 1 each of episcleritis, anterior synechia, prolapse of the iris and orbital cellulitis, 12 of ulcers, 6 of keratitis, 3 of iritis, 4 of tarsal cysts and 5 each of injuries and trachoma.

Trachoma.

Special care was exercised as regards examination for, and " following up " of children suffering or suspected to be suffering from, trachoma. Parents who were inclined to be negligent regarding regular attendance for treatment were " followed up " every month and warned that blindness would eventually result if the disease was not treated. Suspects were also " followed up " and urged to attend for observation and treatment. Fortunately the number found to be suffering from the disease was small as the following figures indicate.

I.—*Old Cases.*

Positive	5.

II.—*Suspects*—5.

Positive ...	Nil.
Negative	4.
Doubtful	1

The old cases have been under treatment more or less continuously for varying periods—one since 1933, two since 1934 and two since 1936. The attendance for and results of treatment are as follows.

Case under treatment since 1933—Attendance for treatment up to May, 1936 rather irregular, attendance since then good. She developed pannus in 1935 but has improved rapidly since June, 1937 and has been pronounced " almost cured." She is to continue to attend weekly for observation and treatment.

Visual Acuity—R. 6/9 (part). L. 6/36.

Cases under treatment since 1934—(Case 1)—Attendance on the whole irregular but has improved since June 1937. She suffers from pannus which is now improving. She is to continue to attend daily for treatment.

Visual Acuity—R. 6/24. L. 6/24.

(Case 2.)—Attendance very good. There is a history of " sore eyes " since the age of three for which she had intermittent treatment until seen at school at the age of seven. The condition improved steadily and is now reported as being " very satisfactory." She is to continue to attend the Hospital once a month.

Visual Acuity—R. 6/18 (part). L. 6/24 (part).

Cases under treatment since 1936. (Case 1.)—Attendance, on the whole, good. The condition is improving. She is to continue to attend daily for treatment.

Visual Acuity—R. 6/36. L. 6/36.

(Case 2.)—Attendance very good. The condition was pronounced " cured " on the 16th October, 1937. She is to attend the Hospital twice yearly for observation.

Visual Acuity—R. 6/36. L. 6/36 (January). R. 6/18. L. 6/24 (December, 1937).

The two last mentioned cases are sisters who belonged to the travelling class previous to taking up residence in Cork two years ago. Another sister was sent for examination in 1936 and pronounced negative. There is a strong family history of trachoma—both parents and two maternal aunts being affected.

The family history of the other three cases is, as far as I could ascertain, negative.

Suspected Cases—(A. Negative). Three members of one family who were found to be suffering from a follicular type of conjunctivitis and whose father has been suffering from trachoma for twenty years were sent for treatment and diagnosis. They attended for treatment and observation for periods of two to three months when the conjunctivitis cleared up and they were pronounced negative. They are now free from all traces of conjunctivitis.

A very interesting case was that of Spring Catarrh, between which and trachoma it is sometimes very difficult to make a differential diagnosis. The evidence obtained from pathological examination of this case was in favour of trachoma but the results of treatment proved it to be a case of spring catarrh.

(B. Doubtful).—The diagnosis in this case was " suspected but not definite trachoma." Attended regularly for daily treatment over a period of two months when the case was pronounced " cured." Very probably this was a case of follicular conjunctivitis.

School Meals.

A Mid-day meal is given in the following schools :—Angel Guardian, Mayfield ; The Cathedral ; Central District ; Christian Brothers, Blarney Street ; Presentation Brothers Greenmount ; South Presentation Monastery ; St. Joseph's Monastery (Presentation Brothers) ; North Presentation Convent Senior Girls' ; North Presentation Convent Infant Boys' and Girls' ; South Presentation Convent Infant Boys' ; South Presentation Convent Infant and Senior Girls' ; St. Marie's of the Isle ; St. Vincent's Convent ; St. Nicholas' Girls,' Blackpool ; St. Nicholas' Boys,' Blackpool ; Strawberry Hill, Girls' ; Strawberry Hill, Boys' ; St. Francis' Girls' ; St. Francis' Boys' ; SS. Peter and Paul's Senior Girls' ; SS. Peter and Paul's Infant Girls' ; SS. Peter and Paul's Infant Boys' ; St. Patrick's Senior Boys' ; St. Patrick's Senior Girls' ; St. Patrick's Infants' ; St. Mary's, Eason's Hill ; St. Mary's of the Rock.

The meal consists of bread and butter or jam, or a currant bun and a cup of cocoa, except in nine schools where milk is given instead of cocoa. It is regrettable that the grant (£2,100) does not permit of milk being substituted for cocoa. In the majority of schools where milk is supplied, lack of funds does not permit of its being given every school day. The number of children catered for was 3,861.

Breakfast to twenty pupils of St. Vincent's Convent and breakfast and dinner to ninety pupils of the North Presentation Convent were supplied at the Communities' expense.

Fresh Air Holidays for Children.

Debilitated children who were sent on a fortnight's holiday to the seaside or country (by the Fresh Air Fund Committee of the Cork Council of Women) appeared to benefit considerably by the change.

Review of General Working of the Scheme.

Owing to closure of the schools during the influenza epidemic last January, school medical inspections were not begun until the 25th of that month. The attendance at the Clinic for that period was poor in comparison to that for the previous year. The total number of attendances at the Clinic for the year was 8,121, this shows a decrease of 124 on those for last year. Home visits by the Nurses show a decrease of 397 ; this is probably entirely due to the sick leave absence of one Nurse for a period of 24 days.

Treatment of defects other than enlarged Tonsils and Adenoids has been well availed of ; the percentage who obtained treatment of the latter is still very low—44.4%—though it shows an increase of 9.8 on last year's percentage.

I desire to thank the Teachers for their kind co-operation and the Nurses and Clerk for their efficient work.

HYGIENE OF SCHOOLS.

In accordance with the Minister's instructions, a report on the hygiene of each school visited since April 1st, 1937, was made to the Medical Superintendent Officer of Health.

The most common hygienic defect found was in connection with cloakrooms. A large majority of these are not heated and many are poorly lighted and ventilated. In other cases the cloakroom accommodation consists of pegs on the walls of entrance halls, stairs, landings, corridors or classrooms, and, in a few instances, of cupboards built in to classroom walls or of presses in corridors. These cupboards and presses are ventilated by perforations on the door. Inadequacy in number or bad spacing of pegs is common, the result being that in wet weather garments are piled on top of each other and become sodden. All cloakroom pegs should be numbered and allotted to the children—in many instances pegs are either not numbered or children hang their clothes on any peg convenient to them.

Another defect, which happily is not so common as the first mentioned, is inadequate heating of classrooms. This defect is chiefly confined to rooms which are heated by an open fire. The heating effects of the latter are likely to be too local even in average sized classrooms. There are very large classrooms (areas ranging from 900 to over 1,300 square feet) heated by this means. The heating effects are, of course, very inadequate and in cold weather a tolerable temperature is often maintained at the expense of ventilation. In some of these cases the poor ventilation is further increased by the absence of covered shelters in the playground—on wet days the rooms are not vacated during the intervals and consequently they cannot be flushed with fresh air.

These are defects which, in the interest of the health of pupils and teachers should receive attention. Adequate cloakroom accommodation is necessary and all cloakrooms should be well ventilated, lighted and heated. The heating of, at least, the larger classrooms should be supplemented by hot water pipes on the side furthest from the fire and covered shelters should be built in the playgrounds.

The following improvements were made during the year :—

New Buildings :—A new school for the pupils of St. Patrick's Senior Boys. I have not yet visited this school.

Painting of School Premises :—The entire interior of Christian Brothers, North Monastery ; Classrooms of Presentation Brothers, Greenmount, St. Patrick's Infants, St. Marie's of the Isle, Bun Scoil Gobnatan and North Presentation Convent Senior Girls'. Windows and doors of St. Ann's Shandon and cloakroom and lavatories of Summerhill.

Division of Classrooms by Wooden and Glass Partitions :—One classroom each of Presentation Brothers (South Monastery) and Christian Brothers, Blarney Street.

Modern Desks Procured :—St. Patrick's Senior Girls' 45 ; St. Patrick's Infants' and Presentation Brothers (South Monastery) 24 each.

Repairs :—A new floor in the principal room of Scoil Gaedhealac na mBuachailli. Repairs to windows, covered shelter and furniture

of St. Nicholas' Boys', Blackpool, and to windows and furniture of SS. Peter and Paul's Senior Girls.' Two new lavatory tanks were got at the North Presentation Convent Senior Girls,' a new furnace was installed at the Presentation Brothers (South Monastery) and the gas fittings of one classroom of the latter school altered and repaired.

TABLE 94.

FLOOR AND CUBIC SPACE PER PUPIL IN AVERAGE ATTENDANCE

NATIONAL SCHOOL	Average attendance	Sq. feet per pupil in average attendance	Cb. Feet per pupil in average attendance
Angel Guardian	132.9	8.3	116.5
St. Patrick's Senior Girls'	194.1	9.0	162.6
St. Mary's, Eason's Hill	313.8	9.2	110.1
St. Nicholas' Boys, Blackpool	429.3	10.4	143.4
The Cathedral	379.2	10.6	125.5
St. Patrick's Infants'	240.0	10.0	176.2
St. Francis' Boys'	184.0	11.1	127.9
South Presentation Monastery	548.3	11.3	169.0
St. Mary's of the Rock	276.3	11.3	192.8
St. Marie's of the Isle	1,155.0	11.4	185.8
Strawberry Hill Boys'	134.2	12.1	144.7
St. Nicholas' Girls, Blackpool	279.2	12.1	173.4
Scoil Neasain Naomtha	444.7	12.1	160.1
Presentation Brothers Greenmount	532.2	12.2	263.1
St. Joseph's Monastery, Mardyke	393.4	12.4	173.5
North Presentation Convent Senior Girls'	636.7	12.4	196.2
St. Vincent's Convent	1,312.7	12.6	184.2
North Monastery	614.5	12.6	205.2
North Presentation Convent Infant Boys' and Girls'	540.2	11.3	185.3
South Presentation Convent Infant Boys'	195.8	11.5	194.1
Bun Scoil Gobnatan	249.4	11.8	355.7
South Presentation Convent Infant and Senior Girls'	1,330.7	13.3	145.9
Christian Brothers, Blarney Street	409.8	13.5	229.0
Strawberry Hill Girls'	124.5	13.8	164.0
SS. Peter and Paul's Senior Girls'	141,7	13.8	414.5
St. Patrick's Senior Boys'	241.1	14.2	185.6
SS. Peter and Paul's Infant Girls'	149.9	12.9	193.1
St. Francis' Girls'	139.2	15.8	189.7
SS. Peter and Paul's Infant Boys'	136.0	14.4	215.9
An Mhodh Scoil	151.4	19.0	568.7
Ard Scoil Gobnatan	139.5	19.3	580.6
Scoil Gaedhealac na mBuachailli	83.7	22.2	668.0
St. Finbarr's, Dean Street	46.1	33.8	406.1
St. Ann's Shandon	22.7	46.3	740.1
St. Luke's	39.6	54.9	1,025.8
Central District	54.6	57.5	920.4
Summerhill	36.7	58.8	1,177.1
St. Mary's Shandon	22.5	59.6	954.3
St. Nicholas', Cove Street	62.8	60.8	802.3

Appendix I.

OPERATION OF THE SCHEME FOR THE TREATMENT OF VENEREAL DISEASES.

Record of Work done in the V.D. Treatment Centre.

	Cork City		Cork County		Other Districts		Total		Total Male and Female Cases
	M.	F.	M.	F.	M.	F.	M.	F.	
New Cases (1st Time)									
Syphilis	16	2	5	–	6	–	27	2	29
Soft Chancre	1	–	–	–	1	–	2	–	2
Gonorrhoea	20	–	7	–	7	–	34	–	34
Not V.D.	23	–	3	–	4	–	30	–	30
Total	60	2	15	–	18	–	93	2	95
Total Attendances :—									
Syphilis	476	27	102	–	9	–	587	27	614
Soft Chancre	6	–	–	–	2	–	8	–	8
Gonorrhoea	537	–	321	–	16	–	874	–	874
Not V.D.	104	–	10	–	12	–	126	–	126
Total	1123	27	433	–	39	–	1595	27	1622
Cured :—									
Syphilis	–	–	–	–	–	–	–	–	–
Soft Chancre	–	–	–	–	–	–	–	–	–
Gonorrhoea	26	–	2	–	–	–	28	–	28
Total	26	–	2	–	–	–	28	–	28
Pathological Exams. :—									
Wassermanns	58	7	20	2	11	–	89	9	98
Gonococci	32	–	16	–	5	–	53	–	53
Kahn	50	7	20	2	11	–	81	9	90
Dark Ground	7	–	–	–	1	–	8	–	8
Total	147	14	56	4	28	–	231	18	249
Therapy :—									
Stabilarsan	180	8	58	–	2	–	240	8	248
Bismostab	206	13	40	–	6	–	252	13	265
Irrigations	498	–	289	–	13	–	800	–	800
Mercury and Iodides	47	–	3	–	–	–	50	–	50
Total	931	21	390	–	21	–	1342	21	1363

Appendix II.

OPERATION OF THE COUNTY BOROUGH SCHEME FOR THE WELFARE OF THE BLIND.

The following are the terms of the Scheme drafted for this purpose and now in operation within the Borough :—

In this scheme the term " Blind Person " shall mean any inhabitant of the County Borough who is so blind as to be either unable to perform any work for which eyesight is essential, or unable to continue his or her ordinary occupation ; the term " The Corporation " shall mean the Lord Mayor, Aldermen and Burgesses of the County Borough of Cork, acting by the City Manager ; the term " The Minister " shall mean the Minister for Local Government and Public Health.

2. The Corporation will establish and maintain a Register in which shall be entered the name and address, age, sex, religion and other necessary particulars of every blind person who shall produce a certificate from a recognised Ophthalmic Surgeon that the acuity of vision of such person (refractive error being corrected) is below 1/20th normal (3/60th Snellen), or that such person is so blind as to be unable to continue his or her ordinary occupation. Any person between the ages of 30 and 70 may, however, be registered without producing such certificate on furnishing evidence of being in receipt of a pension in pursuance of Section 6 of the Old Age Pensions Act, 1932. The Register shall be kept written up-to-date, and shall be revised annually in the month of January. The Corporation shall be empowered to pay reasonable fees to Ophthalmic Surgeons for certifying in cases of necessitious persons.

3. Arrangements will be made by the Corporation with the Authorities of one or more of the Institutions for the Blind mentioned in the Schedule hereto on such terms as may be approved by the Minister for the following purposes :—

(a) the education or industrial training of suitable blind persons between the ages of five years and thirty years ;

(b) the employment in workshops for the Blind of blind persons suitable for such employment, their maintenance in a Hostel, and the augmentation of their wages ;

(c) the maintenance in Homes of blind persons who, owing to age or infirmity, are incapable of work.

4. The Corporation may in cases of unemployed and necessitous blind persons ineligible for education or industrial training under Article

3 (a) of this Scheme and living in their own homes or in lodgings, grant assistance to such persons in accordance with the following scale :—

Classification of Blind Persons	Amount of weekly allowance
(a) Blind person over 15 years and under 30 years of age	12s. 6d.
(b) Blind person 30 years of age and upwards	6s. 0d. (with pension)
(c) Married man under 30 years of age with wife dependent on him	19s. 0d.
(d) Married man 30 years of age and upwards with wife dependent on him	12s. 0d. (with pension)
(e) Additional allowance for each child	2s. 6d.

In considering the grant of allowances on this scale to the classes of blind persons at (a) and (c) above, the Corporation will not take into account casual earnings of any such person where they are satisfied that such earnings do not exceed six shillings per week.

5. Nothing in this Scheme is to be construed as giving blind persons, irrespective of their means or conduct, a right absolute to assistance. The Corporation will not grant an allowance under Article 4 above to any blind person under 30 years of age who is capable of instruction and who declines without a satisfactory reason to take advantage of the facilities for education, training or employment under the Scheme, or who is by conduct or otherwise deemed unsuitable for assistance. No habitual mendicant shall be granted an allowance under the Scheme unless the practice of mendicancy is discontinued. No person shall be eligible to receive assistance under this Scheme who shall not have been resident within the County Borough for two years previous to date of application for assistance.

6. The Corporation may incur such expenditure in the execution of this Scheme as the Minister may from time to time approve.

7. This Scheme shall come into operation on the 1st October, 1932, and shall continue for a period of three years, but may during the period with the consent of the Minister be modified, extended or revoked by the Corporation, and with the like consent may be continued for such further time as may be deemed necessary. Any question, dispute or difference arising in connection with the interpretation of this Scheme shall be determined by the Minister whose decision shall be final.

SCHEDULE

Institutions for the Blind Approved by the Minister	Class of Blind Persons Received
1. St. Mary's Institution for Female Blind, Merrion, County Dublin	Females, also boys up to 7 years of age
2. St. Joseph's Asylum for Male Blind, Drumcondra, Dublin	Males
3. Richmond National Institution for Industrious Blind, 41 Upper O'Connell Street, Dublin	Males
4. Cork County and City Asylum for the Blind, Infirmary Road, Cork	Males and Females

The number of persons receiving weekly allowances from the Corporation during the year was 170, and the disbursements under the heading amounted to £3,216 17s. 0d. 25 applications were received for allowances. 3 blind persons were sent during the year for industrial training. Other disbursements amounted to £43 11s. 0d. (examinations and other expenses). In addition to the above-mentioned cases, there were 13 (7 females and 6 males) in the County and City Asylum for the blind who were not maintained by direct grants from the Corporation but indirectly through the Board of Public Assistance. So far as can be ascertained, the total number of persons receiving state pensions for blindness was 219, of whom 56 are totally blind.

The following note is contributed by the Hon. Secretary of the local branch of the National Council for the Blind of Ireland.

Home Teaching for the Blind.

Under the National Council for the Blind, this very essential service has been inaugurated in Cork City, to which the Corporation has granted a small annual contribution towards the expenses incurred by employing trained and qualified Home Visitors and Teachers.

The work of the Home Visitor is varied and broad, embracing social as well as mental instruction. She must help the blind to become active members in their homes, teach them to read embossed type, various handicrafts, such as knitting and rugmaking, and to bring an interest and hope into their otherwise hopeless lives.

The Home Visitor can help to prevent blindness in children, who often, through parental ignorance and negligence, or want of interest, lose their sight, which under proper care and supervision can be cured, by seeing that they are provided with glasses where necessary and sent for treatment. She also gives her assistance and advice over pension applications, appeals and better accommodation.

Wireless sets are distributed on loan where most required, entertainments organised and free seats at musical shows secured.

Voluntary visitors also give their services to read and spend some time talking to the lonely blind, who greatly appreciate these visits.

Classes are held weekly for instruction in basket making, chair-caning and other forms of handicraft. The finished articles are presented for sale only if up to standard—no inferior goods labelled "Made by the Blind" are passed for sale. Efficiency is the definite aim.

The Home Teacher becomes a real friend of the Blind, who turn to her in all their difficulties, knowing that they will obtain help and encouragement to become as useful and important as their sighted brothers and sisters.

Suitable cases are urged to enter institutions for the blind and arrangements made for this purpose.

The Home Teacher has office hours daily where any blind or defective sighted person can get in touch with her and make enquiries. Over

the Home Visitor is an Executive Council who meet monthly, receive the reports of the Home Visitor, deal with various cases, arrange the financial side of the work and follow closely and with interest the progress which is being made.

SUMMARY.

Number of city cases on Register on 31st December, 1937	230
Visits paid to the Blind	1,485
Interviewed at Office, 18, Parnell Place	329
Number of Braille readers	10
Number of Moon readers	2
Number learning handicrafts at Men's weekly classes	11
Number of Home Workers whose work is of saleable standard	11
Number of bed-ridden and aged blind visited and helped in various ways	17
Number sent to Convalescent Home	1
Number sent to Royal Normal College, London	1
Number helped to obtain spectacles or artificial eyes	9
Number given special relief during illness	22
Number given clothing and blankets	45
Number given various Christmas gifts	21
Number given Wireless Sets on loan	20
Number given gramophone and records	1
Help given over dentures	1

Appendix III.

ROADS AND SEWERS.

ROADS COMPLETED DURING 1937.

	Area in Sq. Yards
Concrete Roads—	
Baker's Lane Estate	7,800
Spangle Hill Estate	6,660
Mastic Asphalt—	
Anglesea Street	8,950
Union Quay	4,624
George's Quay	2,730
White Street	1,314
Streets and Highways—	
No. of miles of Streets and Highways	76.25 Miles
	Sq. Yards
Total area of road surfaces	640,460
Area of Water Bound Macadam	2,500
Area of Bituminous Macadam	75,183
Area of Block Paving (stone)	15,000
Area of Asphalt	317,617
Area of Concrete	228,460
Area of Block Paving (Wood)	1,700

STREET CLEANING AND DOMESTIC SCAVENGING.

(a) **Mechanical Street Cleaning (Karrier Sweeper)**	
Total miles travelled per annum	5,000
Surface sweepings collected and disposed of	2,000 Tons
Average cost of Collection and Disposal	8/– per Ton
(b) **Night Service** (Mechanical Washer and Sweeper)	
Area washed per night	50,000 Sq. Yds
Cost per 1,000 sq. yards per night	1/–
(c) **Scavenging and Surface Sweepings** (hand)	
No. of Electric Trucks	13
Average number of miles travelled per annum	55,000
Surface sweepings and Domestic refuse collected and disposed of per annum	30,000 Tons
Average Cost of Collection and Disposal	7/– per Ton

SEWERS

Dimensions	Location	Description	Length in Yards
18"	Baker's Lane Estate	Concrete	280
12"	do.	Glazed Stoneware	170
9"	do.	do.	340
6"	do.	do.	190
36" x 24"	Spangle Hill Estate	Concrete	110
30" x 20"	do.	do.	500
16"	do.	Cast Iron	100
12"	do.	Glazed Earthenware	240
9"	do.	do.	80
6"	do.	do.	200

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