

Report of Dr. Sidney Coupland on the outbreak of small-pox in the Dewsbury Union in 1891-2.

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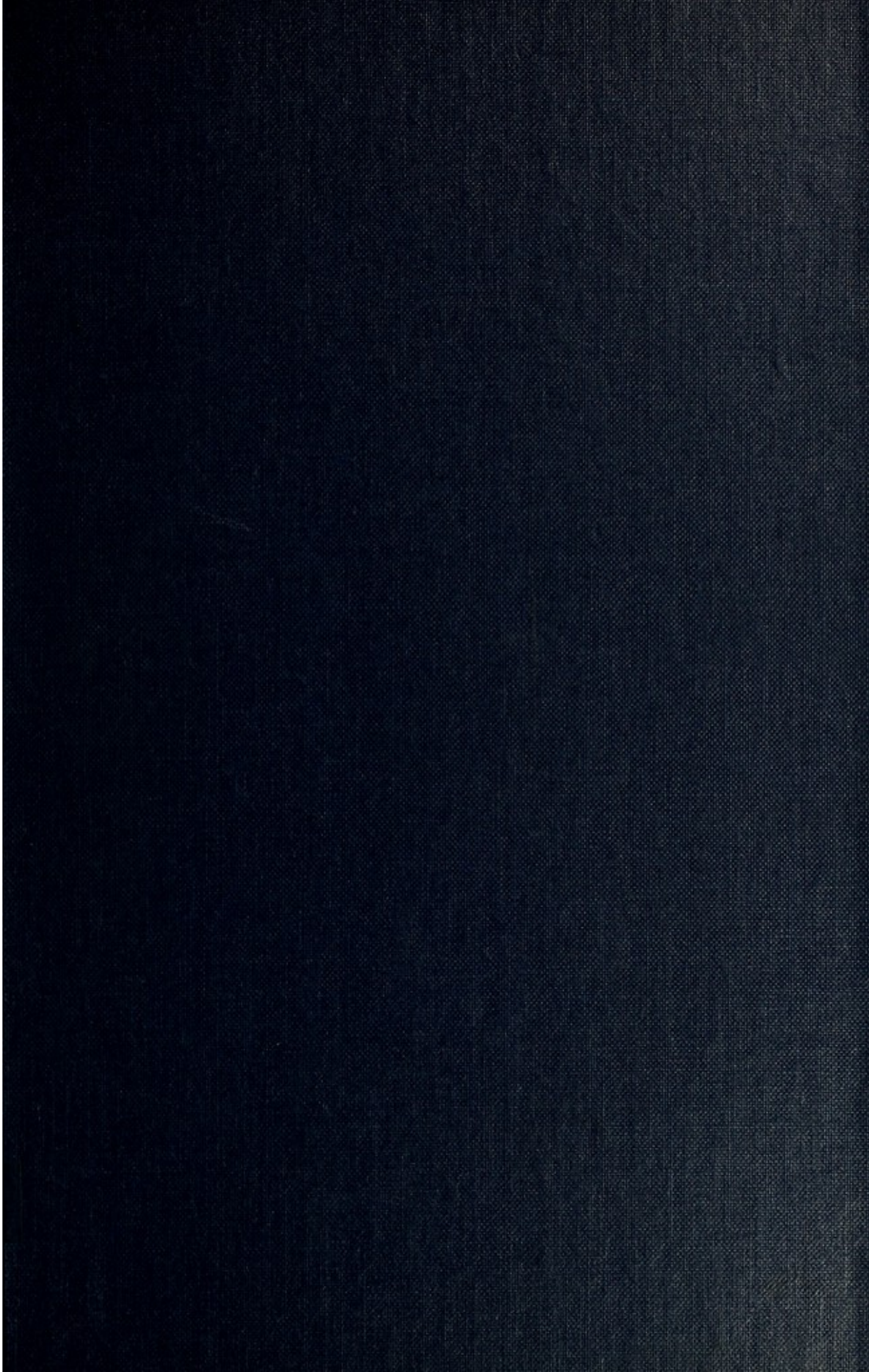
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REPORT
OF
DR. SIDNEY COUPLAND
ON THE
OUTBREAK OF SMALL-POX
IN THE
DEWSBURY UNION
in 1891-2.



LONDON:
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1894.

[Confidential.]

Report of Dr. Sidney Coupland on the Outbreak of Small-pox
in the Dewsbury Union in 1891-2.

CONTENTS.

Introduction.

Part I.—General account of the district as regards area, population, zymotic history, sanitary administration, notification, isolation, and vaccination.

Part II.—Small-pox in 1891-2: a general analysis of the whole outbreak.

Part III.—Small-pox in 1891-2: history of the epidemic in the various districts of the Union and analysis of the leading facts of its incidence in Batley, Dewsbury, and the other districts of the Dewsbury Union.

Part IV.—Vaccination in relation to small-pox in this epidemic.

INTRODUCTION.

During the year 1891 small-pox prevailed in certain parts of the West Riding of Yorkshire, especially in the districts of the Dewsbury Union. The outbreak increased in severity at the beginning of 1892, and in compliance with instructions received from the Chairman of the Royal Commission on Vaccination I proceeded to Leeds on March 31st, 1892, to institute an inquiry into its course and extent.

I desire at the outset to express my warm thanks to Dr. Whitelegge, the Medical Officer to the West Riding County Council, for his valuable advice and assistance in initiating the inquiry, which did so much to facilitate a task somewhat foreign to my usual avocations. I also lost no time in putting myself into communication with the local authorities and the medical officers of the Dewsbury Registration District, who cordially gave me every information and assistance. I learnt that the epidemic, which had been of considerable proportions, was then apparently declining, and that the inquiry would embrace an extended personal investigation if it were to any degree to fulfil the objects aimed at. The plan entailed a personal house-to-house visitation of every dwelling of which one or more inmates had suffered from the disease, and it soon became evident that to have attempted this single-handed would have involved a very great expenditure of time. Accordingly I applied to the Chairman of the Royal Commission for permission to have the co-operation of Mr. E. A. Fardon, the resident medical officer of the Middlesex Hospital, during a part at least of the inquiry. That permission was given, and my thanks are due to the weekly board of the Middlesex Hospital for granting me the use of Mr. Fardon's services. The value of those services cannot be estimated too highly.

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Mr. Fardon arrived on April 19th, and from that date until May 7th we were daily engaged in the work of inspection. This work I continued after his departure so as to include all the cases of small-pox arising up to April 30th, the inquiry being so far completed on May 14th.

In the month of August and for a few days in September I again visited the district, and was thereby enabled to include in my returns particulars of every case that had occurred up to August 27th, 1892—the total period covered by the inquiry being 16 months or 70 weeks—the first case having occurred in the week ending May 2nd, 1891.

During this time there were known to have occurred in the Dewsbury Union a total of 1,029 cases of small-pox. This number is inclusive of six cases arising in the Dewsbury Union Workhouse, one in the Dewsbury Infirmary, and one in the Batley Small-pox Hospital. It was found that the 1,021 patients came from 645 houses, and an attempt was made to visit every infected house; but owing to removals or to the absence of the inmates at the date of the visit, it was not possible to procure particulars of every household. Altogether information was gathered from personal visitation of 544 houses, yielding a total of 3,000 inmates, of whom 887 had been attacked with small-pox. Frequent visits were also made to the various hospitals where cases were inspected and other cognate inquiries made.

Definition of terms used.

It may be well if, in this place, I were to briefly explain and define certain terms employed in the text of the report to signify the type of small-pox and the character of vaccination. In few diseases do we have so markedly exhibited gradations in severity as in small-pox. There is the widest possible difference between cases which are characterised by a profuse, confluent rash, severe secondary fever and constitutional disturbance, and those in which the eruption is limited to a few sparse papules, which may never mature, and where the only constitutional disturbance is a slight initial fever. Yet between these two extremes (not to mention the malignant hæmorrhagic class, which strictly fall into a category of their own) there is every degree of extent of eruption, not always, be it noted, associated with a like severity of febrile disturbance commensurate with the profuseness of the rash. Since, however, the data are not always available for dividing cases of the disease strictly according to their degree of severity as marked by the secondary fever, and its duration, and since also we have in the character and extent of the skin eruption an approximate indication of the severity of attack, I have adopted the terms "mild," "discrete," "coherent," and "confluent" to denote the various types of the disease. Under the head of *mild* are included most, if not all those cases often termed "varioid," a term I have hesitated to adopt, seeing that, strictly speaking, it implies something different from variola, and have also limited this class to the cases of very sparse eruption and slight general disturbance. Again, of the *discrete* variety the eruption varies from a moderately profuse rash, which may run a mild course to a thickly distributed eruption of papules that mature freely and leave a certain amount of pitting. It is hardly possible to draw a line between these "severer" discrete cases, and those where the papules are so profuse and contiguous as to be really "coherent." Accordingly, whenever I have had evidence that the attack, although "discrete" has been of that severe type, I have grouped it with the "coherent" class. This latter form passes also insensibly into the "confluent" type, where, on the face especially, the pustules run together to form more or less extensive irregular areas which become covered by a common crust. I admit that these divisions are arbitrary, but great care has been taken in assigning the cases to each of them. As to the *hæmorrhagic* class, I have for statistical purposes grouped them with the confluent cases.

I may also explain here the phraseology which has been employed with regard to vaccination. In each case of small-pox and for each inmate of an infected house, inquiry was made respecting the date, and when possible also, the character of primary vaccination. In that way five categories were established.

- (1.) *The vaccinated.*—In these there was evidence of primary vaccination having been performed, or when ocular inspection was not possible, the statement of the parent or other near relative was accepted. In the persons inspected, notes were made of the character and quality of the vaccination marks. The fact and date of re-vaccination—a rare event—was also noted.

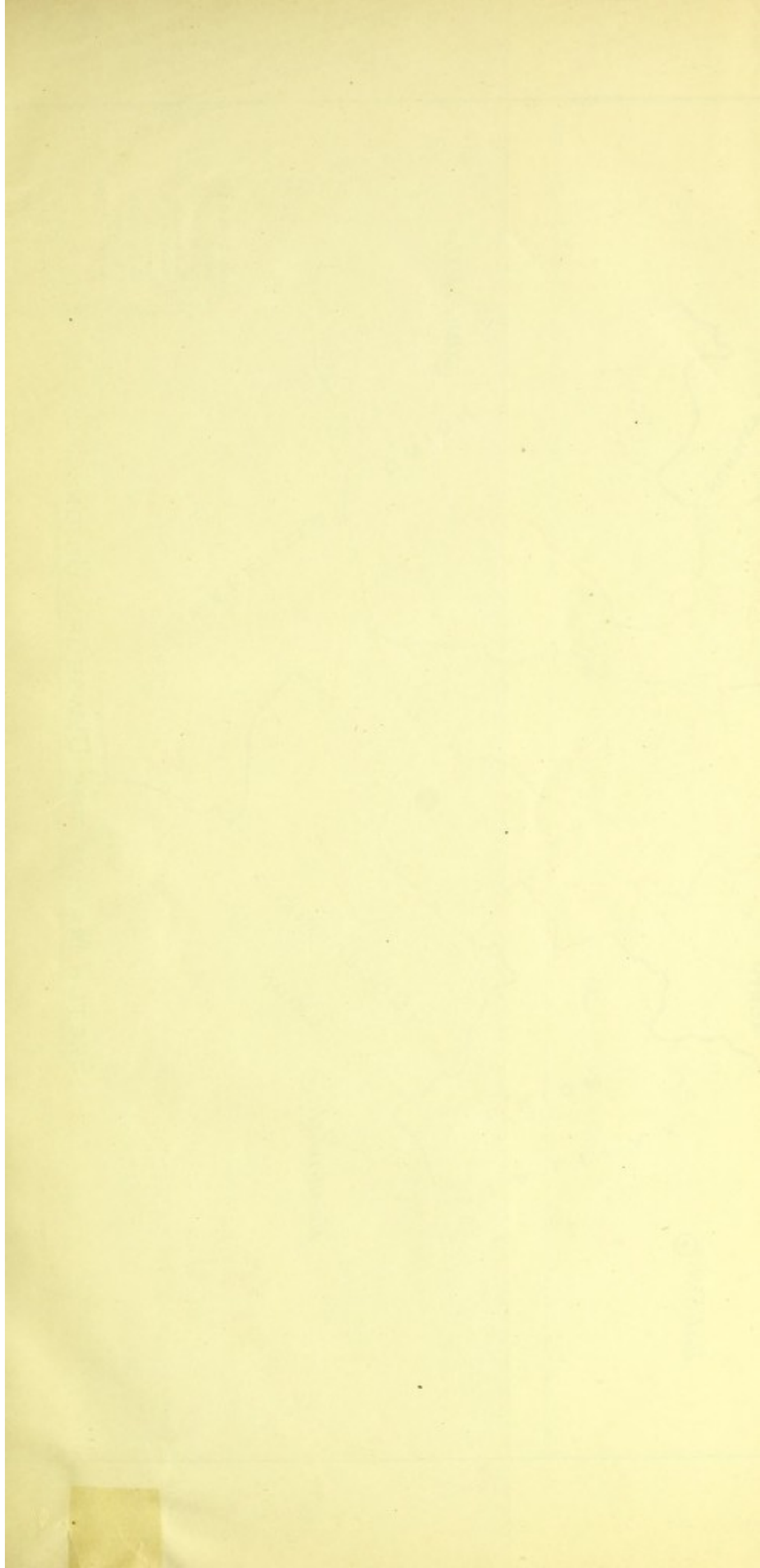
- (2.) *Vaccination uncertain or doubtful.*—In this class no information was at all available.
- (3.) *Alleged Vaccination.*—This includes those individuals who were said to have been vaccinated, but in whom, on examination, there were no visible “marks” to corroborate the statement. This class may possibly be larger than appears, since some of those included in the first class who were not inspected might have presented the same fact.
- (4.) *“Under” Vaccination.*—This phrase, which is here used to denote those individuals who, when suffering from small-pox, or when exposed to liability to infection, were undergoing primary vaccination, requires a few words of explanation. In every small-pox epidemic a certain number of hitherto unvaccinated persons are vaccinated on the appearance of small-pox in their dwellings. Should one of these recently-vaccinated persons contract the disease whilst thus undergoing primary vaccination his case would fall into the category here defined. He would be suffering from small-pox whilst “under vaccination,” and might be regarded as presenting an instance of concurrent vaccinia and variola. Nevertheless, if the onset of his attack of small-pox is within 14 days of the vaccination the probability is that he was *infected* with variola prior to being inoculated with vaccinia—and with barely an exception that has been so with all the cases of small-pox which are included under this head in this Report. On the other hand, an individual vaccinated for the first time on the occurrence of small-pox in his dwelling, and not himself contracting the disease, would not be considered as being “under vaccination” in the strict sense unless he were still exposed to liability to infection from the case. It is assumed that on the removal or convalescence of the patient, and disinfection of the house, such liability to infection ceases, and hence the term “under vaccination” as applied to other inmates of the house than those contracting small-pox will apply—
- (a) to those vaccinated at any time in the period of treatment of a patient retained at home; or,
- (b) to those only who are vaccinated before the removal of the patient to hospital, and the disinfection of the house.
- (5.) *The Unvaccinated.*—The source of the evidence necessary to establish a claim to be included in this class was, for the most part, similar to that obtaining in Class I. There remain a certain number in whom, of necessity, the only record of the fact is that appearing in the hospital register or on the death certificate. In many (69 out of 89) such fatal cases, however, the surviving relatives were seen, and bore out the statements gathered from those sources.

The report is drawn up in four parts. In Part I. an attempt has been made to give some idea of the condition of the district concerned as regards its sanitation, and the prevalence of zymotic disease. The account I have been able to prepare is imperfect in many details, partly from lack of material, partly because at the time of the inquiry attention was mainly concentrated upon the then prevalent epidemic, and the relation of vaccination to small-pox. In Part II. a general outline of the epidemic and its relation to small-pox in other parts of the West Riding are discussed; and a summary analysis given of the chief results regarding the incidence and type of the disease, and the occupations of the patients, and those exposed to infection from them. In Part III. the early history of the outbreak, so far as it could be obtained in each of the districts of the Union that were included, is given; and the facts regarding it and its character, and the vaccination relations of those attacked and those exposed to infection, are analysed in three main groups, Batley and Dewsbury being separately treated, and the remaining infected districts grouped together. In Part IV. the whole series of cases of small-pox is collected, and analysed with especial reference to vaccination.

*Division of
subject.*

I take this opportunity of acknowledging my indebtedness to the following gentlemen for kindly giving me every assistance in the prosecution of this inquiry, viz., Mr. Mawdsley, Town Clerk, Mr. W. F. Watts, Medical Officer, Mr. Thackray, Sanitary Inspector, of Dewsbury; Mr. Craik, Town Clerk, Dr. Swann, Medical Officer, Dr. J. Stewart, Acting Medical Officer, and Mr. Lindley, Sanitary Inspector, of Batley;

Dr. Forsyth, Medical Officer, and Mr. Blackburn, Sanitary Inspector, of Birstal; Mr. Broughton, Medical Officer, and Mr. Gledhill, Sanitary Inspector, of Heckmondwike; Dr. Shives, Medical Officer, of Liversedge; Mr. Fairclough, Medical Officer, and Mr. Booth, Sanitary Inspector, of Mirfield; Mr. Steele, Medical Officer, and Mr. Ward, Sanitary Inspector, of Morley; Mr. J. W. Greenwood, Medical Officer, and Mr. Hirst, Sanitary Inspector, of Ossett; Dr. Richardson, Medical Officer, and Mr. Hemingway, Sanitary Inspector, of Ravensthorpe; Dr. Laird, Medical Officer, and Mr. Tuley, Sanitary Inspector, of Soothill Upper; Mr. Clay, Medical Officer, and Mr. Scott, Sanitary Inspector, of Soothill Nether; Mr. Davies, Medical Officer, of Thornhill.



Bradford



BRADFORD UNION

NORTH BIERLEY UNION

BRAMLEY UNION

HOLEBECK UNION

Leeds



HUNSFLET UNION

Halifax



HALIFAX UNION

UNION

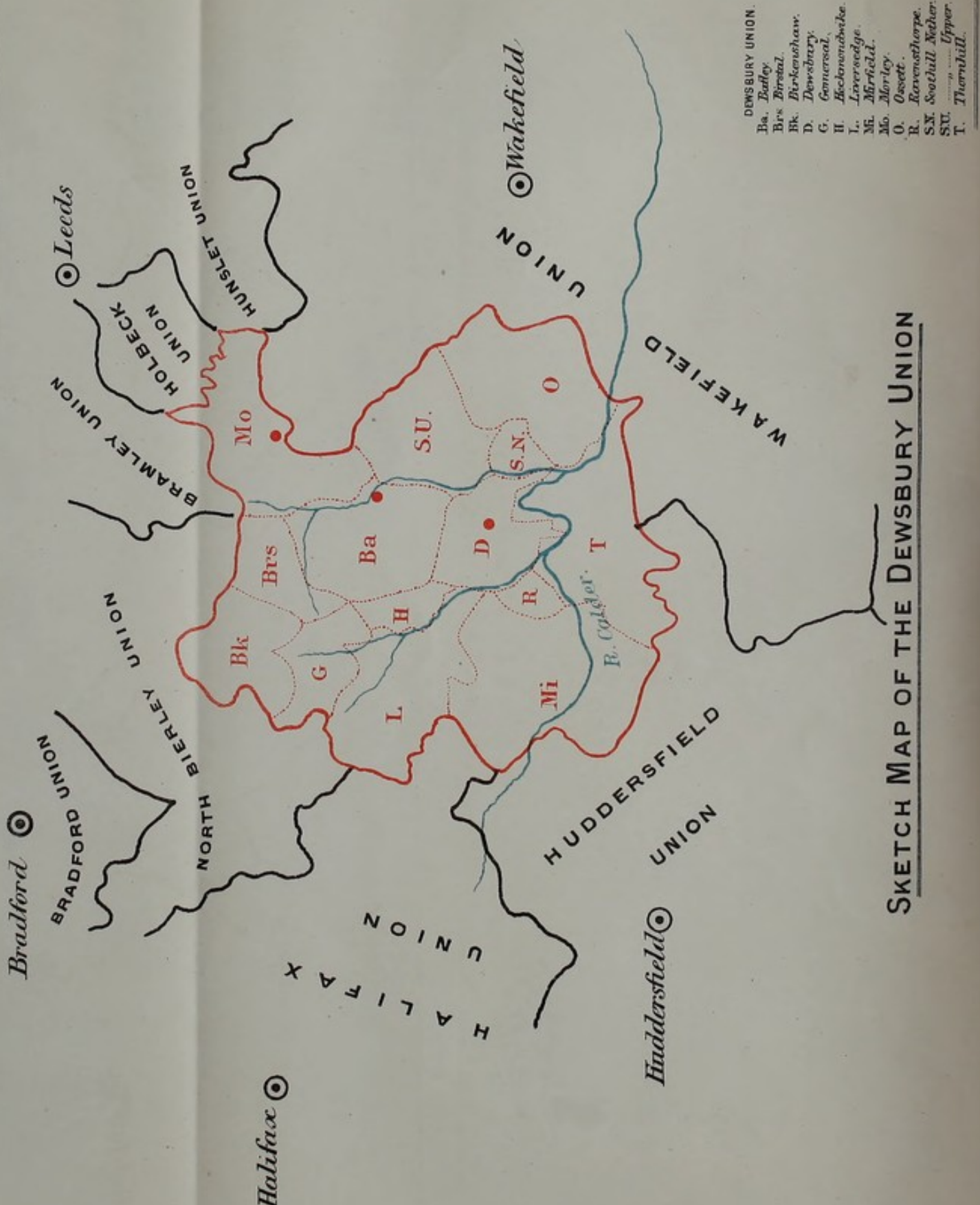
HUDDERSFIELD UNION

Huddersfield



WAKEFIELD UNION

Wakefield



DEWSBURY UNION.

- Ba. *Bailey.*
- Brs. *Birstal.*
- Bk. *Birkenshaw.*
- D. *Dewsbury.*
- G. *Gomersal.*
- H. *Heckmondwike.*
- L. *Liversedge.*
- Mi. *Mirfield.*
- Mo. *Morley.*
- O. *Ossett.*
- R. *Ravensthorpe.*
- S.U. *Southall Nether.*
- S.N. *Southall Upper.*
- T. *Thornhill.*

SKETCH MAP OF THE DEWSBURY UNION

PART I.

Topography of the District. Acreage. Population in 1871, 1881, 1891. Birth rate, death rate, zymotic death rate in 1891 and 1892. Industries, Manufactures, &c. The "heavy woollen" industry and rug trade. Sanitary state. Dr. Thorne's report in 1878. Dr. Barry's reports in 1886. Prieys middens. Back-to-back houses. Provision for isolation of cases of infectious disease. The fever block at the union workhouse infirmary. Vaccination returns. Prevalence of zymotic disease. Previous outbreaks of small-pox. DEWSBURY.—Sanitary administration. Statistics of zymotic disease in past years. The Corporation Hospital for infectious diseases. Crow Nest Convalescent Home. Procedure in dealing with small-pox. Ambulance. Disinfection. Vaccination returns 1891-92. BATLEY.—Sanitary administration. The Small-pox Hospital. Illingworth's disinfectant. Vaccination returns, 1891-92. Statistics of zymotic disease. MORLEY.—Sanitary administration. Temporary small-pox hospital. Vaccination. Zymotic mortality statistics. OSSETT.—Sanitary administration. Fever hospital. Vaccination and mortality statistics. BIRSTAL.—Sanitary administration. Vaccination and mortality statistics. HECKMONDWIKE.—Sanitary administration. Vaccination statistics. LIVERSEDGE.—Sanitary administration. Vaccination and mortality statistics. MIRFIELD.—Sanitary administration. Vaccination statistics. RAVENSTHORPE.—Sanitary administration. Mortality statistics. SOOTHILL NETHER. Sanitary administration. Vaccination statistics. SOOTHILL UPPER.—Sanitary administration. Vaccination and mortality statistics. THORNHILL.—Sanitary administration. Vaccination and mortality statistics.

The Dewsbury Union, which is co-terminous with the Dewsbury Registration District, is situated in the southern, populous manufacturing part of the West Riding of Yorkshire, below the meridian of Leeds. It is contiguous on the north to the North Brierley, Bramley, Holbeck, and Hunslet Unions, on the east and south-east to the Wakefield Union, on the south and south-west to the Huddersfield Union, and on the west to the Halifax and North Brierley Unions, its boundaries being almost equidistant (about three miles) from Leeds, Bradford, Huddersfield, and Wakefield.*

The area of the whole district is 25,284 acres, and the population (census 1891) 162,596.

The following account of the topography of the district is taken from a report by Dr. Thorne Thorne to the Local Government Board in 1878 †:—

"Speaking generally of the district, it consists of a series of steep undulations intersected by numerous valleys, at times deep and narrow. Here and there are broad, elevated plateaux, and to the south is a considerable expanse of low-lying ground, which forms part of the Calder Valley. This river flows through the district from west to east, receiving in its course numerous tributaries, of which the most important are the Spen Beck and the Dewsbury Beck. Both these becks have different names in different parts of their courses. . . . By far the greater portion of the district generally divides itself into two drainage areas. The first, or the *Spen Beck Drainage Area*, contains Mirfield, north of the Calder, Ravensthorpe, a portion of Dewsbury, Heckmondwike, Liversedge, a portion of Gomersal, and Birkenshaw. On the west the boundary of this area, so far as this registration district is concerned, extends from Mirfield Moor northwards to the west corner of the Liversedge urban district. The eastern boundary runs through Dewsbury northwards, passing through the extreme west of Batley, and through Great Gomersal to Birkenshaw. On the west side of this area small tributary streams divide the country into distinct and prominent ridges, on the east the ground, which rises rather abruptly in places, as, for example, at Dewsbury Moor and Little Gomersal, forms generally a wavy outline being indented with smaller valleys, all of which drain into the main one. The second, or the *Dewsbury Beck Drainage Area*, would include the principal portions of Dewsbury, Soothill Nether, Soothill Upper, and Batley, Birstal, and part of Gomersal, an area of nearly 11 square miles. The western boundary of this area is the eastern one of the Spen Beck, and the eastern one runs through Ossett Street side to the north-east of Soothill Nether through Chidswell in Soothill Upper, and across Bruntcliffe Moor to Adwalton Moor which lies beyond the northern

boundary of Birstal. In the northern part of this area a ridge of land extends from Lamp annds through Howden Clough, and divides Batley valley from the narrow valley of the Howley Beck, but these two valleys unite at Batley and have their natural outfall into the Dewsbury Beck. To the north this ridge merges into the watershed which divides the basin of the River Calder from that of the River Aire. The ground between Earlsheaton in Soothill Nether and Hanging Heaton in Soothill Upper takes the form of a broad plateau with a gentle slope towards the south. From the top of the escarpment of the Thornhill Rock which forms the western boundary of this plateau, the slope of the ground towards Dewsbury Beck valley is very abrupt. On the opposite side of this valley the land rises with a steep ascent to the escarpment of the Birstal Rocks and then slopes gradually from Batley Carr to Staincliffe. In a north-westerly direction from Batley the sides of the valley rise less steeply except at Birstal, where the Birstal Rock forms a prominent feature. To the south of these two areas lies a portion of Mirfield and Thornhill. From Mirfield Moor the ground slopes southwards towards the River Calder; the district also lying to the north of a line drawn from the village of Thornhill through Fox-Royd and Lower Whitley and on to Heaton Moor, just beyond the south-western boundary of Mirfield falls rapidly towards the same river. This part of the country is bold and varied, and is conspicuously marked by the high range known as Thornhill Edge. From Thornhill Edge the inclination is very steep down to the Smithy Beck, towards which, on the south, the country, which is intersected by numerous deep and narrow valleys, drains. Beyond the eastern boundary of the Dewsbury Beck area lie the greater portion of Ossett, the eastern part of Soothill Upper and Morley."

The Union contains the following urban sanitary districts:—

Urban Sanitary Districts.	Acreage.	Population, 1891.
1. Dewsbury Borough	1,468	29,847
2. Batley Borough	2,039	28,719
3. Birkenshaw	925	2,553
4. Birstal	1,233	6,528
5. Gomersal	1,096	3,923
6. Heckmondwike	697	9,700
7. Liversedge	2,150	13,668
8. Mirfield	3,413	11,707
9. Morley Borough	3,381	18,725
10. Ossett Borough	3,105	10,984
11. Ravensthorpe	353	5,134
12. Soothill Nether	562	5,848
13. Soothill Upper	1,897	5,646
14. Thornhill	3,692	9,696
Total	25,900*	162,596

* In the Registrar-General's summary the total acreage is given as 25,284 acres, the area for Morley being stated at 2,765 acres. The above figures are those quoted in the Annual Summary of the Medical Officer to the County Council of the West Riding, 1892.

Thus, within the Union there are four boroughs, viz.: Dewsbury, Batley, Morley, and Ossett, the corporation being the sanitary authority in each case. Each of the remaining township districts is controlled by a local board, which is the sanitary authority.

It will be seen that there is considerable variation in the area of these 14 districts, as also in the density of their respective populations. In many of them there is much open ground, for example at Thornhill, Mirfield, Soothill Upper, and around Ossett; whilst, on the other hand, the small area of Ravensthorpe is in great part covered by dwellings, as is also Soothill Nether, these two districts flanking the populated borough of Dewsbury.

From the following table (Table I.) it will be seen that the population in the whole registration district increased at a far greater rate in the decade 1871 to 1881 than in the next decade, namely, as 1·23 : 1·057; that the greatest rate of increase has been in Morley (1·91 for the 20 years 1871-1891), Thornhill (1·52), Batley (1·37), and the Soothills (1·36).

* The borough of Dewsbury is about 8 miles from Leeds, 8 miles from Bradford, 5½ miles from Huddersfield, 2 miles from Wakefield.

† Report to the Local Government Board on the sanitary condition of the Dewsbury Registration District with special reference to the prevalence of infectious diseases in the district.

The subjoined Tables II., III., IV., extracted from the figures given in the Annual Reports of the Medical Officer to the County Council, show that in the years 1891 and 1892 the birth-rate in the whole Dewsbury Registration District was respectively 28.7 and 28.1 per 1,000 of the estimated population; the death-rates during the same period being 24.0 and 19.6 per 1,000. From the same valuable Reports I have extracted the birth-rate, death-rate, zymotic death-rate, and infant mortality in each of the sanitary districts of the union.

Industries, Manufactures, &c.—The staple industry of this district is the manufacture of heavy woollen and cloth goods, blankets, and carpets. The trade has made great advances during the last 20 years, and the rapid growth of the population is largely owing to this. Associated with these manufactures is the rag trade, which is very extensive, and for which there is a market held in Dewsbury. This trade employs a large number of persons of both sexes, especially females, in the pursuit of rag-picking and sorting, whilst attached to the woollen mills are departments in which the "rags" are "ground" to shreds to reduce them into a condition suitable for their re-production in cloth-weaving. It may be remarked that the "rags"—

which come from all parts of the world, consist of cast-off wearing apparel of all kinds of material, and in all degrees of filthiness. The opportunity thus afforded for the conveyance and dissemination of infected dust would, *a priori*, seem to be extreme, and, except to a very limited extent, there is no effort made to disinfect the "raw material" before submitting it to disintegration and weaving. A certain amount of this material is simply utilised as flock, but the major part undoubtedly forms the staple ingredient of the inferior kind of cloth, commonly known as "shoddy."

In addition to the above industry there are ironworks at Dewsbury, glass works at Thornhill, chemical works at Birkenshaw, and the whole area is pervaded with coal-pits, of which the most extensive are to be found at Morley, Soothill, and Dewsbury. Lastly, the more open districts, such as Birkenshaw, Liversedge, Mirfield, Ossett, Soothill Upper, and Thornhill, contain a considerable portion of land devoted to agricultural purposes.

Sanitary Conditions.—At the time of Dr. Thorne Thorne's visit, 20 years ago, the sanitary conditions of the various places within the Dewsbury Union were in a most imperfect state, and the disproportionate prevalence of fever in

TABLE I.
(Population of the Dewsbury Union.)

Registration Sub-district.	Urban Sanitary District.	Population.					
		1871.		1881.		1891.	
		Total.	Per Acre.	Total.	Per Acre.	Total.	Per Acre.
1. Morley	Morley	9,607	2.8	15,011	4.4	18,725	5.5
2. Batley	Batley	20,871	10.2	27,505	13.4	28,719	14.0
3. Gomersal	Birkenshaw	2,833	3.0	2,699	2.9	2,553	2.7
	Birstal	6,044	4.9	6,766	5.4	6,528	5.2
4. Liversedge	Gomersal	4,033	3.6	3,988	3.6	3,923	3.5
	Heckmondwike	8,300	11.9	9,282	13.3	9,709	13.9
5. Mirfield	Liversedge	11,103	5.2	12,757	5.9	13,668	6.4
	Mirfield	9,959	2.9	11,508	3.3	11,707	3.4
6. Dewsbury	Ravensthorpe	2,910	8.2	4,364	14.0	5,134	14.5
	Dewsbury	24,764	17.4	29,637	20.1	29,847	20.3
7. Soothill	Soothill Nether	4,927	8.7	5,240	9.3	5,848	10.4
	Soothill Upper	3,469	1.8	5,155	2.7	5,645	2.9
8. Ossett	Ossett	9,190	2.9	10,957	3.5	10,984	3.5
9. Thornhill	Thornhill	6,306	1.7	8,843	2.4	9,606	2.6
Dewsbury Registration District		124,286	4.8	153,712	5.9	162,596	6.2

TABLE II.
DEWSBURY UNION—Birth-Rate, Death-Rate, Zymotic Death-Rate, and Infant Mortality for the Years 1891 and 1892.

	Annual Rates per 1,000 of Estimated Population.						Infant Mortality.	
	Birth-Rate.		Death-Rate.		Zymotic Death-Rate.		(Deaths under one Year per 1,000 Births.)	
	1891.	1892.	1891.	1892.	1891.	1892.	1891.	1892.
Batley Borough	29.4	26.7	24.4	21.4	3.1	4.4	239	198
Birkenshaw	23.9	26.8	17.7	16.2	1.6	4.3	115	162
Birstal	28.1	25.4	25.9	18.0	1.5	1.7	240	261
Dewsbury Borough	26.3	27.2	27.9	21.1	3.4	3.6	228	115
Gomersal	21.2	20.9	18.1	13.3	1.8	0.8	120	195
Heckmondwike	28.5	29.3	24.3	19.6	1.4	3.0	188	175
Liversedge	31.9	28.4	25.6	18.7	1.5	1.3	185	174
Mirfield	22.3	22.4	22.1	18.4	2.8	1.3	161	251
Morley Borough	46.0	33.2	23.7	17.4	2.4	2.2	199	158
Ossett Borough	27.0	29.0	19.8	16.5	0.9	1.5	185	132
Ravensthorpe	26.0	26.5	18.2	21.9	3.9	1.7	172	216
Soothill Nether	28.5	27.4	21.2	18.6	1.2	2.5	186	237
Soothill Upper	33.2*	33.7	22.3*	20.2	2.0*	3.4	306*	126
Thornhill	30.0	31.7	17.5	14.6	0.8	0.7	128	162

* Return incomplete. Calculated upon six months' returns.

the district was with justice ascribed to these imperfections. Since then, however, considerable improvements have been effected, although there is much still to be done, especially in the matter of excrement disposal, and in house-construction, as will be seen from the extracts of the reports upon the sanitary condition of these districts, which occur in the record of the sanitary survey made by the Medical Department of the Local Government Board in 1886. These excerpts give in a condensed and at the same time comprehensive form the leading defects in sanitation then observed as contrasted with those prevailing eight years previously. At the time of my visit—in the spring of 1892—although some of the houses and localities visited were still unreformed in these respects, yet there were several in which considerable changes had been made. There has, for example, been much done in the way of re-placing the old midden privy by a system of water-closet both in Batley

and Dewsbury, and (at least in connexion with the houses I visited) there were not many absolutely bad and open middens. Within the past year or two an extensive sewage works had been erected in Batley, and was in full working, the system employed being that of precipitation, the effluent flowing into the Batley Beck. At these works there is also a large destructor. Drainage works were in progress at Heckmondwike, and, indeed, in most of the districts it was evident that far greater attention was being paid to sanitary conditions than was the case 15 years ago. Still much remains to be done, both in the re-construction or abolition of midden privies, and in house construction. The back-to-back system of dwellings, although regulated by byelaws requiring them to be in blocks of four, with passages intervening, is still the rule, especially in Batley, where are to be found most of the recently built houses.

TABLE III.

DEWSBURY UNION.—Population, Total Births, Deaths, and Deaths from Zymotic Diseases.

1891.

—	Area (Acres).	Estimated Population.	Births.	Deaths.	Small-pox.	Scarlet Fever.	Diphtheria.	Croup.	Enteric Fever.	Erysipelas.	Measles.	Whooping cough.	Diar- rhea.
Batley Borough	2,039	28,732	846	701	13	8	7	—	12	—	18	7	20
Birkenshaw	1,925	2,549	61	45	—	1	—	—	1	—	—	1	1
Birstal	1,233	6,522	183	169	—	—	—	1	2	—	5	1	1
Dewsbury Borough	1,468	29,852	785	936	14	11	2	5	7	1	34	24	16
Gomersal	1,095	3,921	83	71	—	—	—	—	1	—	1	3	2
Heckmondwike	697	9,730	277	231	—	—	—	1	6	1	—	5	2
Liversedge	2,139	13,692	457	342	—	3	3	3	4	1	3	2	2
Mirfield	3,497	11,713	261	239	—	2	6	2	5	3	11	3	2
Morley Borough	2,765	18,829	678	446	—	3	1	1	5	1	12	11	12
Ossett Borough	3,105	10,985	297	217	—	2	1	3	2	2	2	—	—
Ravensthorpe	355	5,156	134	94	—	1	—	—	—	—	1	—	—
Soothill Nether	562	5,655	161	120	—	1	1	1	1	—	1	1	1
Soothill Upper	1,897	5,867	189*	131*	?	?	?	?	?	?	?	?	?
Thornhill	3,602	9,626	289	162	—	—	1	—	1	—	1	2	3
Total	25,284	162,869	4,681	3,924	27	32	22	17	47	9	89	60	62

* Calculated on estimated rates for six months of year.

TABLE IV.

DEWSBURY UNION.—Population, Births, Deaths, and Deaths from Zymotic Diseases.

1892.

—	Area (Acres).	Estimated Population.	Births.	Deaths.	Small pox.	Scarlet Fever.	Diphtheria.	Croup.	Enteric Fever.	Erysipelas.	Measles.	Whooping Cough.	Diar- rhea.
Batley	2,039	28,883	772	618	49	14	15	—	7	3	4	16	17
Birkenshaw	925	2,535	68	41	—	8	—	—	—	—	—	1	—
Bristol	1,233	6,499	165	117	—	1	1	—	—	—	7	1	1
Dewsbury	1,468	29,873	812	724	45	11	1	—	7	2	8	20	21
Gomersal	1,095	3,915	82	52	—	2	—	—	1	—	—	—	—
Heckmondwike	697	9,764	286	186	1	3	—	—	1	—	6	7	1
Liversedge	2,139	13,786	391	261	1	5	—	1	2	—	1	5	3
Mirfield	3,413	11,735	263	216	—	1	—	1	—	3	—	5	3
Morley	3,381	21,508	716	376	1	8	4	1	3	3	1	15	14
Ossett	3,105	10,988	319	181	1	7	1	—	3	1	—	1	3
Ravensthorpe	352	5,247	139	118	—	2	—	—	1	—	—	2	2
Soothill Nether	562	5,698	156	106	—	—	—	—	—	—	3	4	7
Soothill Upper	1,897	5,894	199	119	1	4	2	—	5	—	—	7	1
Thornhill	3,602	9,706	308	142	1	1	—	1	—	—	—	1	3
Total	25,990	166,121	4,676	3,257	100	74	33	—	30	12	39	55	76

EXTRACT FROM " ABSTRACTS OF INSPECTORS' REPORTS ON THE SANITARY SURVEY OF ENGLAND AND WALES MADE IN ANTICIPATION OF CHOLERA, 1886."—Annual Report Medical Officer Local Government Board for 1886.

1.	2.	3.	4.	5.	6.	7.	8.	9.
Urban Sanitary District, Inspector, and Date of Report, Population (1881), Industries, &c.	Cleanliness of Roadways and Domestic Premises.	Sewering and Drainage.	Excrement Disposal and Removal.	Refuse removal.	Water Supply.	Sanitary Conditions of Dwellings of Poor.	Crowding of Dwellings on Area.	Overcrowding of Dwellings.
Devonbury Dr. Barry. November 1886. Population, 29,017. (Woollen works, collieries, and iron works.)	Private streets neglected and in unsatisfactory condition.	Sewering just completed. Vestibules obliterated with dirt or with charcoal. Many houses still have sink-pipes not disconnected from sewers.	Chiefly midden privies, some draining into sewers. Many of the worst existing at Dr. Thorne's inspection in 1878 have been abolished and w.c.'s substituted otherwise much as before.	Unsatisfactory	Public supply on constant system. Some improvements in conduit complained of by Dr. Thorne in 1878, but other sources of possible danger exist.	Still much wretched property grouped round filthy yards, but considerable improvement since Dr. Thorne's inspection in 1878. Many cellar dwellings illegally occupied.	Much, and in older parts many small courts.	Not much.
Batley Dr. Barry. September 1886. Population, 27,244. (Woollen works.)	Back and private streets in disreputable condition, and many courts and yards exceptionally bad.	Sewering incomplete. Districts referred to as unsewered by Dr. Thorne in 1878 remains so still. Branch sewers everywhere defective. Ventilation very inadequate. Majority of house waste-pipes disconnected but others not, and sewer air entering dwellings.	Midden privies of worst type all but universal; very often against dwelling-houses, and source of great and dangerous nuisance. Experimental flushing into houses with exceptional frequency as at Dr. Thorne's inspection in 1878.	Unsatisfactory; great accumulations.	Public supply on constant system; good quality. In some instances sewers flushed direct by overflow from reservoir.	Very damp, and surrounded by filthy dangerous nuisances.	Great crowding in older parts. A very large proportion of back-to-back houses.	Not much.
Osselt and Gawthorpe Dr. Barry. November 1886. Population, 10,567. (Collieries, woollen works, semi-rural district.)	Private streets often in disgraceful condition, yards and courts often unpaved and sloppy.	Completely sewerd. Sewers ventilated. Waste pipes mostly disconnected.	Midden privies, many of which have been improved since Dr. Thorne's inspection in 1878. Still some remain as dangerous nuisances. In some instances insufficient accommodation.	Unsatisfactory; much accumulation.	Public supply from Batley Corporation on constant system. Public wells all closed.	Many damp from lack of water spouting, otherwise fair.	None	None.
Ravenshoe Dr. Barry. October 1886. Population, 5,000. (Woollen works, collieries, &c.)	Satisfactory	Completely sewerd. Sewers ventilated and flushed.	Midden privies but great improvements since Dr. Thorne's inspection in 1878.	Satisfactory	Public supply from Dewsbury Waterworks on constant system.	Generally exceptionally good. Many back-to-back, but none so built since Dr. Thorne's inspection.	Not to any serious extent.	None.
Hoekmondwike Dr. Barry. November 1886. Population, 9,882. (Blanket and carpet making.)	Private streets unsatisfactory. Many courts and yards unpaved and sloppy.	Sewering (although some sewers have been put in) still very unsatisfactory as at Dr. Thorne's inspection in 1878. House drainage also unsatisfactory.	Midden privies, commonly exceptionally bad, although a certain number have been covered since Dr. Thorne's inspection in 1878.	Satisfactory	Public supply from Dewsbury Waterworks on constant system.	Considerable improvements made in older parts since Dr. Thorne's inspection in 1878.	Much needless crowding and many back-to-back houses.	None.
Thornhill Dr. Barry. November 1886. Population, 8,818. (Woollen works, glass works, collieries, agriculture.)	Fair	No public works of sewerage done, and sewerage and drainage remain in same condition as at Dr. Thorne's inspection in 1878, except for the disconnection of a number of sink pipes.	Midden privies; about one half are still in the former unsatisfactory condition, while half have been improved satisfactorily.	Satisfactory	Public supply from Dewsbury Waterworks on constant system.	Exceptionally good	None	None.
Mirfield Dr. Barry. November 1886. Population, 11,208. (Woollen and cotton mills, collieries, agriculture.)	Good, except private streets, which were unsatisfactory.	All north of Calder sewerd, with means of ventilation and flushing. South of Calder not sewerd, but houses connected still with old drains. House connections in progress under caretaker regulations.	Midden privies mostly roofed over since Dr. Thorne's inspection in 1878, but still sloppy from admission of ground water.	Satisfactory	Public supply from Huddersfield Corporation. Water acts powerfully on load, and much lead poisoning has resulted.	Good	Little overcrowding. Exception of back-to-back houses discontinued since Dr. Thorne's inspection.	None.

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1.	2.	3.	4.	5.	6.	7.	8.	9.
Urban Sanitary District, Inspections, and Date of Report, Population (1881), Industries, &c.	Cleanliness of Roadways and Domestic Premises.	Sewering and Drainage.	Excrement, Disposal and Removal.	Refuse Removal.	Water Supply.	Sanitary Conditions of Dwellings of Poor.	Crowding of Dwellings on Area.	Overcrowding of Dwellings.
Southall Upper Dr. Barry, November 1886. Population, 5,115. (Woolen works, collieries, agriculture, &c.)	Good	No system of sewerage. Drainage in same condition virtually as at Dr. Thorne's inspection in 1878. In many instances inferior of houses in direct communication with faulty drains through sink pipes.	Midden privies of bad type and uncovered. Many drains into the faulty drains.	Unsatisfactory. Large accumulations.	Public supply on constant system from Halifax Corporation; satisfactory.	Exceptionally good. Some damage for lack of cave spouting, and some cellars illegally occupied.	Not to any serious extent.	None.
Southall Nether Dr. Barry, November 1886. Population, 5,346 (Blanket making, collieries, &c.)	Private streets and yards frequently unchannelled, sloppy, and filthy.	No system of sewerage. House drains very defective; house sink pipes directly communicating with old faulty drains.	Midden privies, many still of old objectionable type as at Dr. Thorne's inspection in 1878, but improvements made in construction in respect of new houses.	Satisfactory.	Public supply from Dewsbury Waterworks on constant system.	Fairly good, but many damp for lack of cave spouting.	Not to any serious extent.	None.
Common Dr. Barry, November 1886. Population, 29,888. (Wool, cotton, and silk works, chemical works, &c.)	Many private streets in unsatisfactory condition.	Partially sewered, but Great Common still dependent on old square drains. House waste pipes as a rule disconnected.	Midden privies, many in same unsatisfactory condition as at Dr. Thorne's inspection in 1878, but a large number altered and new satisfactory.	Satisfactory.	Public supply from Bradford Waterworks on constant system.	As a rule satisfactory; some cellars illegally occupied.	Not to any serious extent.	None.
Morley Dr. Barry, November 1886. Population, 15,011. (Cloth-weaving, collieries, &c.)	Fair on the whole. Some yards and courts unpaved and sloppy.	Greater part sewered, but ventilation imperfect. Disconnection of sink pipes actively progressing since Dr. Thorne's inspection in 1878.	Almost universally midden privies, still some objectionable, but a considerable number materially improved since Dr. Thorne's inspection in 1878.	Not sufficiently frequent.	Public supply from Leeds Corporation on constant system.	Imperfect ventilation and want of cave spouting in older parts, where also there are some dilapidated houses unfit for habitation.	Many courts and back-to-back houses.	None.
Birston Dr. Barry, November 1886. Population, 2,699. (District rural; worsted mills, collieries, chemical works, agriculture, &c.)	Private streets unsatisfactory.	Complete system of sewerage just completed with means of flushing and ventilation. House connection next to be seen to.	Midden privy system, same as at Dr. Thorne's inspection in 1878, since that a few middens have been covered.	Unsatisfactory. Large accumulations.	Public supply from Bradford Corporation on constant supply.	Some damp from lack of cave spouting, otherwise fair.	Some back-to-back houses.	None.
Birston Dr. Barry, November 1886. Population, 6,268. (Collieries, iron-works, woolen works, &c.)	Many yards and courts unpaved, sloppy, and filthy.	Sewered, but still many houses are not connected with system. Main sewers insufficiently ventilated, branch sewers unventilated.	Midden privies still (except on new property) of the worst type.	Until recently very bad indeed, accumulations of years. Much improved of late.	Public supply from Bradford Corporation on constant system.	Good as a rule, but some old dilapidated houses unfit for habitation.	Not to any serious extent. Back-to-back houses sanctioned by private Act of Parliament (1872).	None.
Liversedge Dr. Barry, November 1886. Population, 11,711. (Carpet, blanket, worsted, and cotton works, collieries, &c.)	Private streets very unsatisfactory. Many yards and courts unpaved and sloppy.	Majority of houses still in unbroken connexion with inferior of sewers. Altogether much as at Dr. Thorne's inspection in 1878. Sewering completed except at Waterbottom and New Town. House connections proper. House connections and waste pipes are being cut off.	Midden privies almost universally, mostly deep, uncovered, and sloppy, and sources of dangerous nuisances. Some drained into sewers.	Fair	Public supply from Bradford Corporation on constant system, but still, as at Dr. Thorne's inspection in 1878, some resort is had to E. L. Mott's spring, liable to pollution.	Many damp, old, and dilapidated houses. Great lack of cave spouting.	Very large proportion of back-to-back houses. Some cellars illegally occupied, much needless crowding has been permitted.	None.

Provision for Isolation of Cases of Infectious Disease.

Until the occurrence of small-pox in 1891-92, the districts of this Union were very imperfectly provided with means for the isolation of infectious cases. A special "fever" block at the workhouse infirmary at Stancliffe, a fever hospital at Dewsbury (erected 1887), and one at Ossett, formed the only institutions of this class. It will be seen in dealing with the history of the outbreak, that as it progressed steps were taken both at Batley and Morley, to remedy this defect, but only with buildings of a temporary character. When I arrived in the district in April 1892, a scheme had nearly been carried for a conjoint hospital for infectious disease on the part of several districts, but this scheme fell through, and I am not aware whether any further action has been taken to attain this desirable end.

The infectious block of the Union workhouse infirmary at Stancliffe is a stone building consisting of two floors, the administration (nurses' rooms) forming the centre, and on each side there being two male and two female wards. Each ward contains five beds, so that the total accommodation of 20 beds is singularly inadequate for the needs of the union. The building runs parallel to and about 10 to 15 yards distant from the main building of the workhouse infirmary. Although the nurse in charge of the infectious block does not enter the main building, the food-supplies of the patients in it are furnished from the workhouse kitchen and stores, and placed on a table in the area between the two buildings, whence it is taken by the nurse. It may be added that the laundry for the infirmary closely adjoins the fever house (being about 7 yards distant from the left wing).

Vaccination in the Dewsbury Registration District.

The returns of vaccinations performed during the past 20 years (1870-89) show that there has been an increase in the numbers of children who escaped vaccination, amounting of late years to about one-third of the total births in each year (Table V.). There is not, and has not been for some time, any pressure to enforce the law, and many of those children were not vaccinated because, as more than one mother informed us, "no one troubled them about it." The registrar of births and deaths in Batley informed Mr.

Fardon that there was "no such widespread aversion to vaccination amongst the inhabitants as has been supposed, but that the large number of unvaccinated cases is due in great measure to the supineness of the vaccination officer who is probably encouraged in his apathy by the Board of Guardians, the majority of whom at present are opposed to the vaccination laws." He added that he (the registrar) "had formed this impression from conversations he has had with relatives of those who had died from the disease (small-pox) coming to his office for purposes of registration."

Zymotic Diseases.—In his report on the sanitary conditions of the Dewsbury Registration District in 1878 Dr. Thorne Thorne demonstrated that the mortality from "fever" was disproportionately high. The mean death rate (per 10,000 living) for the whole district from this cause was found by him to be 8.3, whereas in London during the same period it was 4.1, and for "large towns and cities of England," 5.4.

I have endeavoured to bring Dr. Thorne's returns up to date, and am indebted to the medical officers of health for furnishing me, wherever possible, with the necessary statistics. These will be found in detail under the head of each district concerned. The returns are not complete for some of the years, and I can quote none from Heckmondwike, Mirfield and Soothill Nether. However, such figures as I have obtained suffice to show that since the period named there has been a notable decline in mortality from this class of disease. To make the comparison as clear as possible I have compiled the following table (VI.), which gives the per-centage rate on the mean total deaths from all causes of the mortality from the chief classes of zymotic disease. The calculation for the years prior to and including 1877 is made on the figures given in Dr. Thorne's report. Those for other years (grouped in all cases when returns are available in quinquennial periods) are from the figures given me by the medical officers of health, excepting those for 1891 and 1892, which are taken from the reports of the medical officer to the West Riding County Council.

It may be added that the zymotic death rate in the Dewsbury District for 1891 is less than that for the whole country in that year. (Fifty-fifth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England, 1891.)

TABLE V.

Dewsbury Union.

YEAR.	Births registered during year.	Of the children whose births were registered during the year given in the first column, by the 31st January in the year next but one following that year there were:—						The children not finally accounted for (including cases postponed) being per cent. of births.
		Successfully vaccinated.	Certified as in-susceptible of vaccination.	Had Small-pox.	Died Unvaccinated.	Vaccination postponed by Medical Certificate.	Remaining.	
1872	5,279	4,256	1	3	643	376	7.1	
1873	5,358	2,886	9	2	726	3	32.4	
1874	5,510	2,713	1	6	844	9	35.3	
1875	5,323	3,456	1	0	648	45	22.9	
1876	5,661	3,031	2	1	756	42	33.0	
1877	5,815	4,048	3	0	733	86	17.7	
1878	5,914	4,382	2	0	730	66	18.5	
1879	5,433	4,177	3	0	545	63	13.0	
1880	5,379	3,754	9	0	713	82	16.8	
1881	5,248	3,611	3	1	595	92	19.8	
1882	5,196	3,910	5	1	624	77	12.6	
1883	5,237	3,684	5	0	568	62	20.0	
1884	4,991	2,497	4	0	613	24	37.6	
1885	4,947	2,093	3	0	515	29	47.2	
1886	4,975	2,427	5	0	678	88	37.5	
1887	4,987	2,812	6	0	695	53	29.6	
1888	4,843	2,644	4	0	634	53	32.2	
1889	4,660	2,281	3	0	637	69	37.3	
1890	4,619	2,090	5	0	718	66	39.1	
1891	4,601	2,347	11	3	743	61	32.5	
1892	4,616	2,139	9	1	727	73	37.7	

Small-pox in Previous Years.—For nearly nine years the Dewsbury Union had enjoyed an almost complete immunity from small-pox until the outbreak in 1891. This fact alone deserves mention in view of the presumed liability to the introduction of the disease by infected rags coming from abroad. Were this a common medium of small-pox infection it is hardly conceivable that outbreaks of the disease should not be, as frequent in these industrial centres as they are in the main seaports, where hardly a year passes without the introduction of some cases into the port. At the same time, the periods of its incidence in this district has fairly corresponded with the general prevalence in England as a whole. I am again unfortunately not able to give complete returns, but the subjoined table (VII.) comprises most of the districts of

the Union, and those the most populous. It will be seen that small-pox was the cause of many deaths in the years 1873 to 1875. The period 1871-75 stands highest of all the seven quinquennial periods, 1888-90, for the small-pox mortality in England. In that quinquennium the small-pox deaths in the whole country were 410·8 per million living. During each of the next quinquennia this rate for the whole country is precisely the same, viz., 78·4; and it will be observed that the figures given in the appended table, approximate to the degree of reduction in mortality from small-pox thus expressed for the whole country. Finally, in the five years 1886-90, when the general death-rate from small-pox was as low as 13·2, only two deaths are given as occurring in Dewsbury.

TABLE VI.

COMPARATIVE STATISTICS of MORTALITY in Groups of Years in Various Districts of the DEWSBURY UNION.

—	Periods of Years.	Mean of total Deaths in each Period.	Proportion to Mean Total Deaths of Deaths from					
			"Fever."	Small-pox.	Scarlet Fever.	Diphtheria.	Measles.	Diarrhoea and Dysentery.
			(Per 100 Deaths from all Causes.)					
Batley - - -	1873-77	605	3·1	0·8	8·2	?	?	6·4
	1884-87	601	1·2	—	3·4	2·6	3·9	6·2
	1888-92	599	1·4	2·0	1·8	1·6	2·2	4·0
Birstal - - -	1875-77	136	2·7	—	3·6	?	?	1·6
	1878-82	149	2·7	0·1	4·0	0·4	1·7	1·6
	1883-92	133	0·4	—	0·3	0·6	2·8	0·4
Dewsbury - - -	1873-77	692	3·3	4·3	7·6	?	?	3·7
	1878-82	752	2·0	0·6	3·1	0·2	2·0	4·0
	1883-97	651	1·4	—	2·3	0·3	1·2	5·6
	1888-92	744	1·2	1·6	1·8	0·3	2·5	2·9
Liversedge - - -	1875-77	282	1·7	—	6·4	?	?	4·5
	1880-82	261	0·9	—	1·6	1·0	1·5	4·2
	1883-87	224	1·6	—	1·7	—	0·8	2·0
	1888-92	259	0·5	—	0·8	0·3	0·8	1·2
Morley - - -	1873-77	288	2·5	2·5	8·3	?	?	3·5
	1878-82	800	1·8	—	2·7	0·2	3·0	4·4
	1883-87	334	1·2	—	9·0	0·7	3·6	4·8
	1888-92	341	0·7	—	0·8	0·4	1·9	3·7
Ossett - - -	1873-77	219	1·9	0·7	6·8	?	?	3·5
	1883-87	191	0·5	0·1	4·5	0·4	1·3	2·5
	1888-92	198	0·5	0·1	1·8	0·6	0·7	1·2
Ravensthorpe - - -	1875-77	73	3·1	1·3	—	?	?	4·0
	1878-82	80	1·0	—	3·2	—	1·5	1·2
	1883-87	80	1·5	—	2·0	0·7	4·2	2·2
	1888-92	97	0·8	—	1·6	—	2·0	1·8
Soothill, Upper - - -	1875-77	100	4·0	1·0	6·6	?	?	4·3
	1883-87	101	1·2	—	1·8	0·2	1·4	0·6
	1888, 1890-92	108	2·3	0·4	2·3	0·6	1·6	1·8
Thornhill - - -	1873-77	147	4·0	0·7	3·8	?	?	1·6
	1878-82	170	2·0	0·1	4·0	0·1	0·8	0·5
	1884-87	155	1·0	—	1·7	—	2·1	3·3
	1888-92	165	0·9	0·1	0·3	0·1	2·1	2·7

I propose now to give a brief sketch of the sanitary administration of each of the districts of the union in which cases of small-pox have occurred during the period covered by this inquiry. For full details respecting the topography, &c. of the districts I may refer to Dr. Thorne Thorne's report.

Dewsbury.

The municipal borough of Dewsbury has an area of 1,468 acres, and a population in 1891 of 29,847.

The sanitary administration is under the control of the Town Council, the Medical Officer of Health being W. F. Watts, Esq., M.R.C.S.

There is one sanitary inspector, Mr. J. Thackray. Notification of infectious diseases has been in force in the borough since 1884.

The Borough Hospital for infectious diseases (see Plan) was opened in 1888, and since June 1891 had been used exclusively for small-pox, cases being admitted from Heckmondwike, Ravensthorpe, Thornhill, Soothill Nether, as well as from the borough. It will be seen later that with but few exceptions, every case of small-pox arising in Dewsbury was thus isolated. The building is situated on a fairly open site, on low ground, at the extreme south-western boundary of the borough. It stands on land belonging to the cemetery, between the Huddersfield and Heckmondwike roads, and has but few inhabited dwellings within 500 yards of it. The building, which is constructed of wood and iron, was extended in 1892, and comprises in all five wards (48 ft long by 20 ft. wide, and about 12 ft. high), holding from 10 to 15 beds, and a central administration block, containing nurses' rooms and bath-room. The Medical Officer of Health is in charge of the Hospital, which he visits once or twice daily, and the nursing is done by a resident matron, and a staff of two to four nurses, according to the number of cases under treatment. The accommodation for administrative purposes is somewhat limited, whilst that for bathing patients was, (at the time of my visit) certainly inadequate. During the height of the epidemic the resources of this building were severely taxed, but fortunately, a property adjoining the site had been recently acquired by the Corporation for a public

park, and the mansion "Crow Nest," standing on high ground above the Heckmondwike road, was fitted up to receive convalescent patients, who were drafted there as soon as practicable, and retained until they were declared by the medical officer free from infection. By this means the hospital wards were made available for acute cases, and fortunately the accommodation sufficed to admit them all.

The procedure adopted in cases of small-pox consists in the prompt removal to hospital upon receipt of notification, followed by disinfection of the house, &c. The Corporation possesses a special ambulance, and the sanitary inspector accompanies it to the house, and superintends the transference of the case. The inspector selects such articles from the room which the patient has occupied which, in his opinion, are likely to retain infection, such as bedding, &c. These are taken to the hospital, all flock being burnt; linen and clothing fumigated with sulphur. The disinfection of the room is effected by sulphur-fumigation, the room being sealed up for five hours. At the end of that time the room is opened, and the inmates directed to have it re-papered and whitewashed at the discretion of the inspector. The Corporation supply carbolic soap for cleansing purposes after the fumigation, and replaces articles that may have been destroyed. The ambulance is fumigated after each case has been removed, and a separate vehicle is used for the conveyance of convalescent patients.

Every patient on admission to the hospital is bathed (unless too ill), and before his discharge he has a course of baths; but, as already stated, this service was defective. There are only two baths in the building, and the means of heating the water is inadequate. Before the discharge of a patient his clothes are fumigated, and he does not re-enter the ward to leave the building after taking the bath—a similar precaution being adopted at Crow Nest as at the hospital.

Re-vaccination of inmates of houses from which cases were removed was carried out by the medical man in attendance in some instances, but in no great proportion of the whole.

The amount of vaccination in the borough and the union workhouse during the first year of the epidemic may be seen in the appended return (Tables VIII. and IX.).

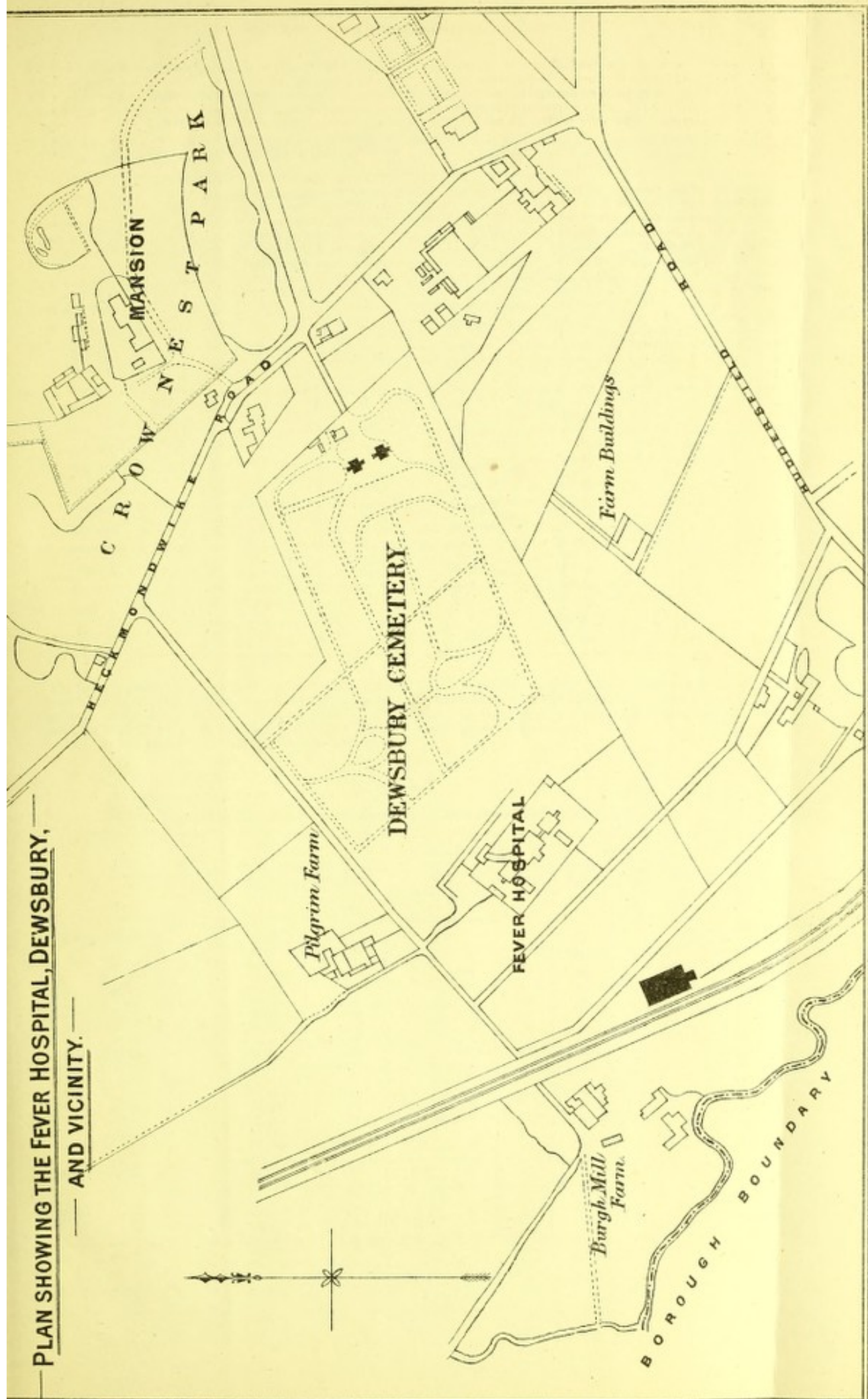
TABLE VII.

SMALL-POX DEATHS IN DISTRICTS OF DEWSBURY UNION (exclusive of BIRKENSHAW and GOMERSAL).

—	Dewsbury.	Batley.	Bristol.	Heckmondwike.	Liversedge.	Mirfield.	Morley.	Ossett.	Ravensthorpe.	Soothill Nether.	Soothill Upper.	Thornhill.
1873 -	14	10	No return.	No return.	No return.	No return.	36	—	No return.	No return.	No return.	—
1874 -	129	7	"	"	"	"	1	7	"	"	"	5
1875 -	5	7	"	4	"	2	—	1	3	"	3	—
1876 -	—	—	—	1	—	—	—	—	—	—	—	—
1877 -	—	—	—	—	—	—	—	—	—	—	—	—
1878 -	3	—	—	No return.	—	No return.	—	1	—	No return.	—	—
1879 -	1	No return.	—	"	—	"	—	—	—	"	—	—
1880 -	4	"	—	"	—	"	—	—	—	"	—	—
1881 -	7	"	—	"	—	"	—	7	—	"	—	—
1882 -	9	"	1	"	—	"	—	2	—	"	—	1
1883 -	—	"	—	"	—	"	—	1	—	"	—	No return.
1884 -	—	—	1	"	—	"	—	—	—	"	—	—
1885 -	—	—	—	"	—	"	—	—	—	"	—	—
1886 -	—	—	—	"	—	"	—	—	—	"	—	—
1887 -	—	—	—	"	—	"	—	—	—	"	—	—
1888 -	2	—	—	"	—	"	—	—	—	"	—	No return.
1889 -	—	"	—	"	—	"	—	—	—	"	—	—
1890 -	—	—	—	"	—	"	—	—	—	"	—	—
1891 -	14	13	—	"	—	"	—	—	—	"	—	—
1892 -	45	49	—	1	1	"	1	1	—	"	1	1

PLAN SHOWING THE FEVER HOSPITAL, DEWSBURY, —

— AND VICINITY. —



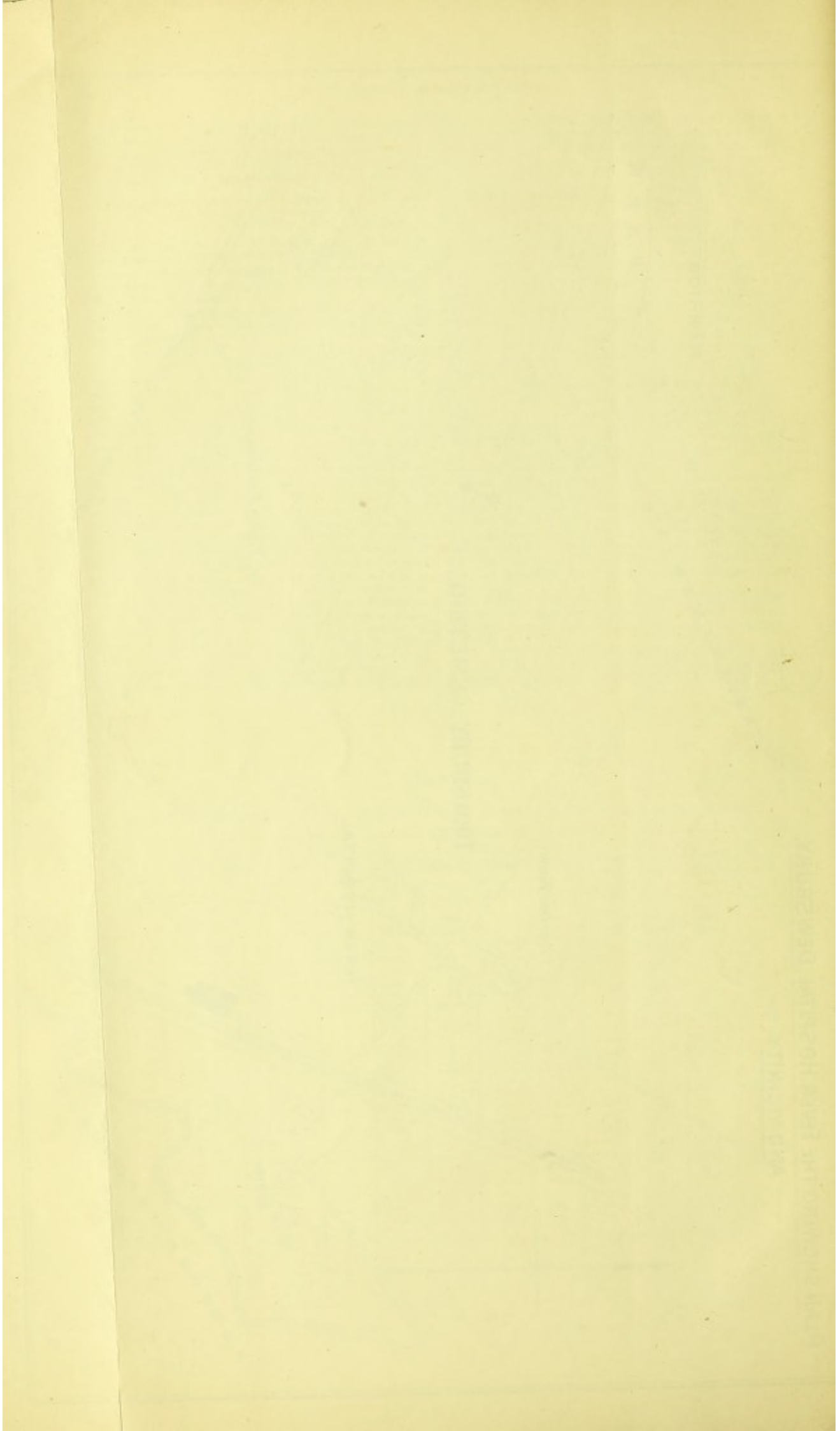


TABLE VIII.

DEWSBURY UNION.

Dewsbury District.

RETURN as to NUMBER of VACCINATIONS from 1st January 1891 to 30th April 1892, inclusive.

Month.	Primary Vaccinations.			Re-vaccinations.
	Under One Year.	Between One and Two Years.	Two Years and Upwards.	All Ages.
1891.—January	—	—	—	—
February	—	—	—	—
March	8	5	2	—
April	2	1	—	—
May	6	6	3	—
June	13	4	6	—
July	1	—	2	—
August	9	—	4	—
September	2	—	2	—
October	10	4	6	—
November	6	3	2	—
December	2	1	1	—
1892.—January	—	—	—	—
February	25	4	11	—
March	8	10	29	—
April	6	1	1	—
Totals	98	38	69	—

TABLE IX.

DEWSBURY UNION.

The Workhouse.

RETURN as to NUMBER of VACCINATIONS from 1st January 1891 to 30th April 1892, inclusive.

Month.	Primary Vaccinations.			Re-vaccinations.
	Under One Year.	Between One and Two Years.	Two Years and upwards.	All Ages.
1891.—January	—	—	—	—
February	—	—	—	—
March	—	—	—	—
April	—	—	—	—
May	—	—	—	—
June	—	1	1	—
July	1	—	4	13
August	—	—	—	—
September	—	—	—	—
October	—	—	1	—
November	—	—	—	—
December	—	—	—	—
1892.—January	—	—	4	—
February	—	—	—	—
March	—	—	—	—
April	—	—	—	—
Totals	1	1	10	14

The following table (X.) gives the mortality statistics of the borough during the past 20 years, the means for each quinquennium being calculated to facilitate comparison. The figures for 1873-77 are from Dr. Thorne Thorne's Report in 1878. [The estimated population in the intercensal

periods is calculated on the difference between the adjoining census returns, with the correction up to the middle of the year. In the census years, however, I have retained the figures given at the census.]

TABLE X.

MORTALITY STATISTICS for the BOROUGH of DEWSBURY for the Years 1873-92.

	Estimated Population.	Total Deaths, all Causes.	"Fever."		Small-pox.	Scarlet Fever.	Diphtheria.	Measles.	Diarrhoea and Dysentery.
			Typhus.	Enteric.					
Mean for 1873-77	27,411	692	28		30	51	?	?	33
1878	27,809	839		19	3	69	?	?	43
1879	28,784	718		13	1	20	1	6	14
1880	29,271	763		18	4	18	3	27	66
1881	29,637(c)	662		5	7	7	5	1	11
1882	29,663	780		18	9	5	2	39	18
Mean for 1878-82	29,172	752		15.6	4.8	23.8	2.7*	15.8*	12
1883	29,684	649		9		4	5	3	12
1884	29,705	592		10		23	2	5	49
1885	29,726	661		8		18		7	24
1886	29,747	600	1	5		18	2	14	72
1887	29,768	751	1	13		14	2	12	79
Mean for 1883-87	29,726	651	0.4	9	—	15.4	2.2	8.2	37.4
1888	29,789	695	1	15	2	23	3	12	19
1889	29,810	693	1	12		13	4	39	35
1890	29,831	661		5		11	4	3	18
1891	29,847(c)	936		7	14	11	2	34	16
1892	29,873	724		7	45	11	1	8	21
Mean for 1888-92	29,830	741	0.4	9.1	12.2	13.8	2.8	19.2	21.8

* Four years.

Batley.

The area of the borough is 2,039 acres, and the population at the Census of 1891 is returned as 28,719. It is a municipal borough, the Town Council being the sanitary authority, a Committee of the Council having the direction of sanitary measures.

Dr. A. Swann is the medical officer of health, and during the winter of 1891-2 in his absence from ill-health, the duties of the office were energetically carried on by Dr. I. Stewart. The sanitary inspector is Mr. J. Lindley, who during the chief months of the small-pox outbreak had two assistants working under his direction.

The Notification Act was adopted by Batley on March 1, 1891, and was therefore in force for two months prior to the commencement of the outbreak of small-pox.

At this time the borough was unprovided with any hospital for the isolation of cases of infectious disease; and some of the small-pox cases were admitted into the workhouse infirmary at Staincliffe. In the month of December, however, when the disease again broke out, and when in consequence of the action of the Local Government Board, cases of small-pox could no longer be admitted into the workhouse, the Batley Corporation took steps to acquire a site and erect a temporary small-pox hospital (see plan). The buildings which are on the Decker principle were erected with great despatch and ready for occupation in the first week in January, 1892. The site acquired for this purpose was on high ground near the Birstal-Batley boundary, in a field to the left of the Upper Batley Lane leading to Howden Clough. The situation is an open one, the nearest houses being two cottages in the above-named road; the nearest to the hospital buildings (as finally completed) being distant 365 feet. The original buildings were obtained in London, where they had been used for other purposes, and the windows were small and roof low (only 7 feet from floor to eaves.) The building was, however, provided with an extra wood floor and corrugated iron roof. It consisted of three wards arranged in a T shape, but not intercommunicating, each being 34 feet long by 17 feet wide (see Plan). The following is from a published account of these buildings when in progress:—

"The buildings will be warmed by slow combustion stoves, and ample means are provided for ventilation by a cylindrical tube which surrounds the flue pipe from the stove. By this arrangement the germs of disease are destroyed by heat before reaching the outside air. As regards the construction of the buildings it may be said that the sides consist of leather and jute mixed, with a cavity between, and lighted all round by small windows made to open with Louvre ventilators. Two gaslights are fixed in each hospital, the height of which, from floor to roof, is about 10 feet. Two of the buildings are placed lengthwise, the third jutting from the centre, and a covered portico roof is provided to the entrance of each hospital. Spring mattresses, with palliase beds and pillows, have been purchased, while sheets, wool blankets, and warming counterpanes complete the outfit. The best of everything has been obtained—in fact no effort has been spared for the comfort of inmates. Among the necessities, or accessories of the place, are to be found a bath-room, surgery, and kitchen, fitted up with two portable gas cooking stoves. Hot water will be supplied to the bath by means of a portable boiler, holding about 60 gallons. A washhouse is also included in the arrangements, and is fitted up with the usual requisites. Pail closets have been erected in connexion with each ward, and these will be entered from a narrow passage, ventilated so as to prevent any effluvia entering the hospitals. There is also provided a disinfecting chamber, while a new cab has been specially purchased for the removal of patients. The vehicle will be disinfected on every occasion it is used. Drains have been laid down, and these are disconnected over trapped gulleys, emptying into a properly constructed sump, the contents of which will be conveyed away periodically."

There was also constructed a separate residence for the matron about 40 yards distant from the wards and adjacent to another building which formed the kitchen. This was fitted up in February 1892, at the same time that another block of two wards, to accommodate about 32 patients and the nursing staff, was erected. These wards were constructed of wood, the walls being filled with sawdust, and although much on the same pattern as the original wards, they were loftier and wider, with also somewhat larger windows. These two wards were utilised for convalescent cases, the nurses' room being at the end of the female ward. In addition to this nursing staff there was a male attendant employed. Dr. Stewart had sole

medical charge of the hospital, and frequently visited it more than once daily. During the months of January to April 1892, it was kept constantly full of patients, who came not only from Batley but also from Birstal, Mirfield, and Sootill Upper.

It may be of interest to note the means taken to dispose of the excreta and infected material at this hospital. All the ash and dust and food-refuse, &c. were collected and daily removed in a special covered van to the town destructor at the sewage works, Bradford Road, where it was burned. The excreta received into pail closets were treated with carbonate of lime, and the pails daily emptied into a shallow pit, dug in the middle of the field (near Windmill Lane, see plan) on which the hospital stands. About once a month the pit was emptied, and the contents conveyed to the destructor to be burned. The waste-water, slops, bath-water, &c. were drained into a sewage tank (site marked in the plan) in the field, the contents of which were pumped into an iron cart, for conveyance to a convenient place where they were discharged into the town sewers.

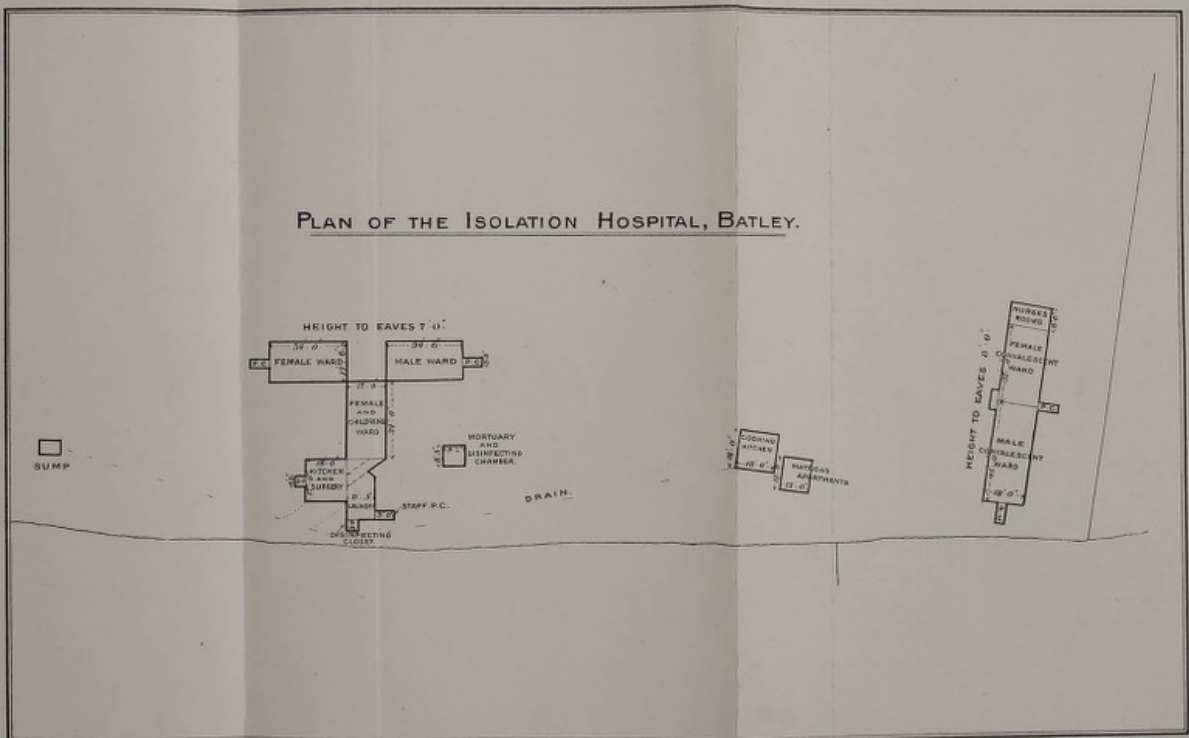
The patients before leaving the Hospital were given a disinfectant bath, their clothing being at the same time fumigated with sulphur. On leaving the patient went out by a separate exit, and thus did not again come in contact with any of the remaining patients.

Some trouble was occasioned by the convalescent patients crossing the field to the lane to converse with friends who came up (especially on Sunday afternoons) to see them or bring them articles. A low hedgerow bordered the field, and in order to check this possible source of infection, it was found necessary to station a police officer in the lane to prevent any access of strangers to the hospital precincts.

The measures taken by the Sanitary Authority with respect to infected houses varied according as to whether a case was removed to hospital or not. It will be seen later that a large proportion of cases were treated at their own homes, owing to the lack of hospital accommodation, a condition of things which became less and less as the epidemic advanced. From the end of December 1891 until about the middle of January 1892 the Corporation granted to each inmate of an infected house who was engaged in work the full amount of his or her wages on condition that they remained away from work so long as the house was infected, and did not frequent the public streets, or pay visits or go to public-houses, &c., &c., but they were not confined to the room. On January 11th the Town Council revised the scale of compensation allowed in these cases, granting in a family the sum of 7s. 6d. per week to the father, 7s. 6d. to the mother, and 2s. 6d. to each child, provided that the total amount did not exceed 30s. These sums were paid on conditions analogous to the former, with the stipulation that the case of small-pox should be isolated in a room, protected by a carbolised sheet over the door; and that no one but the medical man was allowed to enter the house. This plan continued until March 5th, by which time the hospital accommodation sufficed for all the cases that arose. If then a patient refused admission to hospital no compensation was given. There is no doubt that the attempt to strictly quarantine the people in their own homes was a very partial success. Some of them carried out the instructions literally, but several evaded them, and although not resuming work, went about elsewhere. Indeed, when the patient cannot be removed to an isolation hospital it must be impossible to enforce a rigid system of "quarantine" throughout the weeks that must elapse before that house can be declared free from infection.

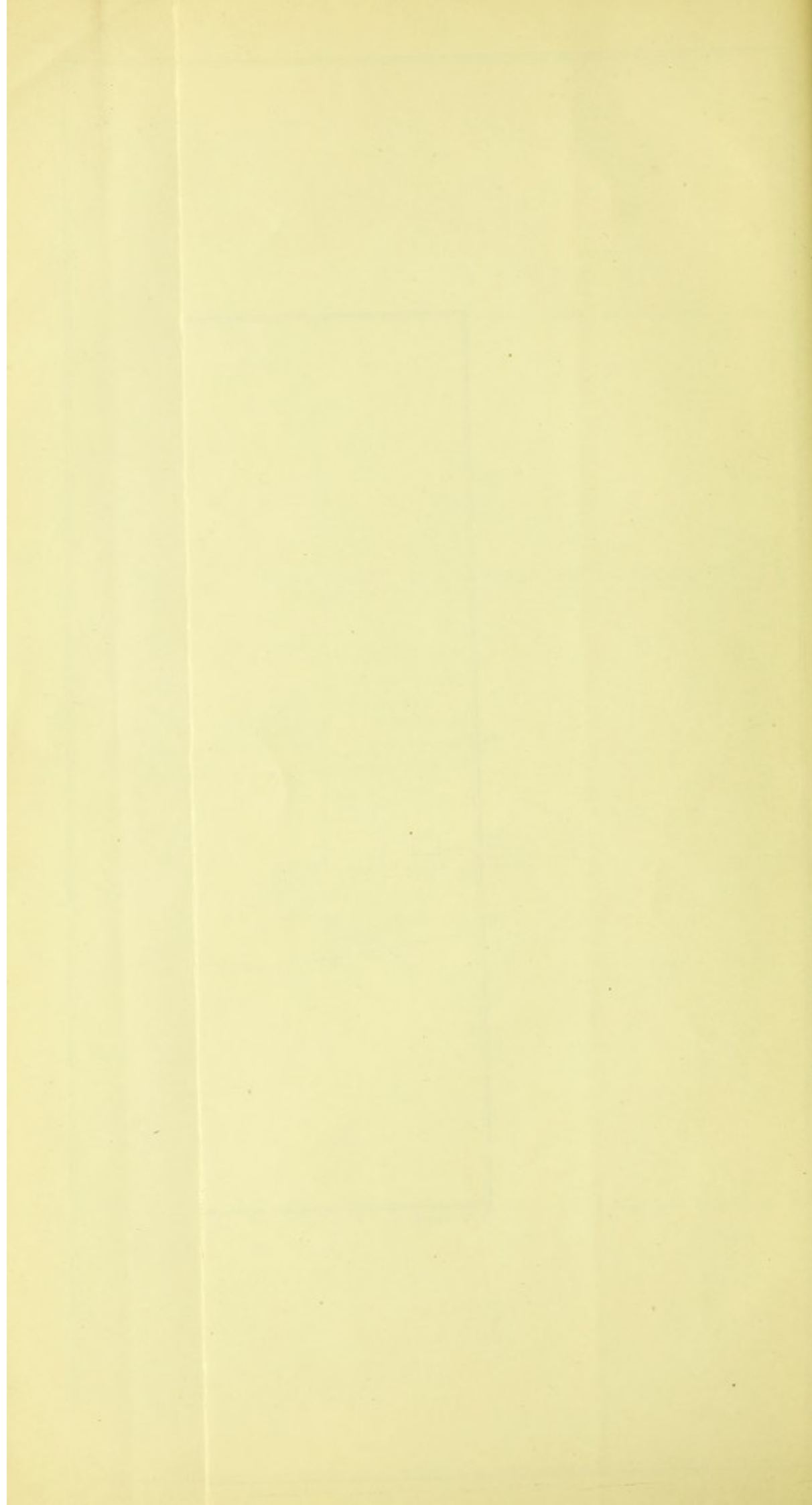
When the patient had quite recovered the same measures of disinfection were adopted as took place on the removal of a patient to hospital, viz., the removal of clothing, bedding, &c., to the disinfecting station, sulphur-fumigation of the rooms, followed by papering, lime-whitening, and cleansing. Prior to March 1892 the Corporation had no disinfecting apparatus, and consequently compensation was paid (in kind generally) to those whose bedding had been destroyed. In March, however, there was available a steam and hot-air disinfecter which had been erected at the sewage works from the plans of Mr. Illingworth, a member of the council, who, it may be remarked, adopts a similar method for the disinfection of rags at his mill. Mr. Fardon and myself paid a visit to this disinfecter, with Mr. Lindley, and were met by Mr. Illingworth, who courteously demonstrated the construction and working of his apparatus. It consists (see Diagram) of an iron chamber set in brickwork, and lined with coils of steam pipe. It is closed at each end by a steel door so constructed as to permit of steam being passed into the chamber between the plates of which the door is made. There is also an

PLAN OF THE ISOLATION HOSPITAL, BATLEY.

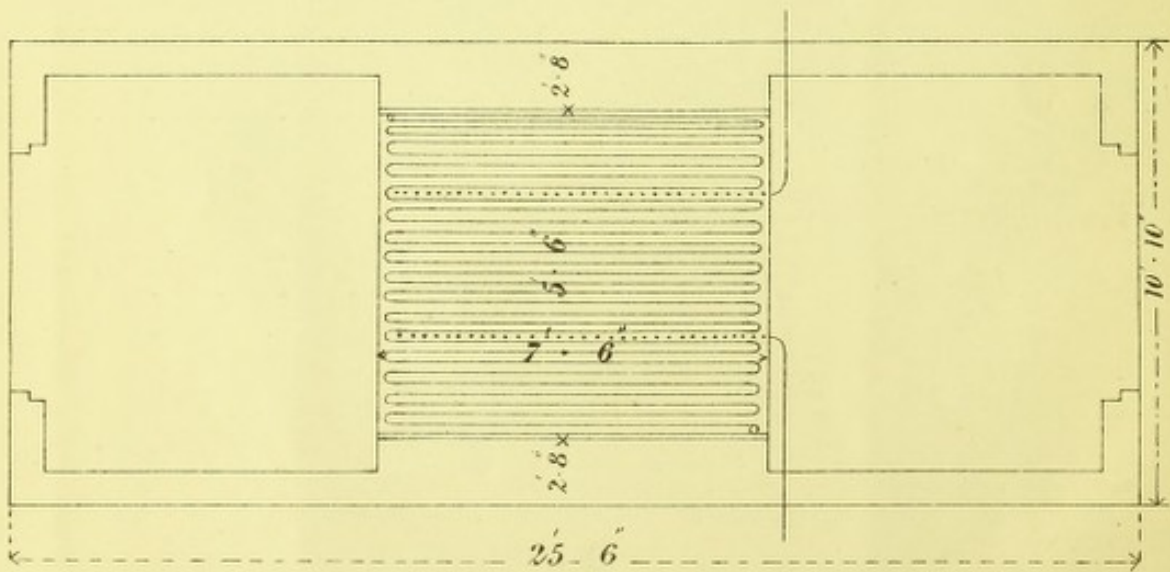
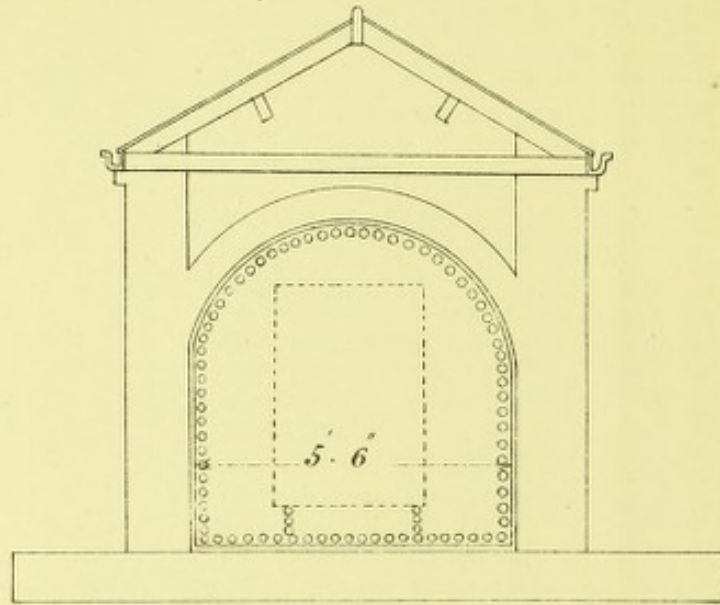


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MR. J. ILLINGWORTH'S PATENT DISINFECTING APPARATUS IN USE AT BATLEY.



arrangement whereby jets of steam from a pipe running along the whole length of the floor can be forced into the chamber at will. The steam is supplied from the engine boiler connected with the sewage works and destructor, at a pressure of from 40 to 60 lbs. per square inch. In one experiment a dry heat in the chamber of 260° F. was obtained in 20 minutes, whilst a thermometer wrapped up in seven layers of an ordinary shawl registered 180° F. Steam was then admitted twice at intervals of five minutes, each time for a period of five minutes, and at the end of 20 minutes in all the heat was cut off. It was then found that whereas the temperature attained in the body of the chamber remained at 260° F., that registered by the thermometer in the shawl was 214° F. In each of these experiments the steam pressure was 60 lbs.

The ordinary procedure adopted is for the attendant to receive the infected clothing, &c., which is sent down a "shoot" from above into a carriage which runs on rails to the chamber. The attendant wears a macintosh coat and cap and follows this code of instructions:—

1. Place cradle containing articles in the chamber.
2. Close up for 30 minutes.
3. Then turn on steam jet for five minutes.
4. Let it stand for 15 minutes.
5. Then turn on steam jet for five minutes.
6. Then let it stand for 30 minutes.
7. After which open the three air-valves for five minutes to clear chamber of any foul air before opening the outer door."

The articles are removed at the opposite end of the chamber to that at which they are introduced and conveyed away in a separate cart to that which is used to bring them to the place. All the arrangements for keeping infected articles separate from the disinfected and of providing access to the disinfector were highly satisfactory.

Re-vaccination of the inmates of infected houses, and the vaccination of those previously unvaccinated was advised by the medical attendants, but only carried out in a certain proportion of instances. Particulars on this point will be given hereafter; but the accompanying returns of the public vaccinations done during 1891 and the first four months of 1892, when the epidemic was at its height, may be given here (Table XI.).

TABLE XI.
DEWSBURY UNION.
Batley District.

RETURN AS TO NUMBER OF VACCINATIONS FROM
1st January 1891 to 30th April 1892, inclusive.

Month.	Primary Vaccinations.			Re-vaccinations.
	Under One Year.	Between One and Two Years.	Two Years and upwards.	All Ages.
1891.—January	—	—	—	—
February	16	—	2	—
March	19	1	—	—
April	17	1	—	—
May	11	3	3	—
June	19	5	4	—
July	35	1	3	—
August	21	4	4	—
September	9	2	1	—
October	30	1	1	—
November	8	1	1	—
December	4	—	3	2
1892.—January	44	27	79	23
February	43	21	43	28
March	37	15	29	3
April	4	—	3	1
Totals	317	82	167	57

In pursuance of the plan adopted in the case of Dewsbury and with the object of conveying some idea as to the extent to which zymotic disease has prevailed of late years in these districts, I have been favoured by Dr. Swann with the following mortality statistics (Table XII.), which may be compared with those for the years 1873-77 cited by Dr. Thorne in his report:—

TABLE XII.

MORTALITY STATISTICS for the BOROUGH of BATLEY, for the years 1873-1892.

	Estimated Population.	Total Deaths, all Causes.	"Fever."		Small-Pox.	Scarlet Fever.	Diphtheria.	Measles.	Diarrhoea, Dysentery, &c.
			Typhus.	Enteric.					
Mean for 1873-77	24,957	605	19		5	50	?	?	39
1878 to 1883	No returns available.								
1884	27,899	607	1	8		40	22	22	54
1885	28,020	573		7		13	21	15	14
1886	28,142	579		4		22	7	4	41
1887	28,463	645		10		8	14	52	42
Mean for 1884-87	28,131*	601*	0.2*	7.2*		20.7*	16*	23.5*	37.7*
1888	28,385	511		6		12	7	4	18
1889	28,506	582		7		19	12	30	33
1890	28,627	584		10		1	4	10	33
1891	28,719(c)	701		12	13	8	7	18	20
1892	28,870	618		7	49	16	18†	4	17
Mean for 1888-92	28,581	599		8.4	12.4	11.2	9.6	13.4	24.2

* Four years.

† Including croup.

So far as these statistics go they show a notable decline in the mortality from all forms of zymotic disease, excepting small-pox—and the mortality therefrom is confined to the last 2 years—since 1883. It is to be regretted there are no figures for the years 1878–83, as in Dewsbury during the first five of these years there were deaths from small-pox.

Morley.

Morley, which became a borough in 1885, has a population (census 1891) of 18,725.

The town council is the sanitary authority, the medical officer of health being S. T. Steele, Esq., L.R.C.P., D.P.H., and the sanitary inspector, Mr. Joseph Ward.

The Notification of Infectious Diseases Act is not in force in the borough, but there is no reason to believe that any cases of small-pox escaped the notice of the medical officer.

The procedure as to disinfection, &c. is much the same as in other districts.

When the first cases (two in one family) of small-pox occurred in Morley in 1891 there was no provision for their isolation within the borough. These patients were, therefore, admitted into the Small-pox Hospital at Leeds, and the rest of the family sent into quarantine at the Cemetery Lodge, a building which had been left vacant on the dissolution of the Burial Board in 1885 when the Corporation took over the cemetery. It occupies an elevated position and is some distance from inhabited dwellings. Consequently, when some months later small-pox re-appeared and the borough was still without hospital accommodation, it was decided to utilise this building as a temporary hospital; and up to the time of my last visit (August 1892) it was still being employed for that purpose. Care was taken to lodge the patients in three rooms, capable of accommodating from 12 to 14 cases, on the side of the building away from the entrance to the cemetery. Every case as it arose was removed thither, and fortunately the outbreak was a comparatively mild and limited one. Suitable precautions were taken in the discharge of convalescent patients, as to bathing and change of clothing, and so far as known no cases had been traced to infection from this hospital.

Re-vaccination was almost invariably performed on inmates of houses in which cases of small-pox occurred.

The following is the return of the public vaccinations made in the Morley District during 1891 and the first four months of 1892:—

TABLE XIII.
DEWSBURY UNION.
Morley District.

RETURN AS TO NUMBER OF VACCINATIONS FROM 1st January 1891 to 30th April 1892, inclusive.

Month.	Primary Vaccinations.			Re-vaccinations.
	Under one Year.	Between one and two Years.	Two Years and upwards.	All Ages.
January 1891.	8	1	—	—
February	16	1	—	—
March	9	2	—	—
April	8	—	—	—
May	13	1	—	—
June	15	2	—	—
July	12	3	—	—
August	14	—	—	—
September	11	1	—	—
October	10	1	—	—
November	8	2	2	—
December	—	—	—	—
January 1892.	8	1	3	3
February	20	—	—	—
March	8	—	1	6
April	17	3	1	22
Totals	181	18	7	31

The "zymotic history" of Morley for the past 20 years may be traced in the following statistics kindly furnished by Dr. Steele (Table XIV.). They show that scarlet fever and measles and diphtheria were unduly prevalent in the quinquennium, 1883–87, but that in other respects, here as elsewhere in the Dewsbury Union, the mortality from these diseases has notably decreased in spite of the increase of population.

TABLE XIV.

MORTALITY STATISTICS for the BOROUGH of MORLEY for the years 1873–93.

—	Estimated Population.	Total Deaths, all Causes.	"Fever."	Small-pox.	Scarlet Fever.	Diphtheria.	Measles.	Diarrhoea, Dysentery.
Mean 1873–77	10,715	288	7.2	7.4	24	?	?	10.2
1878	13,524	296	4	.	21	1	4	13
1879	14,065	270	2	.	7	2	6	5
1880	14,605	312	9	.	10	.	3	19
1881	15,011(c)	284	6	.	3	.	6	9
1882	15,475	341	7	.	.	.	26	21
Mean 1878–82	14,536	300	5.6	.	8.2	0.6	9	13.4
1883	15,846	305	7	.	5	1	1	5
1884	16,218	403	3	.	91	7	15	24
1885	16,589	296	2	.	15	4	.	5
1886	16,967	305	3	.	20	.	.	24
1887	17,332	360	3	.	20	1	44	22
Mean 1883–87	16,590	334	4	.	30.2	2.6	12	16
1888	17,703	310	.	.	1	2	.	7
1889	18,075	302	2	.	3	.	.	25
1890	18,446	341	2	.	.	1	23	9
1891	18,725(c)	377	5	.	3	1	9	9
1892	19,189	376	3	1	8	4	1	14
Mean 1888–92	18,467	341	2.4	0.2	3	1.6	6.6	12.8

Ossett.

The combined borough of Ossett-cum-Gawthorpe has a population of 10,984 (Census 1891), showing a very slight advance on the numbers returned in 1881. In his annual report for 1891, Mr. G. W. Greenwood, the late medical officer of health, writes on this point:—

“Some surprise was not unnaturally exhibited at the small increase of population in Ossett during the past decade, but the altered conditions of trade, which virtually drove away the male element in search of employment no longer procurable here, the limited extent to which the manufacture of woollen cloth was carried on (formerly the noted and staple trade of Ossett), and the absence of activity in other industries, are responsible for the present state of things. Hundreds of non-resident women and girls, denizens of adjoining parishes, hither come daily to assist in carrying on work,” and he expresses the opinion that extension of the collieries in the district will show a largely increased population at the next census.

The present medical officer of health is G. S. Greenwood, Esq., M.R.C.S., L.R.C.P., D.P.H., and the sanitary inspector, Mr. Hirst.

The town council form the sanitary authority.

The Notification of Infectious Diseases Act was adopted at the beginning of 1891 and has worked well.

The infectious disease hospital is a corrugated iron building with high-pitched roof standing in an exposed situation, facing west, on an escarpment 250 feet above sea level, near the southernmost boundary of the borough. It was erected in 1880 and shows evidence of considerable wear. I was informed that it was proposed shortly to erect a new building. The arrangement of the building, which is lofty and well lighted, is simple. A central corridor runs the length of the building terminating in a large ward, 45 feet by 15 feet, containing six beds and running transversely to the corridor. On the left hand of the latter is another ward (20 feet by 27 feet) containing 11 beds and a bath-room; on the right hand is the kitchen, nurses' room, sitting room for convalescents, and a surgery facing the bath-room.

Every case of small-pox has been taken to the hospital with promptitude, and the houses disinfected, bedding, &c. destroyed. Vaccination of other inmates of the house has been carried out in many cases.

Public vaccination has much declined of late years in the district, owing, I was informed, largely to the objection of

parents to have more than “1 or 2 marks” made on the arms, and they prefer to pay for this than take their children to the vaccination stations to have “4 marks” made.

TABLE XV.

DESWBURY UNION.

Ossett District.

RETURN AS TO NUMBER OF VACCINATIONS from 1st January 1891 to 30th April 1892 inclusive.

Month.	Primary Vaccinations.			Re-vaccinations.
	Under One Year.	Between One and Two Years.	Two Years and upwards.	All Ages.
January 1891.	—	—	—	—
February	18	—	—	—
March	5	—	—	—
April	—	—	—	—
May	—	—	—	—
June	8	—	—	—
July	—	—	—	—
August	—	—	—	—
September	18	1	—	—
October	24	—	—	—
November	7	—	—	—
December	—	—	—	—
January 1892.	—	—	—	—
February	9	—	3	—
March	10	—	1	—
April	4	—	—	—
Totals	165	1	4	—

TABLE XVI.

MORTALITY STATISTICS for the BOROUGH of OSSETT for the Years 1878-92.

—	Estimated Population.	Total Deaths.	“ Fever.”		Small-pox.	Scarlet Fever.	Diphtheria.	Measles.	Diarrhoea and Dysentery.	Whooping Cough.	Remarks.
			Typhus.	Enteric.							
Mean 1873-77	9,686	219	4.2		1.6	15	?	?	7.8	6	
1878	10,471	235	1	4	1	11	7	7	—	—	* Total from zymotic diseases. 30
1879	10,647	224	—	*	—	21	*	*	*	*	26
1880	10,824	214	—	*	—	11	*	*	*	*	18
1881	10,257 (c)	209	—	*	7	—	*	*	*	*	—
1882	10,960	235	—	1	2	1	3	10	7	2	—
Mean 1878-82	10,771	227	2	—	—	—	—	—	—	—	—
1883	10,263	193	—	1	1	9	3	—	4	1	
1884	10,265	193	—	2	—	6	—	—	8	1	Erysipelas 1, puerperal fever 1.
1885	10,268	190	—	—	—	20	1	9	—	5	
1886	10,371	165	—	—	—	3	—	1	5	1	
1887	10,373	216	—	2	—	5	—	3	7	1	
Mean 1883-87	10,268	191	—	1	0.2	8.6	0.8	2.6	4.8	1.8	
1888	10,266	183	—	—	—	2	1	1	1	1	
1889	10,270	166	—	—	—	1	3	4	6	—	Erysipelas 1, Croup 1.
1890	10,282	245	—	—	—	6	—	—	2	9	Erysipelas 2, Croup 2.
1891	10,284 (c)	217	—	2	—	2	1	2	—	—	
1892	10,287	181	—	3	1	7	1	—	3	1	
Mean 1888-92	10,281	198	—	1	0.2	3.6	1.2	1.4	2.4	2.2	

The appended table (XVI.) of mortality statistics shows that there is a continued decrease in the zymotic death-rate. Mr. J. W. Greenwood's remarks on this head, in the annual report above cited, are of interest:—

"Notwithstanding the severe scourge of influenza with which we had to contend, and which exercised a very baneful influence, largely augmented the death list, and leaving behind it serious after consequences, it is satisfactory to find that the total number of deaths from all causes is considerably below that of the previous year. The zymotic death-rate fell to a low point, being only 1·09, or almost half the average of England and Wales. Diarrhoea was entirely absent. Measles prevailed extensively during the second quarter of the year, but as a rule was of a mild type, and only occasioned two deaths. One-fourth of the deaths was due to disease of the respiratory organs; pneumonia of a low and malignant character proving very fatal."

The remaining urban sanitary districts of the Dewsbury Union in which small-pox occurred during the period covered by this inquiry are Birstal, Heckmondwike, Liversedge, Mirfield, Ravensthorpe, Soothill Nether, Soothill Upper, and Thornhill.

Each of these is administered by a local board, and in none of them was there any special isolation hospital established.

Birstal.

The population of Birstal in 1891 was 6,528—a falling off of 240 persons since the previous census.

The Medical Officer of Health is R. Forsyth, M.D., and the sanitary inspector, Mr. J. Blackburn.

Notification of infectious disease came into operation on March 1st, 1892.

Some of the cases of small-pox were treated in their own homes, others sent to the Batley Hospital, which is situated close to the boundary of Birstal.

The usual methods of disinfection of the houses inhabited by cases of small-pox were carried out, the bedding of the patient being removed and destroyed, and renewed at the expense of the Local Board.

Re-vaccination was performed by Dr. Forsyth on members of infected houses, calf-lymph being usually preferred.

I append the returns of public vaccination in this district in 1891, and the first few months of 1892; and also the mortality statistics for the 18 years, 1875-92 (Tables XVIII. and XIX.):—

TABLE XVII.
DEWSBURY UNION.
Birstal District.

RETURN AS TO NUMBER OF VACCINATIONS FROM
1st January 1891 to 30th April 1892, inclusive.

Month.	Primary Vaccinations.			Revac- cinations.
	Under One Year.	Between One and Two Years.	Two Years and upwards.	All Ages.
1891.—January	—	—	—	—
February	—	—	—	—
March	10	—	—	—
April	9	—	—	—
May	12	1	1	—
June	40	1	3	—
July	22	—	4	—
August	7	3	1	—
September	27	2	—	—
October	13	2	1	—
November	23	3	1	—
December	10	—	—	—
1892.—January	2	—	2	7
February	13	—	1	1
March	14	—	—	—
April	8	1	—	—
Totals	210	13	14	8

TABLE XVIII.

MORTALITY STATISTICS FOR THE URBAN SANITARY DISTRICT OF BIRSTAL, 1875-92.

	Estimated Population.	Total Deaths, all Causes.	"Fever."		Small- pox.	Scarlet Fever.	Diph- theria.	Measles.	Diarrhoea and Dy- sentery.
			Tpyhus.	Enteric.					
Mean 1875-77	6,944	136	3·7			5	?	?	2·3
1878	6,566	167		3		16	2	3	
1879	6,638	155		6		5	1	2	8
1880	6,710	159		1		2		7	
1881	6,766 (c)	120	1	4		1			2
1882	6,736	143		5	1	6		1	2
Mean 1878-82	6,683	149	0·2	3·8	0·2	6	0·6	2·6	2·4
1883	6,712	165				6	2		1
1884	6,688	150		4	1	10	2	1	12
1885	6,654	146		1			2	3	1
1886	6,631	138		1		6			1
1887	6,607	146				2	1	7	
Mean 1883-87	6,658	149		1·2	0·2	4·8	1·4	2·2	3
1888	6,593	120					4		
1889	6,569	140				1		4	
1890	6,545	118		1				3	1
1891	6,528 (c)	169		2				5	1
1892	6,498	117				1	*	7	1
Mean 1888-92	6,546	133		0·6		0·4	0·8	3·8	0·6

* Group 1.

Heckmondwike.

The population of this district in 1891 was 9,709, being an increase of 427 since the previous census.

The Medical Officer of Health is H. T. Broughton, Esq., M.R.C.S., and the sanitary inspector, Mr. T. Gledhill.

The procedure adopted in cases of small-pox infection is similar to that obtaining elsewhere. Some of the cases were treated in their own homes, others removed to the Dewsbury Hospital, and two of the earliest cases to the union infirmary at Staincliffe.

The vaccination returns for 16 months ending April 1892 are appended (Table XIX), but I am unable to give any mortality statistics as in the case of most of the other districts.

TABLE XIX.

DEWSBURY UNION.

Heckmondwike District.

RETURN as to NUMBER of VACCINATIONS from 1st January 1891 to 30th April 1892, inclusive.

Month.	Primary Vaccinations.			Re-vaccinations. All Ages.
	Under One Year.	Between One and Two Years.	Two Years and upwards.	
1891.—January	3	—	—	—
February	—	—	—	—
March	—	—	—	—
April	5	—	1	—
May	—	—	—	—
June	—	—	—	—
July	7	—	—	—
August	2	—	—	—
September	—	—	—	—
October	17	8	7	—
November	1	—	—	—
December	—	—	—	—
1892.—January	7	—	—	—
February	1	—	—	—
March	—	—	—	—
April	6	1	5	6
Totals	45	9	13	6

Liversedge.

This district, which adjoins Heckmondwike, but is far less densely peopled, has a total population of 13,668 (1891), being an increase over the population in 1881 of 911 persons.

The Medical Officer of Health is J. Shives, M.D., and the sanitary inspector, Mr. W. Houldershaw.

Compulsory notification came into force on February 1, 1892.

Most of the cases of small-pox here arising were treated in their own homes, but every precaution was taken to avoid the spread of the disease, the inmates of infected houses being in most cases promptly vaccinated.

Appended are the vaccination returns for the 16 months ending April 1892 (Table XX.), and the mortality statistics (so far as available), for the 18 years, 1875 to 1892 (Table XXI):—

TABLE XX.

DEWSBURY UNION.

Liversedge District.

RETURN as to NUMBER of VACCINATIONS from 1st January 1891 to 30th April 1892 inclusive.

Month.	Primary Vaccinations.			Re-vaccinations. All Ages.
	Under One Year.	Between One and Two Years.	Two Years and upwards.	
1891.—January	8	2	—	1
February	—	—	—	—
March	1	—	—	—
April	54	2	—	—
May	—	—	—	—
June	—	—	—	—
July	40	4	2	—
August	—	—	—	—
September	—	—	—	—
October	41	8	—	—
November	—	—	—	—
December	—	—	—	—
1892.—January	30	2	7	7
February	5	—	3	13
March	1	—	—	17
April	55	7	2	—
Totals	233	25	14	38

TABLE XXI.

MORTALITY STATISTICS for the URBAN SANITARY DISTRICT of LIVERSEDGE, 1875-92.

	Estimated Population.	Total Deaths.	"Fever."		Small-pox.	Scarlet Fever.	Diphtheria.	Measles.	Diarrhoea and Dysentery.
			Typhus.	Enteric.					
Mean 1875-77	12,507	282	5	—	—	18.3	?	?	12.7
1878	12,302	280	No return		—	No return	—	4	17
1879	12,467	261	"		—	"	—	—	5
1880	12,532	299	"		—	"	—	8	19
1881	12,757 (c)	268	—	5	—	8	—	3	8
1882	12,870	215	1	1	—	5	5	1	6
Mean 1878-82	12,565	261	0.3	2	—	4.3	2.6	4	11
1883	12,962	223	2	4	—	—	—	—	2
1884	13,053	240	—	5	—	—	—	4	10
1885	13,144	242	1	2	—	13	—	—	1
1886	13,235	196	—	2	—	2	—	2	4
1887	13,326	222	—	1	—	4	—	3	8
Mean 1883-87	13,144	224	0.6	3	—	3.8	—	1.8	4.6
1888	13,417	241	—	1	—	1	—	1	—
1889	13,508	237	—	—	—	—	—	5	8
1890	13,599	217	—	—	—	2	1	1	3
1891	13,688 (c)	342	—	4	—	3	3	3	2
1892	13,782	261	—	2	1	5	—	1	3
Mean 1888-92	13,600	259	—	1.4	0.2	2.2	0.8	2.2	3.2

Mirfield.

This is a large thinly-populated district, the total population being 11,707, an increase of 199 persons since 1881 census.

The Medical Officer of Health is T. B. Fairclough, Esq., L.R.C.P., and the sanitary inspector, Mr. W. Booth.

The usual precaution of removal and destruction of infected bedding, and of fumigation of rooms and houses after removal of the case of small-pox were carried out.

The cases were removed to the Batley Small-pox Hospital, a distance of four or five miles.

The following table (XXII.) gives the number of public vaccinations performed in the 16 months ending April 1892.

Ravensthorpe.

This district, the smallest in the Union, is more densely populated than any other except Dewsbury. It had a total population of 5,134 in 1891, an increase of 770 since 1881.

The Medical Officer of Health is W. J. Richardson, M.D., and the sanitary inspector, Mr. Hemingway.

The Notification Act was adopted in March 1890.

The cases of small pox were removed to the Dewsbury Hospital, which is situated close to the boundary of Ravensthorpe. Disinfection was prompt and thorough, and in some cases re-vaccination of inmates of infected houses was performed.

At my visit I had the opportunity of seeing the sewage works in which lime-precipitation is used, the effluent being run on to the land. I was informed that since the introduction of a thorough drainage system, the death rate in this low-lying district has materially fallen. The chief items in the mortality are to be found in the accompanying table (XXIII.) :-

TABLE XXII.

DEWSBURY UNION,
Mirfield District.

RETURN AS TO NUMBER OF VACCINATIONS from 1st January 1891 to 30th April 1892, inclusive.

Month.	Primary Vaccinations.			Re-vaccinations. All Ages.
	Under One Year.	Between One and Two Years.	Two Years and upwards.	
1891.—January	2	—	—	—
February	1	—	—	—
March	6	2	—	—
April	12	4	3	—
May	4	—	—	—
June	15	—	—	—
July	12	—	—	—
August	4	—	2	—
September	15	3	3	—
October	13	7	5	—
November	1	2	1	—
December	—	—	—	—
1892.—January	—	—	—	—
February	1	—	1	—
March	4	—	1	18
April	—	—	—	—
Total	91	15	16	18

TABLE XXIII.

MORTALITY STATISTICS OF THE URBAN SANITARY DISTRICT OF RAVENSTHORPE, 1875-92.

	Estimated Population.	Total Deaths.	"Fever."		Small-Pox.	Scarlet Fever.	Diphtheria.	Measles.	Diarrhoea and Dysentery.
			Typhus.	Enteric.					
Mean 1875-77	3,772	73	2.3		1	—	?	?	3
1878	3,964	61	—	1	—	6	—	—	3
1879	4,109	69	—	1	—	3	—	—	—
1880	4,255	118	—	—	—	3	—	2	—
1881	4,364 (c)	68	—	1	—	1	—	—	2
1882	4,460	85	—	1	—	—	—	4	—
Mean 1878-92	4,250	80	—	0.8	—	2.6	—	1.2	1.0
1883	4,537	61	—	—	—	—	—	—	—
1884	4,614	66	—	—	—	1	1	—	3
1885	4,691	66	—	—	—	1	1	4	—
1886	4,768	98	—	4	—	6	—	1	4
1887	4,845	112	—	2	—	—	1	12	2
Mean 1883-87	4,691	80	—	1.2	—	1.6	0.6	3.4	1.8
1888	4,922	65	—	1	—	4	—	2	1
1889	4,999	112	—	—	—	1	—	5	2
1890	5,076	98	—	2	—	—	—	2	4
1891	5,130 (c)	94	—	—	—	1	—	1	—
1892	5,230	118	—	1	—	2	—	—	2
Mean 1888-92	5,072	97	—	0.8	—	1.6	—	2.0	1.8

Soothill Nether.

This district, which extends between Dewsbury and Ossett, and Soothill Upper, is somewhat densely populated. The Census of 1891 showed its population to be 5,848, an increase of 608 since 1881.

The Medical Officer of Health is C. Clay, Esq., M.R.C.S., and the Sanitary Inspector Mr. H. Scott.

Most of the cases of small-pox were sent to the Dewsbury Hospital, and prompt measures taken to disinfect bedding, clothing, and rooms inhabited by the patients.

Re-vaccination of several of the inmates was effected.

The returns of public vaccination during the 16 months ending April 1892 are appended (Table XXIV.).

TABLE XXIV.

DEWSBURY UNION.

Soothill Nether District.

RETURN as to NUMBER of VACCINATIONS from 1st January 1891 to 30th April 1892, inclusive.

Month.	Primary Vaccinations.			Re-vaccinations.
	Under One Year.	Between One and Two Years.	Two Years and upwards.	All Ages.
1891.—January	—	—	—	—
February	—	—	—	—
March	—	—	—	—
April	8	—	1	—
May	—	—	—	—
June	—	—	—	—
July	1	—	—	—
August	—	—	—	—
September	—	—	—	—
October	13	2	1	—
November	—	—	—	—
December	—	—	—	—
1892.—January	—	—	—	—
February	—	—	—	—
March	—	—	—	—
April	1	—	—	—
Totals	23	2	2	—

Soothill Upper.

This is a large, wide, high-lying district—the population being grouped in the three centres of the "Leeds Road," close to Dewsbury, Hanging Heaton, above Batley Carr, and Soothill Lane. The total population in 1891 was 5,645, being an increase on the preceding census of 490.

The Medical Officer of Health at the time of my visit was T. Laird, Esq., M.D., the Sanitary Inspector, Mr. W. Tully.

Some of the cases of small-pox were treated in their own homes; others removed to Batley Small-pox Hospital.

The usual procedure of disinfection, &c. was promptly carried out.

I append tables (XXV. and XXVI.) of the public vaccinations in 1891-92, and of mortality statistics (so far as available) for 1875-92.

TABLE XXV.

DEWSBURY UNION.

Soothill Upper District.

RETURN as to NUMBER of VACCINATIONS from 1st January 1891 to 30th April 1892, inclusive.

Month.	Primary Vaccinations.			Re-vaccinations.
	Under One Year.	Between One and Two Years.	Two Years and upwards.	All Ages.
1891.—January	5	—	—	—
February	—	—	—	—
March	—	—	—	—
April	10	—	2	—
May	—	—	—	—
June	—	—	—	—
July	8	2	1	—
August	—	—	—	—
September	—	—	—	—
October	2	5	—	—
November	—	—	—	—
December	—	—	—	—
1892.—January	5	—	—	—
February	—	—	—	—
March	—	—	—	—
April	3	—	6	—
Totals	33	7	9	—

TABLE XXVI.

MORTALITY STATISTICS for the URBAN SANITARY DISTRICT of SOOTHILL UPPER, 1875-77 and 1883-92.

—	Estimated Population.	Total Deaths.	"Fever."		Small-pox.	Scarlet Fever.	Diphtheria.	Measles.	Diarrhoea and Dysentery.
			Typhus.	Enteric.					
Mean 1875-77	4,093	100	4		1	6.6	?	?	4.3
1878 to 1882	—	No return.							
1883	5,265	93	—	1	—	2	—	—	—
1884	5,314	104	1	1	—	2	—	—	—
1885	5,363	104	—	1	—	2	1	—	—
1886	5,412	81	—	1	—	2	—	1	3
1887	5,561	124	—	1	—	1	—	6	—
Mean 1883-87	5,363	101	0.2	1	—	1.8	1.2	1.4	0.6
1888	5,510	92	—	2	—	4	—	—	—
1889	—	No return.							
1890	5,608	104	—	2	—	1	1	3	6
1891	5,645 (c)	117	—	1	—	1	—	4	1
1892	5,706	119	—	5	1	4	2	—	1
Mean 4 years	5,617	158	—	2.5	0.5	2.5	0.7	1.7	2

TABLE XXVII.

DEWSBURY UNION.

Thornhill and Whitley District.

RETURN as to NUMBER of VACCINATIONS from 1st January 1891 to 30th April 1892 inclusive.

Thornhill.

This is a wide district, south of Dewsbury, and consisting of partly low ground in the Calder Valley (Saville Town) and partly high ground (Thornhill Lees and Thornhill). Its population in 1891 was 9,606, an increase of 763 since 1881.

The Medical Officer of Health is H. E. Davies, Esq., L.R.C.P., and the sanitary inspector Mr. J. Hampshire.

Compulsory notification is not in force in the district.

The cases of small-pox were sent to the Dewsbury Hospital, and prompt disinfection of houses carried out.

Re-vaccination of inmates of infected houses was performed in some instances but not in all.

The returns of public vaccination for 1891 and the first four months of 1892 are appended (Table XXVII.); and also the mortality statistics from zymotic disease for the 20 years 1873-92.

Month,	Primary Vaccinations.			Re-vaccinations.
	Under One Year.	Between One and Two Years.	Two Years and upwards.	All Ages.
1891.—January	—	—	—	—
February	—	—	—	—
March	—	—	—	—
April	23	3	—	—
May	1	2	—	—
June	2	—	—	—
July	3	—	—	—
August	2	—	1	—
September	8	7	—	—
October	10	1	1	—
November	3	2	—	—
December	—	1	—	—
1892.—January	1	—	—	—
February	5	1	2	—
March	4	1	5	—
April	6	—	—	—
Totals	58	18	9	—

TABLE XXVIII.

MORTALITY STATISTICS FOR THE URBAN SANITARY DISTRICT OF THORNHILL, 1873-92.

—	Estimated Population.	Total Deaths.	"Fever."		Small-pox.	Scarlet Fever.	Diphtheria.	Measles.	Diarrhoea and Dysentery.
			Typhus.	Enteric.					
Mean 1873-77	8,013	147	6		1	5.6	?	?	3.4
1878	8,145	190	—	4	—	22	—	1	3
1879	8,399	167	—	5	—	7	—	1	—
1880	8,652	175	—	5	—	3	1	1	—
1881	8,843 (C)	148	—	—	—	—	—	1	1
1882	8,938	173	—	3	1	2	—	3	1
Mean 1878-82	8,595	170	—	3.4	0.2	6.8	0.2	1.4	1
1883	9,014	104	"4 deaths from zymotic diseases."			—	—	—	—
1884	9,090	188	—	3	—	3	—	—	13
1885	9,167	134	—	3	—	1	—	8	2
1886	9,243	145	—	3	—	—	—	3	6
1887	9,320	155	—	6	—	7	—	3	—
Mean 1883-87	9,167	155	—	3.7*	—	2.7*	—	3.5	5.2
1888	9,396	Returns not complete.			—	1	—	12	3
1889	9,472	169	—	—	—	—	—	1	8
1890	9,548	181	—	5	—	—	—	—	—
1891	9,606 (C)	168	—	1	—	—	1	1	4
1892	9,700	142	—	—	1	1	—†	—	3
Mean 1889-92	9,540	165	—	1.5	0.2	0.5	0.2	3.5	4.5

* Four years.

† Group 1.

PART II.

Period covered by Report:—April 1891 to August 1892. Relative prevalence of small-pox during this period in the Dewsbury Union, and other districts of West Riding. Monthly incidence in the several districts of the Dewsbury Union. Weekly incidence. Cases arising at Union Work-house. Number of infected houses and cases proceeding therefrom in each month. Number of such houses visited, and their inmates. Analysis of size of households and of cases (single or multiple) occurring therein. Sex and age incidence. Incidence of the disease on those (a) engaged at home, (b) attending school, (c) engaged at work from home. Types of small-pox and mortality. Numbers and ages of those treated at home or isolated in hospital.

PART II.—GENERAL HISTORY OF OUTBREAK.

The first case of small-pox known to have arisen in the epidemic in the Dewsbury Union of 1891-2, was that of a rag sorter, residing at Batley, whose illness commenced on April 30, 1891. At that date, the West Riding of Yorkshire was, and had been for some 3 years, i.e., since the abatement of the extensive epidemic in Sheffield in 1888, practically free from the disease. I am unable to state positively that there was no small-pox in each of the sanitary districts of the Riding, but the monthly reports of the Medical Officer to the County Council which commence in April 1891, give no cases for the districts then furnishing returns.

The only other case occurring in the West Riding at this date that is known to me, was at Leeds, the first of a series of 48 cases that arose in that borough during 1891. This man, although a recent arrival in Leeds, was probably infected in that borough, for he fell ill on April 14th, about 20 days after his arrival. All inquiries were made at the time by Dr. Spottiswoode Cameron to trace the source of his infection, but without success, the only possible clue being a visit to a tailor's shop, which he made on March 31st. No other cases prior to a subsequent to this, was traceable to the same source.*

The period covered by the present inquiry, viz., 70 weeks, from the week ending March 2nd, 1891, to the week ending August 27th, 1892, was marked by a far greater prevalence of small-pox in the Dewsbury Union, than in any other district of the West Riding. This is clearly shown by the following table which has been prepared (as regards all other than the Dewsbury district), from the notification returns furnished monthly to the County Council Medical Officer. I have collected the figures given under each district of the Halifax Union, which adjoins the Dewsbury Union and was the seat of a somewhat severe outbreak in the early summer of 1892, at a time when the disease was on the decline in the former area.

Month.	Dewsbury Union.	Halifax Union.	Other Districts of West Riding.	County Boroughs.			
				Leeds.	Bradford.	Halifax.	Sheffield.
1891.							
April	1	—	—	2	—	—	—
May	5	—	—	1	—	—	—
June	16	—	—	2	—	—	—
July	13	—	—	6	—	—	—
August	13	—	1	21	—	—	—
September	8	—	3	15	—	—	—
October	6	—	4	—	—	—	—
November	13	—	—	—	—	—	—
December	83	—	2	1	—	—	—
1892.							
January	219	1	21	1	—	—	—
February	198	1	14	1	—	—	—
March	156	—	25	1	—	2	1
April	112	2	28	3	—	2	2
May	78	104	62	—	1	5	7
June	44	54	60	—	2	24	2
July	38	31	44	6	4	16	14
	1,003	198	264	60	7	49	26

* Annual Report of the Medical Officer of Health for the Borough of Leeds, 1891.

The accompanying series of maps indicate the sanitary districts of West Riding, in which cases of small-pox are known to have occurred in each of the 17 months, April 1891 to August 1892. The scale of the map has only permitted of the boundaries of the several unions to be delineated; the red dots indicate urban sanitary districts; the open circles rural sanitary districts. The following list may serve as a key to the maps:—

Month.	Union.	Urban Sanitary Districts.	Rural Sanitary District.
1891.			
April	Dewsbury	Batley.	
	Leeds	Leeds.	
May	Dewsbury	Batley, Ossett.	
	Leeds	Leeds.	
June	Dewsbury	Batley, Birstal, Dewsbury, Heckmondwike, Soothill Upper.	
	Leeds	Leeds.	
July	Dewsbury	Batley, Dewsbury.	
August	"	"	
	Leeds	Leeds.	
	Pontefract	Pontefract.	
September	Barnsley	"	Barnsley.
	Dewsbury	Batley, Dewsbury.	
	Leeds	Leeds.	
	Pateley Bridge.	"	Pateley Bridge.
	Wakefield	Wakefield.	
October	Dewsbury	Dewsbury.	
	Hunslet	Rothwell.	
	Wakefield	Wakefield	Wakefield.
November	Dewsbury	Batley, Dewsbury, Ossett, Ravenshorpe.	
December	Dewsbury	Batley, Birstal, Dewsbury, Thornhill.	
	Leeds	Leeds.	
	Wakefield	Wakefield.	
1892.			
January	Barnsley	Barnsley.	
	Dewsbury	Batley, Birstal, Dewsbury, Heckmondwike, Liversedge, Morley, Soothill Nether, Soothill Upper, Thornhill.	
	Halifax	"	Halifax.
	Huddersfield	Glaithwaite (Colne Valley).	
	Leeds	Leeds.	
	North Bierley.	Drighlington.	
	Pateley Bridge.	"	Pateley Bridge.
	Pontefract	Pontefract.	
	Wakefield	Wakefield	Wakefield.
February	Barnsley	Barnsley, Wombwell.	Barnsley.
	Bramley	Gildersome.	
	Dewsbury	Batley, Birstal, Dewsbury, Heckmondwike, Liversedge, Mirfield, Ossett, Ravenshorpe, Soothill Nether, Soothill Upper, Thornhill.	
	Halifax	Ovenden.	
	Huddersfield	Meltham.	
	Leeds	Leeds.	
	North Bierley.	Drighlington.	
	Pateley Bridge.	"	Pateley Bridge.
	Wakefield	"	Wakefield.
	Wortley	Stocksbridge.	
March	Barnsley	"	Barnsley.
	Dewsbury	Batley, Birstal, Dewsbury, Heckmondwike, Mirfield, Morley, Ravenshorpe, Soothill Nether, Soothill Upper, Thornhill.	
	Halifax	Halifax.	
	Huddersfield.	Meltham.	

Month.	Union.	Urban Sanitary Districts.	Rural Sanitary District.	Month.	Union.	Urban Sanitary Districts.	Rural Sanitary District.
1892.				1892.			
March	Leeds	Leeds.		July	Huddersfield	Marston (Colne Valley).	
	Sheffield	Sheffield.			Knareston	Knareston.	
	Wakefield	Wakefield	Wakefield.		Leeds	Leeds.	
	Wortley	Stocksbridge.			North Bierley.	Drighlington, North Bierley.	
April	Dewsbury	Batley, Birstal, Dewsbury, Heckmondwike, Liversedge, Mirfield, Morley, Ossett, Ravensthorpe, Soothill Nether, Soothill Upper, Thornhill.			Pontefract	Knottingley.	
	Doncaster		Doncaster.		Sheffield	Handsworth, Sheffield.	
	Halifax	Halifax	Halifax.		Wakefield	Normanton, Wakefield.	Wakefield.
	Huddersfield	Huddersfield, Meltham.			Wharfedale	Olley.	
	Hunslet		Hunslet.		Wortley	Stocksbridge.	
	Leeds	Leeds.		August	Barnsley	Barnsley.	
	North Bierley.	North Bierley, Cleekeaton, Sheffield.			Bradford	Bradford.	
	Sheffield				Dewsbury	Dewsbury, Heckmondwike, Mirfield, Morley, Ossett, Ravensthorpe, Thornhill.	
	Wakefield	Wakefield	Wakefield.		Doncaster	Merboro'.	
	Wortley	Stocksbridge.			Halifax	Brighouse, Sowerby Bridge.	Halifax.
May	Bradford	Bradford.			Leeds	Leeds.	
	Dewsbury	Batley, Dewsbury, Heckmondwike, Morley, Ossett, Ravensthorpe, Soothill Nether, Soothill Upper, Thornhill.			North Bierley.	Cleekeaton, Drighlington.	
	Doncaster		Doncaster.		Pateley Bridge.		Pateley Bridge.
	Halifax	Halifax, Brighouse, Hipperholme, Rastrick.	Halifax.		Penistone	Penistone, Thurlstone.	
	Huddersfield	Huddersfield.			Sheffield	Handsworth.	
	Hunslet	Rothwell	Hunslet.		Todmorden	Mytholmroyd.	
	Keighley	Keighley.			Wakefield	Horbury, Normanton, Sandal, Wakefield.	
	North Bierley.	North Bierley, Cleekeaton, Drighlington.					
	Penistone		Penistone, 1st Div.				
	Sheffield	Sheffield.					
	Wakefield	Wakefield	Wakefield.				
	Wortley	Stocksbridge.					
June	Barnsley		Barnsley.				
	Bradford	Bradford.					
	Dewsbury	Batley, Dewsbury, Heckmondwike, Liversedge, Morley, Ossett, Ravensthorpe, Soothill Nether, Soothill Upper, Thornhill.					
	Doncaster	Merboro'.	Doncaster.				
	Halifax	Brighouse, Hipperholme, Queensberry, Rastrick, Sowerby Bridge, Halifax, Holmfirth.	Halifax.				
	Huddersfield						
	North Bierley.	Cleekeaton, North Bierley.					
	Penistone	Thurlstone.					
	Pontefract	Knottingley.					
	Rotherham	Swinton.					
	Sheffield	Sheffield.					
	Wakefield	Wakefield	Wakefield.				
	Wortley	Stocksbridge.					
July	Bradford	Bradford.					
	Dewsbury	Batley, Dewsbury, Heckmondwike, Liversedge, Morley.					
	Doncaster		Doncaster.				
	Goole	Goole.					
	Halifax	Brighouse, Greetland, Queensbury, Rastrick, Southowram, Sowerby Bridge, Halifax.	Halifax.				

Reverting now to the outbreak within the Dewsbury Union, I propose, in the first place, to give a general account of this, and afterwards to deal with the epidemic in each of the 13 districts that were invaded.

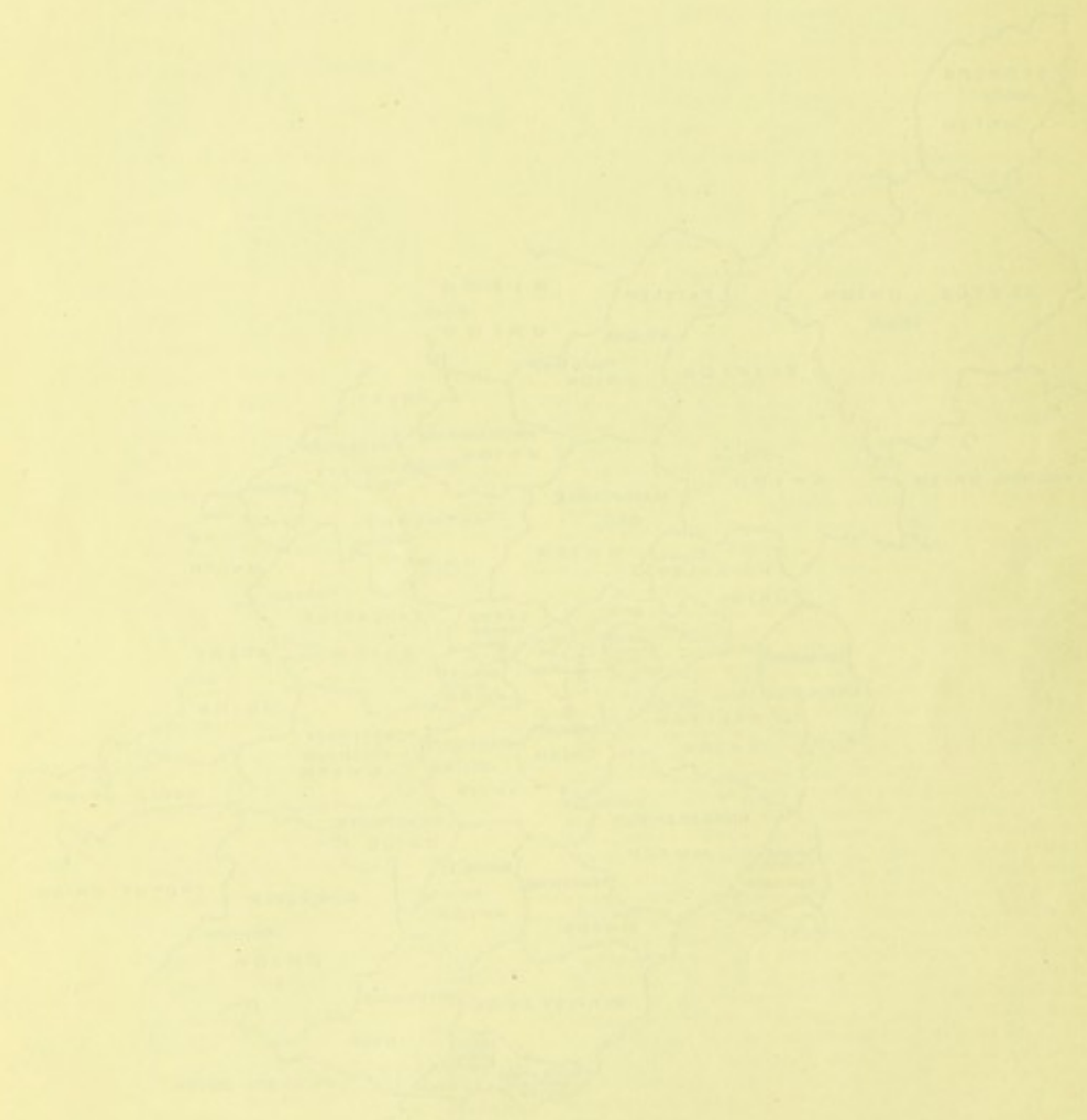
The total number of cases occurring within the period named (70 weeks), was 1,029, and as the annexed table (Table XXIX.) and diagrams (Plans A., B., and C.) show the distribution throughout the union varied from month to month. Thus, as already said, one case occurred in Batley in April 1891; in May there was, in addition to cases in Batley, one in Ossett. In June, one case in Birstal, Heckmondwike and Soothill Upper respectively, as well as in Batley and Dewsbury. Cases continued to arise in Batley and Dewsbury during July, August and September, but it may be observed that the disease had practically died out in Batley. Indeed, save for two children in one family attacked in the middle of September, Batley enjoyed an immunity from it until the week of November. Cases occurred in Dewsbury in October; and in November one case each from Ossett and Ravensthorpe, were added to these in Batley and Dewsbury. In December, Birstal, Heckmondwike and Liversedge were the districts infected in addition to Batley (where the disease had markedly recrudesced), and Dewsbury (where it had almost ceased). The early months of 1892, were characterised by a severe and wide extension of the small-pox. In January cases occurred in Birstal, Heckmondwike, Liversedge, Morley, Soothill Nether, and Soothill Upper, besides in Batley and Dewsbury, where it had now got a firm hold. In February, only three out of the fourteen districts of the Union were free from cases of small-pox, viz.:—Birkenshaw, Gomersal and Morley. Birkenshaw and Gomersal had no cases during the whole period under review, and the majority of those arising in Morley were of a remarkably mild type. In March, Liversedge and Ossett were free; but in April, a case occurred in the latter district. In May, there were no cases in Birstal, Liversedge, and Mirfield; in June, none in Birstal, Mirfield, and Thornhill. In July, the only districts which had cases were Batley, Dewsbury, Liversedge, Morley, and Thornhill; and in August (to the week ending 27th), cases had occurred in seven different districts, chiefly in Mirfield and Morley.

SKETCH MAP OF THE WEST RIDING OF YORKSHIRE,

INDICATING THE SANITARY DISTRICTS INVADED
BY SMALLPOX IN THE MONTH OF APRIL 1891.



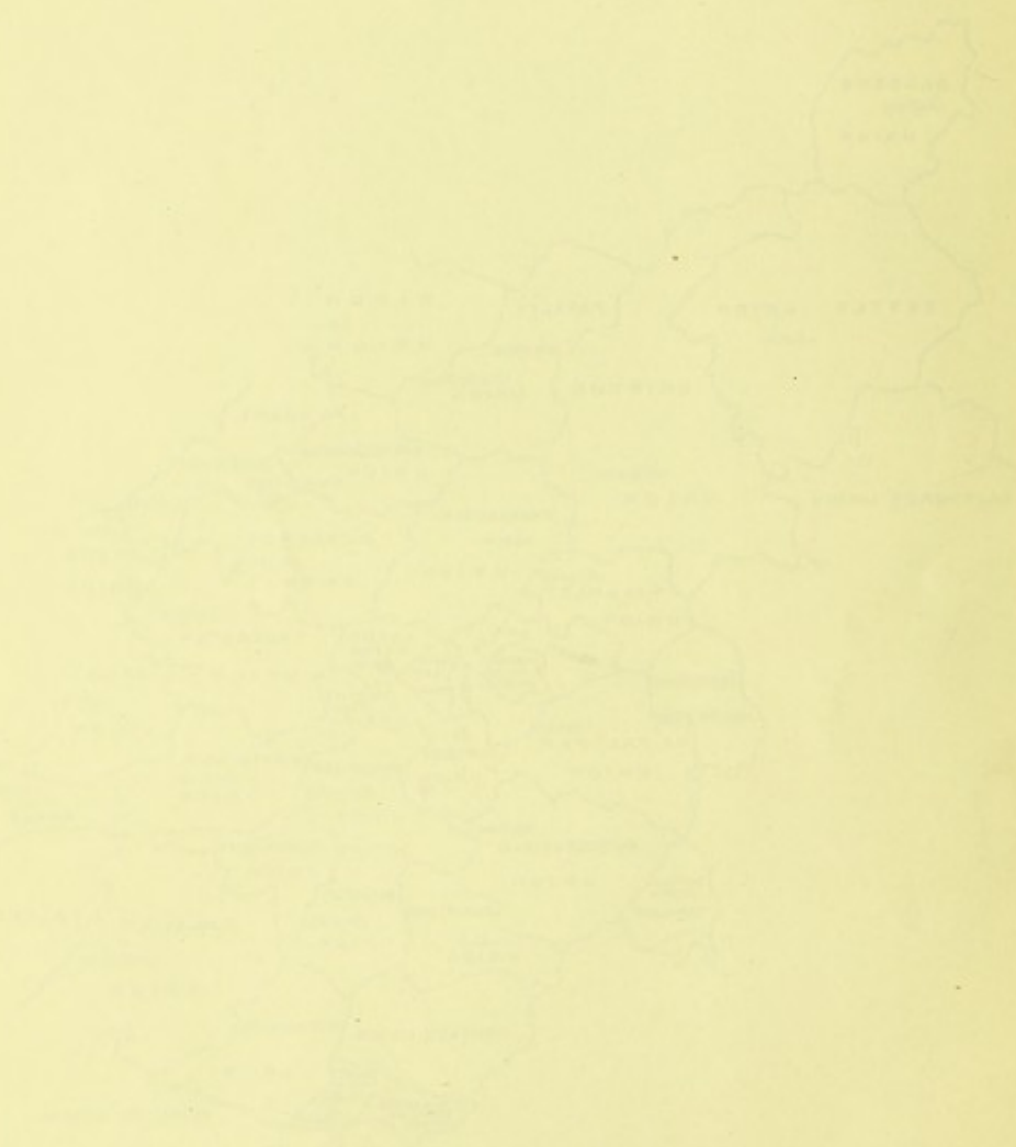
SKETCH MAP
OF THE
West Riding of Yorkshire
showing the sanitary districts created
by Act of Parliament in the Month of April 1891



SKETCH MAP
 OF THE
WEST RIDING OF YORKSHIRE,
 INDICATING THE SANITARY DISTRICTS INVADED
 BY SMALLPOX IN THE MONTH OF MAY 1891.



Sketch Map
of the
WEST RIDING OF YORKSHIRE
INDICATING THE PARISHES DIVIDED
BY ACTS OF PARLIAMENT IN THE REIGN OF JAMES I. 1603

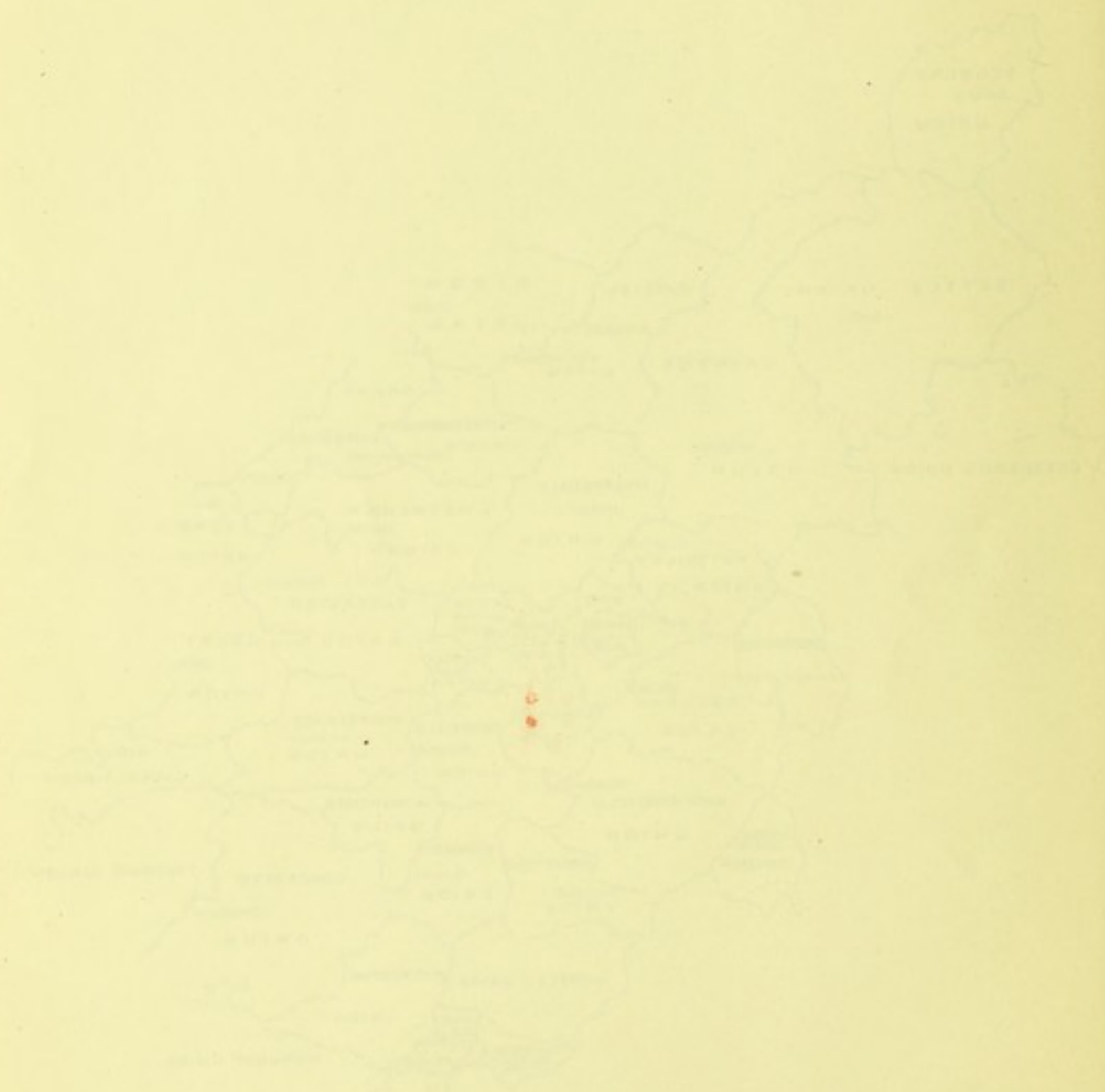


SKETCH MAP OF THE WEST RIDING OF YORKSHIRE,

INDICATING THE SANITARY DISTRICTS INVADED
BY SMALLPOX IN THE MONTH OF JUNE 1891.



SKETCH MAP
OF THE
WEST RIDING OF YORKSHIRE
SHOWING THE CANALRY DISTRICTS INVADED
BY ENGLAND IN THE MONTH OF JANUARY 1801.

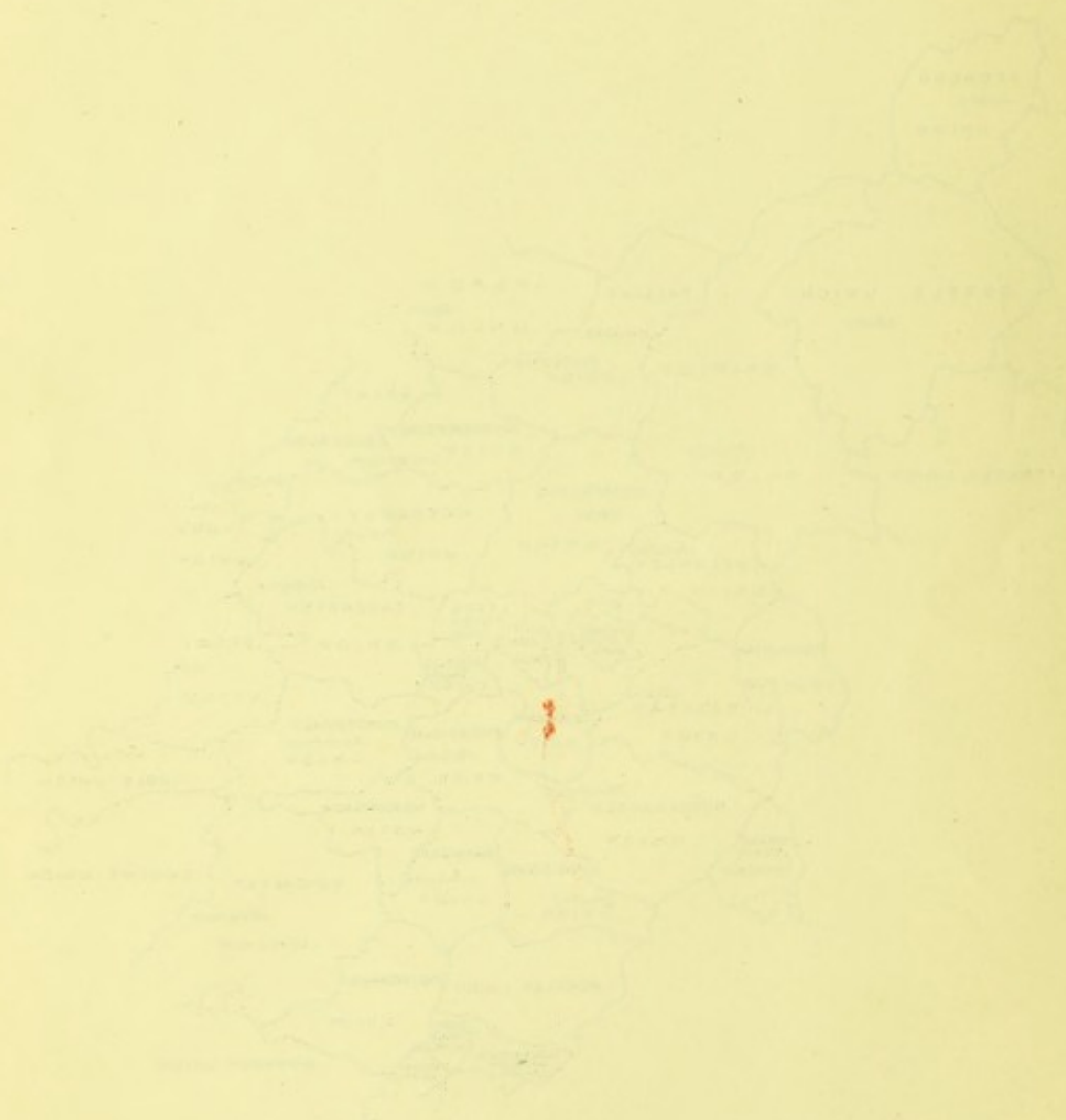


SKETCH MAP
OF THE
WEST RIDING OF YORKSHIRE,

INDICATING THE SANITARY DISTRICTS INVADED
BY SMALLPOX IN THE MONTH OF JULY 1891.

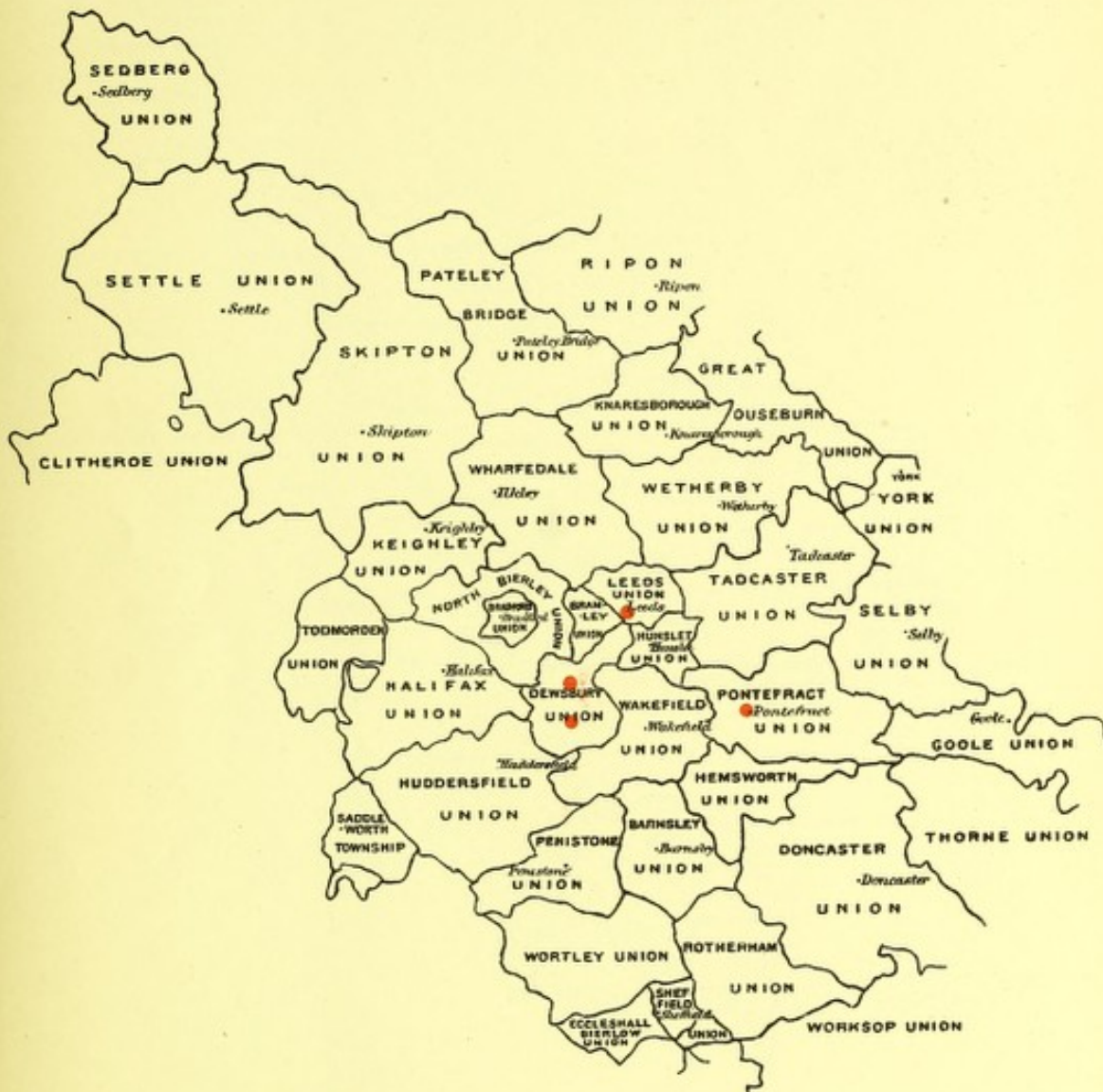


SKETCH MAP
WEST RIDING OF YORKSHIRE
SHOWING THE SEVERAL DISTRICTS FORMED
BY ACT OF PARLIAMENT IN THE MONTH OF JULY 1851

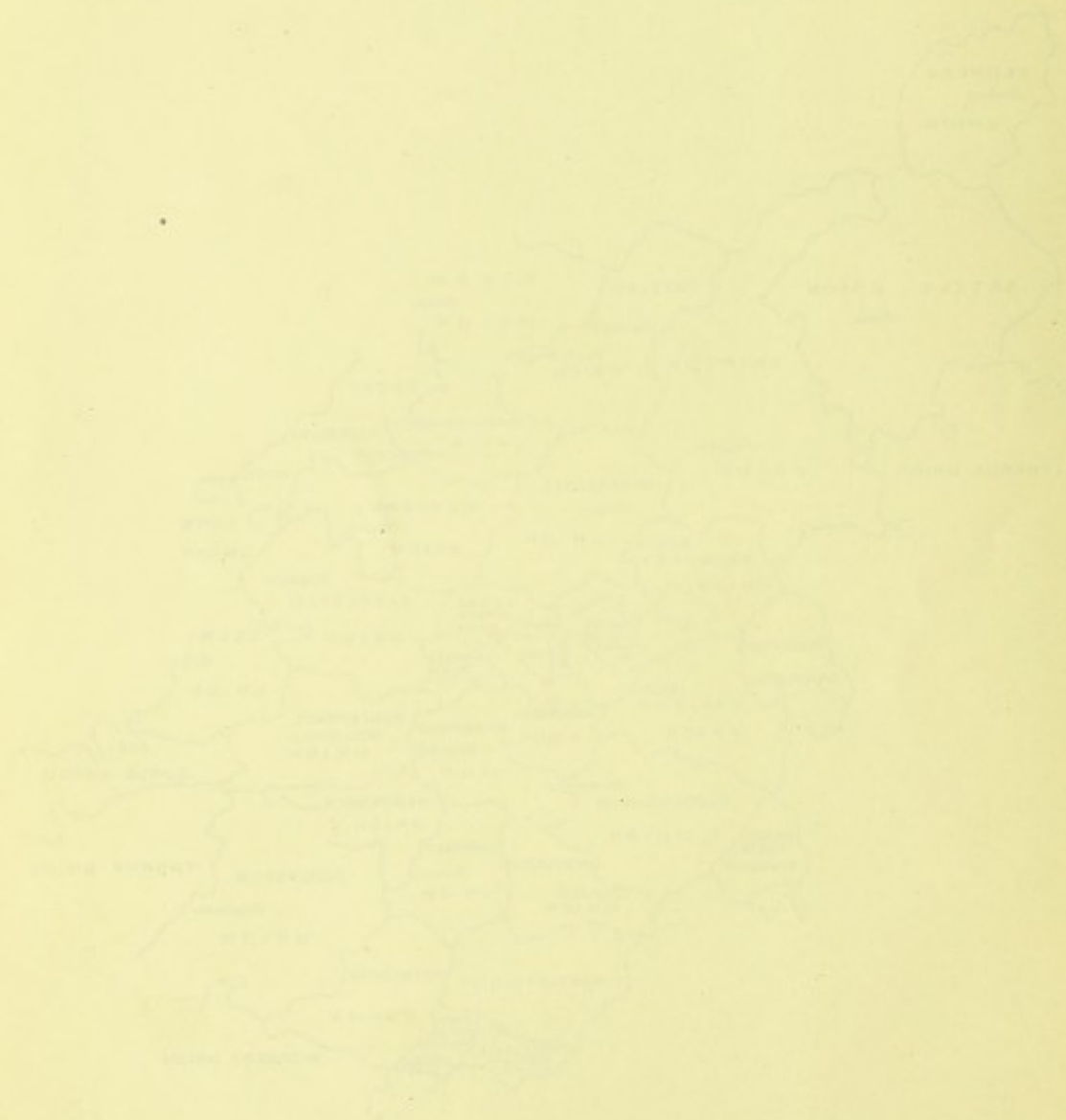


SKETCH MAP
OF THE
WEST RIDING OF YORKSHIRE,

INDICATING THE SANITARY DISTRICTS INVADED
BY SMALLPOX IN THE MONTH OF AUGUST 1891.



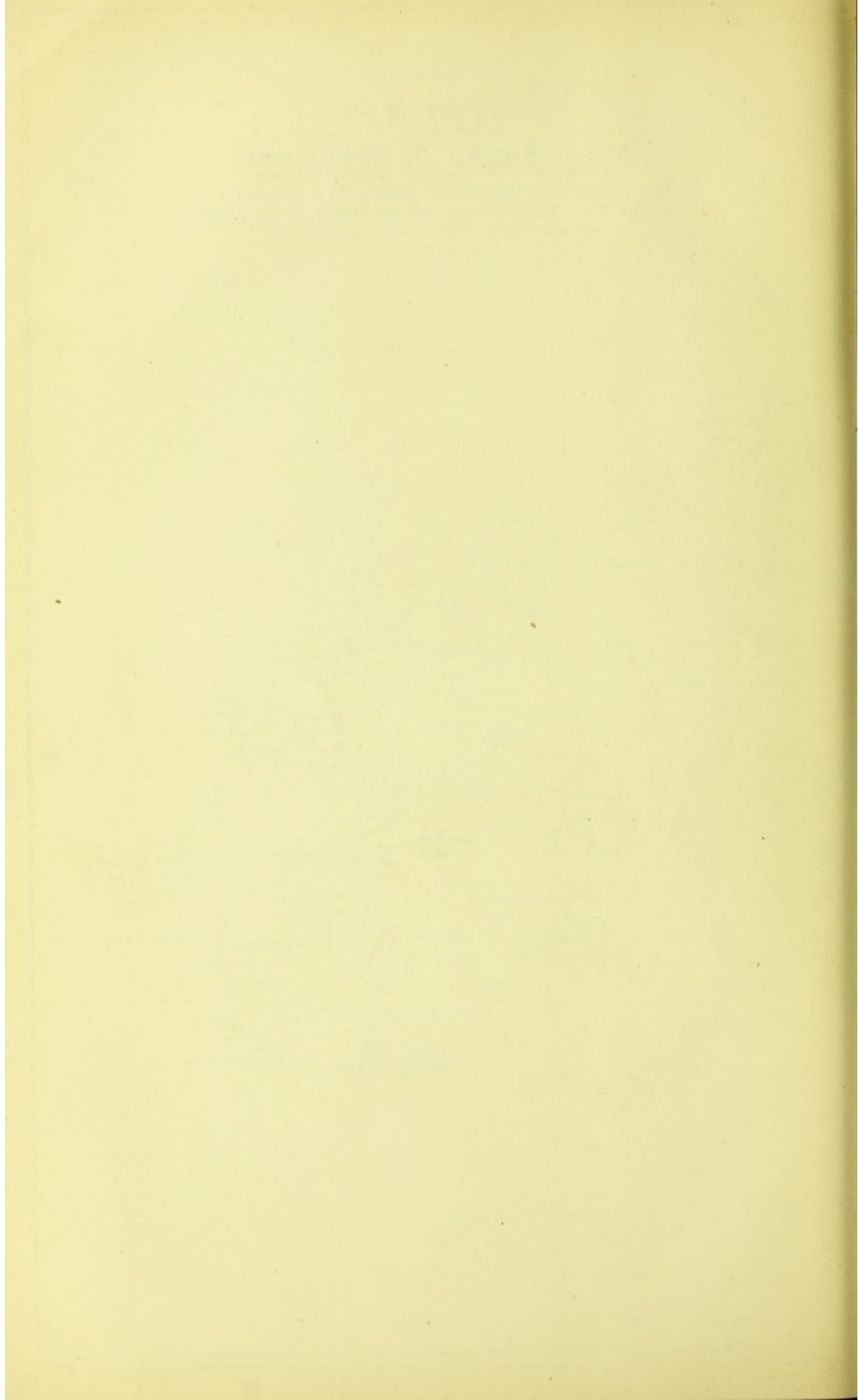
WEST RIDING OF YORKSHIRE
OF THE
SHEET 4
INDICATING THE PARISHES DIVIDED
BY ORIGIN IN THE MONTH OF AUGUST 1891.



SKETCH MAP
OF THE
WEST RIDING OF YORKSHIRE,

INDICATING THE SANITARY DISTRICTS INVADED
BY SMALLPOX IN THE MONTH OF SEPTEMBER 1891.





SKETCH MAP
 OF THE
WEST RIDING OF YORKSHIRE,
 INDICATING THE SANITARY DISTRICTS INVADED
 BY SMALLPOX IN THE MONTH OF OCTOBER 1891.



THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY
LABORATORY OF ORGANIC CHEMISTRY
505 EAST SOUTH EAST AVENUE
CHICAGO, ILLINOIS 60607

SKETCH MAP
OF THE
WEST RIDING OF YORKSHIRE,

INDICATING THE SANITARY DISTRICTS INVADED
BY SMALLPOX IN THE MONTH OF NOVEMBER 1891.

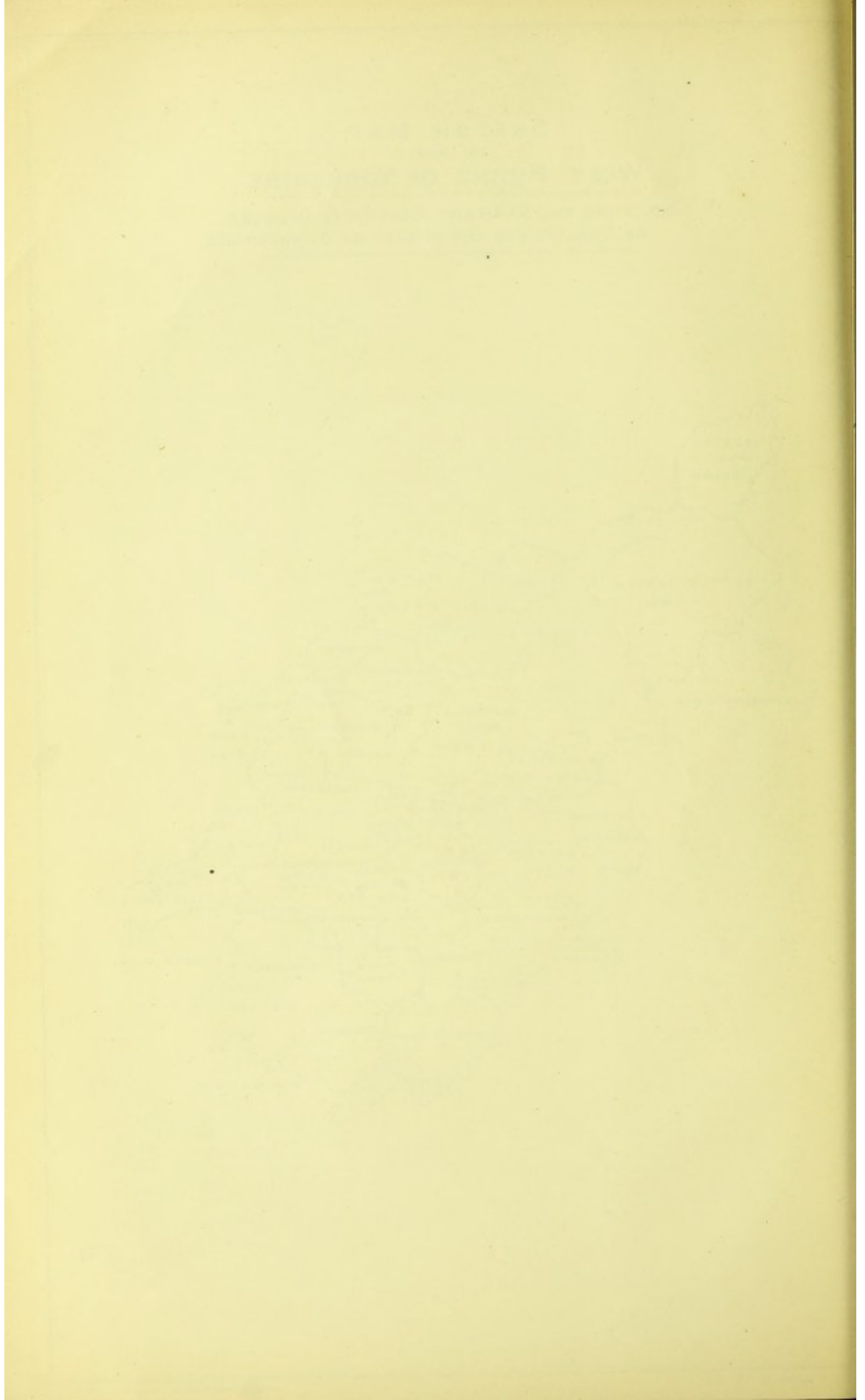


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SKETCH MAP
OF THE
WEST RIDING OF YORKSHIRE,

INDICATING THE SANITARY DISTRICTS INVADED
BY SMALLPOX IN THE MONTH OF DECEMBER 1891.

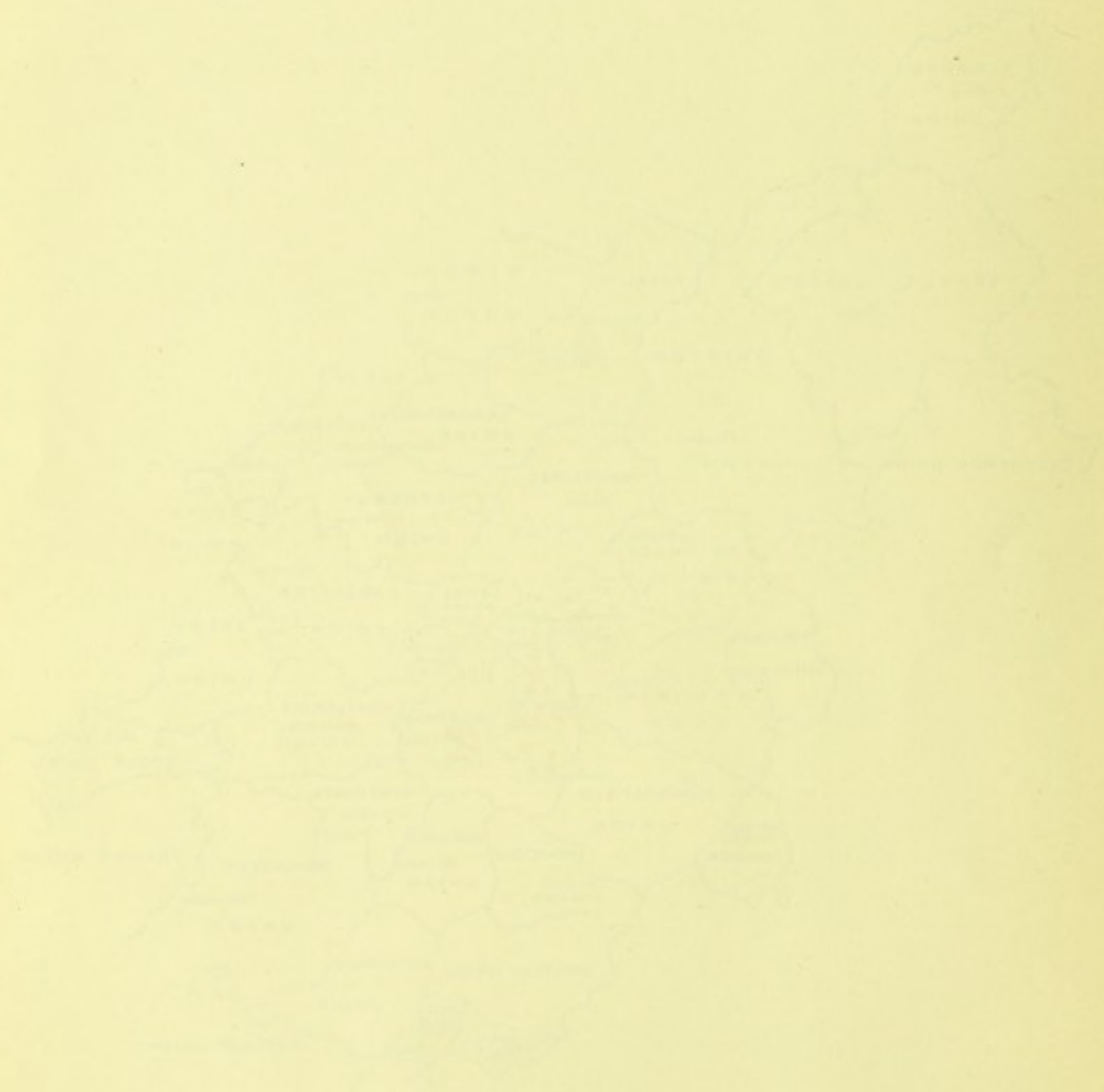




SKETCH MAP
 OF THE
WEST RIDING OF YORKSHIRE,
 INDICATING THE SANITARY DISTRICTS INVADED
 BY SMALLPOX IN THE MONTH OF JANUARY 1892.



MAP
OF THE
WEST END OF YORKSHIRE
FROM THE SURVEY MADE IN 1822
BY GENERAL COLLETT

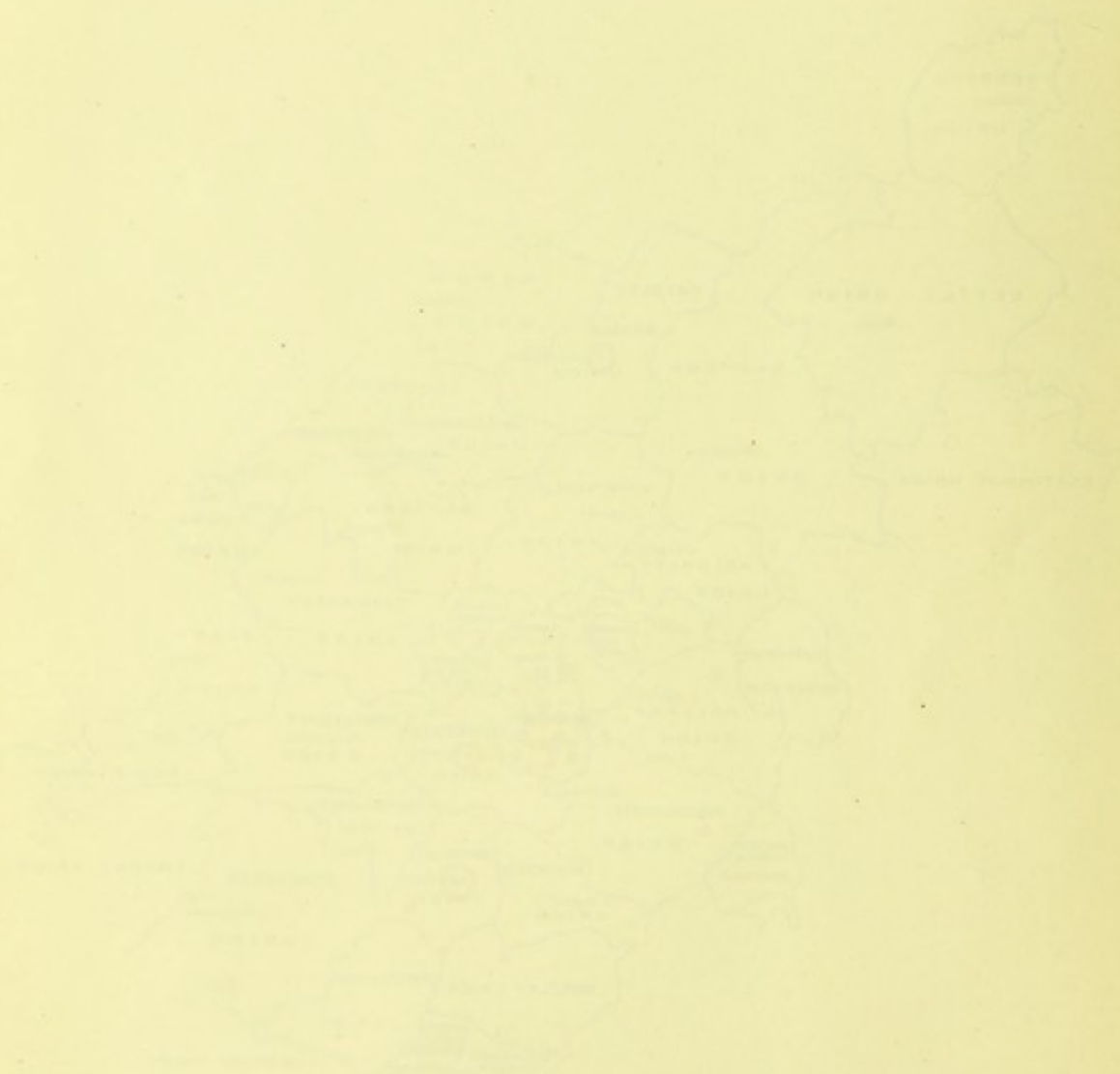


SKETCH MAP
OF THE
WEST RIDING OF YORKSHIRE,

INDICATING THE SANITARY DISTRICTS INVADED
BY SMALLPOX IN THE MONTH OF FEBRUARY 1892.



SKETCH MAP
OF THE
WEST RIDING OF YORKSHIRE
SHOWING THE PARISHES AND TOWNS
BY WHICH THE RIVER OF WHARFE IS
BOUNDARY

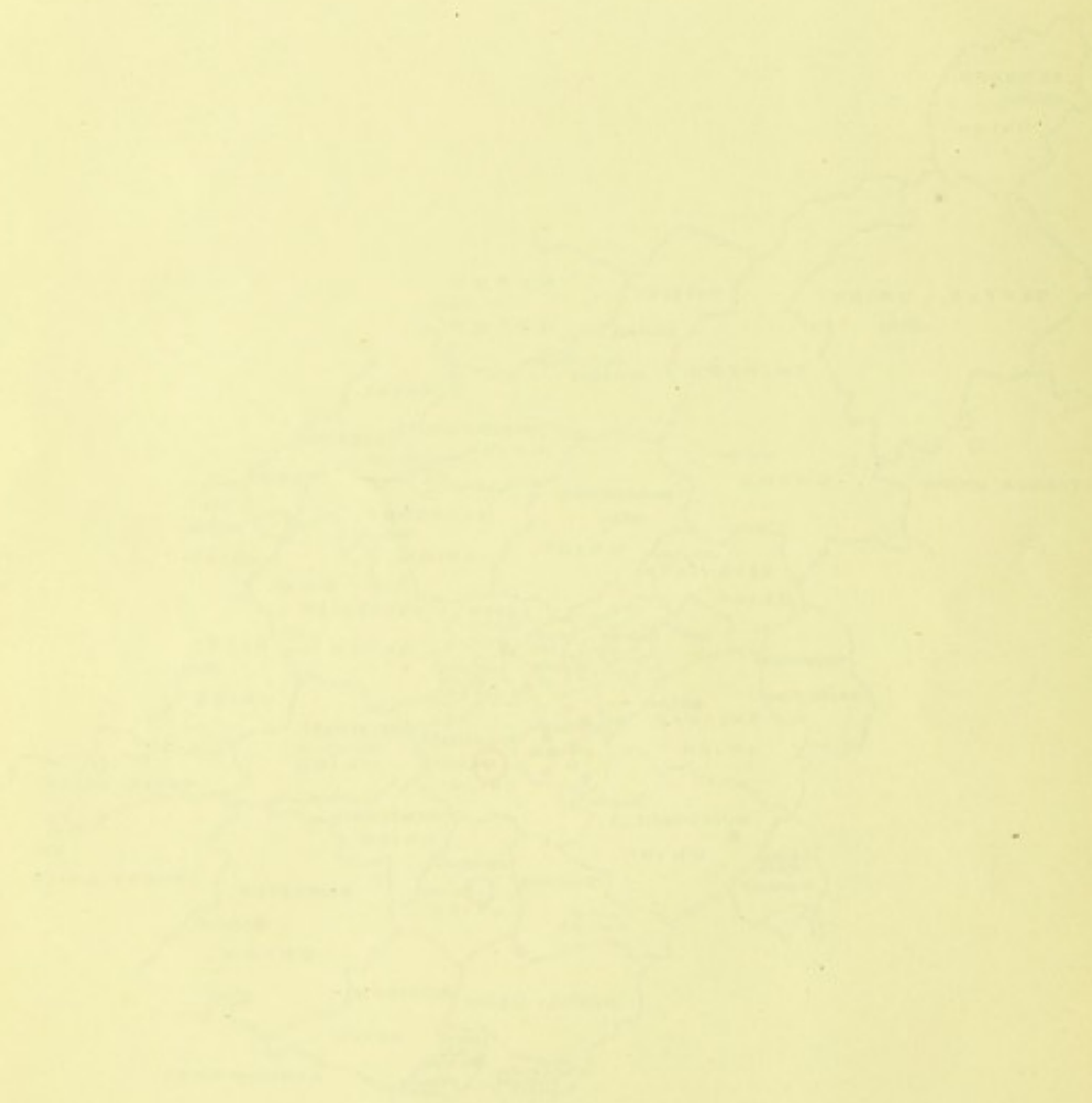


SKETCH MAP OF THE WEST RIDING OF YORKSHIRE,

INDICATING THE SANITARY DISTRICTS INVADED
BY SMALLPOX IN THE MONTH OF MARCH 1892



Sketch Map
of the
West River of Yorktown
Showing the Location of
the Forts in the Town of Yorktown

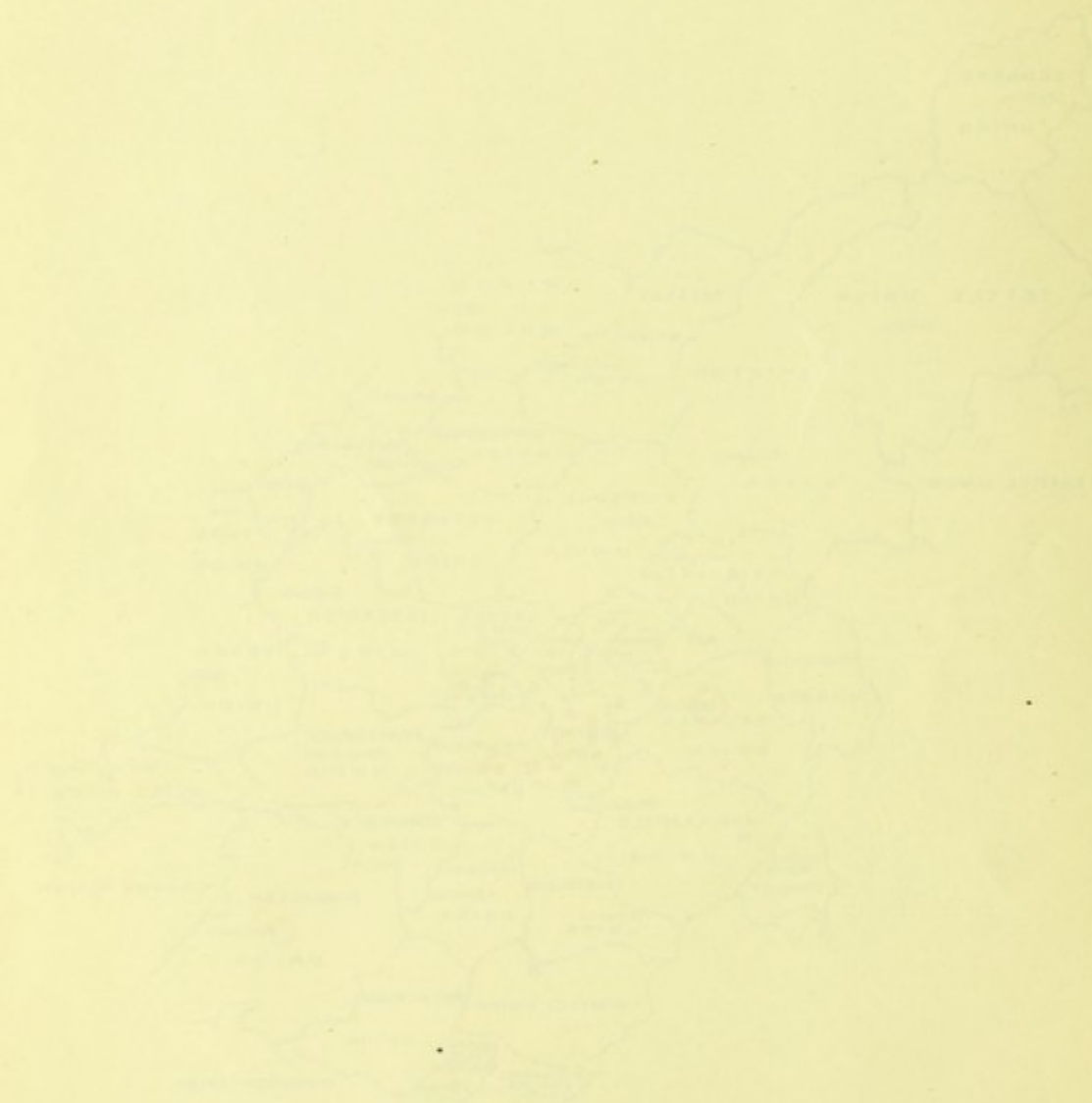


SKETCH MAP
OF THE
WEST RIDING OF YORKSHIRE,

INDICATING THE SANITARY DISTRICTS INVADED
BY SMALLPOX IN THE MONTH OF APRIL 1892.



SKETCH MAP
OF THE
WEST RIDING OF YORKSHIRE
SHOWING THE PARISH BOUNDARIES
BY PARISHES IN THE YEAR 1850



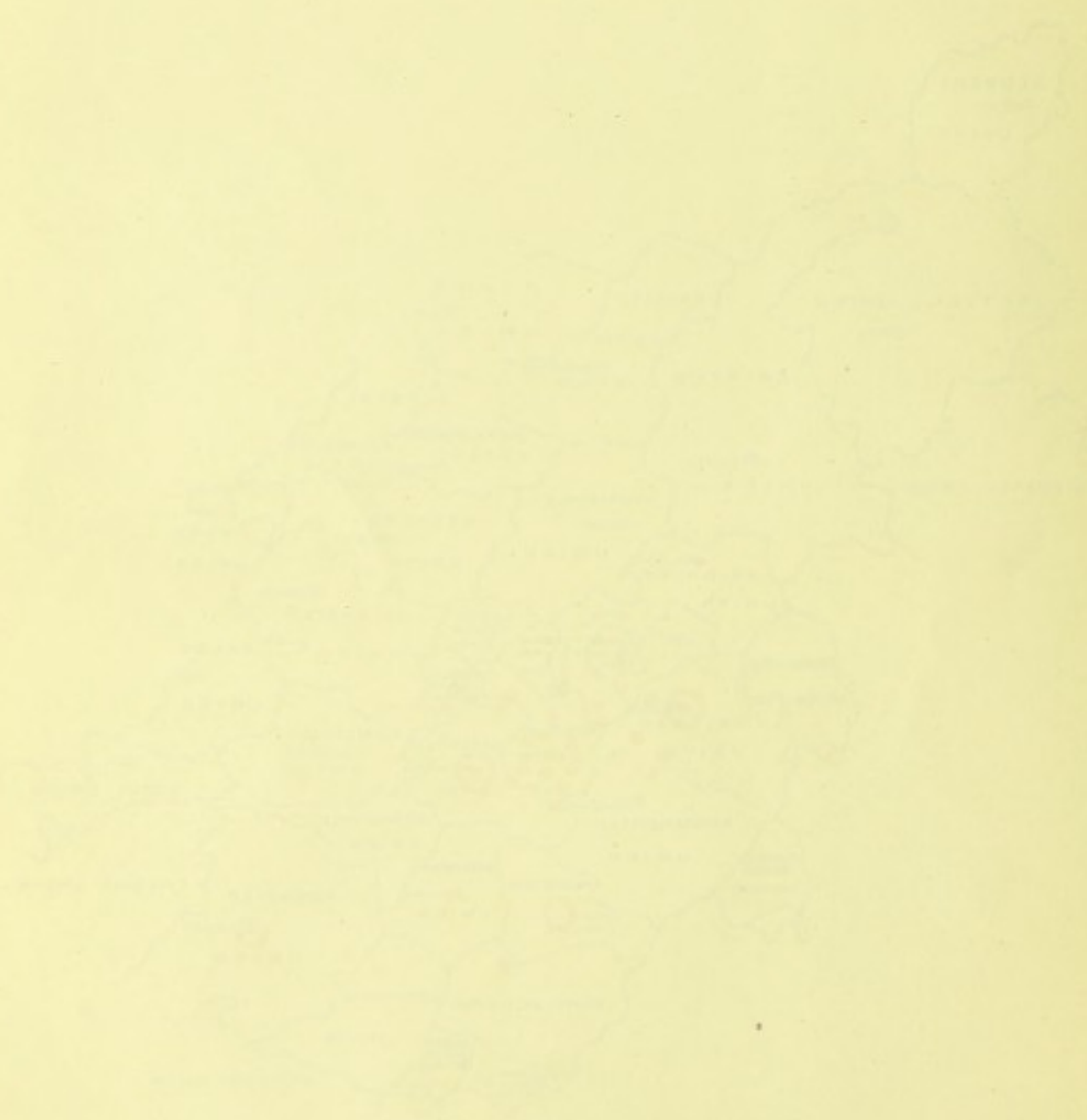
SKETCH MAP
 OF THE
WEST RIDING OF YORKSHIRE,
 INDICATING THE SANITARY DISTRICTS INVADED
 BY SMALLPOX IN THE MONTH OF MAY 1892.



SKETCH MAP

WEST RIVER OF YONKONING

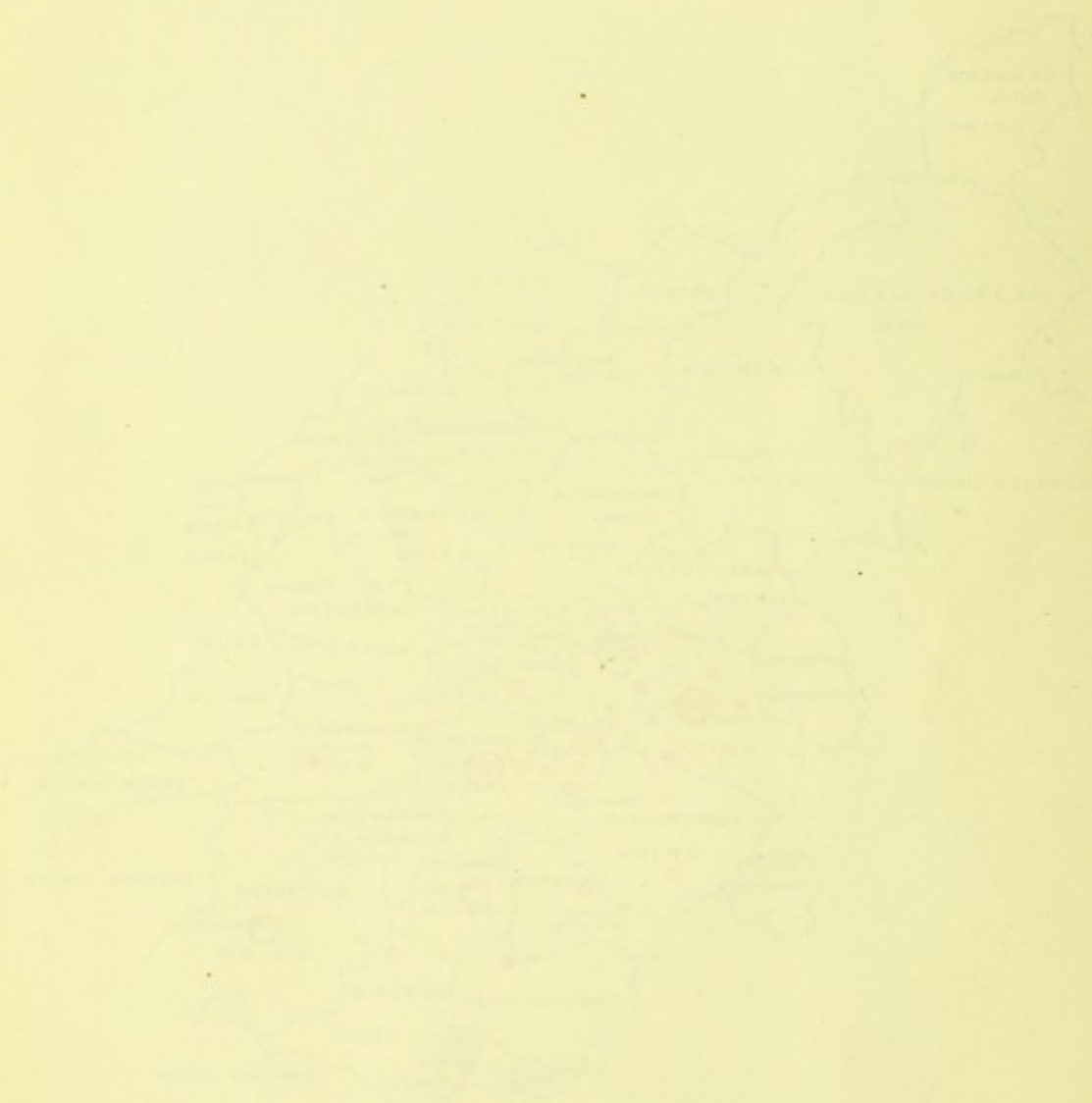
SHOWING THE COURSE OF THE RIVER
IN THE STATE OF NEW YORK



SKETCH MAP
 OF THE
WEST RIDING OF YORKSHIRE,
 INDICATING THE SANITARY DISTRICTS INVADED
 BY SMALLPOX IN THE MONTH OF JUNE 1892



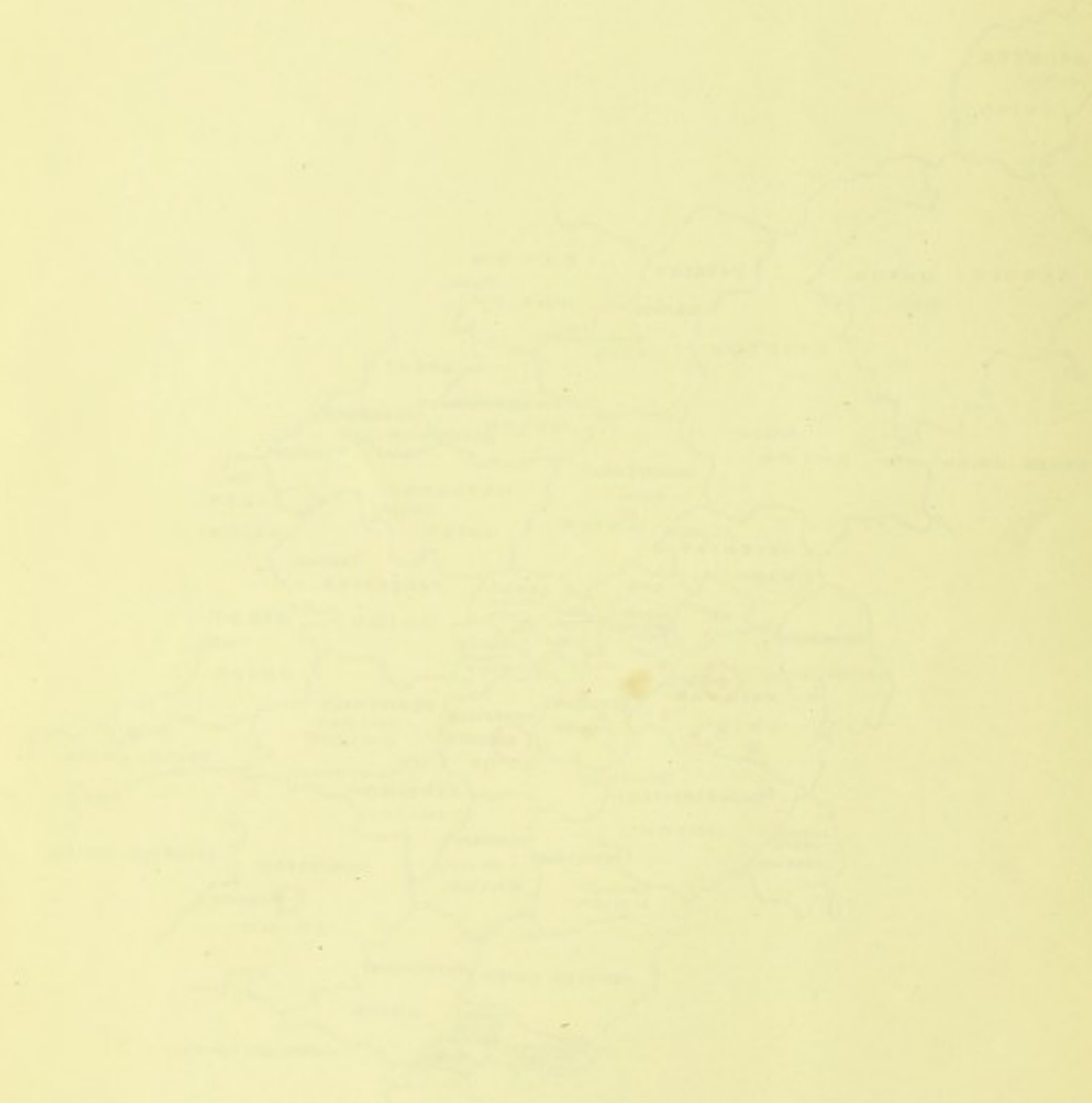
SECTION MAP
OF THE
WEST RIVER OF YONKONG
INDICATING THE VARIOUS DISTRICTS
AND THE BOUNDARIES OF THE



SKETCH MAP
 OF THE
WEST RIDING OF YORKSHIRE,
 INDICATING THE SANITARY DISTRICTS INVADED
 BY SMALLPOX IN THE MONTH OF JULY 1892.



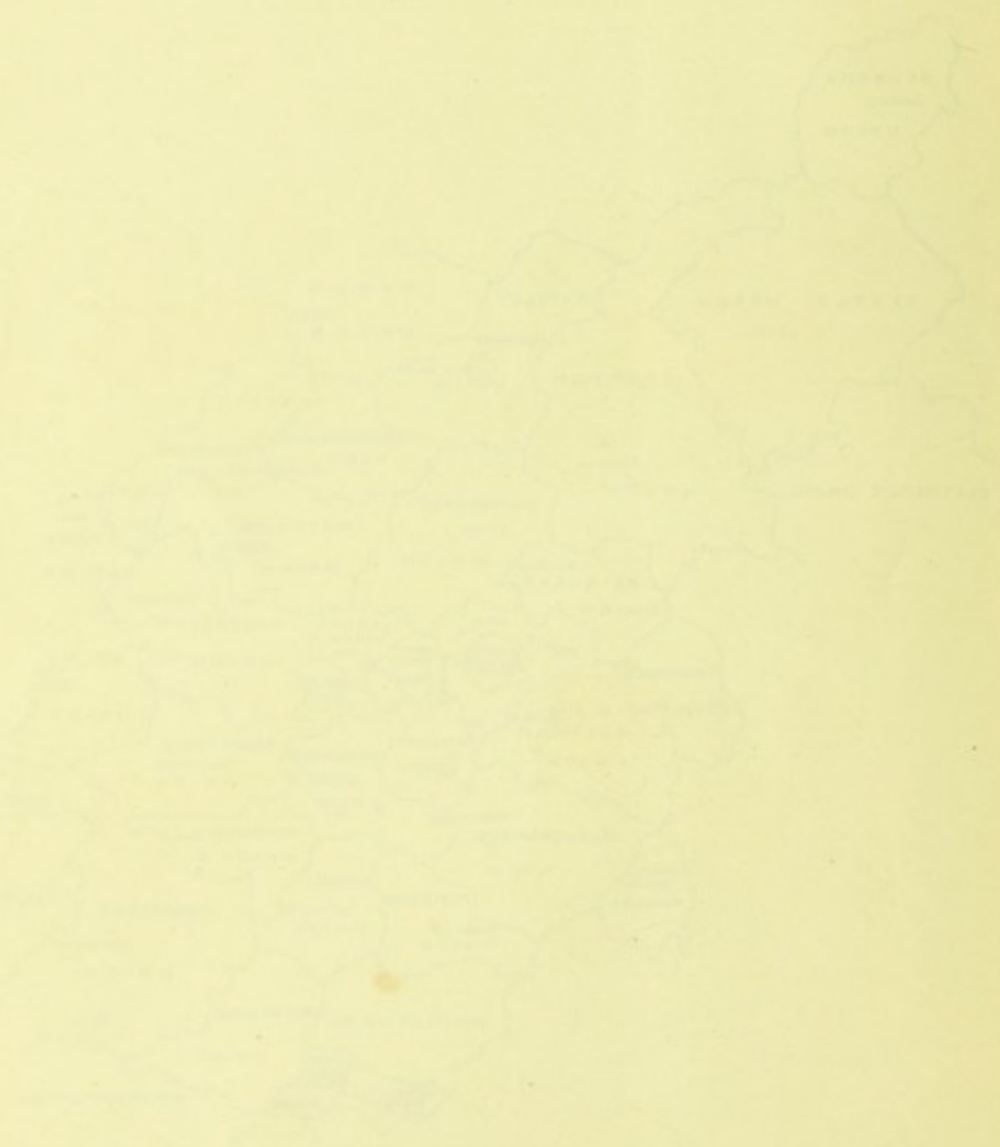
Wesley's History of the Church
of the
Methodist Episcopal Church
in America
Volume I
The First Part of the History
of the Church
from its Origin
to the Year 1784



SKETCH MAP
OF THE
WEST RIDING OF YORKSHIRE,
INDICATING THE SANITARY DISTRICTS INVADED
BY SMALLPOX IN THE MONTH OF AUGUST 1892.





BRITON MAP
WEST KINGDOM OF YORKSHIRE
INDICATING THE CANALS, RIVERS, AND
THE CHIEF TOWNS AND VILLAGES



PLANS (A., B AND C.) INDICATING THE SANITARY DISTRICTS OF THE DEWSBURY UNION
 IN WHICH CASES OF SMALL-POX OCCURRED IN THE SEVERAL MONTHS
 APRIL 1891 TO AUGUST 1892.

PLAN A.

Explanation

Red  indicates infected Districts. Blue  indicates non-infected Districts.
 (N.B. For key-map see Plan C)

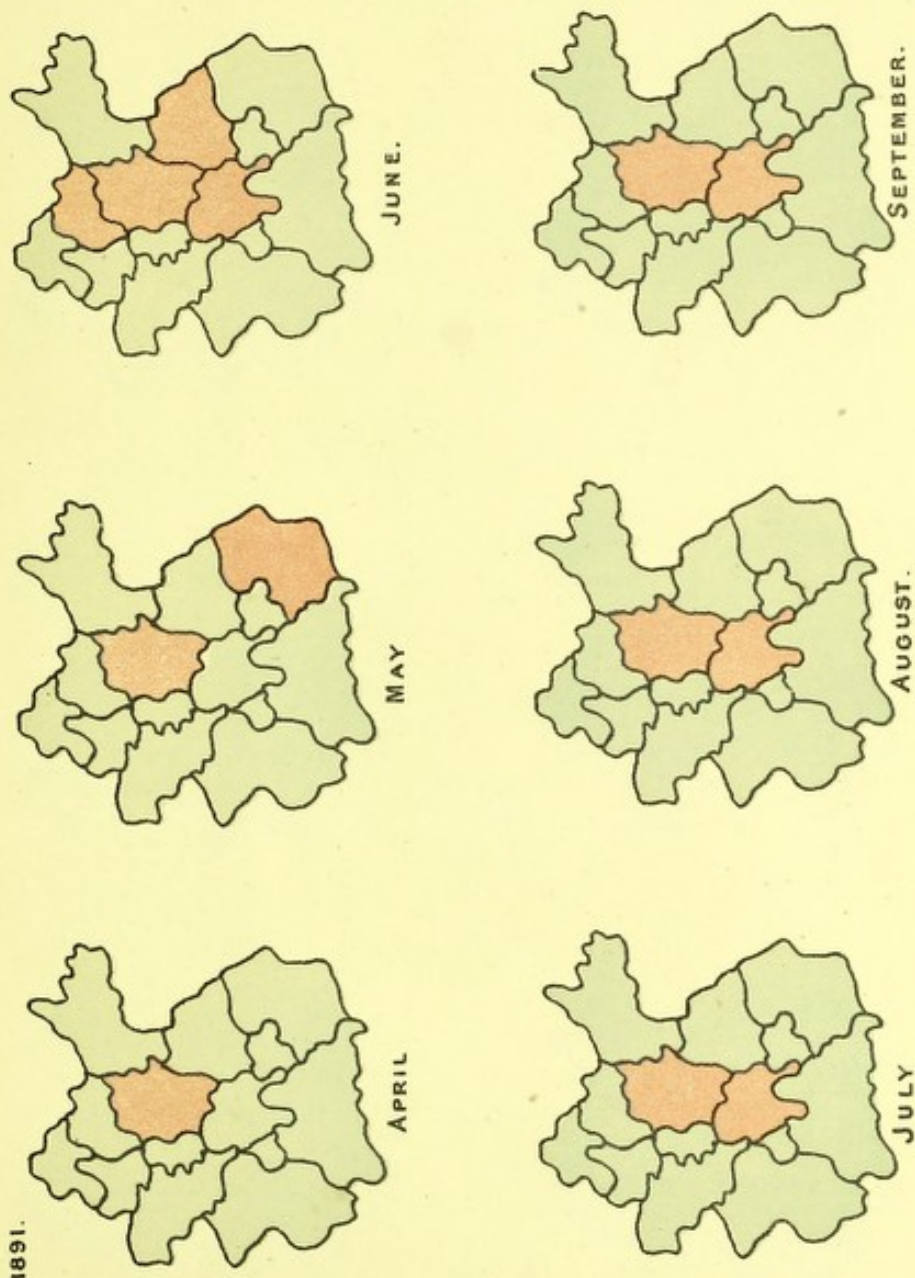
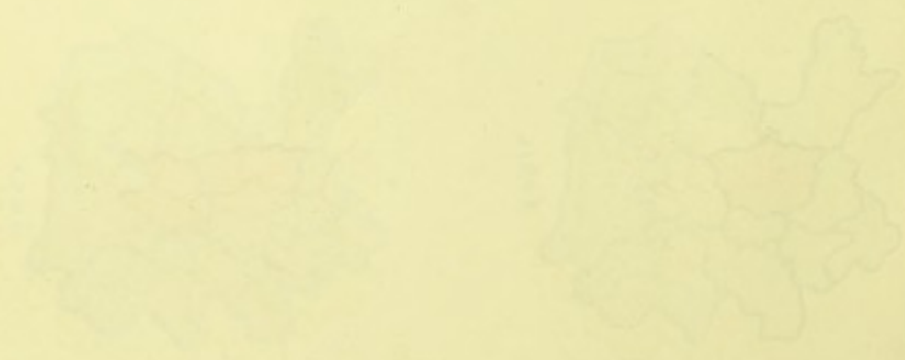
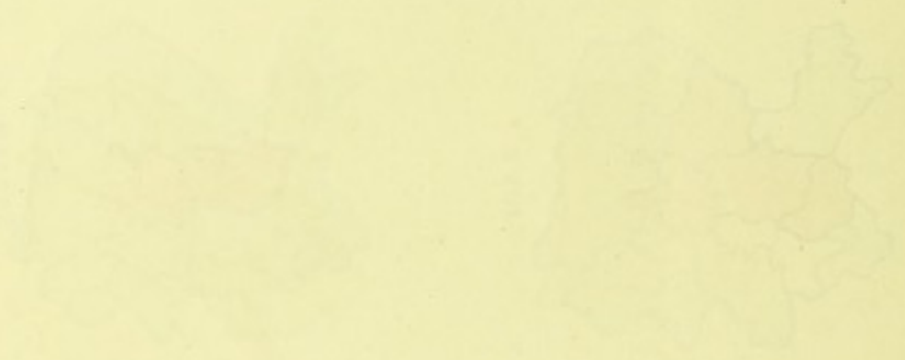


PLATE A. (BASED ON THE DATA OF THE BUREAU OF BIRD MORTALITY)
IN WHICH CASES OF SMALL-POX OCCURRED IN THE UNITED STATES
AND THE DISTRICT OF COLUMBIA IN THE YEAR 1901



Map showing the distribution of small-pox cases in the United States and the District of Columbia in the year 1901. The map is divided into states and territories, with shaded areas indicating the locations of small-pox cases.



PLANS (A., B AND C.) INDICATING THE SANITARY DISTRICTS OF THE DEWSBURY UNION
 IN WHICH CASES OF SMALL-POX OCCURRED IN THE SEVERAL MONTHS
 APRIL 1891 TO AUGUST 1892.

PLAN B .

Explanation

Red  indicates infected Districts. Blue  indicates non-infected Districts.
 (NB For key-map see Plan C)



DECEMBER.



MARCH.



NOVEMBER.



FEBRUARY



OCTOBER.



JANUARY

1891

1892



PLATE I
FIG. 1. A. B. C. D. E. F. G. H. I. J. K. L. M. N. O. P. Q. R. S. T. U. V. W. X. Y. Z. AA. AB. AC. AD. AE. AF. AG. AH. AI. AJ. AK. AL. AM. AN. AO. AP. AQ. AR. AS. AT. AU. AV. AW. AX. AY. AZ. BA. BB. BC. BD. BE. BF. BG. BH. BI. BJ. BK. BL. BM. BN. BO. BP. BQ. BR. BS. BT. BU. BV. BW. BX. BY. BZ. CA. CB. CC. CD. CE. CF. CG. CH. CI. CJ. CK. CL. CM. CN. CO. CP. CQ. CR. CS. CT. CU. CV. CW. CX. CY. CZ. DA. DB. DC. DD. DE. DF. DG. DH. DI. DJ. DK. DL. DM. DN. DO. DP. DQ. DR. DS. DT. DU. DV. DW. DX. DY. DZ. EA. EB. EC. ED. EE. EF. EG. EH. EI. EJ. EK. EL. EM. EN. EO. EP. EQ. ER. ES. ET. EU. EV. EW. EX. EY. EZ. FA. FB. FC. FD. FE. FF. FG. FH. FI. FJ. FK. FL. FM. FN. FO. FP. FQ. FR. FS. FT. FU. FV. FW. FX. FY. FZ. GA. GB. GC. GD. GE. GF. GG. GH. GI. GJ. GK. GL. GM. GN. GO. GP. GQ. GR. GS. GT. GU. GV. GW. GX. GY. GZ. HA. HB. HC. HD. HE. HF. HG. HH. HI. HJ. HK. HL. HM. HN. HO. HP. HQ. HR. HS. HT. HU. HV. HW. HX. HY. HZ. IA. IB. IC. ID. IE. IF. IG. IH. II. IJ. IK. IL. IM. IN. IO. IP. IQ. IR. IS. IT. IU. IV. IW. IX. IY. IZ. JA. JB. JC. JD. JE. JF. JG. JH. JI. JJ. JK. JL. JM. JN. JO. JP. JQ. JR. JS. JT. JU. JV. JW. JX. JY. JZ. KA. KB. KC. KD. KE. KF. KG. KH. KI. KJ. KK. KL. KM. KN. KO. KP. KQ. KR. KS. KT. KU. KV. KW. KX. KY. KZ. LA. LB. LC. LD. LE. LF. LG. LH. LI. LJ. LK. LL. LM. LN. LO. LP. LQ. LR. LS. LT. LU. LV. LW. LX. LY. LZ. MA. MB. MC. MD. ME. MF. MG. MH. MI. MJ. MK. ML. MM. MN. MO. MP. MQ. MR. MS. MT. MU. MV. MW. MX. MY. MZ. NA. NB. NC. ND. NE. NF. NG. NH. NI. NJ. NK. NL. NM. NN. NO. NP. NQ. NR. NS. NT. NU. NV. NW. NX. NY. NZ. OA. OB. OC. OD. OE. OF. OG. OH. OI. OJ. OK. OL. OM. ON. OO. OP. OQ. OR. OS. OT. OU. OV. OW. OX. OY. OZ. PA. PB. PC. PD. PE. PF. PG. PH. PI. PJ. PK. PL. PM. PN. PO. PP. PQ. PR. PS. PT. PU. PV. PW. PX. PY. PZ. QA. QB. QC. QD. QE. QF. QG. QH. QI. QJ. QK. QL. QM. QN. QO. QP. QQ. QR. QS. QT. QU. QV. QW. QX. QY. QZ. RA. RB. RC. RD. RE. RF. RG. RH. RI. RJ. RK. RL. RM. RN. RO. RP. RQ. RR. RS. RT. RU. RV. RW. RX. RY. RZ. SA. SB. SC. SD. SE. SF. SG. SH. SI. SJ. SK. SL. SM. SN. SO. SP. SQ. SR. SS. ST. SU. SV. SW. SX. SY. SZ. TA. TB. TC. TD. TE. TF. TG. TH. TI. TJ. TK. TL. TM. TN. TO. TP. TQ. TR. TS. TT. TU. TV. TW. TX. TY. TZ. UA. UB. UC. UD. UE. UF. UG. UH. UI. UJ. UK. UL. UM. UN. UO. UP. UQ. UR. US. UT. UY. UZ. VA. VB. VC. VD. VE. VF. VG. VH. VI. VJ. VK. VL. VM. VN. VO. VP. VQ. VR. VS. VT. VU. VV. VW. VX. VY. VZ. WA. WB. WC. WD. WE. WF. WG. WH. WI. WJ. WK. WL. WM. WN. WO. WP. WQ. WR. WS. WT. WU. WV. WW. WX. WY. WZ. XA. XB. XC. XD. XE. XF. XG. XH. XI. XJ. XK. XL. XM. XN. XO. XP. XQ. XR. XS. XT. XU. XV. XW. XX. XY. XZ. YA. YB. YC. YD. YE. YF. YG. YH. YI. YJ. YK. YL. YM. YN. YO. YP. YQ. YR. YS. YT. YU. YV. YW. YX. YY. YZ. ZA. ZB. ZC. ZD. ZE. ZF. ZG. ZH. ZI. ZJ. ZK. ZL. ZM. ZN. ZO. ZP. ZQ. ZR. ZS. ZT. ZU. ZV. ZW. ZX. ZY. ZZ.



PLANS (A., B AND C) INDICATING THE SANITARY DISTRICTS OF THE DEWSBURY UNION
 IN WHICH CASES OF SMALL-POX OCCURRED IN THE SEVERAL MONTHS
 APRIL 1891 TO AUGUST 1892.

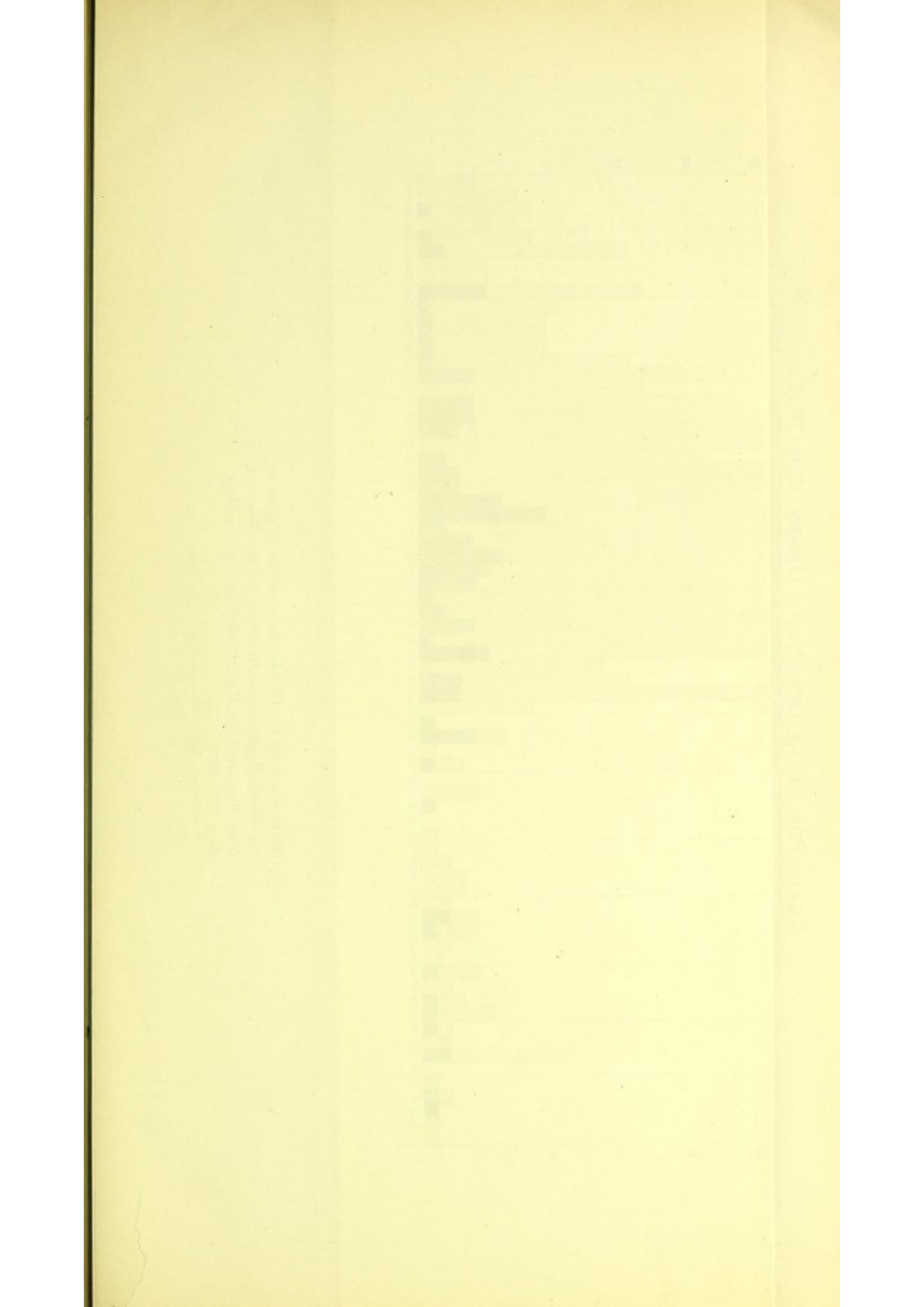
PLAN C .

Explanation

Red  indicates infected Districts. Blue  indicates non-infected Districts.



1892.



SMALL POX IN THE DEWSBURY UNION 1891 - 1892.

Chart I.

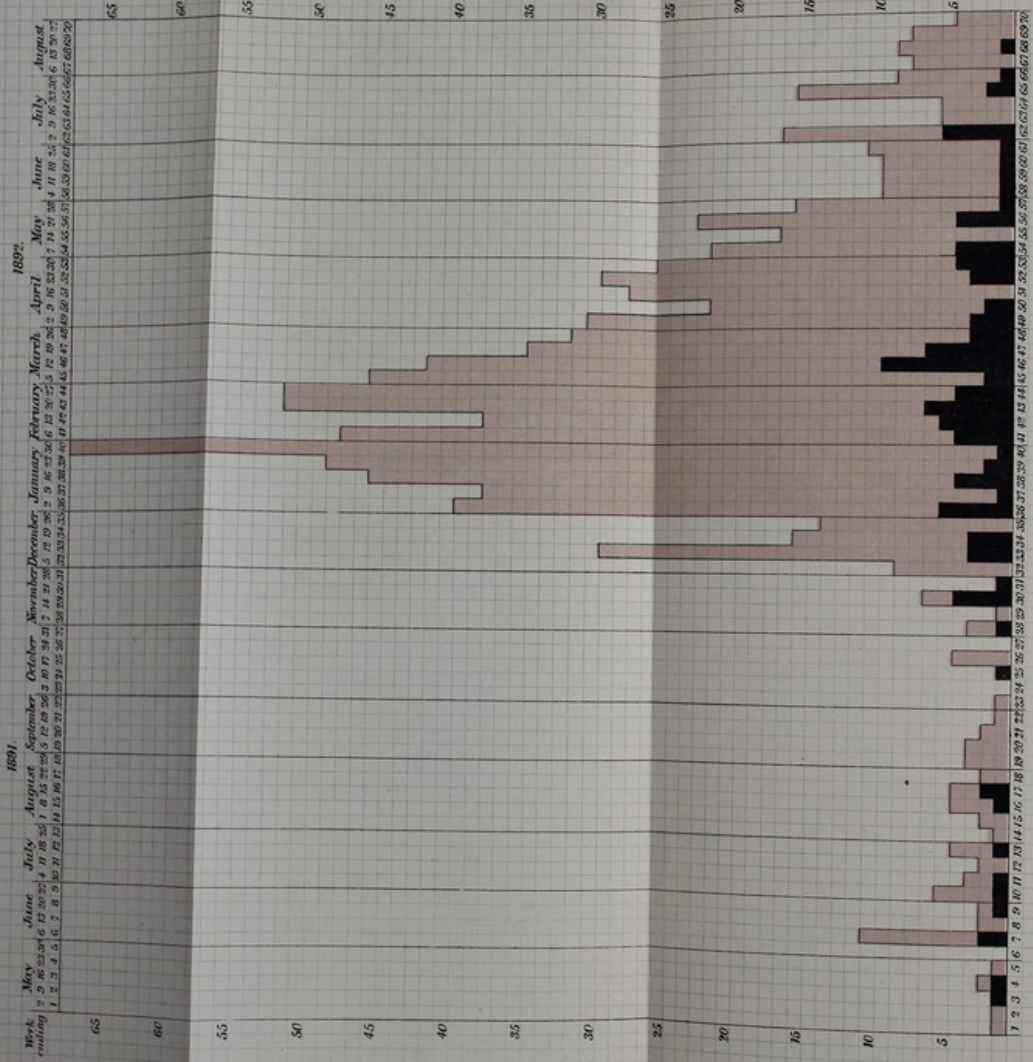


Chart shewing the Weekly Distribution of Cases in the whole Registration Districts for the 70 weeks from Week ending May 2nd 1891 to Week ending Aug. 27th 1892.

TABLE XXIX.

MONTHLY INCIDENCE of SMALL-POX in the DEWSBURY UNION.

Urban Sanitary Districts.

		Batley.	Dewsbury.	Birkenshaw.	Birtal.	Gomersal.	Heckmondwike.	Liversedge.	Mirfield.	Meerley.	Osselt.	Ravensthorpe.	Seothill Nether.	Seothill Upper.	Thornhill.	Total Cases.	Deaths.
1891.																	
April		1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
May		4	-	-	-	-	-	-	-	-	1	-	-	-	-	5	2
June		8	5	-	1	-	1	-	-	-	-	-	-	1	-	16	4
July		3	10	-	-	-	-	-	-	-	-	-	-	-	-	13	2
August		5	8	-	-	-	-	-	-	-	-	-	-	-	-	13	3
September		2	5	-	-	-	-	-	-	-	1	-	-	-	-	8	-
October		-	6	-	-	-	-	-	-	-	-	-	-	-	-	6	1
November		5	7	-	-	-	-	-	-	-	1	1	-	-	-	13	6
December		76	2	-	1	-	1	1	-	-	-	-	-	2	-	83	8
1892.																	
January		176	23	-	2	-	7	3	-	2	-	-	2	4	-	219	11
February		123	44	-	1	-	4	4	1	-	8	1	2	4	6	198	20
March		85	37	-	3	-	13	-	1	1	-	2	1	9	6	156	21
April		35	44	-	2	-	5	-	5	8	1	2	5	4	1	115	10
May		16	31	-	-	-	4	-	-	6	6	2	2	3	2	78	9
June		1	17	-	-	-	2	11	-	7	2	1	2	1	-	44	8
July		5	19	-	-	-	1	1	-	11	-	-	-	-	1	38	4
August		2	7	-	-	-	1	-	5	6	1	2	-	-	2	26	1
		545	265	-	10	-	39	20	12	41	20	17	14	25	20	1,029	110

The weekly incidence of the disease is illustrated in Charts I. and II.; the former giving the total number of cases and the case-mortality for each of the 70 weeks; the latter represents diagrammatically the relative distribution of the cases in the three main divisions here adopted, viz., (1) Batley, (2) Dewsbury, and (3) "Other" Districts than (1) and (2), viz., those enumerated above. The figures on which these charts are based are given in the following table:—

TABLE XXX.
SMALL-POX IN THE DEWSBURY UNION, 1891-92.
Charts I.* and II.

Week ending.	Batley.		Dewsbury.		Other Districts.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1891.								
May 2	1	-	-	-	-	-	1	-
" 9	1	-	-	-	-	-	1	-
" 16	1	1	-	-	-	-	1	1
" 23	1	1	-	-	1	-	2	1
" 30	1	-	-	-	-	-	1	-
June 6	-	-	-	-	-	-	-	-
" 13	7	2	-	-	3	-	10	2
" 20	-	-	2	-	-	-	2	-
" 27	-	-	2	1	-	-	2	1
July 4	2	1	3	-	-	-	5	1

* Explanation of Chart I.—
This Chart shows the total number of cases arising in all the infected districts of the Dewsbury Union in each of the 70 weeks covered by the inquiry, viz., from the week ending May 2nd, 1891, to the week ending August 27th, 1892. It also indicates the number of fatal attacks amongst the cases so arising. The total number of cases was 1,029; of deaths, 110.

Week ending.	Batley.		Dewsbury.		Other Districts.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
July 11	-	-	3	1	-	-	3	1
" 18	-	-	2	-	-	-	2	-
" 25	1	-	3	1	-	-	4	1
August 1	1	-	-	-	-	-	1	-
" 8	1	-	1	-	-	-	2	-
" 15	2	-	2	1	-	-	4	1
" 22	2	-	2	2	-	-	4	2
" 29	-	-	2	-	-	-	2	-
September 5	-	-	5	-	-	-	5	-
" 12	1	-	1	-	1	-	3	-
" 19	1	-	1	-	-	-	2	-
" 26	-	-	1	-	-	-	1	-
October 3	-	-	1	-	-	-	1	-
" 10	-	-	-	-	-	-	-	-
" 17	-	-	1	1	-	-	1	1
" 24	-	-	4	-	-	-	4	-
" 31	-	-	-	-	-	-	-	-
November 7	-	-	2	1	1	-	3	1
" 14	-	-	1	-	-	-	1	-
" 21	4	3	2	1	-	-	6	4
" 28	1	1	-	-	-	-	1	1
December 5	6	-	2	-	-	-	8	-
" 12	27	3	-	-	2	-	29	3
" 19	15	3	-	-	-	-	15	3
" 26	11	-	2	-	-	-	13	-

SMALL-POX IN THE DEWSBURY UNION, 1891-92—
continued.

Week ending.	Batley.		Dewsbury.		Other Districts.		Totals.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1891.								
January 2	34	3	2	2	3	—	39	5
“ 9	29	1	6	—	2	—	37	1
“ 16	34	4	2	—	9	—	45	4
“ 23	41	2	5	—	2	—	48	2
“ 30	53	1	8	—	6	—	67	1
February 6	31	3	7	1	9	—	47	4
“ 13	23	2	10	2	5	1	37	5
“ 20	35	5	12	1	4	—	51	6
“ 27	26	1	13	1	12	2	51	4
March 5	30	2	9	—	6	—	45	2
“ 12	23	5	9	1	9	3	41	9
“ 19	15	2	10	1	9	3	34	6
“ 26	17	2	5	—	9	1	31	3
April 2	14	1	7	1	9	1	30	3
“ 9	6	1	7	1	8	—	21	2
“ 16	7	—	13	—	7	—	27	—
“ 23	11	2	9	1	9	—	29	3
“ 30	6	—	14	3	5	1	25	4
May 7	5	1	7	2	9	1	21	4
“ 14	4	—	4	—	8	—	16	—
“ 21	6	2	10	2	6	—	22	4
“ 28	—	—	10	1	5	—	15	1
June 4	1	—	3	1	5	—	9	1
“ 11	—	—	3	1	6	—	9	1
“ 18	1	—	2	1	6	—	9	1
“ 25	—	—	2	1	8	—	10	1
July 2	1	1	9	3	6	1	16	5
“ 9	—	—	3	—	2	—	5	—
“ 16	1	—	2	—	2	—	5	—
“ 23	1	1	8	1	6	—	15	2
“ 30	2	—	4	1	2	—	8	1
August 6	2	—	1	—	4	—	7	—
“ 13	—	—	3	1	5	—	8	1
“ 20	—	—	1	—	6	—	7	—
“ 27	—	—	2	—	2	—	4	—
	645	57	265	39	219	14	1,029	110

Leaving the record of particular features of the epidemic to the account furnished of its spread in each of the infected districts it may be useful to point out in this place that the occurrence of a small outbreak amongst the inmates of the Dewsbury Union Workhouse coincided with the appearance of the disease in Dewsbury. There can be little question that small-pox was introduced into the Workhouse by the transference to the building set apart for infectious diseases at the Workhouse Infirmary of cases from Batley, which at that time had no special provision for their isolation. Nine of the 23 cases occurring at Batley—April to September 1891—were thus removed to the Workhouse Infirmary, viz., one in April, two in May, five in June, and one in July. The six inmates of the infirmary who contracted the disease were attacked in June, July, and August; but immediately prior to this the first case notified in Dewsbury itself was that of a young weaver employed at a mill adjoining the workhouse at Staincliffe. It is of course impossible to say whether he, and indeed others living in the vicinity who also suffered early in the outbreak, were infected from their proximity to the infirmary. There were other conditions for the spread of the disease—once it had gained entrance into a working population like that of Batley and Dewsbury. That it was

primarily introduced through infected rags is of course highly probable; but the incidence of the disease fell far more upon the class of weavers and miners than on those more directly concerned in the rag trade (i.e., rag-sorters, rag-pickers, &c.). The lack of hospital accommodation at Batley during the months of December to March may have contributed to the diffusion of the disease, but a chief share in this diffusion must unquestionably be ascribed to the mines, workshops, and elementary schools. It will be seen from the foregoing Tables and Chart II.* that the disease was vastly more prevalent during the months of January, February, and March than at any other period of like extent, more than half the cases of the 16 months occurring then—or in Batley about 70 per cent. of the whole number, in Dewsbury about 40 per cent., and in the other districts about 40 per cent. As showing the different degrees of prevalence in a more striking manner one may divide the 16 months—May to August—into four periods which would give for

Batley.

	Cases.	Deaths.
1st period (May-August 1891.)	20 or 3·6 per cent.	5 or 8·7 per cent.
2nd period (September-December 1891.)	83 „ 15·2 „	12 „ 21·0 „
3rd period (January-April 1892.)	417 „ 76·6 „	35 „ 61·4 „
4th period (May-August 1892.)	24 „ 4·4 „	5 „ 8·7 „
	544	57

Dewsbury.

	Cases.	Deaths.
1st period	23 or 8·7 per cent.	6 or 15·4 per cent.
2nd „	20 „ 7·5 „	3 „ 7·7 „
3rd „	148 „ 55·8 „	15 „ 38·4 „
4th „	74 „ 28 „	15 „ 38·4 „
	265	39

Other Districts.

	Cases.	Deaths.
1st period	4 or 1·8 per cent.	0
2nd „	7 „ 3·2 „	0
3rd „	130 „ 54·8 „	12 or 85·7 per cent.
4th „	88 „ 40·2 „	2 „ 14·3 „
	219	14

It will be seen that the case prevalence did not correspond with the “mortality” except during one of the periods. The figures are too few to permit of any deduction being made as to varying severity of the cases in regard to the period of the outbreak, nor would this be at all profitable since the inquiry has not covered the whole of the epidemic.†

Of the total number, 1,029 cases, all but eight occurred in private dwellings. As already stated six were inmates of the Workhouse Infirmary (which are reckoned in the Dewsbury series as cases arising in the Workhouse are notified to the Dewsbury Sanitary Authority), one was a nurse at the Dewsbury Infirmary, and one a nurse engaged at the Batley Small-Pox Hospital.

* Explanation of Chart II.—

In this Chart the relative distribution (weekly) of the cases of small-pox arising in the Union among the several districts is represented. The different shades of tint indicate the number of cases occurring in—

- (a.) Batley, 545 cases,
 (b.) Dewsbury, 265 cases,
 (c.) Other districts of union, 219 cases,
 (d.) Union workhouse, 6 cases. } = 1,029.

† See note (*) at foot of next page.

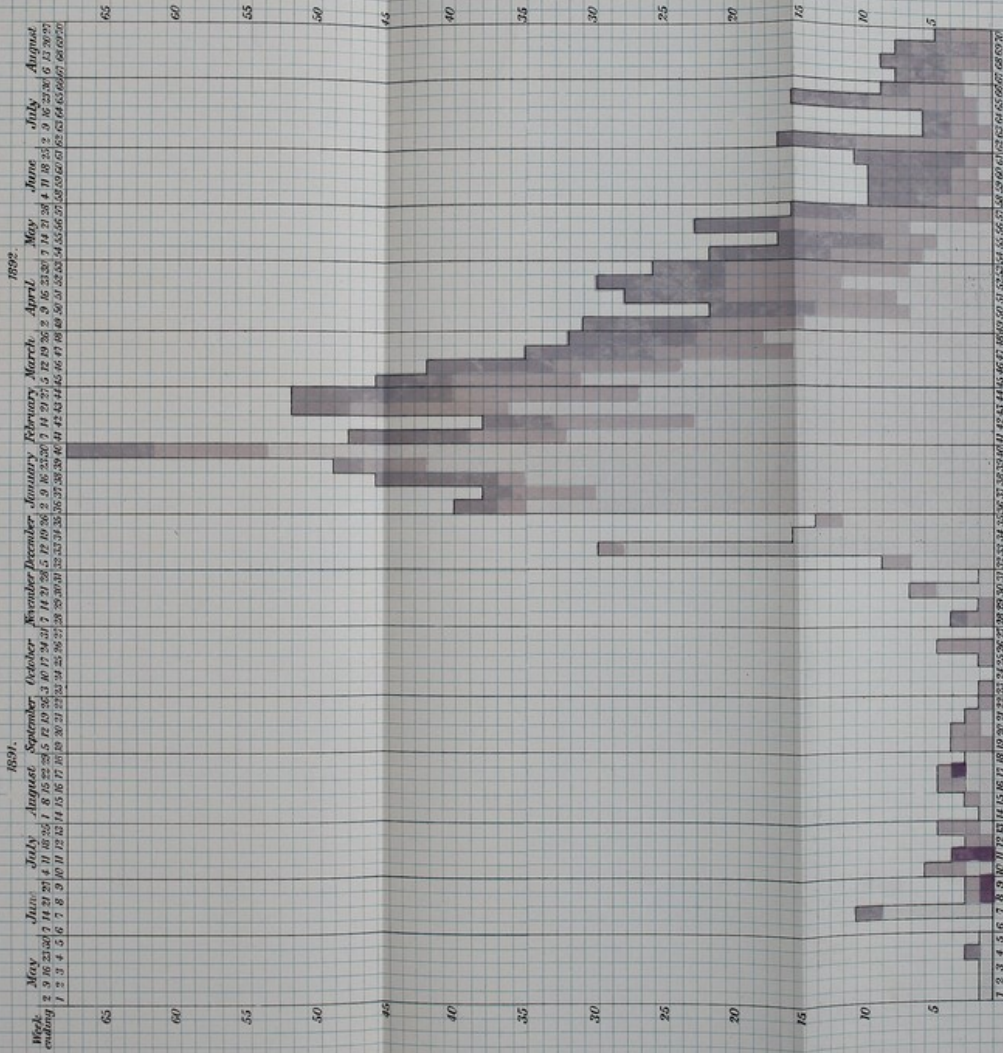
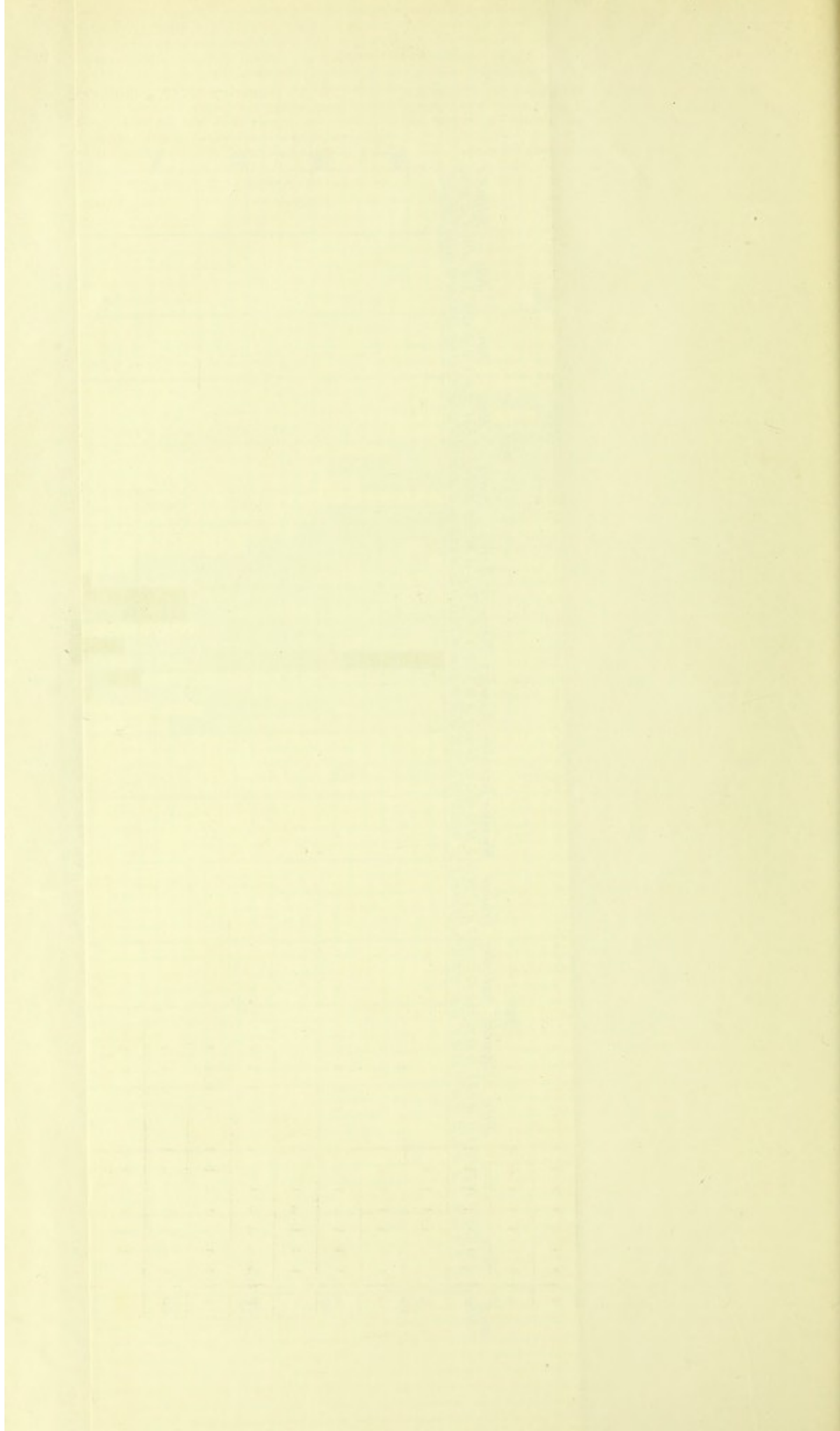


Chart showing Weekly Distribution of Cases arising in the Several Districts.

- Batley
- Dewsbury
- Other Districts
- Union-Workhouse



The 1,021 cases came from 645 houses, namely one case from 426 households, and the remainder—595—consisted of two or more members of 219 households. More precisely stated—

In 426 houses there occurred 426 cases.			
" 115 "	" "	" "	250 "
" 55 "	" "	" "	165 "
" 25 "	" "	" "	100 "
" 8 "	" "	" "	40 "
" 3 "	" "	" "	18 "
" 2 "	" "	" "	14 "
" 1 "	" "	" "	8 "

The months in which these houses were severally invaded, and the number of cases arising therefrom were as follows :—

TABLE XXXI.

1891.		1892.	
Month.	No. of Houses Invaded.	Month.	No. of Cases in Houses.
April . . .	1	January . . .	132
May . . .	4	February . . .	121
June . . .	12	March . . .	100
July . . .	9	April . . .	78
August . . .	5	May . . .	44
September . . .	5	June . . .	23
October . . .	4	July . . .	19
November . . .	11	August . . .	21
December . . .	56		
	110		236

Particulars were obtained by personal inquiry of the inmates of 544 houses, viz. : 130 in Desbury, 267 in Batley, and 147 in the "Other" Districts. The inmates of these houses amounted to exactly 3,000, the number of cases of small-pox which had occurred amongst them being 887. So that the proportion of houses to inmates was 1 : 5.5; of houses to cases 1 : 1.6; and of cases to inmates

† Visits were made to many more of the invaded houses, but from various causes, such as absence of all inmates at work, or their removal from the neighbourhood, &c. the inquiry came to be restricted as above.

1 : 3.3. In this community of 3,000 individuals rather less than one-third had the disease. Of the 544 houses there was one case of small-pox in 355 whilst two or more cases occurred in the remaining 189 houses, which yielded 232 cases, thus distributed :—

Houses.	Cases.
355	355
98	196
59	156
25	100
8	40
3	18
2	14
1	8
544	887

The number of inmates to a house varied from one—a female living by herself, who contracted small-pox—to 11, so that there were—

Houses.	Number of Inmates per House.	Total Persons.
11	11	121
19	10	190
27	9	243
43	8	344
60	7	420
91	6	546
95	5	475
102	4	408
42	3	186
33	2	66
1	1	1
544		Yielding a total of 3,000 persons.

It may be of further interest to ascertain the relative number of cases of small-pox occurring in the larger and smaller households, and a table may be drawn up to assist in this analysis, thus :—

* The following table is prepared from the Monthly Reports of the County Council Medical Officer, and gives the cases of small-pox notified in each of the districts, subsequent to August 1892 :—

	Batley.	Desbury.	Birkenshaw.	Birstal.	General.	Heckmondwike.	Liversedge.	Mirfield.	Morley.	Orsett.	Ravenscroft.	Seothill Nether.	Seothill Upper.	Thornhill.	
1892.															
September . . .	—	4	—	—	—	—	—	—	—	—	—	—	—	1	5
October . . .	—	6	—	—	—	2	1	—	—	—	—	—	—	1	10
November . . .	1	4	—	—	—	4	2	—	1	—	—	4	—	2	15
December . . .	5	13	—	—	—	7	7	—	1	1	—	1	—	—	21
1893.															
January . . .	5	10	—	—	—	1	—	5	1	4	—	—	1	2	29
February . . .	—	7	—	2	—	—	4	2	1	—	—	2	—	—	18
March . . .	1	3	—	—	—	—	—	—	—	—	1	2	3	—	10
April . . .	2	5	—	—	—	—	—	1	5	8	—	—	—	—	21
May . . .	1	6	—	—	—	—	—	—	—	2	8	—	—	1	18
June . . .	—	—	—	—	—	1	—	—	—	3	—	7	—	—	4
July . . .	—	5	—	—	2	6	—	—	—	2	—	—	—	—	15
	15	63	—	2	2	14	7	8	9	20	9	9	4	7	169

† No return.

TABLE XXXII.

Number of Inmates per House.	Number of Houses.	Number of Cases of Small-pox per House.								Total In-mates.	Total Cases.
		1.	2.	3.	4.	5.	6.	7.	8.		
11	11	8	1	1	—	1	—	—	—	121	18
10	19	8	2	3	2	1	2	—	1	190	54
9	27	14	6	2	4	—	—	1	—	243	55
8	43	20	7	9	5	1	—	1	—	344	93
7	60	30	14	12	2	1	1	—	—	420	113
6	91	55	18	9	6	3	—	—	—	546	157
5	95	70	10	8	6	1	—	—	—	475	143
4	102	72	22	8	—	—	—	—	—	408	140
3	62	63	9	—	—	—	—	—	—	186	71
2	33	24	9	—	—	—	—	—	—	66	42
1	1	1	—	—	—	—	—	—	—	1	1
	544	355	98	52	25	8	3	2	1	3,000	887

As might be surmised the larger households mostly present a larger proportion of "multiple" cases than do the smaller, but there is no regular scale of increase in proportion as the numbers presumably exposed to infection rise. Nor is this to be wondered at, since so many factors may have contributed to "protect" the remaining inmates from the contagion. The point, however, will be referred to again in a subsequent part of this report. Meanwhile the relative proportions of single and of multiple cases in these households may be stated in approximate terms, as:—

Households, Members of.	Single Cases.	Multiple.
	Per cent.	Per cent.
11	72	28
10	42	58
9	52	48
8	46	54
7	50	50
6	60	40
5	74	26
4	70	30
3	85	15
2	73	27

Of the total number of cases of small-pox, 1,029, 521 were males, and 508 females. These may be classified in age-groups as follows:—

	Male.	Female.	Both Sexes.
Under 1 year of age	14	15	29
From 1 to 10 years	88	107	195
10 to 30 years	278	282	560
30 years and upwards	137	161	298
Age not ascertained	4	3	7
	521	508	1,029

Analysing in the same manner the community of 3,000 persons of whom 887 contracted small-pox, we obtain the relative age-incidence of the disease to the total numbers exposed at the various ages:—

	Total Number of Inmates of House.	Total of Cases of Small-pox.	Per-centage attacked.
Under-1 year	75	25	33·3
1 to 10 years	654	178	27·2
10 to 30	1,340	482	35·7
30 and upwards	901	202	22·3
Age not ascertained	21	—	—
	3,000	887	29·2

Reference may here be made to Chart III,* where facts as to age incidence are diagrammatically represented. The Chart also gives the number of fatal attacks. It will be seen that of 203 attacked in age-period, 0 to 10 years, 48, or 23·6 per cent. died; of 482 attacked between 10 and 30 years, 24 died, or 4·9 per cent.; and of 202 aged 30 and upwards 11 died, or 5·4 per cent.

Of the whole number (3,000) exposed to infection, 123 had previously suffered from small-pox, 6 of them being again attacked. Of these individuals, 99 were aged 30 years and upwards, 23 between 10 and 30 years, and of one the age was not ascertained.

With but few exceptions the incidence of the disease fell upon members of the working class community, and as the proportion of those engaged in weaving and allied industries, is naturally greatest in this district, it was amongst this class, that a larger number of cases were to be found than in any other avocation.

In order to facilitate comparison I have separated all persons concerned into three main groups, viz:—

(a.) Those living at home, having either no fixed occupation, or engaged in domestic duties, or in work carried on in their dwellings.

This class comprises therefore most of the children under 5 years of age, and the great majority of mothers of families.

(b.) The children attending school, their ages ranging between 4 and 15 years.

(c.) Those engaged in work at factories, mines and elsewhere, and only going home for meals and rest.

Under the first head, those "At Home," are included 340 cases of small-pox, viz., 99 males and 241 females.

Under the second head, those "At School," are included 173 cases of small-pox, viz., 90 males and 83 females.

Under the third head those "At Work," are included 510 cases of small-pox, viz., 329 males and 181 females.

The total number, 1,029, is made up by the addition of the 6 inmates of the workhouse infirmary who contracted the disease.

Reserving to the sections dealing with particular districts any detailed list of the occupations of those attacked with small-pox, it may be useful here to give in tabular form a condensed summary of these returns:—

TABLE XXXIII.

	MALES.					Total.
	Under 1 year.	1 to 10 years.	10 to 30 years.	30 and over.	Are not ascertained.	
At home:—						
Of no occupation	14	34	6	2	1	57
Engaged in trade, &c.	—	—	14	28	—	42
At school	—	54	36	—	—	90
At work:—						
Mill or factory	—	—	67	26	1	94
Bag sorter	—	—	1	3	—	4
Miner	—	—	81	17	—	98
Other occupations	—	—	55	53	—	108
Occupation not ascertained	—	—	15	8	2	25
Workhouse inmates	—	—	3	—	—	3
Total	14	88	278	137	4	521

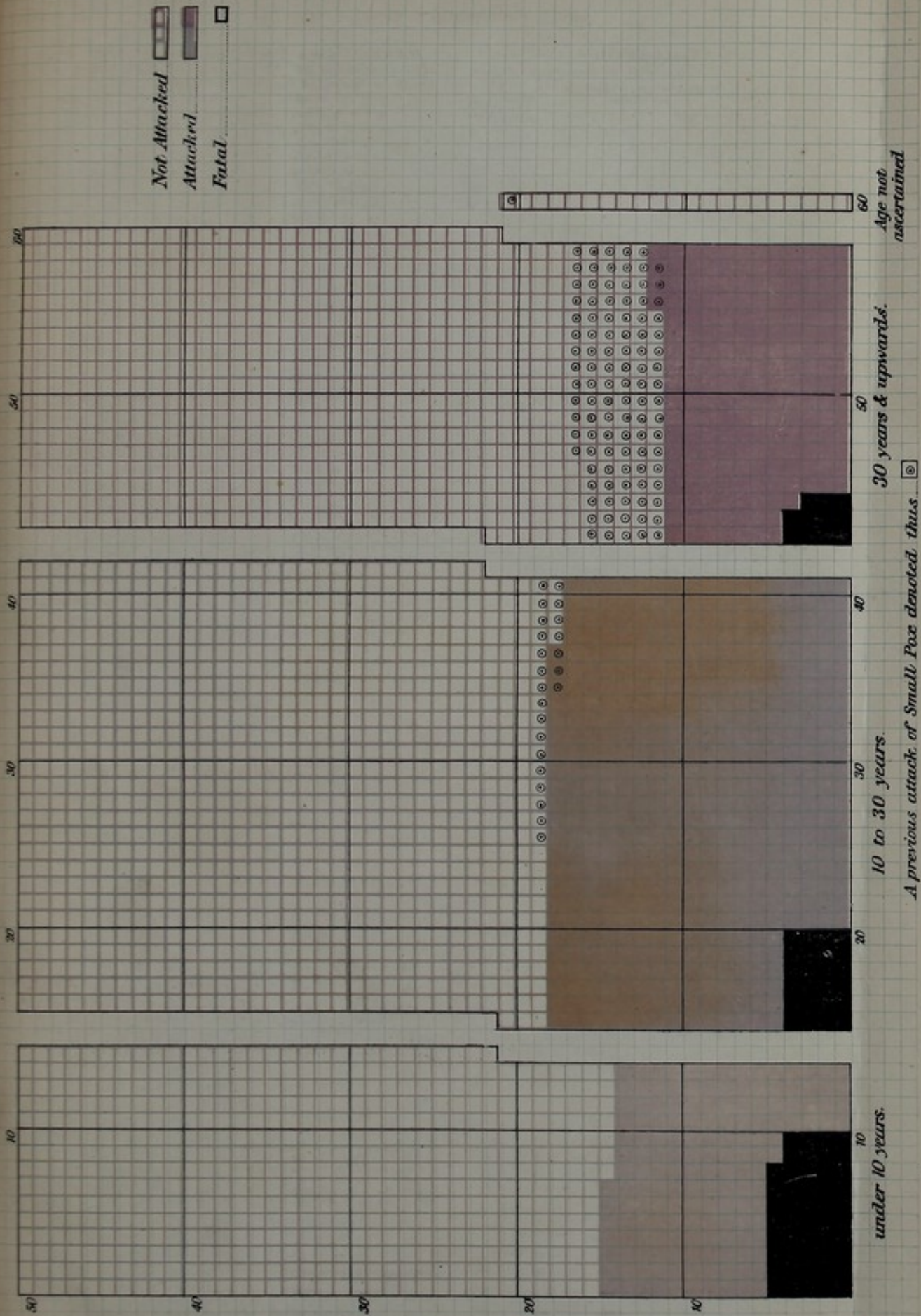
* Explanation of Chart III.—

In this Chart the incidence of small-pox upon the members of 244 houses visited during the inquiry is represented. The total number of this community was 3,000, and in the Diagram each small square represents one individual. These are arranged in four groups according to age periods; those attacked with small-pox being indicated by shading.

	Persons.	Attacked.	Died.
Group A. (under 10 years)	759	203	48
" B. (10 to 30 years)	1,349	482	24
" C. (30 years upwards)	901	302	11
" D. (age not known)	21	None	—

The diagram further shows the numbers of those who had previously suffered from small-pox. Of these there are 23 in Group B., including 3 again attacked in this epidemic; 99 in Group C., of whom 2 were again attacked, and 1 in Group D.

Chart III.
INCIDENCE OF SMALL POX UPON 3000 MEMBERS OF INVADIED HOUSEHOLDS.



To face page 28.

A

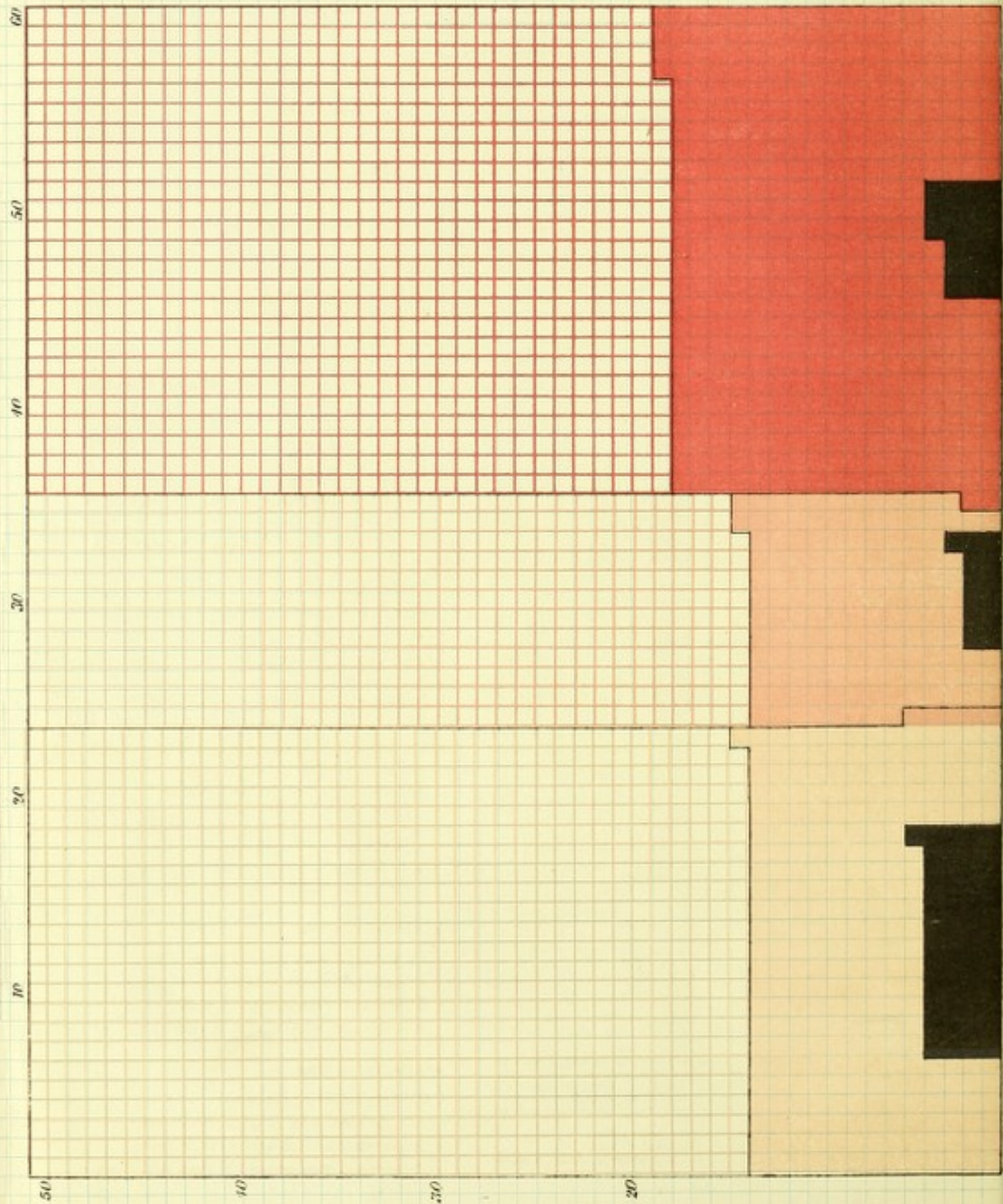
B

A previous attack of Small Pox denoted thus [Symbol]

C

D

Chart IV. CHART SHEWING PROPORTION OF THOSE ATTACKED WITH SMALL POX OUT OF 3000 INMATES IN HOUSES, (ALL DISTRICTS OF THE DEWSBURY UNION.)



The different shades of colour represent the 3 groups into which the 3000 inmates of infected houses have been divided.

- (1) Living at Home or engaged in Home duties
- (2) Attending School
- (3) Engaged in daily work away from Home

- Cases of Small Pox "at Home"
- Other inmates
- Cases of Small Pox "at School"
- Other inmates
- Cases of Small Pox "at Work"
- Other inmates
- Fatal cases in each group.

TABLE XXXIII.—continued.

	FEMALES.					Total.
	Under 1 year.	1 to 10 years.	10 to 30 years.	30 and over.	Age not ascertained.	
At home :—						
Housewife	—	—	49	73	2	124
Of no occupation	15	48	29	2	—	94
Engaged in trade, &c.	—	—	14	8	1	23
At school						
	—	59	24	—	—	83
At work :—						
Mill or factory	—	—	111	13	—	124
Rag sorter	—	—	37	2	—	39
Other occupation	—	—	13	3	—	16
Occupation not ascertained	—	—	2	—	—	2
Workhouse inmates						
	—	—	3	—	—	3
Total	15	107	282	101	3	508

In Chart IV,* there is represented, diagrammatically the relative proportions of the inmates of the 544 invaded houses, of which particulars were obtained, who were residing "at home" in one capacity or another throughout the day, or were in daily attendance "at school," or engaged "at work" away from home. The diagram also shows the numbers of those under each of those sections who were attacked with small-pox. The figures are :—

At Home.

Total number of inmates	-	-	1,155
Number attacked by small-pox	-	-	305
Proportion of inmates to cases	-	-	3·7 : 1

At School.

Total number of inmates	-	-	593
Number attacked by small-pox	-	-	151
Proportion of inmates to cases	-	-	3·9 : 1

At Work.

Total number of inmates	-	-	1,252
Number attacked by small-pox	-	-	431
Proportion of inmates to cases	-	-	2·9 : 1

This analysis shows that the liability to attack, owing doubtless to greater opportunity of exposure, was above the average (3·3 : 1) in the cases of those engaged at work, and slightly below it in the other two series.

Respecting the type and mortality of the disease, the cases fall under the following heads, viz :—

	Cases.	Deaths.
Confluent	273	105
Coherent	125	—
Discrete	333	3
Mild	283	—
Type not determined	15	2

* Explanation of Chart IV. :—

In this chart the 5,000 persons dwelling in 545 infected houses are grouped according to their daily occupations, viz., into three classes (indicated by different shades of colour)—of those engaged (a) at home, (b) attending school, (c) employed at work away from home. The first group comprises 1,155 persons, 305 of whom were attacked with small-pox, and 10 died. The second group, 593 persons, 151 attacked, 13 died. The third group, 1,252 persons, 431 attacked, 21 died. There being thus 827 attacked out of a community of 5,000 members, 26 being fatal attacks.

They may be tabulated according to age periods as follows :—

TABLE XXXIV.

	Confluent.		Coherent.		Discrete.		Mild.		Indeterminate.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	20	18	2	—	3	—	3	—	1	1	29	19
1 to 10 years	76	35	24	—	43	3	48	—	4	—	195	38
10 to 30 years	130	33	75	—	153	—	157	—	5	—	500	33
30 years and upwards	46	19	23	—	93	—	73	—	3	1	238	20
Age not ascertained	1	—	1	—	1	—	2	—	2	—	7	—
Total	273	105	125	—	333	3	283	—	15	2	1,029	119

The study of these figures shows that the proportion of confluent cases at all ages was 26·5 per cent. :—

Under 1 year of age	-	-	69	per cent.
From 1 to 10 years	-	-	36·8	"
From 10 to 30 years	-	-	23·3	"
30 years and upwards	-	-	19·4	"

The proportion of coherent cases at all ages was 12·1 per cent. :—

Under 1 year of age	-	-	3·8	per cent.
From 1 to 10 years	-	-	12·4	"
From 10 to 30 years	-	-	13·5	"
30 years and upwards	-	-	9·2	"

The proportion of discrete cases at all ages was 32·3 per cent. :—

Under 1 year of age	-	-	10·3	per cent.
From 1 to 10 years	-	-	22·8	"
From 10 to 30 years	-	-	34·2	"
30 years and upwards	-	-	39·8	"

The proportion of mild cases at all ages, was, 27·5 per cent. :—

Under 1 year of age	-	-	10·3	per cent.
From 1 to 10 years	-	-	24·8	"
From 10 to 30 years	-	-	28	"
30 years and upwards	-	-	30·8	"

Or again, of the whole number of confluent cases at all ages :—

- 7·3 per cent. were under 1 year of age, with a mortality of 90 per cent.
- 27·8 per cent. were at ages of from 1 to 10 years, with a mortality of 46·6 per cent.
- 47·6 per cent. were at ages from 10 to 30 years, with a mortality of 25·2 per cent.
- 16·8 per cent. were at ages of 30 years and upwards, with a mortality of 41·3 per cent.

Of the coherent class :—

- 1·6 per cent. were under 1 year of age.
- 19·2 per cent. were at ages 1 to 10 years.
- 60 per cent. were at ages 10 to 30.
- 18·4 per cent. were at ages 30 years and upwards.

Of the discrete class :—

- 0·9 were under 1 year of age.
- 12·9 per cent. were at ages 1 to 10 years.
- 58 per cent. were at ages 10 to 30 years.
- 28 per cent. were at ages 30 years and upwards.

Of the *mild* class :—

- 1 per cent. were under 1 year of age.
 16.9 per cent. were at ages 1 to 10 years.
 55.4 per cent. were at ages 10 to 30 years.
 26 per cent. were at ages 30 years and upwards.

From which it appears :—

- 1st. That the age-period of 10 to 30 years afforded not only the absolutely largest number of the cases of small-pox, but of each of the four types of the disease.
- 2nd. That whereas in the mild and discrete forms the age-period of 30 years and upwards afforded absolutely more cases than the age-period of 1 to 10 years, the reverse was the case as regards the coherent and confluent types.
- 3rd. That by far the fewest cases in each series, were in the age-period "under 1 year."
- 4th. In contrast to the foregoing we find that whereas in each age-period the coherent type furnished the fewest cases in the two periods below 10 years the confluent cases were in greatest excess in these periods, whilst in the two periods, from 10 years upwards, the discrete cases predominated and the proportion of mild cases was in excess of that of the confluent.
- 5th. The absolute mortality was highest in the second age-period (1 to 10 years), but by far the highest relative mortality was among the infants under 1 year of age.

It will be necessary to revert to these figures when the question of the influence of vaccination comes to be considered.

It will be seen subsequently that whereas in Dewsbury all the patients, with five exceptions, were treated in hospital, a considerable proportion of the Batley cases could not be so isolated. In the early months of the outbreak most of the cases were indeed removed to the Workhouse Infirmary at Staincliffe, but when this was closed to small-pox in November, by order of the Local Government Board, the temporary Small Pox Hospital at Batley did not exist. This hospital began to receive patients in January, but it was not until the middle of March, after the buildings had been extended, that it could afford accommodation sufficient for all cases. Hence, from November to March, the majority of the Batley patients had to be treated in their own homes. As regards the other districts, the boroughs of Ossett and Morley had their own provision for isolation, and the rest availed themselves of either the Dewsbury or Batley hospitals; but a certain number of the cases (more than one-fourth), were cared for in their own dwellings.

Taking as before, the whole number of cases under review, it appears that :—

- 355 were treated at home.
 639 " " in isolation hospitals.
 35 " " in the Union Workhouse Infirmary,

Of the first group, 33 died, a mortality of 9.3 per cent.

Of the second group, 68 died, a mortality of 10.6 per cent.

Of the third group, 9 died, a mortality of 25.7 per cent.

These figures must not, however, be taken to show the comparative value of the different places of treatment, for the "workhouse" mortality is considerably heightened by the fact that three out of the nine fatal cases, were already patients in the infirmary when attacked with small-pox; and I think it is also a fact, that when a choice had to be made, from insufficient accommodation for all cases, those who were most ill were removed to hospital, and the others left at home.

Analysed according to age-periods the destiny of the cases may be thus summarised :—

Under 1 year of age.

18 were kept at home	-	-	12 died, or 66.6 per cent.
10 were sent to hospital	-	6	" " 60.0 "
1 was sent to workhouse infirmary	-	1	" " 100.0 "
		29	
		19	

From 1 to 10 years.

53 were kept at home	-	-	11 died, or 20.7 per cent.
135 were sent to hospital	-	25	" " 18.5 "
7 were sent to workhouse infirmary	-	2	" " 28.5 "
		195	
		38	

From 10 to 30 years.

197 were kept at home	-	-	8 died, or 4 per cent.
343 were sent to hospital	-	20	" " 5.8 "
29* were treated at workhouse infirmary	-	5	" " 17.1 "
		560	
		33	

From 30 years upwards.

85 were kept at home	-	-	2 died, or 2.3 per cent.
146 were sent to hospital	-	17	" " 11.6 "
7 were sent to workhouse infirmary	-	1	" " 14.2 "
		238	
		20	

* Including 6 inmates of whom 3 died.

Whilst of the 7 cases whose ages were not ascertained, 2 were left at home, and 5 sent to hospital.

It will be observed that as would naturally be expected, a much larger proportion of infants were left at home than of patients at other ages, the per-centages being :—

	At Home.	At Hospital.	At Workhouse Infirmary.
At all ages	34.6	62.	3.4
Under 1 year	62.1	34.5	3.4
1 to 10 years	27.1	70.	3.0
10 to 30 years	35.1	61.2	5.6
30 years and under	36.3	60.7	3.

PART III.

In this part I propose to give an account of the origin and progress of the epidemic in each of the districts invaded by small-pox up to the date of my inquiry, viz.—In Batley, Dewsbury, Birstal, Heckmondwike, Liversedge, Mirfield, Morley, Ossett, Ravensthorpe, Sootnill Nether, Sootnill Upper, and Thornhill. As the disease first appeared in Batley, and the cases were most numerous there, I shall consider that borough first, and shall deal statistically in turn with—(a) Batley, (b) Dewsbury, and (c) the other infected districts (collectively). It must be borne in mind that the epidemic which commenced in April 1891 and had been most marked in the months January to March 1892, was manifestly subsiding when my inquiry commenced. I have, however, done my best with the data at my disposal to give a connected account of its earlier history.

BATLEY.

Cases of small-pox notified in period of inquiry—History of origin of outbreak—Chapel Fold cases—The Union Workhouse Infirmary at Staincliffe—Cessation of outbreak in September 1891—The second outbreak—early cases—Invaded houses and their inmates—Numbers invaded in each month—List in order of invasion—The weekly incidence of cases of small-pox—monthly prevalence—Age and sex distribution—Analysis of households in relation to case incidence—Attack rates at different age periods—Occupations of those attacked—and of the members of 267 infected houses classified—Relative incidence of the disease upon those (a) at home—(b) attending school—(c) at work. Type of attacks—proportion of confluent, coherent, discrete, and mild cases. Measures of isolation—Monthly and weekly return of cases removed from home and those detained there during illness. Age and sex in these two classes—Analysis of "single" and "multiple" cases in households with respect to isolation—The multiple class divisible into three series, according as one or more were removed. "Initial" cases and "later" cases—Vaccination statistics—Weekly incidence in the various classes of vaccinated and unvaccinated subjects—Age analysis—Mortality—Relation to type of small-pox—Proportions of each class among inmates of invaded houses—and attack rates at various ages—Precious attacks of small-pox—The statistics of vaccination amongst the inmates of houses yielding single and multiple cases—in reference to isolation measures.—Detailed list of households, with respect to vaccination of their members.

During the period covered by this inquiry, viz., the seventy weeks ending August 27th, 1892—there were known to have occurred in Batley 545 cases of small-pox.* These cases came from 327 different dwellings, and one case arose at the small-pox hospital.

The first person known to be attacked was H. W., 22 years of age, a "minder" in one of the largest woollen factories in Batley. His illness began on April 30, 1893, the variculous rash (discrete) appeared on May 2nd, the case was notified to the medical officer of health and removed to the workhouse infirmary on May 7th, where he remained until July 1st. The patient lived in Harrison's Yard, at the foot of Dark Lane, Batley, whence another case was removed (No. 298), much later in the epidemic (Feb. 14, 1892). He was vaccinated, as also were the other members of his family, viz., W., W. the father, *æt.* 48, H. W., 20, and F. W., 18., brothers. The father and F. W. worked in the same mill as the patient. The origin of the attack could not be traced.

The next case notified was E. M., 22 years, a female "rag-picker" at the same mill as No. 1. She sickened on May 3, and was removed to the workhouse Infirmary on May 12, where she remained until June 26. She came from 5, Pearson Street, in the centre of town, a two-roomed dwelling, without free ventilation, in bad repair, but kept clean. There was an indifferent privy-midden at the back with covered ash-pit; the wall of same was damp from defective roof-drains, and a butcher's slaughter-house was situated opposite. The rent was 3s. 3d. per week. This

* All but 12 of these cases were notified to the Medical Officer of Health. There were also four other cases notified as small-pox, but presenting such ill-developed symptoms as to justify their exclusion from the list. Four other cases (Nos. 127, 140, 371, 485 in register) notified as small-pox proved on inquiry to be cases of variocella; two of them subsequently contracting small-pox. One of these (No. 471) was re-notified (No. 452 in register); the other (No. 485) was re-admitted to hospital without fresh notification.

tenement was occupied by three other persons besides the patient; viz., Mr. and Mrs. B., the one a cloth finisher, the other a rag-picker; and their child, M. A. B. (unvaccinated), who was attacked by small-pox on May 23, removed to the workhouse on the 26th, where she died on the 30th (No. 4). No other cases occurred in this neighbourhood.

It is not unlikely that the first two cases were exposed to the same source of infection. This was not traceable to any antecedent case, and may have been conveyed by the rags used in the trade. At the same time it is noteworthy that no other cases occurred in workers at this mill for some months (December 1891).

The next case known was that of an infant five months of age living in High Street. He sickened on May 11th and died on the 14th, and Dr. Stewart reports that the child was unvaccinated. The parents had left the neighbourhood, and no information was available as to the possible source of infection in this case.

A series of cases next occurred on the high ground near Staincliffe off the Halifax Road, near the westernmost boundary of Batley, and the Union Workhouse. The first of these (No. 11) was a youth, J. G., who was attacked on May 25. He worked in H.'s mill in Dewsbury, but at this time no cases were known to have occurred in that borough and the origin of his illness is unexplained. He lived with five others (aged from 77 to 22) in a small two-roomed "back-to-back" tenement in Chapel Fold, and was nursed at home by his mother. She alone kept to the house, the others employed at various mills "went about as usual." Only two of these people had been vaccinated, the rest, including the patient, were unvaccinated. On June 7, M. B., a girl of 15 (No. 5), living at 39, Chapel Fold, and working at F.'s mill, which adjoins the workhouse, was attacked, i.e., on the 14th day of the earliest symptoms in the previous case. She was removed to the workhouse infirmary on June 12th, where she remained until August 14th. It may be presumed she contracted the disease from No. 11, for it is hardly likely that she was infected (serially) by the proximity of her workplace to the infirmary which at that time (i.e., about May 12) only contained one small-pox case. It may be mentioned here that the first case notified in Dewsbury was a worker in this same mill. He sickened on June 14, only eight days after the foregoing case of M. B., who, however, besides contracting the disease herself may well have been the medium of contagion to this lad, from the infected area in which her home was situated. On the whole this seems more probable than infection from the infirmary, which at that date (i.e., about June 1) contained two cases of small-pox, one having died on May 30. (See later, "Dewsbury" section.)

Other cases in Chapel Fold were members of one household, a man named S. P., at 35, a gardener, with a wife and a family of five children, the oldest ten years of age, and the youngest two months old when her mother was attacked with small-pox on June 10. She was probably infected on May 28, three days after the first case occurred in this area. She was not taken to the infirmary until July 4, when her infant was removed there, and her husband also, the one sickening on June 30, the other on July 3rd. The infant (who was unvaccinated) died on July 8th. The four other children were removed to the workhouse for quarantine at the same time; they had all been vaccinated in infancy, and none of them took the disease. The house inhabited by this family was an old low roofed building and contained only two rooms. There was thorough ventilation, but the cleanliness and repair of the place was very moderate. A midden shared by the next house was situated about ten yards from the dwelling and had an open ash-pit.

Another case in this vicinity is that of G. B., a youth 17 years of age, living in Newsome's Yard, Chapel Fold, engaged in the co-operative grocery stores in the main road hard by. He was attacked on June 12th, and was nursed at home by his mother and sister, who were re-vaccinated on the day that his rash appeared, whilst his brother, the only other inmate of the house, was sent away from home. It was thought that he might have been infected in his shop by folk coming there from infected houses. The house, a back-to-back one, is well kept; but there is in the yard a defective privy-midden with a large and foul open ash-pit.

Chapel Fold is situated on the northern side of the Halifax Road about 800 feet from the workhouse. On the opposite side of the same road, about 500 feet from the workhouse, a large mill reservoir and field intervening, are two or three comparatively new rows of houses. In one

of these, Cullingworth Street, a young married woman, J. A., in third month of pregnancy, fell ill of small-pox on June 8th. She was removed to the workhouse infirmary on the 12th and died there on the 17th. Her husband, a soldier, being away, she lived with her parents Mr. and Mrs. C., who had five other children at home. The house, which is a back-to-back one, has three rooms, and did not seem to be well kept. It is uncertain where J. A. contracted the disease. At the time of her presumed infection (about May 26) there were three cases of small-pox in the workhouse infirmary; but it is hardly probable that she was infected by them. Nevertheless another case (No. 7) a man, aged 40, occurred in a neighbouring house in the same street, on June 10, this case being left at home but no information available; and a third (No. 8), in a back-to-back house on the main road close to Cullingworth Street, a female child, two years of age, who sickened on June 12, and was taken to the workhouse infirmary on June 15, where she stayed until August 8. This child was unvaccinated, as also was her sister, *et. 9*, but the other inmates of the house, the parents, had been vaccinated in infancy. The house contained two rooms, was well kept and clean; and the privy was situated in a back yard, and was shared by three other households.

On June 12th there also fell ill a young woman, L. W. (No. 12) living in Upper North Street, also on high ground in a newly built over district in the same direction as Staincliffe. She was removed to the workhouse infirmary on June 15, and died there on the 18th. She was a weaver, but as the family had removed, I could get no information as to where she worked. The source of her infection cannot be surmised.

In July two fresh cases were notified in the borough. One was that of a lad, C. T., 15 years of age (No. 15), employed by a newsagent to carry papers to customers, and amongst others to Mr. P. at Chapel Fold. The lad sickened on July 25, and must therefore have been infected on or about July 12, a week after all the P. family had been taken to the workhouse. He was nursed at home by his mother, *et. 38* (who had small-pox in 1863, when it prevailed in Batley*), being kept in the dwelling room downstairs. The five other members of the family, all of whom had been vaccinated in infancy, were quarantined in the upstairs room. The house is in Track Quarry, has no through ventilation, a dead wall behind, the privy and ashpit accommodation is bad, and is situated in a narrow passage at the back of the row of houses. No other case occurred in this house. On July 29, R. W., 20, a butcher, living at Clay Hill, a few yards from the first case noted in Batley, was attacked with small-pox. He was left at home and one other of the six inmates, G. L., 17, a maid servant, fell ill on August 15. She was unvaccinated, and had a confluent attack lasting for five weeks. A third member of this household, G. W., brother to the first case, a youth of 16 years, was notified as having small-pox, but the evidence of this seems to be too slight to justify the retention of his case in the list. As to the infection of R. W., his trade would perhaps afford him opportunities of coming into contact with persons from infected houses. Another case, Mrs. W., *et. 46*, occurred in this neighbourhood on August 13, and was also kept at home; but I could obtain no particulars of her illness and surroundings.

In August one other fresh house was invaded, not far from Track Quarry, in Victoria Street, Batley Carr. On August 2nd, Mrs. C., *et. 53*, was attacked, and was left at home during her illness. The house is a four-roomed one and has thorough ventilation. Mrs. C. lives at home, having retired from business; and the four children, ranging in age from 25 to 17, are employed, one as manager of a grocery store, another as a plumber, and two as weavers. These latter, aged respectively 23 and 19, also contracted small-pox, one (No. 21) falling ill on August 18th, the other on August 23rd. All had mild attacks. Another member of the family, G. W., *et. 25* (No. 238), caught small-pox in January 1892.

In September two children (*et. five and seven respectively*) of one family living at Back Chapel Street, were notified, but I could get no particulars, as they had left the neighbourhood. They had mild attacks, and one had nearly convalesced when the second fell ill and was attended by a medical man who notified both cases on September 16.

No other cases occurred in Batley until November.

It may be useful here to summarise the chief facts of this early outbreak, especially as it marks the first appearance of small-pox in the Dewsbury Union since 1888.† Whether the disease was imported by rag-infection or not

cannot be determined with certainty. That the first to be attacked were workers in a mill where there is a large consumption of rags of all kinds does not of course prove that they were infected through rags, although one of them was a rag-picker. That they should have fallen ill within a few days of each other is suggestive of their having been exposed to a common source of infection; but this may have been an unsuspected case, just as much as an infected bale of rags, especially if the large numbers exposed to infection from the latter source be considered. It must also be remembered that a large proportion of the adolescent and young adult population of Batley are employed in rag-picking and wool-weaving, so that the incidence of the disease on members of their class does not of necessity imply that it was contracted in their work.

Batley being at that time unprovided with a separate isolation hospital took advantage of the practice which had been long customary, of sending these two cases of small-pox to the infectious wards of the workhouse infirmary at Staincliffe. In speaking of Dewsbury I shall mention that certain inmates of this Infirmary contracted the disease shortly after the admission of these cases; and it has been seen above that some of the earliest infected centres were in the vicinity of the workhouse (see plan*). I shall refer in more detail to the former point when speaking of Dewsbury; but as regards the latter I may state at once that there is no evidence, but rather the contrary, that the infection of the Chapel Fold and Cullingworth Street cases was from the infirmary. The disease appeared in Chapel Fold on May 25, and the exposure to infection must therefore have been at a date corresponding to the removal of the second Batley case to the workhouse infirmary. I cannot say whether there is any relation at all between these cases, but it may, I think, be confidently averred that the appearance of the disease in this part of the borough was followed by its introduction into Dewsbury. This was, indeed, inevitable, for small-pox does not respect municipal boundaries, no more than do the workers in a mill necessarily reside in the district in which the mill is situated.

During the five months—May to September 1891—there were notified 24 cases of small-pox within the borough of Batley. The doubtful character of one of these cases has led me to eliminate it from the list. This leaves 23 cases which came from 14 different houses. Nine of these patients were sent to the workhouse infirmary of whom four died; twelve were left at home, one of whom died.

Although cases of small-pox continued to be notified almost every week in Dewsbury, it is remarkable that with the exception of the two children in Back Chapel Street, notified in September, no other cases were known to the Batley authorities until the third week in November. Then notifications began to occur again, viz.:—one on the 21st, four on the 24th, three on December 4th, one on the 5th, two on the 6th, three on the 7th, four on the 9th, and one on the 11th. But these cases came from only eight infected houses, at least three of which were inhabited by families who were inter-related.

The number of cases notified every month from this date onwards, was December, 61; January 1892, 167; February, 136; March, 86; April, 33; May, 21; June, 0; July, four, August, three. As stated, eight of these proved not to be small-pox, whilst cases of that disease which were not notified occurred six in January, two in February, two in March, two in April.

On November 21st, 1891, the case of D. B. was notified. He is a millowner living in Dark Lane, and was taken ill on November 18th (No. 25). He said that about a fortnight before he visited a neighbour, Miss H., who was feeling ill, complaining of headache and backache, but she had no medical attendance, and I could not ascertain whether she had any rash. The possibility of his having contracted the disease in the course of his business through handling infected rags was mooted, but could not be sustained, as he had no transactions in those articles a fortnight previously. His last purchase of rags was in Batley on October 19th. His wife, C. B. (No. 30), was attacked on December 1st (*i.e.*, 14th day of his illness). Both were mild attacks, D. B. having very slight eruption. There were two children, aged four and one year respectively, both vaccinated, the elder being re-vaccinated unsuccessfully. It is noteworthy that C. B. was successfully re-vaccinated (three insertions) on November 19th, practically simultaneously with her infection.

On the same day (so far as can be gathered from inquiries made at the several households), that D. B.

* Mrs. T. told me that on that occasion, out of a family of five, three children (herself, a sister, and brother) and the father had small-pox. The children were unvaccinated, vaccination not then being compulsory.

† I have already pointed out that the first cases in the West Riding occurred in Leeds.

* I am indebted for this plan to the Borough Surveyor, Dewsbury; it is based on a survey made several years ago, before the extension of F.'s mill and the construction of Cullingworth Street. These additions I have ventured to make, of course, approximately; and have indicated the fever block by the red tint.

sickened, two cases occurred in two families who were related. One of these was an infant, C. T., *æ*t. three months (No. 28), living in Brearley Street (off Dark Lane), who was taken into Batley by her mother about two weeks previously, but did not visit anywhere. The infant who was about to be vaccinated was noticed by the mother to have some "spots" out on the same day that she sickened (Nov. 16), but no medical man saw her until the 21st, and he notified the case on the 24th. The child died on the 30th. Another infant, 18 months old, R. T., who had been vaccinated 12 months previously by the public vaccinator, and whose arm presented three closely aggregated foveate scars, did not contract the disease. The house was a small one containing one bedroom and one sitting room, and was one of a row at the corner of a small passage leading to a yard enclosed on three sides by houses, and containing an ill-kept privy-midden, about three yards distant from the building. This tenement was occupied by Mr. and Mrs. T. (who had both been vaccinated in infancy) and their two children as above. It received another inmate on December 1st from Hume Street, in the person of the infant E. B., aged 15 months, whose mother, E. B., was removed on that date to the Union Workhouse, suffering from small-pox, which she had contracted from her brother, A. B., *æ*t. 14, a hurrier at Howley Park Pit, who sickened on the same day as C. T., *viz.*, November 16. The infant E. B. (who was un-vaccinated), was removed to the workhouse on December 12, and died there on December 20th (No. 504).

Meanwhile, a series of cases were occurring in the members of other households related to the foregoing, commencing in the family of a married brother of E. B. and A. B., with the illness of his un-vaccinated child, S. E. B., *æ*t. seven months (No. 27), who was attacked on November 21, and died on the 29th. This family occupied a house in Dark Lane, a few yards from that of D. B., who was attacked on November 16th. This house, although a back-to-back one and consisting only of two rooms, was clean and well kept. The parents, C. B. and E. B., were both attacked with small-pox on December 4th (Nos. 35 and 32).^{*} There were two other children, R. B. *æ*t. seven, and M. E. B. *æ*t. three, who were taken by Mrs. W. (mother of E. B.) to her house in Hume Street, when their parents developed the disease. It would appear, however, that the W. family were already infected (probably from the other branch of the B. family living in Hume Street, and already mentioned), for on December 7th and 9th three cases were notified in this house, *viz.*:—E. W., *æ*t. 35, A. W., *æ*t. 15, and B. W., *æ*t. four (Nos. 38, 42, 41). So far as we could determine, these fell ill on December 6; whilst another, M. W., *æ*t. 19, was attacked on December 18 (No. 505). The household consisted of nine members, the father, a miner, and also two sons, a daughter and a cousin, and another son and daughter attending school. All were discrete attacks, one only, the youngest, being un-vaccinated. The whole family together with the two B. children were removed to the workhouse; the cases of small-pox being taken to the fever block, and the rest kept in quarantine in the workhouse. One of the B. children (*viz.* M. E. B., *æ*t. three years—No. 36) had a mild attack, but R. B. escaped.

Another family to be attacked about the same period was that of R. living in Colbeck Buildings, Mount Pleasant, a court containing a large number of back-to-back two-roomed tenements, on high ground. The family in question consisted of six members, the first to be attacked being S. A. R., *æ*t. six, a schoolgirl, un-vaccinated, attacked on the 24th November, left at home and died on December 11th (No. 26); her mother, M. A. R., *æ*t. 30, was removed to the workhouse infirmary on December 9th (No. 34); followed on the 10th by her husband, J. R., *æ*t. 30, and eldest child, M. E. R., *æ*t. eight (Nos. 39, 40). The other two children, aged four and three respectively, were removed to the workhouse at the same time, but not developing the disease, were returned to their homes.

Thus several infected centres were established in the town, and as most of the class amongst whom the disease occurred were engaged either in mills or coal pits, or were attending day school, the disease soon gained a foothold, whilst as the majority of cases were nursed at home, the opportunity for spread was considerable.

It would be impossible to follow the course of the epidemic in any connected way. Suffice it that Hume Street and the neighbouring streets in the heart of Batley, *viz.*:—New Street, Peel Street, Cobden Street, Providence Street, suffered largely, and Colbeck Buildings, Billecliff Buildings, &c. disproportionately to the number of dwellings contained in their areas. Cases occurred in Hume Street from November 16 to April 10; in New Street from December 29 to March 7; in Cobden Street from January 3 to March 28;

in Providence Street from January 6 to April 22; in Colbeck Buildings from November 24 to January 30; Billecliff Buildings, December 11 to January 12; Alma Terrace, December 21 to January 2; Peel Street, December 31 to March 23.

Batley is mainly built on the two sides of the valley along which runs the Batley Beck, a stream fouled by many mills. The Bradford Road, which is the main road between Dewsbury and Batley, runs down the valley turning from a line running nearly due north and south to one from east to west. Adjoining Dewsbury is the district known as Batley Carr mainly to the west of this road, with streets rising upwards towards the high ground of Staincliffe and Mount Pleasant. On the east of this road from Dewsbury are the Batley sewage works and several large factories; whilst as it turns to the west, on the way towards Birstal, it encloses the most densely-peopled and lower parts of the town between Commercial Street and Wellington Street, which are separated by the wide space in which the Market Hall stands. Running between Wellington Street and Commercial Street are a series of parallel streets, Providence, Cobden, Peel, New, and East Streets, where a large proportion of the cases of small-pox occurred. At the western extremity of Wellington Street, a road runs in a south-easterly direction—Purlwell Lane—towards the high ground about Mount Pleasant, and another westwards to Clerk Green and Dark Lane, an open thoroughfare with houses only on one side running southwards, and rising towards Staincliffe. At the foot of Dark Lane are Clayfold and Harrison's Fold where the first case of small-pox occurred, and round to the north-west, are a few streets, including the poor district of Woodwell which adjoins the cemetery, beyond which is Carlinghow. The part of Batley to the north of the Bradford Road is on the summit of a steep hill; it is mostly residential and but few cases occurred here; it leads to Upper Batley, and the open country between Batley, Morley and Birstal.

Sanitary Conditions of the Houses invaded by Small-pox.—In the inquiry made by Mr. Fardon and myself, certain particulars were noted as to the sanitary state of each of the houses we had occasion to visit, and in the tabulated lists that follow, the house is referred to by a numeral indicating its place in the register that was kept by us. The main points, and such as can be treated in a general manner, may be summarised as follows:—

Of 266 houses,* in which details as to sanitation were noted, 95 were so constructed as to have some through ventilation, either complete with back doors and windows, or partial; as, for instance, by means of one or more back windows only. The remainder, 171, had no through ventilation.

Through Houses.—Six of these were detached dwellings; 12 were connected with retail shops. In 79 the through ventilation was complete; in 16 it was partial. The total number of rooms in these 95 houses amounted to 412 (of which 216 were sleeping rooms); and they were inhabited by 530 persons, giving a proportion of 1.3 (nearly) per room. There were 158 cases of small-pox in these houses, giving a proportion of all inmates to the attacked of 3.3:1. In other words, at this rate 100 houses of this type would yield 166 cases.

Not Through Houses.—These include 122 "back-to-back" houses; 42 "single" houses, and seven "cellar-dwellings," containing in all 404 rooms (of which 224 were used as sleeping rooms) for a total of 921 inmates, or a proportion of 2.2 per room. In these 171 dwellings there were 305 cases of small-pox, *i.e.*, a proportion of inmates to cases of 3:1. In other words, at this rate 100 houses of this type would yield 178 cases.

Excrement Disposal.—It may be of interest to note that of the "through" houses, 82 were connected with privy middens (nine noted as "bad," six as "indifferent," the ashpits being uncovered in nine); nine were served by the "trough watercloset"; three by the pail system; and in one there was a watercloset in the house. Of the "not through houses" 159 were connected with privy middens (31 noted as "bad," 16 as "indifferent," nine having open ashpits); 10 used trough waterclosets, and two had the pail system.

The following table is a list of all the houses known to have been invaded by small-pox within the period covered by this report. They are arranged in order according to the date at which the disease appeared in the household. The total number of inmates of each house is given under the four categories of those "under 1 year," "1 to 10 years," "10 to 30 years," and "30 years or upwards." The same division is made for the cases of small-pox arising in those families which are indicated by the numbers that refer to the register of cases.

* The case of the mother is interesting, for she was suckling her infant at the time, and was inoculated on the right nipple and shoulder, the general rash appearing four days after these spots.

* No record of No. 22.

BATLEY.

LIST of HOUSES INVADED by SMALL-POX, with NUMBERS and AGES of INMATES, and REFERENCE to the REGISTER of CASES.

*Date of Invasion of Small-pox.	Name of Street or Court.	Reference to House Register.	Inmates of House.				Cases of Small-pox.†			
			Under 1 year.	1 to 10.	10 to 30.	30 and upwards.	Under 1 year.	1 to 10.	10 to 30.	30 and upwards.
1891.										
1. April 30	Harrison's Fold	138			3	1			1	
2. May 3	Pearson Street	224		1	1	2		4	2	
3. " 11	High Street	—	—	—	—	—	3			
4. " 25	Chapel Fold	238			2	4			11	
5. June 7	Chapel Fold	239			2	2			5	
6. " 8	Cullingworth Street	208		1	5	2			6	
7. " 10	Cullingworth Street	—	—	—	—	—				7
8. " 10	Chapel Fold	206	1	3	1	2	14			10, 13
9. " 12	Staincliffe Road	269		2	1	1		8		
10. " 12	Chapel Fold	207			3	1			9	
11. " 12	Upper North Street	—	—	—	—	—			12	
12. July 25	Track Quarry	246		2	2	3			15	
13. " 29	Clay Hill	136			5	1			16, 19	
14. August 2	Victoria Street, Batley Carr	245			4	2			21, 22, 23	17
15. " 13	Clayfold	—	—	—	—	—				18
16. Sept. 6-13	Back Chapel Street	—	—	—	—	—		23, 24		
17. November 16	Dark Lane	1		2	1	1			30	25
18. " 16	Brensley Street	3	1	2	2		28	50		
19. " 16	Hume Street	22			4	1			29, 31	
20. " 24	Colbeck Buildings	214		4		2		26, 40		34, 39
21. " 24	Dark Lane	151	1	2	2		27	36	35, 32	
22. December 4	Albion Street	243		2	2	1		33		
23. " 4	Colbeck Buildings	215			3	1			75	66
24. " 6	Hume Street	31		3	4	2		41	42, 505	38
25. " 6	Dark Lane	2			2	2			43, 45	
26. " 6	Henrietta Street	226		1	3	2			58	
27. " 9	Hume Street	—	—	—	—	—		46		174
28. " 9	Grosvenor Cottages	—	—	—	—	—			49	
29. " 10	Dark Lane	129		2	1	2		44		
30. " 10	Ward's Hill	—	—	—	—	—			47	
31. " 10	Norfolk Street	70		1	3	4				56
32. " 11	Clayfold	135		3	3	2			48, 53	84
33. " 11	Billeliff Buildings	—	—	—	—	—				51
34. " 11	Colbeck Buildings	211		4	4	2		64	52, 53, 63	
35. " 11	Upton Terrace	291			2	2			54	
36. " 11	Wheatcroft	—	—	—	—	—			59	
37. " 12	Clerk Green	127	1	4	3	2	291	187, 188	50, 109, 189	
38. " 12	Cheapside	208		1	3	3			55, 236	148
39. " 12	Dark Lane	132		3	2				57	
40. " 12	Hanover Street	—	—	—	—	—			60	
41. " 13	Crescent Street	—	—	—	—	—				61, 89
42. " 13	Dark Lane	—	—	—	—	—				62
43. " 13	Clerk Green	68			2	2				68
44. " 13	Henton's Yard	288			1	1				71
45. " 15	Colbeck Buildings	209		4	2			65	108, 516	
46. " 15	Billeliff Buildings	191			3	2			67	
47. " 15	Hume Street	52			5	1			86, 129	
48. " 16	Dark Lane	133			2	3				73
49. " 17	Hume Street	50	1	3	2	2	104	74	163, 102	
50. " 18	Union Street	—	—	—	—	—		72		
51. " 19	Clerk Green	66		2	2	2				70
52. " 19	North Parade	203	1	1	5	2		111	76, 112, 185	
53. " 20	Queen Street	170		2	5	1	69		404	
54. " 23	Hume Street	—	—	—	—	—			82	

* This date refers to the "date of onset" of the first case occurring in the house.
Fatal cases indicated by **black type**.

† The figures refer to the Case Register.

LIST OF HOUSES INVADED BY SMALL-POX, &c.—continued.

*Date of Invasion of Small-pox.	Name of Street or Court.	Reference to House Register.	Inmates of House.				Cases of Small-pox.†			
			Under 1 year.	1 to 10.	10 to 30.	30 and upwards.	Under 1 year.	1 to 10.	10 to 30.	30 and upwards.
55. December 24	Hume Street	30		1	3	1		80	78, 79, 506	7
56. " 25	Bradford Road	163		1	1	2				
57. " 26	Stanley Place	216		2	2	2		85		
58. " 26	Alma Terrace	124		2	1	1		94, 122	229	
59. " 27	Callington Street	240	1	3	1	2		105		184
60. " 28	Brown's Buildings	—	—	—	—	—		87		
61. " 28	Healey Street	242		1		2				98
62. " 28	Back Crescent Street	111			2	2			139	
63. " 29	Carlinglow Lane	—	—	—	—	—			88, 202	
64. " 29	New Street	74			3	1		90		
65. " 29	Parker's Place	98			4	2			101, 307, 511	95, 143
66. " 30	New Scarbrough	209			2				93, 92	
67. " 30	Oxford Street	243		1	5				90, 100, 182, 195, 91	
68. " 31	Grafton Street	—	—	—	—	—				
69. " 31	New Street	76		4	5	2			95, 180, 340	
70. " 31	Staincliffe	—	—	—	—	—				97
71. " 31	Peel Street	59			3	1			116, 510	
1892.										
72. January 1	Hume Street	49		5	3	3		176, 249	105, 315, 331	
73. " 1	Oxford Street	199		2	4	2			107, 278	
74. " 1	Alma Terrace	126	1	3	3	2				10
75. " 1	Wetherhill Street	—	—	—	—	—	134		113	
76. " 1	Colbeck Buildings	218		2	2	2			114, 514	
77. " 1	King Street, E.C.	117		3	3	1		181, 192	118	
78. " 2	Alma Terrace	125			3	1			115, 117	
79. " 2	Woodwell Street	62		2	3	2		119	211	
80. " 2	Charles Street	187		1	2	2		132		
81. " 2	Suffolk Street	73		1	3	2		186, 520	135	
82. " 3	Cobden Street	20		2	4				130, 193	
83. " 3	Billicliff Buildings	195		1	3	2			121	
84. " 3	Providence Street	9				3				122
85. " 3	Colbeck Buildings	210			3	2			123, 512	204, 513
86. " 3	Billicliff Buildings	196		2	4	2			124, 126	
87. " 3	Norfolk Street	69		3	1	1		125		
88. " 3	North Parade	201		4	2	2		128		
89. " 3	Colbeck Buildings	212		1	1	3		224	507	231, 281
90. " 4	Billicliff Buildings	192			3	1			515	508
91. " 5	Belvedere Road	206	1	5	1	2				130
92. " 5	East Street	82		2	2	2		233	140	
93. " 6	Providence Street	13	1	1	2	1	230		131, 216	
94. " 6	Spring Gardens	144			2	2			133	
95. " 6	Parker's Place	—	—	—	—	—			136	
96. " 6	Charles Street	189		3	4	2			138, 147, 509	
97. " 8	Spring Gardens	85			6	2			141, 422	
98. " 9	Hume Street	278			3	2			157	
99. " 9	Billicliff Buildings	193		1	3	2			145	
100. " 9	Clerk Green	128		1	2	2			144, 308	225
101. " 9	New Street	75			3	2			145, 199, 227	
102. " 9	Wilton Street	—	—	—	—	—		146		
103. " 9	New Street	140		4	3	2			150	
104. " 10	Providence Street	11		2	1	2			148	
105. " 1	Woodwell Street	96	1		2	—			151, 269	
106. " 10	Healey Lane	273			6	1			161	
107. " 11	Harrison's Fold	—	—	—	—	—			153	
108. " 11	Dark Lane	134		1	3	2			154	
109. " 11	New Street	142	1	2	4	1	332	237, 518	156	

* This date refers to the "date of onset" of the first case occurring in the house.

† The figures refer to the Case Register.

LIST of HOUSES INVADED by SMALL-POX, &c.—*continued.*

*Date of Invasion of Small-pox.	Name of Street or Court.	Reference to House Register.	Inmates of House.				Cases of Small-pox.†			
			Under 1 year.	1 to 10.	10 to 30.	30 and upwards.	Under 1 year.	1 to 10.	10 to 30.	30 and upwards.
110. January 11	Wheatcroft	185		1	2			158		
111. " 11	Pit Lane	264	1		4	2		160, 159		
112. " 12	Billeff Buildings	190	1	4	1	1	149			
113. " 12	New Street	141			1	3			155	
114. " 12	Woodwell Street	—	—	—	—	—	157	531		
115. " 12	Dark Lane	—	—	—	—	—		162	247	
116. " 13	Commercial Street	231			3	2		163		
117. " 13	Upper North Street	297		1	1	3			191	
118. " 14	King Street, B. C.	116			2			164, 377		
119. " 14	Brearley Place	222			2	2		171		
120. " 14	Wilson's Buildings	—	—	—	—	—			173	
121. " 14	Brown's Buildings	177			2	2		173, 197	178	
122. " 15	Hume Street	23		3	5	2		333	166, 261	
123. " 15	Peel Street	54	1		2	2		167		
124. " 15	Grosvenor Cottages	237		2	2			168		
125. " 15	Queen Street	168		3	5	2	287	169, 279, 286, 288, 179	288	
126. " 15	Cobden Street	30			1	Age? 2				
127. " 16	Dale Street, B. C.	149			4	2		175		
128. " 16	Wellington Street	289		1	3	2		177		
129. " 18	Woodwell	71				3			179	
130. " 18	Charles Street	—	—	—	—	—		203	194	
131. " 18	Pariswell Lane	—	—	—	—	—		198		
132. " 19	Balk Street	102		1	5	1		196, 396, 458		
133. " 19	Peel Street	56				2			200	
134. " 20	Cross Bank	113			4	1		208, 307, 312	309	
135. " 20	Wellington Street	197			2	3			221, 222, 236	
136. " 21	High Street, B. C.	155		1	2		453	205		
137. " 22	Jacob Street	87		2	5	2		204, 210, 216, 519.		
138. " 23	Bath Street	262			1	2			207	
139. " 23	Cobden Street	17		1	5	2		210		
140. " 23	Newsome's Buildings	180		1	1	Age? 2		212		
141. " 23	Victoria Street, B. C.	—	—	—	—	—		236, 282		
142. " 24	Back Peel Street	43		1	2			209, 344		
143. " 24	Providence Street	10			2			215		
144. " 24	Providence Street	14		1	3	2			218	
145. " 24	Henry Street, B. C.	—	—	—	—	—	225, 304			
146. " 25	Hume Street	37			2			213		
147. " 25	Fox's Fold	285			2			214		
148. " 25	Peel Street	40	1	1	3	2	334	317	217, 478	
149. " 25	Peel Street	57		2	4	2		314, 348	229	
150. " 25	Bradford Road	280			4	2		237		
151. " 25	Peel Street	42			2	2			250	
152. " 26	Russell Street	46		1	2	2		219		
153. " 26	Cobden Street	27	1		3			228, 291		
154. " 26	High Street	183			2			232		
155. " 27	Burnley Mill Fold	173			5	1		234, 313, 319, 320, 335		
156. " 27	High Street, B. C.	156	1	1	2			240		
157. " 27	Cobden Street	29		1	2	2		241, 370		
158. " 27	Jacob Street	60		1	5	2		243		
159. " 27	Hick Lane	—	—	—	—	—		248		
160. " 27	Sewage Works	162			2			248		
161. " 27	Colbeck Buildings	220	2	2		2			262	
162. " 27	Cobden Street	25		1	4	2		264		
163. " 27	Cobden Street	21		2	1	1	329, 337	517		
164. " 28	Jacob Street	92		4	1	1	245			
165. " 28	Bright Street	277			4	1			252	

* This date refer to the "date of onset" of the first case occurring in the house.

† The figures refer to the Case Register.

LIST of HOUSES INVADED by SMALL-POX, &c.—continued.

* Date of Invasion of Small-pox.	Name of Street or Court.	Reference to House Register.	Inmates of House.				Cases of Small-pox.†			
			Under 1 year.	1 to 10.	10 to 20.	20 and upwards.	Under 1 year.	1 to 10.	10 to 20.	20 and upwards.
166. January 28	Colden Street	19		2	6	2		327	295, 445, 484	525
167. " 29	Jacob Street	91	2		2	2	267		246	
168. " 29	Commercial Street	230			2	2			251	
169. " 29	High Street	182			5	2			253, 330	
170. " 29	Colbeck Buildings	219			5	2			254, 256, 316	
171. " 29	Brearley Street	204		1		2				255, 301
172. " 29	Colbeck Buildings	217			4	2			258	
173. " 30	Colbeck Buildings	213		4		2		219		
174. " 30	New Street	77				3				260
175. " 30	Billcliff Buildings	194		1	3	1			263	
176. " 30	Warwick Mount	—	—	—	—	—				271
177. " 30	Healey Lane	272			2	3				275
178. " 31	Pustwell Lane	65			2	1			265	
179. " 31	Woodwell Street	—	—	—	—	—				270
180. February 1	Hume Street	36	1	2	2		374	273, 306	335	
181. " 1	Brown's Buildings	—	—	—	—	—			274, 455	
182. " 1	High Street	184		2	1	2				276
183. " 1	Spa Street	283			4	2			277	
184. " 1	Staincliffe	241		4	2	2		284		
185. " 2	Back Taylor Street	164		2	2	2		360	280	272, 305
186. " 3	Peel Street	58			2				293, 360	
187. " 4	Ward's Hill	234		1	6	3			283	355
188. " 4	New Street	143			2	2			285	
189. " 4	Clayfold	—	—	—	—	—				294
190. " 4	Flemming's Place	225	1	2	4	2			295	
191. " 5	Hume Street	51			3	1			292, 373	
192. " 5	Russell Street	47			2	3			297	
193. " 6	Wellington Street	282		2		2				302
194. " 6	Providence Street	12		2	1	2				326
195. " 7	Derby Terrace, Woodwell	94		2	3	2			303, 352	
196. " 7	Wellington Street	198		1	5	2			306	
197. " 8	Harrison Fold	137			1	1			298	
198. " 10	Back Jacob Street	88		2	1	2		311	309	
199. " 12	Kent Street	175			3	2			400	321
200. " 12	Suffolk Street	—	—	—	—	—				325
201. " 14	Hume Street	33		2		2		318		321
202. " 14	Albert Square, B. C.	157		2	2	1		322, 323		
203. " 14	Back Taylor Street	167		2	1	2				324
204. " 14	Victoria Street	—	—	—	—	—			328	
205. " 16	George Terrace	253		2	4	1		402	336, 401	
206. " 16	Jacob Street	89		3	1	2				343
207. " 16	Brookroyd Lane	7				2				367
208. " 17	Bridge Street	257		1	4	2				338
209. " 17	George Terrace	251			2	1			339	
210. " 17	New Street	78		4	2	2			341	
211. " 17	Spa Street	—	—	—	—	—		400		343
212. " 18	Taylor Street	165		2	4	2			346	
213. " 19	New Street	79			7	2			344	
214. " 19	Ward's Hill	233		2	3	1			347	
215. " 19	Spring Gardens	86			1	1			361	
216. " 20	New Scarborough	220	1	3	4	2			345	
217. " 20	Hillborough Road	148				2				349
218. " 20	Corporation Cottages	271		3	4	2			350, 351	
219. " 20	Talbot Street	172			2	2			353	
220. " 20	Commercial Street	286			7	2			356	
221. " 20	Havercroft Fold	—	—	—	—	—			365	

* This date refers to the "date of onset" of the first case occurring in the house.

† The figures refer to the Case Register.

LIST OF HOUSES INVADED by SMALL-POX, &c.—continued.

*Date of Invasion of Small-pox.	Name of Street or Court.	Reference to House Register.	Inmates of House.				Cases of Small-pox.†			
			Under 1 year.	1 to 10.	10 to 30.	30 and upwards.	Under 1 year.	1 to 10.	10 to 30.	30 and upwards.
222. February 21.	Cobden Street	28	1		2	1			354, 409	
223. " 21.	Upper North Street . . .	298		1	2				357, 423	
224. " 21.	King Street	244		2	7	2			358	
225. " 21.	Commercial Street	292			4	2			359	
226. " 21.	Healey Lane	—	—	—	—	—			363	
227. " 21.	George Terrace	252			3				365	
228. " 22.	Peel Street	48		2	2	1				362
229. " 22.	Hick Lane	281	1		2	3				364
230. " 22.	Crown Street	232			4	1			375	
231. " 22.	Fearnside Yard	—	—	—	—	—			372, 437	
232. " 23.	Peel Street	41	1	2	1	1				376
233. " 24.	Alma Terrace	5		3	1	1				378
234. " 24.	Jacob Street	93		2	1	1		280		
235. " 25.	Wellington Street	250			4	4				379, 458
236. " 26.	Alma Terrace	6		1	3	2			381	
237. " 26.	Queen Street	121		1	2				382	
238. " 27.	King Street, B.C.	152			3	2			384, 469	
239. " 28.	Mill Lane	229			2	1				385
240. " 28.	Field Hill	—	—	—	—	—				385, 421
241. " 28.	Providence Street	15			7	2			386, 488	
242. " 28.	Jacob Street	—	—	—	—	—			387, 468	
243. " 28.	Balk Street	103		1	2	2			389	
244. " 28.	Queen Street	118		—	2	2			396	
245. " 29.	Wilton Street	228		2	1	2				388
246. " 29.	High Street, B.C.	154		3	5	2			391	
247. " 29.	Common Road	270		1		4				392
248. " 29.	Charles Street	188		1	2				394	
249. March 1	King Street, B.C.	—	—	—	—	—		396	449	448
250. " 2	Brownhill Street	8		2	1	1				399
251. " 2	Oldroyd's Buildings	159	1	3	3	1	524		407, 523	522
252. " 3	Chapel Street	227			2	3				393
253. " 3	Wood Street	—	—	—	—	—				398
254. " 3	Cemetery Road	290		3	3	4				408, 453
255. " 3	Cobden Street	18			2	4				410
256. " 4	Small-pox Hospital	—	—	—	—	—			405	
257. " 4	Queen Street	119		1	2	2		405		
258. " 4	Dark Lane	67			2	2			406	
259. " 5	King Street, B.C.	153	1	2	3	3			412	
260. " 5	Alma Terrace	63	1		2				415	
261. " 6	Queen Street	109			1	1			411	462
262. " 6	Bk. Henrietta Street	—	—	—	—	—			413	
263. " 6	Sheard's Yard	235		2	2	2				417
264. " 7	New Street	80			1	1			418	
265. " 8	Ambler Street	100			3	1			414, 450, 451, 419	
266. " 8	North Street	—	—	—	—	—			416	
267. " 9	Bath Street	101	1	3	5	2				420
268. " 9	Track Quarry	—	—	—	—	—				431
269. " 10	Wellington Street	249	1	4	4	2				435, 465
270. " 10	Bond Street	255			2	2				
271. " 10	Dale Street, B.C.	159		2	2			471, 472	439	
272. " 11	Peel Street	53			4	1			421	
273. " 11	Russell Street	44	1	4		1		446		424
274. " 11	Suffolk Street	145		2	1	2				426
275. " 11	North Street	105			3	2			430	
276. " 11	East Street	83	1	2	1	2	478	433		
277. " 12	Rack Hume Street	—	—	—	—	—				425, 427

* This date refers to the "date of onset" of the first case occurring in the house.

† The figures refer to the Case Register.

LIST OF HOUSES INVADED BY SMALL-POX, &c.—continued.

* Date of Invasion of Small-pox.	Name of Street or Court.	Reference to House Register.	Inmates of House.				Cases of Small-pox.†			
			Under 1 year.	1 to 10.	10 to 30.	30 and upwards.	Under 1 year.	1 to 10.	10 to 30.	30 and upwards.
278. March 12	Holland Street	261		1	1	2			429	
279. " 13	Well Lane	284			1	2			436	
280. " 14	Cross Bank	—	—	—	—	—		432		
281. " 14	Taylor Street	—	—	—	—	—			434	
282. " 15	Kent Street	174	1	1		2				440
283. " 15	Kent Street	176			2				442, 443	
284. " 17	New Street	—	—	—	—	—			444, 461	
285. " 19	Cobden Street	24				2				454
286. " 20	Cobden Street	26		3	1	2			457	
287. " 23	Crescent Street	114	1	3	2	2		456		
288. " 23	Peel Street	55		2	3	1			457	
289. " 24	Cobden Street	35		1	2				459	
290. " 24	Balk Street	104			4	2			466	
291. " 25	Cobden Street	276		1	2				463	
292. " 26	Cross Bank Street	274		2	1	1			490	464
293. " 28	Newsome's Buildings	181		1	2	1			467	
294. " 28	Cobden Street	16		1	4	1			474	
295. " 29	New Street	139	1		4	2			470	
296. " 30	Suffolk Street	72			2	2			473	
297. April 1	Clerk Green	64		3		2				476
298. " 1	Providence Street	275			2	Age ? 4			477, 526	
299. " 2	Balk Street	—	—	—	—	—			475	
300. " 2	Richmond Street	110		2	4	2 Age ? 1				480
301. " 3	Back Beaumont Street	265	1	2	3				479	
302. " 3	East Street	84				3				481
303. " 4	Bath Street	263				3				482
304. " 10	Dale Street, B.C.	151		2	1	2		485, 533		
305. " 10	Back Hume Street	279			3				486	
306. " 10	Providence Street	—	—	—	—	—				487
307. " 11	Back Richmond Street	169	1		3				489	
308. " 12	Brown's Buildings	178		1	3	2			491	
309. " 17	Bradford Road	—	—	—	—	—			492	
310. " 18	Wetherall Street	287	1	1	2				493	
311. " 20	Dale Street, B.C.	115			1	2			500	
312. " 21	Taylor Street, B.C.	166		1	3	2		496	494, 497, 498, 503	495
313. " 21	Taylor Street	147			1	1				499
314. " 21	Talbot Street	171	1	1		2		501		
315. " 22	Providence Street	—	—	—	—	—				502
316. " 25	Albion Street	—	—	—	—	—			483	
317. " 29	Kent Street	297	1	3		2		527		541
318. " 29	Taylor Street	300		4	2			528, 547	537	
319. " 30	Baylson's Place	—	—	—	—	—			529	
320. May 1	Belvedere Road	295		1	5	1		544	530	
321. " 3	Back Upton Street	298		1	7	2			532, 539, 540, 536	
322. " 6	Riding Street	294			3	2			534	
323. " 8	Ambler Street	—	—	—	—	—			534	
324. " 8	New Street	299		2	4	3		545	535, 543	542
325. " 11	Parswell Lane	296				1				538
326. " 30	Chapel Fold	293	1	1	1			546		
327. July 16	Chapel Fold	301		2	2	2		550	552, 553	548, 551
328. " 22	Bradford Road	—	—	—	—	—				549
257 houses visited			45	312	662	428 Age ? 9	17	68	278	102
69 houses not visited			—	—	—	—	2	12	30	26
Small-pox Hospital			—	—	—	—	—	—	1	—
							19	80	318	123

* This date refers to the "date of onset" of the first case occurring in the house.

† The figures refer to the Case Register.

From this it appears that 327 houses had cases of small-pox within them and the numbers invaded in each month were as follows :—

TABLE XXXV.

	No. of Houses Invaded.	Number of Cases of Small-pox per House.						Proportion of Houses in which more than one Case occurred.
		1.	2.	3.	4.	5.	6.	
1891.								Per cent.
April	1	1	—	—	—	—	—	—
May	3	2	1	—	—	—	—	33·3
June	7	6	—	1	—	—	—	14·2
July	2	1	1	—	—	—	—	50*
August	2	1	—	—	1	—	—	50*
September	1	—	1	—	—	—	—	100*
October	—	—	—	—	—	—	—	—
November	5	—	3	—	2	—	—	100*
December	50	27	10	5	5	2	1	46*
1892.								
January	108	60	25	12	7	3	1	44·4
February	69	47	19	1	2	—	—	31·8
March	47	34	9	3	1	—	—	27·6
April	23	17	4	1	—	1	—	26*
May	7	4	1	1	1	—	—	42·8
June	—	—	—	—	—	—	—	—
July	2	1	—	—	—	1	—	50*
	327	201	74	24	19	7	2	38·57
Small-pox hospital (March.)	1							
Total cases	202	148	72	76	35	12		545

Weekly incidence of cases of small-pox.—The rise and progress of the epidemic is well shown in the weekly returns. As far as possible the list has been compiled according to the date of onset of symptoms in each case, a plan which has been followed throughout. This does not of course tally with the dates of notification, but is an attempt to make the record more accurate. Notification in some instances is not made until some days have elapsed at the earliest on the day at which a definite rash appears; whilst occasionally a mild case has been overlooked (no medical man being called in) and its notification not made until the occurrence of another case, perhaps a fortnight later, in the house.

The facts given in this table are graphically shown in Chart V.*

* *Explanation of Chart V.*—
In this Chart the weekly distribution of cases of small-pox, given for the whole Union in Charts I. and II. is shown (together with fatal cases) for each of the three divisions into which this report is divided, viz. :—

	Cases.	Deaths.
Batley	545	57
Dewsbury	265	29*
Other districts	249	44

* Inclusive of workhouse cases.

TABLE XXXVI.

Week of Outbreak.	Ending	No. of Cases.	Deaths.*
i.	May 2 1891.	1	—
ii.	" 9	1	—
iii.	" 16	1	1
iv.	" 23	1	1
v.	" 30	1	—
vi.	June 6	No cases.	—
vii.	" 13	7	2
viii.	" 20	No cases.	—
ix.	" 27	—	—
x.	July 4	2	1
xi.	" 11	No cases.	—
xii.	" 18	—	—
xiii.	" 25	1	—
xiv.	August 1	1	—
xv.	" 8	1	—
xvi.	" 15	2	—
xvii.	" 22	2	—
xviii.	" 29	No cases.	—
xix.	September 5	—	—
xx.	" 12	1	—
xxi.	" 19	1	—
xxii.	" 26	No cases.	—
xxiii.	October 3	—	—
xxiv.	" 10	—	—
xxv.	" 17	—	—
xxvi.	" 24	—	—
xxvii.	" 31	—	—
xxviii.	November 7	—	—
xxix.	" 14	—	—
xxx.	" 21	4	3
xxxi.	" 28	1	1
xxxii.	December 5	6	—
xxxiii.	" 12	27	3
xxxiv.	" 19	15	3
xxxv.	" 26	11	—
xxxvi.	1892. January 2	34	3
xxxvii.	" 9	29	1
xxxviii.	" 16	34	4
xxxix.	" 23	41	2
xl.	" 30	53	1
xli.	February 6	31	3
xlii.	" 13	22	2
xliii.	" 20	35	5
xliiv.	" 27	26	1
xlv.	March 5	30	2
xlvi.	" 12	23	5
xlvii.	" 19	15	2
xlviii.	" 26	17	2
xlix.	April 2	14	1
l.	" 9	6	1
li.	" 16	7	—
lii.	" 23	11	2
liii.	" 30	6	—
liiv.	May 7	5	—
lv.	" 14	4	—
lvi.	" 21	5	2
lvii.	" 28	No cases.	—

* This column refers to the deaths amongst the cases attacked in the week.

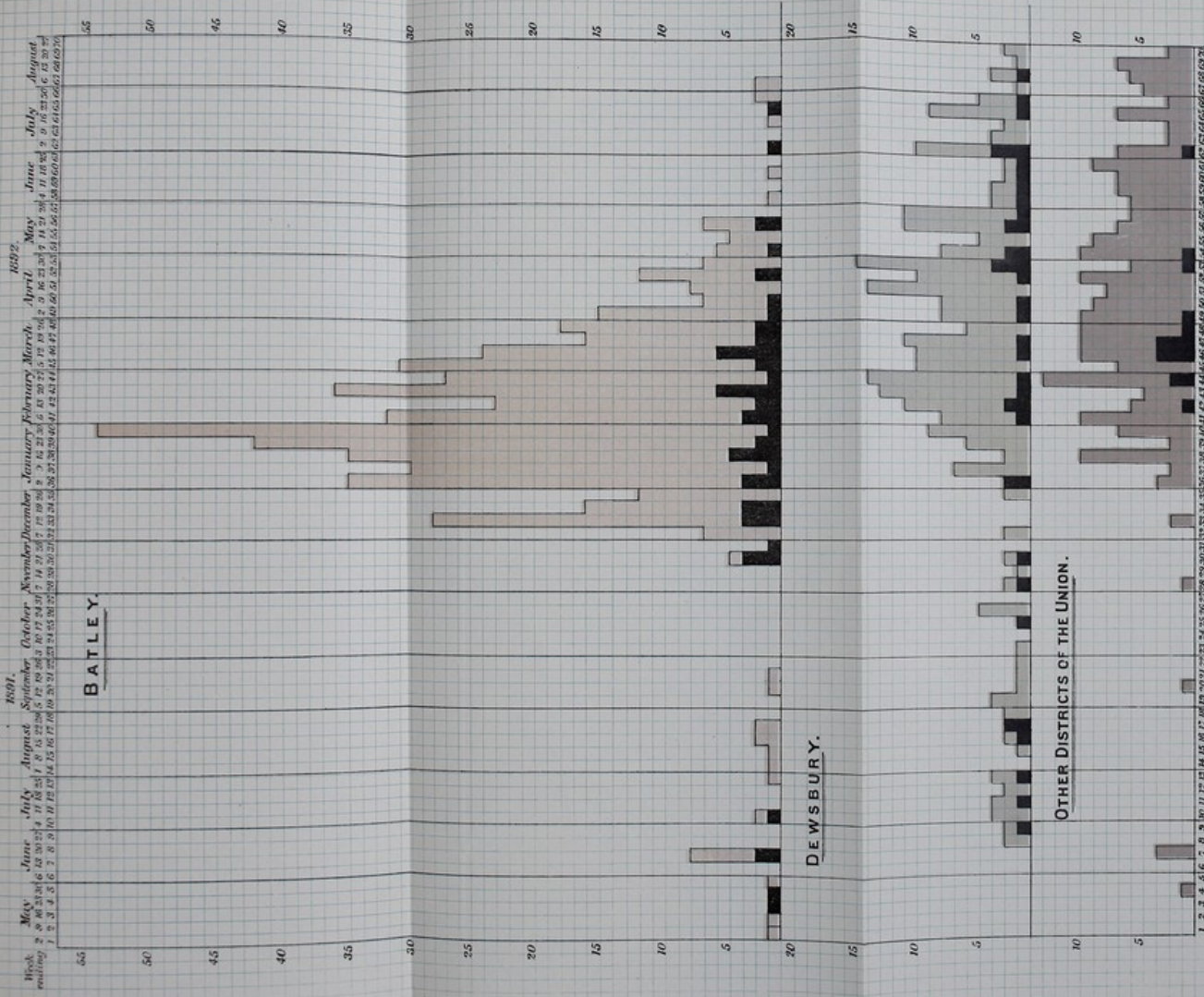


TABLE XXXVI.—continued.

Week of Outbreak.	Ending	No. of Cases.	Deaths.*
lviii.	June 4	1	—
lix.	" 11	No cases.	—
lx.	" 18	1	—
lxi.	" 25	No cases.	—
lxii.	July 2	1	1
lxiii.	" 9	No cases.	—
lxiv.	" 16	1	—
lxv.	" 23	1	1
lxvi.	" 30	2	—
lxvii.	August 6	2	—
lxviii.	" 13	No cases.	—
lxix.	" 20	"	—
lxx.	" 27	"	—
		545 cases.	57 deaths.

* This column refers to the deaths amongst the cases attacked in the week.

The monthly prevalence was as follows:—

	Cases.	Deaths.
1891.		
April	1	0
May	4	2
June	8	3
July	3	0
August	5	0
September	2	0
October	0	0
November	5	4
December	76	8
1892.		
January	176	9
February	123	12
March	83	10
April	35	4
May	16	3
June	1	0
July	5	2
August	2	0
		545
		57

Of the 545 individuals attacked with small-pox 269 were males, 276 females; the fatal attacks among the former amounting to 29, and among the latter to 28.

These were distributed according to their ages as follows:—

TABLE XXXVII.

	Males.		Females.		Total.		
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
Under 1 year	7	4	12	9	19	13	
1 to 5 years	20	7	21	6	41	13	
5 to 10 "	14	2	25	2	39	4	
10 to 15 "	26	1	28	1	54	2	
15 to 20 "	25	3	50	4	105	7	
20 to 25 "	74	5	85	4	159	9	
25 to 30 "	47	3	31	2	78	5	
30 to 40 "	15	2	10	—	25	2	
40 to 50 "	8	2	10	—	18	2	
50 to 60 "	1	—	3	—	4	—	
60 to 70 "	—	—	1	—	1	—	
70 and over	2	—	—	—	2	—	
		269	29	276	28	545	57

or stated in age periods:—

	Cases.	Deaths.	Case Mortality.
Under 1 year	19	13	Per cent. 68·4
1 to 10 years	80	17	21·2
10 to 30 "	318	18	5·6
30 and over	128	9	7·0

in other words, the lowest mortality was between the ages of 10 and 30 years; that at 30 years and over being about one-third higher, that from 1 to 10 years about four times, and under one year 12 times as much.

One of the patients was a nurse employed at the hospital who contracted the disease, apparently by inoculation, in discharge of her duties (No. 403).

The remaining 544 cases came from 327 houses, in 201 of which there was but one case per house, in 74 there were two cases, in 24 three cases, in 19 four cases, in seven five cases and in two there were six cases.

Particulars of the inmates of 267 houses, yielding 465 cases, were obtained on personal inquiry, the total number of inmates being 1,456.

Of those houses which were not visited or of whose inmates no particulars could be obtained, in

42	there was 1 case per house or 42 cases in all.
17	" were 2 cases " " 34 "
1	" " 3 " " 3 "
60	79

The distribution of the cases in proportion to the size of those houses that were visited were as follows:—

TABLE XXXVIII.

Number of Houses.	No. of Inmates to each House.	Number of Cases.						In-mates.	Cases.
		1.	2.	3.	4.	5.	6.		
5	11	3	—	1	—	1	—	55	11
10	10	2	2	2	1	1	2	100	33
15	9	7	3	1	4	—	—	135	32
20	8	9	6	1	3	1	—	160	41
20	7	7	6	6	1	—	—	140	41
48	6	29	8	3	5	3	—	288	89
51	5	34	7	4	5	1	—	255	85
50	4	31	14	5	—	—	—	200	74
28	3	23	5	—	—	—	—	84	33
19	2	13	6	—	—	—	—	38	25
1	1	1	—	—	—	—	—	1	1
		159	57	23	19	7	2	1,456	465

Thus there were—

No. of Members of Households.	Single Cases in House.	Multiple Cases in House.
	Per cent.	Per cent.
11	60·	40·
10	20·	80·
9	46·6	53·3
8	45·	55·
7	35·	65·
6	60·4	39·6
5	66·6	33·3
4	62·	38·
3	82·	18·
2	68·4	31·6

A comparison of the ages of all the inmates of the households visited with those of them who contracted small-pox, showing at what age the liability was greatest, gives the following result :—

—	Inmates.	Cases.	Proportion of Cases at Age Periods.
Under 1 year	45	17	Per cent. 37·7 under 1 year.
1 to 5 years	144	36	—
5 to 10	168	32	—
	312	68	23·8 at 1 to 10 years.
10 to 15	179	49	—
15 to 20	208	98	—
20 to 30	275	131	—
	662	278	41·9 at 10 to 30 years.
30 to 40	178	64	—
40 to 50	131	18	—
50 to 60	80	14	—
60 to 70	28	4	—
70 and over	11	2	—
	428	102	{ 23·8 at 30 years and over.
Age not ascertained	9	—	—

Stated in per-centages of the total numbers the comparison between those who from dwelling in the same house were exposed to the chances of infection and those who were actually attacked at the different age periods :—

—	Inmates (1,456).	Cases (465).
	Per cent.	Per cent.
Under 1 year	3·	3·6
1 to 10 years	21·4	14·6
10 to 30	45·4	59·7
30 years and over	29·3	21·9

Occupation Tables.—In attempting to determine whether the incidence of small-pox was to any extent influenced by the occupations of those exposed to infection, the whole community has been divided into three groups, viz. :—

(a.) Those engaged in domestic duties, or whose place of business was at their own homes, or who were either too young or too old to be attending school or a work-place away from home. This group contains necessarily a large proportion of married women and very young children.

(b.) Those who attended elementary schools during the day.

(c.) Those engaged in mills or in mines, or in other occupations requiring their absence from home.

The order in which these several classes were attacked is shown in Chart VI.*

The first of the tables bearing on this subject gives the occupations of those who were attacked with small-pox, with as much detail (as to sex, age and nature of employment) as was possible.

* *Explanation of Chart VI.*—

This Chart which, like Chart V., shows the weekly incidence in each of the three divisions of the Union, here adopted, is intended to illustrate the incidence upon the different classes—arranged in the three groups of those occupied (a) at home, (b) attending school, (c) employed at work, (d) inmates of Union workhouse. The shades of colour are the same as those employed in Chart IV. The total figures are :—

—	At Home.	At School.	At Work.	Work-house.
Batley	182	68	291	
Dewsbury	81	67	148	6
Other districts	76	48	90	

The second and third tables enumerate all the houses with the number of their inmates, classified under the three divisions above mentioned. It will be observed that the houses are grouped according to the numbers of their inmates. This table is graphically represented in Chart VII.*

TABLE XXXIX.
OCCUPATION TABLE.—MALES.

—	Under 1 Year.	1 to 10 Years.	10 to 20 Years.	20 Years and over.	Total.
AT HOME	7	17	13	15	52
Of no occupation	7	17	4		28
Baker				1	1
Butcher			3	1	4
Cemetery keeper				1	1
Eating-house keeper				1	1
Gardener				2	2
Hairdresser			1		1
Herring curer			1		1
Hosier				1	1
Innkeeper				1	1
Insurance agent			1	1	2
Joiner				1	1
Manufacturer				1	1
Medical student			1		1
Milkvender				1	1
Pawnbroker				1	1
Plumber				1	1
Shoemaker			1	1	2
Shop assistant			1		1
AT SCHOOL		17	16		33
AT WORK			126	58	184
Millhand			40	15	55
Ragsetter			1	3	4
Miner			53	10	63
Barber			1		1
Brickmaker			1	1	2
Brushmaker			1		1
Blacksmith			2		2

* *Explanation of Chart VII.*—

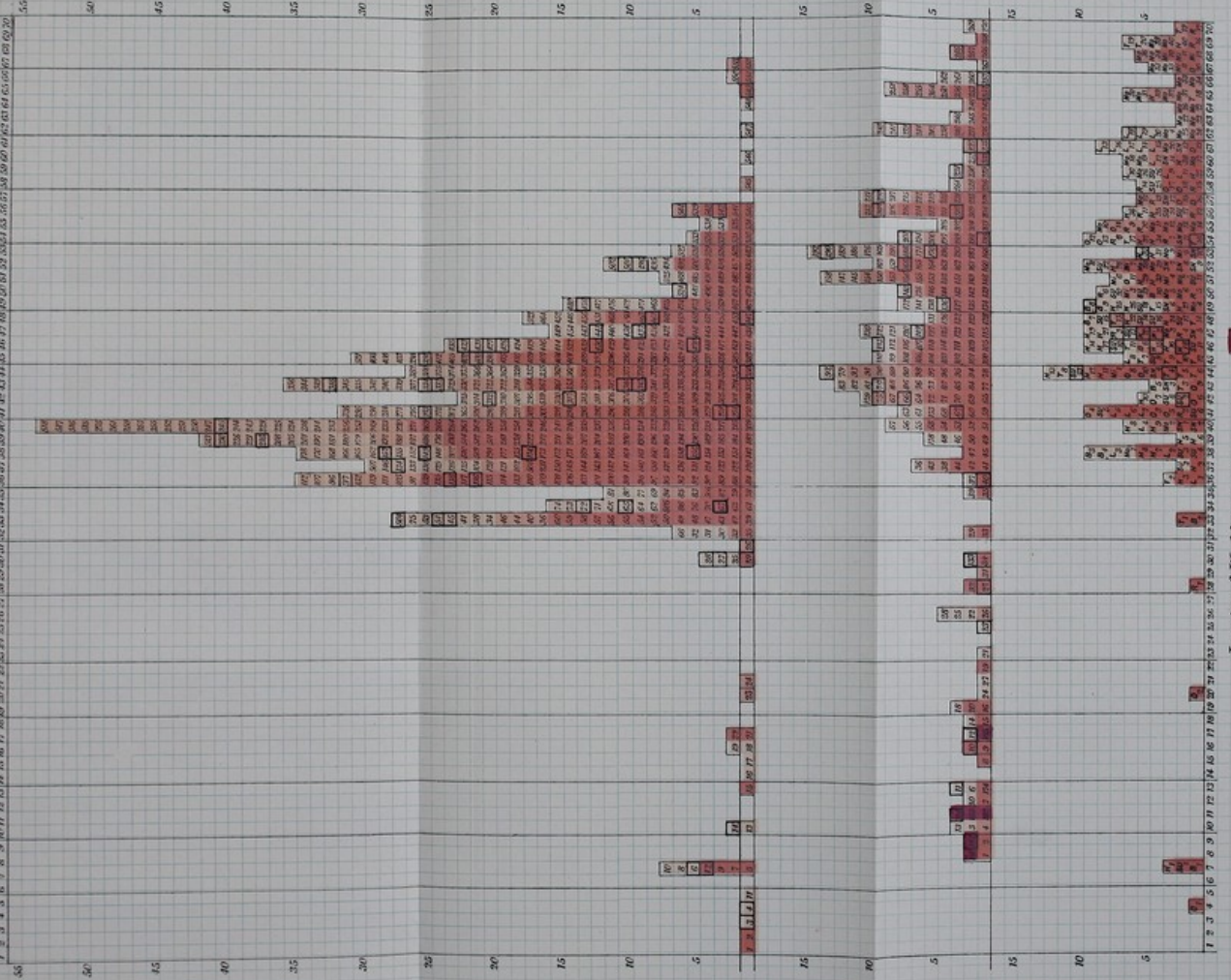
This Chart illustrates graphically the statistical facts given in Table XL., viz., the occupation of each member of the 267 infected households in Batley, of which particulars are obtained; the members attacked with small-pox being indicated by the numbers pertaining to those in the list of cases. It will be seen that the houses are grouped according to the number of their inmates; there being 1 house with one inmate, 19 with two inmates, 21 with three inmates, 20 with four inmates, 51 with five inmates, 45 with six inmates, 20 with seven inmates, 20 with eight inmates, 15 with nine inmates, 10 with ten inmates, and 2 with 11 inmates (see also Table XLI.).

The columns to the right hand of Chart indicate the cases of small-pox occurring in households of which further particulars were not obtained (Table XLa.).

—	At Home.	At School.	At Work.
1,456 inmates of 267 houses	572	271	612
465 attacked with small-pox	168	58	245
And in the supplementary columns :—			
79 cases in 60 houses	20	10	49
1 case arising at small-pox hospital.	1		

N.B.—The fatal cases are indicated by deep borders.

1891. May June July August September October November December January February March April May June July August



Inmates of Workhouse
 At home
 Attending school
 Engaged in work away from home

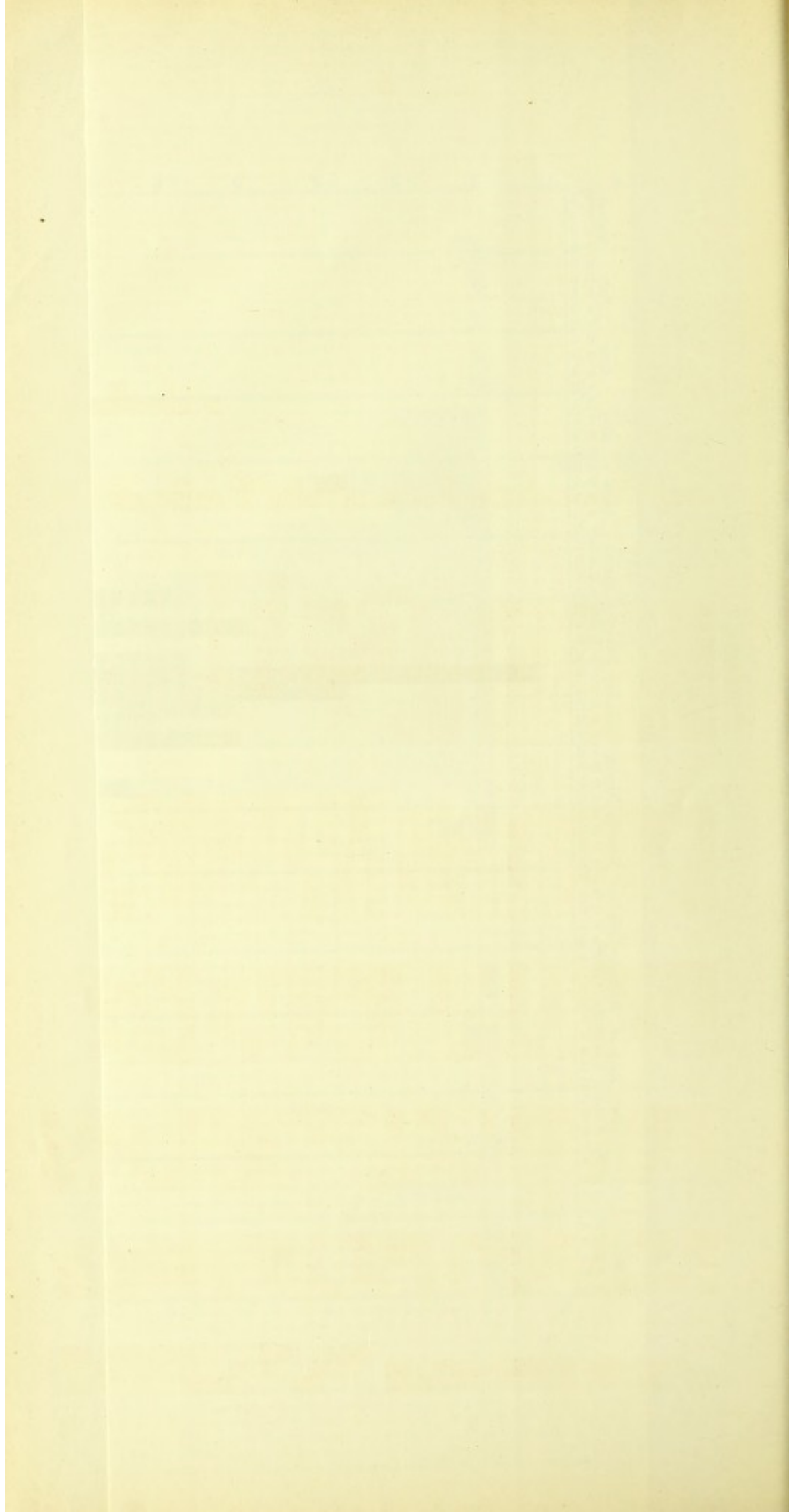





Chart VII .

INVADIED HOUSEHOLDS. OCCUPATION OF INMATES.

206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
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Living at home or engaged
in Home work. 

Attending School... 

Engaged in work from Home 

Numerals, refer to case register.

1852

1853

1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
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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	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950
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1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
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2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
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2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
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2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150
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OCCUPATION TABLE—cont.

	Under 1 Year.	1 to 10 Years.	10 to 20 Years.	20 Years and over.	Total.
Cabdriver				1	1
Cabinetmaker				1	1
Carrier			2	2	4
Clerk		1			1
Decorator and house painter		1	1		2
Engineer		1	3		4
Errand boy		1			1
Fireman				1	1
Grocer			2		2
Hawker				1	1
Insurance agent				1	1
Joiner				2	2
Labourer			5	4	9
Librarian			1		1
Mason			1		1
Millowner			1		1
Plasterer				1	1
Plumber			2		2
Police constable			1		1
Quarryman			1		1
Rag merchant				1	1
Sanitary officer				1	1
Shoemaker				1	1
Shop assistant		1			1
Spirit merchant				1	1
Store manager			1		1
Tailor				1	1
Teamster				4	4
Turner				1	1
Warehouseman				1	1
Watchmaker			1		1
Occupation not ascertained			4		4

OCCUPATION TABLE.—FEMALES.

AT HOME	12	21	53	45	131
Of no occupation	12	21	18	1	52
Homewife			25	39	64
Domestic servant			3		3
Dressmaker			3	1	4
Grocer			1		1
Hospital nurse			1		1
Monthly nurse				1	1
Housekeeper			2	2	4
Shop assistant				1	1
AT SCHOOL		25	10		35
AT WORK			100	10	110
Millhand			65	8	73
Ragsorter			25		25
Confectioner			1		1
Dressmaker			3		3
Domestic servant				1	1
Milliner			2	1	3
Shop assistant			1		1
Occupation not ascertained.			1		1

TABLE XI.

SHOWING the OCCUPATIONS of ALL INMATES of 267 Houses visited, and of those attacked with Small-pox.

(CHART VII.)

Street or Court.	Reference in House Register.	All Inmates.			Attacked with Small-pox.		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
Purlwell Lane	126	1			538		
Heaton's Yard	288	2			71		
Peel Street	56		2				200
Hume Street	37	1		1	213		
Fox's Fold	285	2			214		
Providence Street	10		2				215
High Street	183		2				232
Sewage Works	162	1		1			238
Harrison's Fold	137			2			298
Hillbro' Road	148	2			319		
Spring Gardens	86			2			361
Brookroyd Lane	7	1		1			367
New Street	80			2			418
Cobden Street	24	2			454		
New Searbro'	200			2			92, 30
King Street, B.C.	116			2			164, 377
Peel Street	58			2			203, 300
Kent Street	176	1			443		442
Taylor Street	147			2			490, 503
Queen Street	169			2			411, 462
Healey Street	242	1	1	1			98
Providence Street	9	1		2			122
Wheatcroft	185	1		2			158
Cobden Street	30	1		2	170		
Woodwell	71	2		1	170		
Bath Street	262	2		1			207
New Street	77	1		2			350
Purlwell Lane	65	3			265		
George Terrace	251	1	1	1	339		
George Terrace	232	2		1	365		
Queen Street	121	2		1	392		
Mill Lane	229			3			388
Charles Street	188	1		2			394
Alma Terrace	63	1		2			415
Well Lane	284	1	1	1	436		
Cobden Street	35	2		1			450
Cobden Street	276	1		2			463
East Street	84	1		2	481		
Bath Street	263	2		1			482
Back Hume Street	279	1		2			486
Back Richmond St.	160	1		2			480
Dale Street, B.C.	115	2		1			500
Chapel Fold	293	2	1		546		
Woodwell Street	96	1		2			208, 151
High Street, B.C.	155	3			305, 452		
Back Peel Street	41	2		1	244		209
Brearley Street	204	1	1	1	255		301
Upper North Street	208	2		1	357		423
Harrison Fold	138			4			1
Chapel Fold	230	1		3			5
Staincliffe Road	260	2	1	1	8		
Chapel Fold	267	1		3			9
Upton Street	291	3		1			54

OCCUPATIONS OF INMATES, &c.—*cont.*

Street or Court.	Reference in House Register.	All Inmates.			Attacked with Small-pox.		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
Clerk Green -	68	3		1	68		
Bradford Road -	163	3		1	81		
New Street -	74			4			90
Spring Gardens -	144	2		2	135		
Hume Street -	278	1		3			137
Back Crescent St. -	111	2		2			139
New Street -	141	1	1	2	155		
Grosvenor Cottage	257	3		1	168		
Brearley Place -	222	1	1	2			171
Newsome Buildings	180	1	1	2			212
High Street, B.C. -	156	3		1			235
Peel Street -	42	1		3	250		
Commercial Street	250	4			251		
New Street -	143			4			285
Wellington Street	282	2	1	1			302
Talbot Street -	172	2		2			353
Jacob Street -	93	2	1	1	380		
Queen Street -	118	1		3			395
Brownhill Street	8	3		1			399
Dark Lane -	67	3		1	406		
Holland Street -	261		1	3			429
Kent Street -	174	4			440		
Newsome Buildings	181	1	1	2			467
Suffolk Street -	72	1		3			473
Wetherall Street -	287	3		1			493
Talbot Street -	171	3		1	501		
Pearson Street -	224	1		3	2		2
Dark Lane -	1	4			25, 39		
Peel Street -	59	1		3			116, 510
Colbeck Buildings	218	1		3			114, 514
Alma Terraces -	125	1		3			115, 117
Cobden Street -	27	2		2	291		228
Hume Street -	51	1		3	373		292
Hume Street -	53	1	2	1	521	318	
Cobden Street -	28	2		2			354, 409
Bond Street -	255	3		1	435, 465		
Cross Bank Street -	274	2	1	1	464		450
Billicliff Buildings -	192	1	1	2	515		568
Colbeck Buildings	215	2		2	66, 75		
Dark Lane -	2	2		2	95		43
Alma Terrace -	154	2	1	1	192, 229	94	
Brown's Buildings	177	2		2	178, 197		173
Cobden Street -	21	4			319, 337, 517		
Ambler Street -	109		2	2		414, 451	450
Dale Street, B.C. -	150	2		2	471, 472		430
Albion Street -	245	1	2	2			33
Dark Lane -	129	2	1	2			44
Dark Lane -	132	2	2	1			57
Billicliff Buildings -	191	1	1	3			67
Dark Lane -	133	3	1	1	73		
Norfolk Street -	60	2	2	1	125		
Charles Street -	187	1	2	2		132	
Providence Street -	11	2	1	2	148		
Commercial Street	231	5			163		
Peel Street -	54	4		1			167
Upper North Street	207	1	1	3			191

OCCUPATIONS OF INMATES, &c.—*cont.*

Street or Court.	Reference in House Register.	All Inmates.			Attacked with Small-pox.		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
Russell Street -	46	1	2	2			219
Cobden Street -	29	1	1	3			240
Bright Street -	277	2	1	2	252		
Billicliff Buildings -	194	3		2			283
Healey Lane -	272	5		2	275		
High Street -	184	5	1	1	276		
Russell Street -	47	1		4			297
Back Taylor Street	167	2	2	1			324
Providence Street -	12	2	2	1	325		
Peel Street -	48		3	2			362
Crown Street -	232	4		1	375		
Peel Street -	41	4		1			376
Alma Terrace -	5	3	1	1			378
Wilton Street -	228	3		2			388
Bath Street -	103	1	2	2			389
Common Road -	270	4		1			392
Chapel Street -	227	4		1			393
Queen Street -	119	1	1	3		405	
Peel Street -	53			5			421
Suffolk Street -	145	1	2	2	426		
North Street -	108	1	2	2			430
Clerk Green -	64	2	3		476		
Riding Street -	294	1		4			536
Dale Street, B.C. -	151	1	2	2	533	485	
Brearley Street -	3	4		1	28, 504		
Hume Street -	22	2		3	51		29
Back Jacob Street	88	2	2	1		311, 320	
Kent Street -	175	1		4			321, 460
Albert Square, B.C.	157	1	2	2		322, 323	
King Street, B.C. -	152	1		4			384, 469
Providence Street -	13	4		1	216, 230		131
Clerk Green -	128	2		3	223		144, 366
New Street -	75	1		4			145, 190, 227, 222
Wellington Street -	197	3		2	221, 250		
Dark Lane -	131	2	2	1	27, 32	36	35
Colbeck Buildings	210	1	1	3	513		125, 204, 512
Colbeck Buildings	212	2		3	224, 507		231, 281
Cross Bank -	113	4		1	208, 307, 312		309
Hume Street -	36	4		1	273, 335, 361, 374		
Hume Street -	39	2		3	77, 80		78, 79, 506
Chapel Fold -	238	2		4			11
Henrietta Street -	226	3	2	1			58
Clerk Green -	66	3		3			70
Stanley Place -	256	2	4			85	
Billicliff Buildings -	195	1	2	3		121	
Billicliff Buildings -	193	2	1	3			143
Dark Lane -	134	4		2			154
Dale Street, B.C. -	149	1		5			175
Wellington Street -	289	3		3			177
Providence Street -	14	2	3	1	218		
Bradford Road -	280	2	1	3			237
Jacob Street -	92	4	1	1	245		
Colbeck Buildings	217	1	1	4			258
Colbeck Buildings	213	3	2	1	259		
Colbeck Buildings	220	4	1	1			263
Spa Street -	283	3		3	277		

OCCUPATIONS of INMATES, &c.—cont.

OCCUPATIONS of INMATES, &c.—cont.

Street or Court.	Reference in House Register.	All Inmates.			Attacked with Small-pox.		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
Jacob Street	89	4	1	1	342		
Ward's Hill	213	1	2	3			247
Commercial Street	292	6			359		
Hick Lane	281	6			364		
Alma Terrace	6	1	1	4			381
Cobden Street	18	1		5			410
Sheard's Yard	235	3	1	2			417
Cobden Street	26	4		2			427
Peel Street	55	2	1	3			457
Balk Street	104	1		5			466
Cobden Street	16		2	4			474
Back Beaumont St.	203	5		1			479
Brown's Buildings	178	1	2	3			491
Clay Hill	136	3	1	2	16, 19		
Hume Street	52	2		4	129		86
East Street	82	1	2	3		233	140
Russell Street	44	6			424, 446		
Providence Street	275	1		5	477		526
East Street	83	4	1	1	433, 478, 527		
Kent Street	297	3	2	1	527		541
Jacob Street	91	3	1	2	267		246
Colbeck Buildings	200	3	2	1	65, 516		108
Suffolk Street	73	1	2	3		186, 520	135
Taylor Street, B.C.	300	2	3	1	537, 547	528	
Victoria Street, B.C.	245	2		4	17	21, 22, 238	
Colbeck Buildings	214	2	2	1	34	26, 40	39
Oxford Street	248	1	1	4		92, 100, 182, 195	
Berkaley Fold	173	1	2	3		313, 320	234, 319
Back Taylor Street	164	1	3	2	272	360	280, 305
Parker's Place	98	1		5	165	95, 101, 397, 511	
Taylor Street	166	3		3	494, 496, 495	498, 497	
Chapel Fold	301	2	2	2	550, 548	553	552, 551
Trunk Quarry	246	3	1	3			15
Billicliff Buildings	190	3	3	1	149		
Healey Lane	273	6		1		161	
Cobden Street	25	2	1	4		254	
Bridge Street	257	3	2	2		378	
King Street, B.C.	153	2	3	2		412	
New Street	139	3		4		470	
Woodwell Street	62	2	3	2		119	211
Pit Lane	264	2		5			159, 160
High Street	182	1	3	3		253, 330	
Back Woodwell St.	94	2	2	3		303	352
Cullingworth St.	240	4	2	1		105	194
Belvedere Road	295	2	2	3		544	530
Chapel Fold	266	5	2		10, 13, 14		
Cheapside	258	2	2	3			56, 142, 236
King Street	117	4	1	2	187	192	118
Balk Street	102		1	6			196, 395, 458
Colbeck Buildings	219	1	2	4		256	254, 316
George Terrace	253	2	2	3		402	336, 401
Peel Street	40	2	2	3	334	317	217, 428
Cullingworth St.	268	5	1	4	6		
Norfolk Street	70	2	2	4			56
North Parade	201	1	3	4		128	

Street or Court.	Reference in House Register.	All Inmates.			Attacked with Small-pox.		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
Cobden Street	17	2	2	4			210
Staincliffe	241	3	3	2	284		
Wellington Street	198	3	1	4		306	
New Street	78	3	3	2			341
Taylor Street	165	3	2	3			346
Crescent Street	114	2	5	1		456	
Cobden Street	20	2	2	4			120, 193
Billicliff Buildings	196	3	1	4	155		124
Spring Gardens	85		2	6			141, 422
Jacob Street	60	1	1	6			241, 370
Wellington Street	250	2		6	438		379
Oxford Street	190	3	2	3	107		278
Clay Fold	135	2	3	3		83	48, 54
Hume Street	50	4	1	3	74, 104	102	103
New Street	142	4		4	227, 332, 518		156
Oldroyd's Buildings	150	4	2	2	525, 524		407, 522
Peel Street	67	4	1	3	310, 314, 348	220	239
Alma Terrace	126	4	2	3			110
Belvedere Road	296	3	5	1	130		
New Street	140	2	5	2			150
Fleming's Place	225	4	2	3	295		
New Street	79	3	2	4	344		
Commercial Street	280	9			356		
Richmond Street	110	1	3	5	480		
Queen Street	170	4	2	3	69		464
Corporation Cottages.	271	3	2	4			350, 351, 386
Providence Street	15	3	2	4	488		
Charles Street	180	2	3	4			138, 147, 260
Jacob Street	87	3	3	3		206, 296, 519	290
North Parade	203	4	1	4	112	111	76, 185
Hume Street	31	3	2	4	38, 41		42, 505
New Street	290		2	7		345	535, 542, 54
New Scarbro'	250	3	4	3	345		
High Street, B.C.	154	3	3	4	391		
Ward's Hill	234	2	2	6	355		283
Cometary Road	290	4	4	2	408		453
Hume Street	23	4	2	4	261		105, 323
Back Upton Street	298	5	1	4		539	582, 540
Colbeck Buildings	211	3	3	4	53, 64		52, 63
Cobden Street	19	1	3	6	525	327	266, 446, 484
Clerk Green	127	2	4	4	201	187, 188	109, 50, 189
Queen Street	168	2	4	4		287, 289	169, 379, 286, 288
King Street, B.C.	244	3	3	5			358
Bath Street	101	3	4	4		416	
Wellington Street	249	6	5		431		
New Street	76	7	3	1	96, 180, 340		
Hume Street	40	4	2	5		176, 249	106, 315, 331
297 Households		573	271	612	162		245

TABLE XLA.

TABLE showing OCCUPATIONS of those attacked with SMALL-POX in the 60 Houses not visited.

—	At Home.	At School.	At Work.
High Street	3		7
Cullingworth Street			12
Upper North Street			
Clay Fold	18		
Back Chapel Street		23, 24	
Hume Street		46	174
Ward's Hill			47
Grosvenor Cottage			49
Bilkeiff Buildings	51		
Wheatcroft			59
Hanover Street			60
Crescent Street			61, 80
Dark Lane	62		
Union Street	72		
Hume Street			81
Brown' Buildings	87		
Carlincow Lane		203	88
Grafton Street		91	
Staincliffe			97
Wetherall Street	134		113
Parker's Place			156
Wilton Street	146		
Harrison's Fold			153
Woodwell Street	157		531
Dark Lane	162		247
Wilson's Buildings			172
Charles Street			194, 203
Puriwell Lane			198
Henry Street, B. C.	225	304	
Victoria Street, B. C.			226, 228
Hick Lane	243		
Woodwell Street			270
Warwick Mount			271
Brown's Buildings			272, 455
Clay Fold			294
Suffolk Street	325		
Victoria Street			328
Spa Street		400	343
Hesley Lane	363		
Havercroft Fold			368
Fearnside's Yard	437		373
Field Hill	441		385
Jacob Street			387, 468
King Street, B. C.	449	590	448
Wood Street	308		
Back Henrietta Street			415
North Street		419	
Track Quarry			420
Back Hume Street	427		425
Cross Bank		442	
Taylor Street			434
New Street			[444, 461]
Balk Street			475
Providence Street			487
Bradford Road			492
Albion Street			493
Providence Street	522		
Blaydon's Place			520

TABLE showing OCCUPATIONS of those attacked with SMALL-POX in the 60 Houses not visited—cont.

—	At Home.	At School.	At Work.
Ambler Street			234
Bradford Road			549
60 houses	25	10	49
Small-pox hospital	463		

The facts given in the preceding table (XL) and Chart VII. may be thus summarised:—

Of the 1,456 persons inhabiting 267 houses invaded by small-pox, there were,—

573 living at home and engaged in home-work.
271 attending school.
612 engaged in daily work away from home.

Of these attacked with small-pox there were:—

162 at home or 28·2 per cent.
58 at school or 21·4 per cent.
245 at work or 39·9 per cent.

The same series analysed according to the size of the households give:—

TABLE XLI.

Number of Inmates per House.	Number of Houses.	Total Inmates.			Total Cases.		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
11	5	23	17	15	4	3	4
10	10	29	30	41	9	6	18
9	15	48	36	51	10	5	17
8	20	51	37	72	15	6	20
7	20	51	34	55	6	11	24
6	48	118	52	118	30	12	47
5	51	108	45	102	34	10	41
4	50	91	15	94	34	4	36
3	28	41	5	38	13	1	19
2	19	12	—	26	6	—	19
1	1	1	—	—	1	—	—
	267	573	271	612	162	58	245

Taking the whole numbers of each series, it is seen that of those—

(a.) Engaged at home there were in all 183 cases, 35 of which were fatal, a mortality in this class of 19·2 per cent.

(b.) Attending school 68 cases, four of which were fatal, a mortality of 5·8 per cent.

(c.) Engaged in work away from home 294 cases, 18 of which were fatal, a mortality of 6·7 per cent.

The high death-rate of class (a) is due to the inclusion in it of all infants.

Type of Attacks of Small-pox.—As regards the type of the disease amongst these 545 cases, it was found that there were:

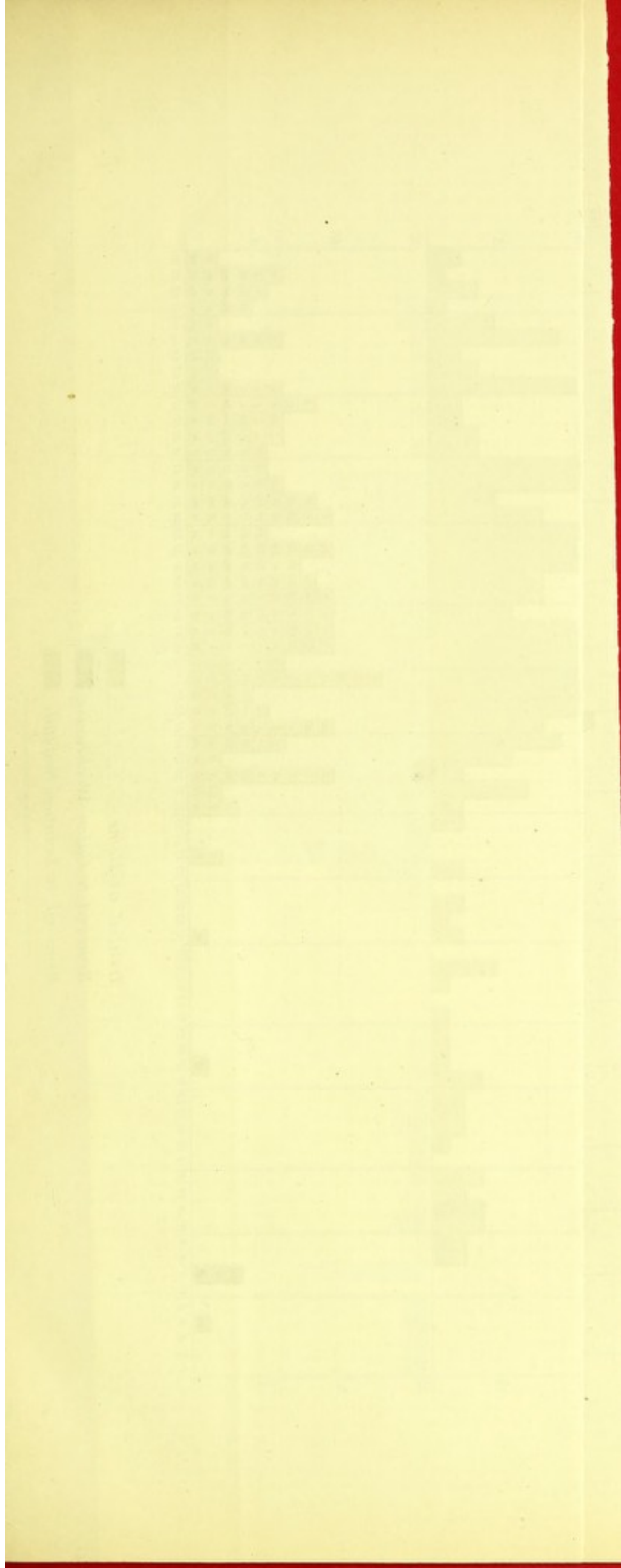
126 confluent cases or 23·1 per cent.
75 coherent " " 13·7 "
197 discrete " " 36·1 "
142 mild " " 26·0 "

and in five cases the type could not be ascertained.

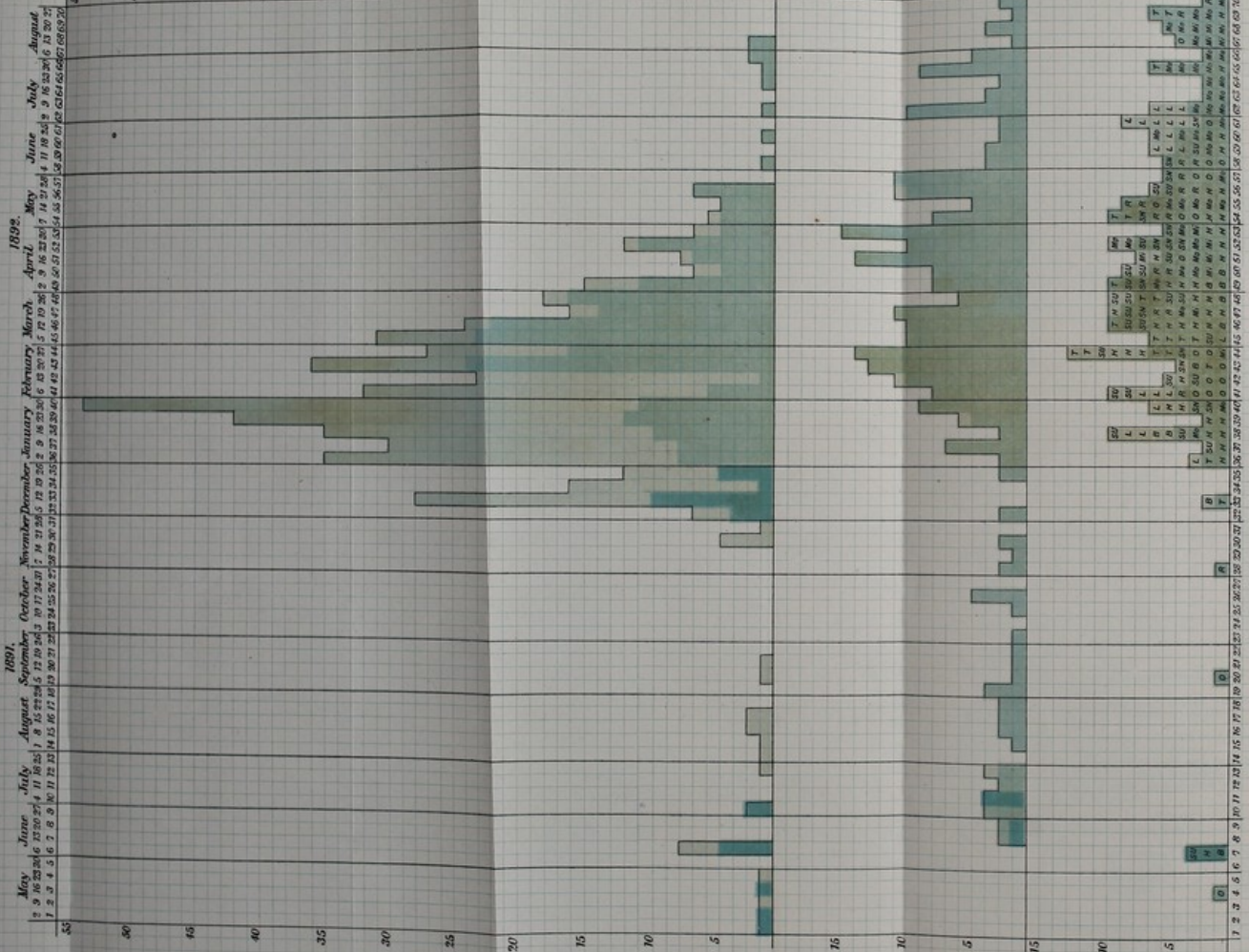
The proportion of confluent cases was therefore below the whole district (26·5 per cent.)

The mortality of the whole number was 10·4 per cent.; three of the 57 fatal cases being of the discrete type; the rest confluent (including two hæmorrhagic).

The average mortality of the whole district was 10·7 per cent.



DISTRIBUTION OF CASES ACCORDING TO MEASURES OF ISOLATION.



Treated at Home.....
 Removed to Union Workhouse.....
 Removed to Isolation Hospital.....

The distribution of these cases at different life periods was as follows:—

	Cases.	Per cent.
<i>Under 1 year of age</i>	19	—
Confluent	15	79·
Coherent	1	5·2
Discrete	3	15·8
<i>From 1 to 10 years</i>	80	—
Confluent	24	30·
Coherent	11	13·7
Discrete	29	36·2
Mild	14	17·5
Type not determined	—	2
<i>From 10 to 30 years</i>	318	—
Confluent	64	20·1
Coherent	49	15·4
Discrete	116	36·5
Mild	88	27·4
Type not determined	1	—
<i>30 years and upwards</i>	128	—
Confluent	23	17·7
Coherent	14	10·8
Discrete	49	38·
Mild	40	31·7
Type not determined	2	31·7

Isolation Measures.—More than one-half of the cases were treated in their own homes. During 1891, 26 of the total number of 87 cases were removed for treatment to the union workhouse at Staincliffe, which however was closed to non-paupers at the end of the year. During 1892 (up to August 27) there had been removed to the small-pox hospital, erected by the Batley Corporation, and opened on January 1st, 217 cases; 241 being retained at home.

In the case of those kept at home endeavours were made by the authorities to restrain the movements of the remaining inmates of the infected houses, but with only partial success. In some instances all the members of the household were kept in the house until it had been disinfected, a matter of three to six weeks, or even longer, according to the severity of the case.

From the annexed tables, and Chart VIII, it will be seen that it was not until the 43rd week of the epidemic that more patients were removed of those attacked in the week than were kept at home; whilst from the 54th week onwards every patient was thus removed.

TABLE XLII.

MEASURES OF ISOLATION. MONTHLY DISTRIBUTION.

Cases arising in	Sent to Workhouse.		Sent to Small-pox Hospital.		Remained at Home.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	1891.					
April	1	—	—	—	—	—
May	3	1	—	—	2	1
June	5	3	—	—	3	—
July	1	—	—	—	2	—
August	—	—	—	—	5	—
September	—	—	—	—	2	—
October	—	—	—	—	—	—
November	—	—	—	—	5	4
December	17	2	3	—	56	6
1892.						
January	—	—	41	1	135	8
February	—	—	32	5	71	7
March	—	—	72	8	11	2
April	—	—	26	2	9	2
May	—	—	15	3	1	—
June	—	—	1	—	—	—
July	—	—	5	2	—	—
August	—	—	2	—	—	—
	26	6	217	21	302	30

Thus of those sent to the workhouse infirmary the mortality was 23 per cent.; of those sent to the small-pox hospital it was 9·6 per cent.; and of those treated in their homes it was 9·9 per cent.

TABLE XLIII.

MEASURES OF ISOLATION. IN WEEKS OF EPIDEMIC.

(Chart VIII.)*

1891.

Week of Epidemic.	Sent to Union Workhouse Infirmary.		Treated at Home.	
	Cases.	Deaths.	Cases.	Deaths.
i.	1	—	—	—
ii.	1	—	—	—
iii.	—	—	1	1
iv.	1	1	—	—
v.	—	—	1	—
vi.	4	2	3	—
vii.	2	1	—	—
viii.	—	—	1	—
ix.	—	—	1	—
x.	—	—	2	—
xi.	—	—	1	—
xii.	—	—	4	3
xiii.	—	—	1	1
xiv.	3	—	3	—
xv.	9	2	18	1
xvi.	1	—	14	3
xvii.	4	—	7	—
	26	6	61	

1892.

Week of Epidemic.	Sent to Small-pox Hospital.		Treated at Home.	
	Cases.	Deaths.	Cases.	Deaths.
xxxvi.	7	1	27	2
xxxvii.	7	—	22	1
xxxviii.	9	—	25	4
xxxix.	11	—	30	2
xl.	10	—	43	1
xli.	5	1	26	2
xlii.	1	—	21	2
xliii.	23	2	12	3
xliiii.	16	1	10	—
xlv.	22	1	8	1

* *Explanation of Chart VIII.*—This chart, drawn on the same plan as Chart V. and VI., illustrates the measures of isolation of the cases of small-pox adopted in each of the infected districts, in each week of the outbreak. The different shades of tint indicate the cases: (a) retained at home; (b) removed to special hospital; (c) to the workhouse infirmary. The figures upon which the chart is based are to be found in Table XLIII., and in the text of report on Dewsbury and other Districts. The chart shows that there were:—

	At Home.	Hospital	Workhouse.
Batley	302	47	6
Dewsbury	3	234	6 (inmates)
Other districts	48	66	3

1892—continued.

Week of epidemic.	Sent to Small-pox Hospital.		Treated at Home.	
	Cases.	Deaths.	Cases.	Deaths.
xlvi.	21	4	2	1
xlvii.	13	2	2	—
xlviii.	15	2	2	—
xlix.	10	—	4	1
i.	4	—	2	1
ii.	6	—	1	—
iii.	10	2	1	—
iiii.	4	—	2	—
lv.	4	1	1	—
lv.	4	—	—	—
lvi.	6	2	—	—
lvii.	1	—	—	—
lviii.	1	—	—	—
lix.	1	—	—	—
lx.	1	—	—	—
lxi.	1	1	—	—
lxii.	1	—	—	—
lxiii.	1	—	—	—
lxiv.	1	—	—	—
lxv.	1	1	—	—
lxvi.	2	—	—	—
lxvii.	2	—	—	—
	217	21	241	21

The distribution of these cases with respect to age and sex was as follows:—

TABLE XLIV.

	Sent to						Remained at Home.						
	Workhouse.				Hospital.								
	Male.		Female.		Male.		Female.						
	C.	D.	C.	D.	C.	D.	C.	D.					
Under 1 year	—	—	1	1	1	—	2	1	6	4	9	7	
1 to 5 years	1	—	5	2	7	1	5	2	12	6	11	2	
5 to 10	—	—	1	—	7	1	10	—	7	1	14	2	
10 to 15	—	—	—	—	6	—	9	—	20	1	19	1	
15 to 20	—	1	—	3	1	25	2	19	2	29	1	29	1
20 to 25	—	3	—	5	1	37	3	34	2	34	2	45	1
25 to 30	—	2	—	2	—	24	2	15	2	21	1	15	—
30 to 35	—	1	1	—	—	6	1	2	—	8	—	7	—
35 to 40	—	—	—	—	—	2	2	4	—	6	—	5	—
40 to 45	—	—	—	—	—	1	—	—	—	—	—	3	—
45 to 50	—	—	—	—	—	—	—	—	—	—	—	—	—
50 to 60	—	—	—	—	—	—	—	—	—	—	—	—	—
60 to 70	—	—	—	—	—	—	—	—	—	—	—	—	—
and over	—	—	—	—	—	—	1	—	2	—	—	—	—
	8	1	18	5	116	12	101	9	145	16	157	14	

Analysing these returns still further, in reference to the number of cases occurring in a house, we find that of the 202 "single" cases (proceeding from 201 houses and the small-pox hospital),—

There were treated at home	96
" " workhouse infirmary	6
" " small-pox hospital	100

Whereas of the 343 "multiple" cases in 126 houses,—

There were treated at home	206
" " workhouse infirmary	20
" " small-pox hospital	117

This second group may be subdivided according to the number of cases arising in the household. Thus:—

(A.)

Of 74 households in which two cases occurred:—

- In 34, both cases were treated at home through the whole illness.
 „ 19, one case remained at home, the other was removed to hospital (17) or infirmary (2).
 „ 21, both were sent to hospital (20) or infirmary (1).

(B.)

Of 24 households in which three cases occurred:—

- In 10, all remained at home.
 „ 2, two remained at home, one was sent to hospital
 „ 3, one remained at home, and two were sent to hospital (2) or infirmary (1).
 „ 9, all were sent to hospital.

(C.)

Of 19 households in which four cases occurred:—

- In 12, all remained at home.
 „ 1, three remained at home, one sent to hospital.
 „ 4, one remained at home, three sent to hospital (2) or infirmary (2).
 „ 2, all were removed to the infirmary (1) or hospital.

(D.)

Of seven households in which five cases occurred:—

- In 1, all remained at home.
 „ 1, four remained at home, one sent to hospital.
 „ 2, one remained at home, four sent to hospital (1) or to infirmary (1).
 „ 3, all removed to hospital.

(E.)

Of two households in which six cases occurred:—

- In both all the patients remained at home.

This may be summarised as follows:—

CASES OF SMALL-POX IN HOUSEHOLDS.

	One Case.	Two Cases.	Three Cases.	Four Cases.	Five Cases.	Six Cases.
Number of Houses	202	74	24	19	7	2
All remained at home	96	70	33	48	5	12
{ At home	—	19	5	8	6	—
{ Sent to workhouse infirmary	—	2	2	6	4	—
{ Sent to small-pox hospital	—	17	5	10	5	—
{ All sent to workhouse infirmary	6	2	—	4	—	—
{ All sent to small-pox hospital	100	38	27	—	15	—
	202	148	72	76	35	12

It might be supposed *à priori* that the risks of infection of other members of the family were much greater in those cases where the patient was detained at home—generally in a small crowded tenement—than where he was removed to hospital; but on examination of this group of "multiple cases in households" there is no very striking difference between the two series, as will appear from the following figures based on 108 of these households of which the number of members was obtained.

These 108 houses comprise:—

Houses.	Inmates.	Total.	No. attacked with Small-pox.
2	11	22	8
8	10	80	31
8	9	72	25
11	8	88	32
13	7	91	34
19	6	114	60
17	5	85	51
19	4	76	43
5	3	15	10
6	2	12	12
108	—	655	306

giving an "attack-rate" of 2:1:1 or 46·8 per cent.

Now in 52 of these households, numbering 303 members in all, every case was treated at home, viz., 150, an attack-rate for this category of 2:1:1 or 50 per cent.

In 26 of these households, numbering 162 members, the cases of small-pox were in part treated at home, in part sent to the workhouse infirmary or hospital; they number 75, giving an attack-rate of 2:1:1 or 46·3 per cent.

In 30 of these households, numbering 190 members, the cases were all sent to infirmary or hospital, viz., 81, an attack-rate of 2:3:1 or 42·6 per cent.

This comparatively small, though appreciable, testimony to the value of hospital isolation is however lessened by the fact that the average number of inmates of the house, and therefore of those presumably exposed to infection from the case was lowest in the series which yielded the largest proportion of cases. In the 52 houses where the patients were nursed wholly at home, the average number of inmates was 5·8; in the 26 houses where one or more of the patients were removed, the rest being kept at home, the average number of inmates was 6·2; and in the 30 houses, where all the cases were removed, the average number of inmates was 6·3. It will be seen that this proportionate rise in the numbers exposed to infection is closely balanced by the proportionate rise in the attack-rates of the three series.

It would, however, be unfair to estimate the value of hospital isolation in small-pox on these figures alone, for they require to be checked by many other considerations, such as the time of removal after development of symptoms, the dates at which the other patients were attacked, and the possible influence of vaccination upon those exposed to infection. The latter question does not come much into play in these returns, as comparatively little re-vaccination was done; but such as it was will be dealt with in the next part of the report (p. 130).

I propose, however, to attempt to deal with some of the other facts, so far as they are capable of analysis. Before doing so it may be useful to state that of the whole number of 545 patients, 265 were of the class in which no case was removed from the infected house; 85 belong to that class in which some were removed and some were not; and 195 to the class where every case in the house was removed.

It has been previously stated that the cases of small-pox came from 327 houses and one from the small-pox hospital, that 201 houses yielded each a single case; whilst multiple (i.e., two or more) cases came from 126 houses.

Of the first group, 97 were treated at home.

" " 104 were removed to the workhouse infirmary or the small-pox hospital (to which may be added the case arising there).

Of the second group, 168 coming from 61 houses were treated at home; 90 coming from 34 houses were removed to hospital or infirmary; whilst of the remaining 85 from 31 houses, some (in each case) remained, and some were removed.

Single Cases in Houses.

In 159 houses that were inspected, containing a total of 801, or an average of five inmates per house, there was only a single case of small-pox. In 77 the patients were treated at home, the total number of dwellers being 387, or an average of five per house, and the attack-rate was 5:1:1 or 20 per cent. In 82, the patient was removed to workhouse or hospital, the total number of dwellers being 414, or an average of five per house, the attack-rate being nearly 5:1:1 or 19·7 per cent.

Multiple Cases in Houses.

The first fact, which has already been stated from another point of view is, that in the 126 households where more than one case occurred, 35 "primary" cases were removed to infirmary or hospital; and that to them there succeeded 58 subsequent cases (the majority probably infected from the first case), which gives a ratio of 1:1·6. On the other hand 91 "primary" cases were treated at home, and were followed by 159 subsequent cases or a ratio of 1:1·7, which does not seem to show any marked advantage from hospital isolation.

It may, however, be shown by grouping these cases in three series that the liability to infection was somewhat greater when no case was removed from the house. I have for this object compiled the following tables, corresponding to each Series.

Series A comprises those households, 43 in number, in which all the "initial cases," signifying by that term every person who sickened within 10 days of the first to be attacked, and most of the "later cases" arising in the same house were removed to hospital or infirmary. In the Table (XLV.) the dates of the appearance of the rash and of the removal to hospital of the initial cases are given; whilst as regards the later cases the date of the rash is stated and also the day of the illness of the first case to which it corresponds, together with the date of removal of the later case to hospital.

It will be seen that on this reckoning there were in these 43 households, 61 "initial cases," and 56 "later cases."

Series B. comprises those households, 24 in number, in which the "initial case" (or cases) was kept at home, whilst the later cases (or some of them) were removed.

The 24 households yielded 26 initial cases and 37 later cases.

Series C. comprises those households, 59 in number, in which all the cases (whether "initial" or "later") were retained at home.

The 59 households yielded 67 initial cases and 78 later cases.

TABLE XLV.

MULTIPLE CASES in Households showing (a) day of illness on which rash appeared in the First Case; (b) Day of Attack on which this Case was removed to Hospital; (c) Cases in same House occurring together with, or subsequent to the First Case, arranged in order of onset, with reference to the day of Attack of the first Case.

Series A.

House.	Number of Inmates.	Initial Case.				Later Cases.			Remarks.	
		Reference to Case Register.	Date of			Reference to Case Register.	Date of Rash.	Day of Attack of First Case.		Date of Removal.
			Rash.	Removal to Hospital.	Day of Attack when removed.					
224	4	2	May 4 - -	May 12 - -	10th - -	4	May 23 - -	20th - -	May 26 - -	
31	9	38	Dec. 7 - -	Dec. 9 - -	4th - -	505	Dec. 18 - -	16th - -	Dec. 9 - -	Sent to workhouse with rest.
		41	Dec. 7 - -	Dec. 9 - -	4th - -					
		42	Dec. 7 - -	Dec. 9 - -	4th - -					
39	5	77	Dec. 28 - -	Dec. 31 - -						
		78	Dec. 26 - -	Dec. 31 - -						
		79	Dec. 25 - -	Dec. 31 - -						
		89	About 26 - -	Dec. 31 - -						
		505	Dec. 26 - -	Dec. 31 - -						
240	7	105	Dec. 29 - -	Jan. 4 - -	9th - -	184	Jan. 18 - -	24th - -	Jan. 21 - -	
117	7	118	Jan. 5 - -	Jan. 9 - -	8th - -	181	Jan. 20 - -	20th - -	-	Remained at home.
						192	Jan. 22 - -	22nd - -	Jan. 23 - -	
49	11	106	Jan. 3 - -	Jan. 6 - -	6th - -	176	Jan. 19 - -	19th - -	Jan. 21 - -	
						249	About Feb. 1	32nd - -	Feb. 17 - -	
						315	Feb. 18 - -	49th - -	Feb. 19 - -	
						331	About Feb. 17	48th - -	Feb. 23 - -	
189	9	138	Jan. 9 - -	Jan. 12 - -	7th - -	147	Jan. 12 - -	7th - -	Jan. 13 - -	} Reckoned as "initial cases."
						509	Jan. 13 - -	8th - -	Jan. 13 - -	
20	8	129	Jan. 6 - -	Jan. 6 - -	4th - -	193	Jan. 21 - -	10th - -	Feb. 12 - -	
75	5	145	?	Jan. 13 - -	5th - -	199	Jan. 22 - -	14th - -	Jan. 22 - -	Remained at home.
						227	Jan. 27 - -	19th - -	-	
85	8	141	Jan. 10 - -	Jan. 12 - -	5th - -	422	March 12 - -		March 14 - -	Obviously fresh infection.
264	7	159	Jan. 14 - -	Jan. 17 - -	6th - -					
		160	Jan. 16 - -	Jan. 17 - -	7th - -					
23	10	166	?	Jan. 17 - -	3rd - -	261	Feb. 5 - -	20th - -	-	Remained at home.
						335	About Feb. 17	34th - -	Feb. 18 - -	
116	2	104	Jan. 16 - -	Jan. 17 - -	4th - -	377	Feb. 27 - -	45th - -	Feb. 27 - -	Probably fresh infection.
155	3	205	Jan. 23 - -	Jan. 25 - -	5th - -	452	March 22 - -		March 23 - -	Fresh infection.
43	3	209	Feb. 25 - -	Feb. 26 - -	3rd - -					Remained at home.
		244	Feb. 28 - -	-	-					
-	-	372	Feb. 26 - -	Feb. 26 - -	5th - -	437	About Mar. 16	24th - -	-	Remained at home.
19	10	205	Feb. 5 - -	Feb. 6 - -	10th - -	327	Feb. 17 - -	21st - -	Feb. 21 - -	
						445	March 18 - -	51st - -	March 21 - -	
						484	April 9 - -	73rd - -	April 9 - -	
						325	April 13 - -	77th - -	-	
51	4	292	?	Feb. 20 - -	19th - -	373	Feb. 26 - -	25th - -	-	Remained at home.
157	5	322	Feb. 16 - -	Feb. 18 - -	5th - -					
		323	Feb. 16 - -	Feb. 18 - -	5th - -					
-	-	348	Feb. 21 - -	Feb. 21 - -	4th - -	490	March 5 - -	18th - -	-	Remained at home.

MULTIPLE CASES IN HOUSEHOLDS—cont.

House.	Number of Inmates.	Initial Cases.				Later Cases.				Remarks.
		Reference to Case Register.	Date of			Reference to Case Register.	Date of Rash.	Day of Attack of First Case.	Date of Removal.	
			Rash.	Removal to Hospital.	Day of Attack when removed.					
253	7	336	?	Feb. 24 -	5th -	441	March 6 -	16th -	March 7 -	
						462	March 6 -	16th -	March 7 -	
250	8	379	Feb. 28 -	March 2 -	7th -	458	March 17 -	26th -	March 18 -	
152	5	384	Feb. 29 -	March 1 -	4th -	469	March 31 -	31th -	March 31 -	
-	-	385	March 1 -	March 1 -	3rd -	441	March 18 -	21st -	March 18 -	
-	-	390	March 3 -	March 3 -	3rd -	448	March 21 -	21st -	March 22 -	
						449	March 21 -	21st -	March 22 -	
-	-	425	March 15 -	March 15 -	4th -					
		427	March 15 -	March 15 -	4th -					
44	6	424	March 13 -	March 15 -	5th -	446	March 21 -	11th -	March 21 -	
100	4	414	March 9 -	March 11 -	4th -	450	March 21 -	14th -	March 22 -	
						451	March 23 -	16th -	March 23 -	
169	2	411	March 8 -	March 9 -	4th -	463	March 28 -	23rd -	March 28 -	
255	4	435	March 13 -	March 17 -	8th -	465	March 29 -	-	-	Remained at home.
150	4	429	March 17 -	March 19 -	9th -	471	April 1 -	22nd -	April 1 -	
						472	April 1 -	22nd -	April 1 -	
-	-	444	March 20 -	March 21 -	5th -	461	March 28 -	12th -	March 28 -	
274	4	464	March 29 -	March 30 -	4th -	499	April 11 -	15th -	April 15 -	
166	6	494	April 23 -	April 23 -	3rd -					
		495	April 23 -	April 23 -	3rd -					
		496	April 23 -	April 23 -	3rd -					
		497	April 23 -	April 23 -	3rd -					
		498	April 23 -	April 23 -	3rd -					
147	2	499	April 23 -	April 25 -	3rd -	503	April 28 -	8th -	April 29 -	Reckoned as "initial cases."
151	5	485	April 27 -	April 28 -	4th -	533	May 10 -	13th -	May 10 -	No. 485 first admitted to hospital April 12th with varicella and discharged April 25th.
300	6	528	May 1 -	May 2 -	4th -	537	May 15 -	16th -	May 16 -	
						547	July 4 -	-	July 4 -	Fresh infection.
295	7	530	May 5 -	May 5 -	5th -	544	May 23 -	23rd -	May 24 -	
298	10	532	May 5 -	May 6 -	4th -	539	May 16 -	14th -	May 16 -	
						540	May 19 -	17th -	May 20 -	
299	9	536	May 11 -	May 11 -	4th -	542	May 22 -	15th -	May 23 -	
						543	May 23 -	16th -	May 25 -	
						545	May 31 -	24th -	June 1 -	
301	6	548	July 20 -	July 24 -	9th -	550	July 31 -	16th -	Aug. 2 -	
						551	Aug. 1 -	17th -	Aug. 4 -	
						552	Aug. 5 -	21st -	Aug. 4 -	
						553	Aug. 6 -	22nd -	Aug. 4 -	
271	9	331	?	Feb. 24 -	5th -	350	Feb. 25 -	4th -	Feb. 24 -	Reckoned as "initial case."
36	5	273	?	Feb. 4 -	4th -	335	Feb. 19 -	19th -	Feb. 29 -	
						366	Feb. 24 -	24th -	Feb. 24 -	
						374	Feb. 25 -	26th -	Feb. 26 -	

TABLE XLVI.

MULTIPLE CASES IN HOUSEHOLDS showing DAY OF ILLNESS on which RASH appeared in the first and subsequent Cases, with reference to the Date of the first Case.

Series B.

House.	Number of Inmates.	Initial Case.*			Later Case or Cases.				Remarks.
		Reference to Register.	Date of Rash.	Day of Illness.	Reference to Register.	Date of Rash.	Day of Attack of Initial Case.	Date of Removal.	
266	7	10	June 13 - -	4th -	13	July 7 - -	24th -	July 3 - -	Accompanied No. 14.
					14	July 3 - -	20th -	July 3.	
22	5	29	Nov. 17 - -	2nd -	31	Dec. 4 - -	12th -	Dec. 10.	
3	5	28	? About Nov. 17	?	504	Dec. 8 - -	?	Dec. 7.	
131	5	27	Nov. 24 - -	4th -	32	Dec. 6 - -	16th -	Dec. 13.	
					35	Dec. 6 - -	16th -	Dec. 10.	
					36	? Dec. 9 - -	19th -	Dec. 10.	
203	9	76	Dec. 23 - -	6th -	111	Jan. 5 - -	18th -	Jan. 7.	
					112	Jan. 5 - -	18th -	Jan. 7.	
					185	Jan. 23 - -	36th -	Jan. 23.	
170	9	69	Dec. 31 - -	2nd -	464	March 7 - -		March 7.	Fresh infection?
199	8	107	Jan. 4 - -	4th -	273	Feb. 5 - -	36th -	Feb. 6.	
98	6	95	Jan. 3 - -	6th -	165	Jan. 15 - -	18th -	—	} Remained at home.
					511	Jan. 25 - -	28th -	—	
					397	March 4 - -		March 4 - -	
192	4	508	Jan. 7 - -	4th -	515	Jan. 27 - -	24th -	Jan. 28.	
102	7	196	Jan. 23 - -	4th -	396	March 4 - -	46th -	March 5.	} Fresh infection.
					458	March 27 - -		March 28 - -	
219	7	254	Feb. 1 - -	4th -	316	Feb. 15 - -	19th -	Feb. 19.	
		256	Feb. 1 - -	4th -					
40	7	217	Jan. 26 - -	2nd -	317	Feb. 11 - -	18th -	—	} Remained at home.
					334	Feb. 16 - -	25th -	—	
					423	March 15 - -		March 15.	
—	—	157	Jan. 15 - -	4th -	531	May 5 - -		May 5.	Fresh infection?
—	—	274	Feb. 4 - -	4th -	455	March 24 - -	53rd -	March 24.	
94	7	303	Feb. 10 - -	4th -	352	Feb. 25 - -	17th -	Feb. 23.	
208	3	337	Feb. 24 - -	4th -	423	March 10 - -	19th -	March 24.	
290	10	408	March 6 - -	4th -	483	March 23 - -	21st -	March 24.	
—	—	387	March 1 - -	3rd -	468	March 30 - -	33rd -	March 30.	
15	9	386	March 2 - -	4th -	488	April 12 - -	43th -	April 14.	
275	6	477	April 5 - -	5th -	526	May 2 - -	32nd -	May 2.	
297	6	527	May 1 - -	3rd -	541	May 19 - -	22nd -	May 20.	
214	6	25	Nov. 27 - -	4th -	34	Dec. 8 - -	15th -	Dec. 9.	
					39	Dec. 10 - -	17th -	Dec. 10.	
					40	Dec. 10 - -	17th -	Dec. 10.	
13	5	131	Jan. 8 - -	3rd -	216	Jan. 24 - -	19th -	—	} Remained at home.
					230	? Jan. 24 - -		Jan. 28.	
96	3	154	Jan. 13 - -	4th -	269	Jan. 31 - -	22nd -	Feb. 3.	

TABLE XLVII.

MULTIPLE CASES in HOUSEHOLDS—Cases treated at Home—dates of ONSET and RASH in First Cases and in later cases—with reference to Day of Attack of first Cases.

Series C.

House.	Number of Inmates.	Initial Cases.				Later Cases.				Remarks.
		Reference to Register.	Date of		Reference to Register.	Date of Onset.	Day of Attack of Initial Case.	Date of Rash.		
			Onset.	Rash.						
136	6	16	July 29 - -	July 31 - -	19	Aug. 15 -	18th -	Aug. 17.		
245	6	17	Aug. 2 - -	Aug. 6 - -	21	Aug. 18 -	17th -	Aug. 21.	Fresh infection probably.	
					22	Aug. 21 -	20th -	Aug. 25.		
					23	Jan. 22 -		Jan. 28		
-	-	23	About Sept. 6 -		24	About Sept. 19			No exact information.	
1	4	25	Nov. 16 - -	Nov. 19 - -	30	Dec. 1 -	16th -	Dec. 4 -		
215	4	66	Dec. 4 - -	Dec. 7 - -	75	Dec. 7 -	4th -	Dec. 10 -	Reckoned as initial case.	
2	4	43	Dec. 6 - -	Dec. 10 - -	45	Dec. 10 -	6th -	Dec. 13 -	Reckoned as initial case.	
211	10	52	Dec. 11 - -	Dec. 14 - -	63	Dec. 15 -	6th -	Dec. 18.	Reckoned as initial cases.	
		53	Dec. 11 - -	Dec. 14 - -	64	Dec. 15 -	6th -	Dec. 18.		
135	8	48	Dec. 11 - -	Dec. 13 - -	83	Dec. 25 -	16th -	Dec. 28.		
					84	Dec. 29 -	19th -	Dec. 31.		
-	-	46	Dec. 9 - -	Dec. 12 - -	174	Jan. 15 -	30th -	Jan. 18.		
127	10	60	Dec. 12 - -	Dec. 15 - -	109	Dec. 28 -	17th -	Jan. 1.		
					187	Jan. 19 -	30th -	Jan. 22.		
					188	Jan. 19 -	30th -	Jan. 22.		
					189	Jan. 19 -	30th -	Jan. 22.		
					201	Jan. 18 -	38th -	Jan. 23.		
258	7	55	Dec. 12 - -	Dec. 15 - -	142	Jan. 8 -	28th -	Jan. 11.		
					236	Jan. 26 -	46th -	Jan. 29.		
-	-	61	Dec. 13 - -	Dec. 16 - -	89	Dec. 30 -	18th -	Jan. 1.		
52	6	86	Dec. 15 - -	?	129	Jan. 5 -	22nd -	?		
50	8	74	Dec. 17 - -		103	Jan. 1 -	14th -	Jan. 5.		
					102	Jan. 4 -	19th -	?		
					104	Jan. 4 -	19th -	?		
209	6	65	Dec. 15 - -	Dec. 18 - -	108	Jan. 1 -	18th -	Jan. 4.		
					816	Jan. 26 -	43rd -	Jan. 28.		
124	4	94	Dec. 26 - -	Dec. 28 - -	152	Jan. 11 -	17th -	Jan. 14.		
					229	Jan. 26 -	32nd -	Jan. 28.		
260	2	92	Jan. 1 - -	Jan. 2 - -						
		93	Dec. 30 - -	Jan. 1 - -						
125	4	115	Jan. 2 - -	Jan. 5 - -						
		117	Jan. 2 - -	Jan. 5 - -						
-	-	113	Jan. 1 - -	Jan. 5 - -	184	Jan. 7 -	7th -	Jan. 10 -		
59	4	116	Dec. 31 - -	Jan. 3 - -	510	Jan. 10 -	11th -	Jan. 15 -		
-	-	83	Dec. 26 - -	Dec. 28 - -	202	Jan. 15 -	21st -	Jan. 18 -		
218	4	114	Jan. 1 - -	Jan. 5 - -	514	Jan. 22 -	22nd -	Jan. 26 -		
62	7	119	Jan. 2 - -	Jan. 5 - -	211	Jan. 22 -	21st -	Jan. 26 -		

MULTIPLE CASES IN HOUSEHOLDS, &c.—cont.

House.	Number of Inmates.	Initial Cases.				Later Cases.				Remarks.
		Reference to Register.	Date of		Reference to Register.	Date of Onset.	Day of Attack of Initial Cases.	Date of Rash.		
			Onset.	Rash.						
248	6	90	Dec. 30	- - ?	182	Jan. 17	- - 19th	Jan. 20.		
		100	Dec. 30	- - Jan. 1	106	Jan. 20	- - 22nd	Jan. 22.		
73	6	135	Jan. 2	- - Jan. 10	186	Jan. 19	- - 18th	Jan. 22.		
					659	Feb. 5	- - 33rd	Feb. 8.		
76	11	96	Dec. 31	- - Jan. 3	180	Jan. 17	- - 18th	Jan. 20.		
					340	Feb. 18	- - 50th	Feb. 20.		
196	8	184	Jan. 3	- - Jan. 6						
		126	Jan. 3	- - Jan. 6						
210	5	123	Jan. 3	- - Jan. 6	204	Jan. 21	- - 19th	Jan. 24.		
					512	Jan. 21	- - 19th	Jan. 24.		
					513	Jan. 21	- - 19th	Jan. 24.		
82	6	160	Jan. 5	- - Jan. 10	213	Jan. 28	- - 24th	Jan. 29.		
212	5	231	Jan. 6	- - Jan. 8	251	Jan. 17	- - 13th	Jan. 20.		
		507	Jan. 3	- - Jan. 6	224	Jan. 24	- - 21st	Jan. 21.		
128	5	164	Jan. 9	- - Jan. 12	223	Jan. 24	- - 16th	Jan. 27.		
					308	Feb. 19	- - 33rd	Feb. 12.		
177	4	173	Jan. 16	- - Jan. 18	197	Jan. 19	- - 6th	Jan. 22.		
		178	Jan. 16	- - Jan. 19						
-	-	162	Jan. 12	- - Jan. 16	247	Jan. 27	- - 16th	Jan. 30.		
168	10	169	Jan. 15	- - Jan. 18	279	Feb. 3	- - 20th	Feb. 5.		
					295	Feb. 3	- - 20th	Feb. 7.		
					297	Feb. 5	- - 22nd	Feb. 7.		
					288	Feb. 5	- - 22nd	Feb. 7.		
					289	Feb. 5	- - 22nd	Feb. 7.		
142	8	156	Jan. 11	- - Jan. 14	518	Jan. 29	- - 19th	Feb. 1.		
					257	Jan. 29	- - 19th	Feb. 1.		
					332	Feb. 16	- - 37th	Feb. 18.		
-	-	194	Jan. 18	- - ?	203	Jan. 18	- -	?		
197	5	217	Jan. 20	- - Jan. 27	259	Feb. 7	- - 19th	Feb. 10.		
		222	Jan. 22	- - Jan. 25						
87	9	206	Jan. 22	- - Jan. 24	290	Feb. 5	- - 15th	Feb. 6.		
					296	Feb. 6	- - 16th	Feb. 9.		
					519	Feb. 10	- - 20th	Feb. 13.		
113	5	208	Jan. 20	- - Jan. 21	307	Feb. 8	- - 20th	Feb. 9.		
					309	Feb. 7	- - 19th	Feb. 12.		
					312	Feb. 11	- - 23rd	Feb. 12.		
-	-	226	Jan. 23	- - Jan. 27	282	Feb. 2	- - 11th	Feb. 6.		
27	4	228	Jan. 26	- - Jan. 28	291	Feb. 5	- - 11th	Feb. 8.		
91	6	246	Jan. 29	- - Jan. 30	257	Feb. 1	- - 4th	Feb. 2.	Reckoned as "initial" case.	
-	-	225	Jan. 24	- - Jan. 28	304	Feb. 7	- - 15th	Feb. 11.		
204	3	215	Jan. 29	- - Feb. 1	301	Feb. 7	- - 10th	Feb. 10.		
173	6	284	Jan. 27	- - Jan. 29	513	Feb. 11	- - 16th	Feb. 13.		
					319	Feb. 13	- - 18th	Feb. 15.		
					320	Feb. 13	- - 18th	Feb. 15.		

MULTIPLE CASES IN HOUSEHOLDS, &c.—*cont.*

House.	Number of Inmates.	Initial Cases.				Later Cases.				Remarks.
		Reference to Register.	Date of		Reference to Register.	Date of Onset.	Day of Attack of Initial Case.	Date of Rash.		
			Onset.	Rash.						
182	7	253	Jan. 29	Jan. 31	330	Feb. 14	17th	Feb. 17.		
21	4	517	Jan. 27	Jan. 30	329	Feb. 14	19th	Feb. 17.		
					337	Feb. 16	21st	Feb. 19.		
57	8	220	Jan. 25	Jan. 27	310	Feb. 9	10th	Feb. 12.		
			229	Jan. 27	Jan. 29	314	Feb. 10	17th	Feb. 12.	
					348	Feb. 19	20th	Feb. 22.		
60	8	241	Jan. 27	Jan. 28	370	Feb. 22	27th	Feb. 25.		
58	2	293	Feb. 3	Feb. 6						
			300	Feb. 5	Feb. 8					
234	10	283	Feb. 4	Feb. 6	355	Feb. 22	19th	Feb. 23.		
164	6	272	Feb. 3	Feb. 4	305	Feb. 9	8th	Feb. 11	Reckoned as "initial" case.	
			280	Feb. 2	Feb. 5	300	Feb. 21	20th		Feb. 24.
88	5	311	Feb. 10	?	369	Feb. 22	13th	?		
175	5	321	Feb. 12	Feb. 15	460	March 24	42nd	March 26.		
33	4	318	Feb. 14	Feb. 17	521	? Feb. 28	15th	March 10.		
28	4	354	Feb. 21	Feb. 23	409	March 5	14th	March 8.		
159	8	407	March 2	?	522	March 9	8th	March 9.	Reckoned as "initial" case.	
					523	March 23	22nd	March 25.		
					524	April 6	30th	?		
83	6	433	March 11	March 15	478	April 2	22nd	April 5.		
176	2	442	March 17	March 20						
			443	March 15	March 20					

SUMMARY ANALYSIS OF TABLES XLV. to XLVII.

		<i>Households of which particulars obtained.</i>					
		No. of Houses.	No. of Inmates.	Initial Cases		Later cases	
				Removed.	Remained.	Removed.	Remained.
Single cases	-	159	801	81	78	-	-
Multiple cases	Series A.	37	226	53	1*	44	6
	" B.	21	134	-	23	29	5
	" C.	50	295	-	69	-	76
		267	1,456	134	171	73	87
		<i>Households of which no particulars obtained.</i>					
		42	-	24	18	-	-
		6	-	7	-	4	2
Multiple cases	Series A.	3	-	-	3	-	3
	" B.	9	-	-	9	-	9
	" C.	60	-	31	30	4	14
Case arising in hospital	-	-	1	-	-	-	
		-	-	32	-	-	-

* This case sickened three days after removal of first case (Nos. 244 and 209).

Particulars were obtained of the inmates of 108 of these houses, numbering 655 in all, of whom 306 were attacked with small-pox.

In Series A. there were 37 houses, in five of which, namely, Nos. 39, 264, 157, 166, and 371 in House List, containing 32 inmates, there occurred 16 cases all of which were removed at the same time, no others subsequently arising in those houses. The remaining 32 households containing 194 inmates, yielded 88 cases of small-pox, 38 of which may be regarded as "initial" cases. Subtracting 38 from 194 we have 156 persons who may be presumed to have been exposed to infection; and of these 50 or 32 per cent. were attacked subsequently to the removal to hospital of the initial case.

In Series B. there were 21 houses containing 134 inmates, amongst whom 57 contracted small-pox, 23 of whom may be regarded as "initial cases." Subtracting 23 from 134, we have 111 persons who were exposed to infection from the initial case, which was retained at home. Of this number 34 or 30.6 per cent. were attacked with small-pox, and the majority of them were removed.

In Series C. there were 50 houses containing 295 inmates, amongst whom 145 contracted small-pox, 69 being regarded as "initial cases." Subtracting 69 from 295, the remainder 226 were exposed to infection at any period after illness of the initial case, and 76 or 33.6 per cent. were attacked with small-pox.

Lastly, taking the whole number of 1,456 inmates of 267 infected houses, we find that 305 were "primarily" attacked (in several instances more than one member of a family falling ill within a few days or at the same time as the first). This would leave 1,151 persons subjected to infection (more or less), of which number 160 or 14 per cent. subsequently sickened. And in those houses where the cases were all sent to the hospital (including both single and multiple cases) there would be 500 thus exposed, of whom 50 or 10 per cent. sickened; whilst in those houses where all the cases were retained at home there would be 542 exposed, of whom 78 or 14.4 per cent. sickened.

Vaccination Statistics.

Of the total number (545) small-pox patients at Batley there were:—

- A. Vaccinated 347, of whom nine died.
 B. Alleged to have been vaccinated, but presenting no marks, 13, of whom one died.
 C. "Undergoing" primary vaccination when attacked with small-pox, 8, of whom one died.
 D. Unvaccinated 167, of whom 46 died, and E. in 10 instances no information could be obtained respecting vaccination.

The mortality in the foregoing classes was therefore:—

- A. Vaccinated - - - - 2.9 per cent.
 B. Alleged vaccination - - - 7.7 "
 C. Under vaccination - - - 12.5 "
 D. Unvaccinated - - - 27.5 "

In the accompanying Table and Chart IX.* the incidence every week of these various classes attacked is illustrated.

* Explanation of Chart IX. :—
 This Chart is prepared to show the weekly incidence in Batley of cases of small-pox during the 76 weeks of the epidemic under review, the cases being separately grouped according to their vaccination relations.

The vaccinated are indicated by the blue tint; the unvaccinated by the red. Those who developed small-pox when undergoing primary vaccination are marked green. Those patients who were stated to have been vaccinated, but who showed no evidence of this are indicated by the yellow tint. Those about whose vaccination no information was obtainable are indicated by the brown tint.

The above colours are retained uniformly in all the remaining diagrams referring to vaccination.

The fatal cases are indicated thus +.

As far as possible each case is referred to the week in which the earliest symptoms of the disease were manifested.

TABLE XLVIII.

BATLEY SMALL-POX, 1891-92.

No. of Week of Outbreak.	Vaccinated.		No Information.		"Alleged" Vaccination.		"Under" Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
i.	1	—									1	—
ii.	1	—									1	—
iii.									1	1	1	1
iv.									1	1	1	1
v.									1	—	1	—
vi.												
vii.	3	1	1	—					3	1	7	2
viii.												
ix.												
x.	1	—							1	1	2	1
xi.												
xii.												
xiii.	1	—									1	—
xiv.	1	—									1	—
xv.	1	—									1	—
xvi.	1	—							1	—	2	—
xvii.	2	—									2	—
.....										
xx.			1	—							1	—
xxi.			1	—							1	—
.....										
xxx.	1	—							3	3	4	3
xxxi.									1	1	1	1
xxxii.	5	—							1	—	6	—
xxxiii.	19	—	1	—	1	1			6	2	27	3
xxxiv.	7	—							8	3	15	3
xxxv.	5	—			1	—			5	—	11	—
xxxvi.	21	—	2	—			1	—	10	3	34	3
xxxvii.	19	—					3	—	7	1	29	1
xxxviii.	22	1			1	—	1	—	10	3	34	4
xxxix.	29	1	1	—					11	1	41	2
xl.	38	—	2	—	2	—			11	1	53	1
xli.	20	—			1	—	1	—	9	3	31	3
xlii.	16	—							6	2	22	2
xliii.	21	—			1	—	1	1	12	4	35	5
xliiv.	18	—			1	—			7	1	26	1
xli v.	16	1			3	—			11	1	30	2
xli vi.	15	2			1	—			7	3	23	5
xli vii.	11	1			1	—			3	1	15	2
xli viii.	9	—							8	2	17	2
xli ix.	8	—							6	1	14	1
l.	4	—							2	1	6	1
li.	4	—	1	—					2	—	7	—
lii.	9	—							2	2	11	2
liii.	3	—							3	—	6	—
li v.	3	—							2	1	5	1
li v i.	2	—							2	—	4	—
li v ii.	6	2									6	2
li v iii.												
li v i v.									1	—	1	—
li v i v i.												
li v i v ii.												
li v i v iii.												
li v i v i v.									1	—	1	—
li v i v i v i.												
li v i v i v ii.												
li v i v i v iii.												
li v i v i v i v.									1	1	1	1

Particulars were obtained of the inmates of 108 of these houses, numbering 655 in all, of whom 306 were attacked with small-pox.

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In Series B. there were 21 houses containing 134 inmates, amongst whom 57 contracted small-pox, 23 of whom may be regarded as "initial cases." Subtracting 23 from 134, we have 111 persons who were exposed to infection from the initial case, which was retained at home. Of this number 34 or 30.6 per cent. were attacked with small-pox, and the majority of them were removed.

In Series C. there were 50 houses containing 295 inmates, amongst whom 145 contracted small-pox, 69 being regarded as "initial cases." Subtracting 69 from 295, the remainder 226 were exposed to infection at any period after illness of the initial case, and 76 or 33.6 per cent. were attacked with small-pox.

Lastly, taking the whole number of 1,456 inmates of 267 infected houses, we find that 305 were "primarily" attacked (in several instances more than one member of a family falling ill within a few days or at the same time as the first). This would leave 1,151 persons subjected to infection (more or less), of which number 160 or 14 per cent. subsequently sickened. And in those houses where the cases were all sent to the hospital (including both single and multiple cases) there would be 500 thus exposed, of whom 50 or 10 per cent. sickened; whilst in those houses where all the cases were retained at home there would be 542 exposed, of whom 78 or 14.4 per cent. sickened.

Vaccination Statistics.

Of the total number (545) small-pox patients at Batley there were:—

- A. Vaccinated 347, of whom nine died.
- B. Alleged to have been vaccinated, but presenting no marks, 13, of whom one died.
- C. "Undergoing" primary vaccination when attacked with small-pox, 8, of whom one died.
- D. Unvaccinated 167, of whom 46 died, and E. in 10 instances no information could be obtained respecting vaccination.

The mortality in the foregoing classes was therefore:—

- A. Vaccinated - - - - 2.9 per cent.
- B. Alleged vaccination - - 7.7 "
- C. Under vaccination - - - 12.5 "
- D. Unvaccinated - - - - 27.5 "

In the accompanying Table and Chart IX.* the incidence every week of these various classes attacked is illustrated.

* *Explanation of Chart IX.*—
This Chart is prepared to show the weekly incidence in Batley of cases of small-pox during the 70 weeks of the epidemic under review, the cases being separately grouped according to their vaccination relations.

The vaccinated are indicated by the blue tint; the unvaccinated by the red. Those who developed small-pox when undergoing primary vaccination are marked green. Those patients who were stated to have been vaccinated, but who showed no evidence of this are indicated by the yellow tint. Those about whose vaccination no information was obtainable are indicated by the brown tint.

The above colours are retained uniformly in all the remaining diagrams referring to vaccination.

The fatal cases are indicated thus +.

As far as possible each case is referred to the week in which the earliest symptoms of the disease were manifested.

TABLE XLVIII.

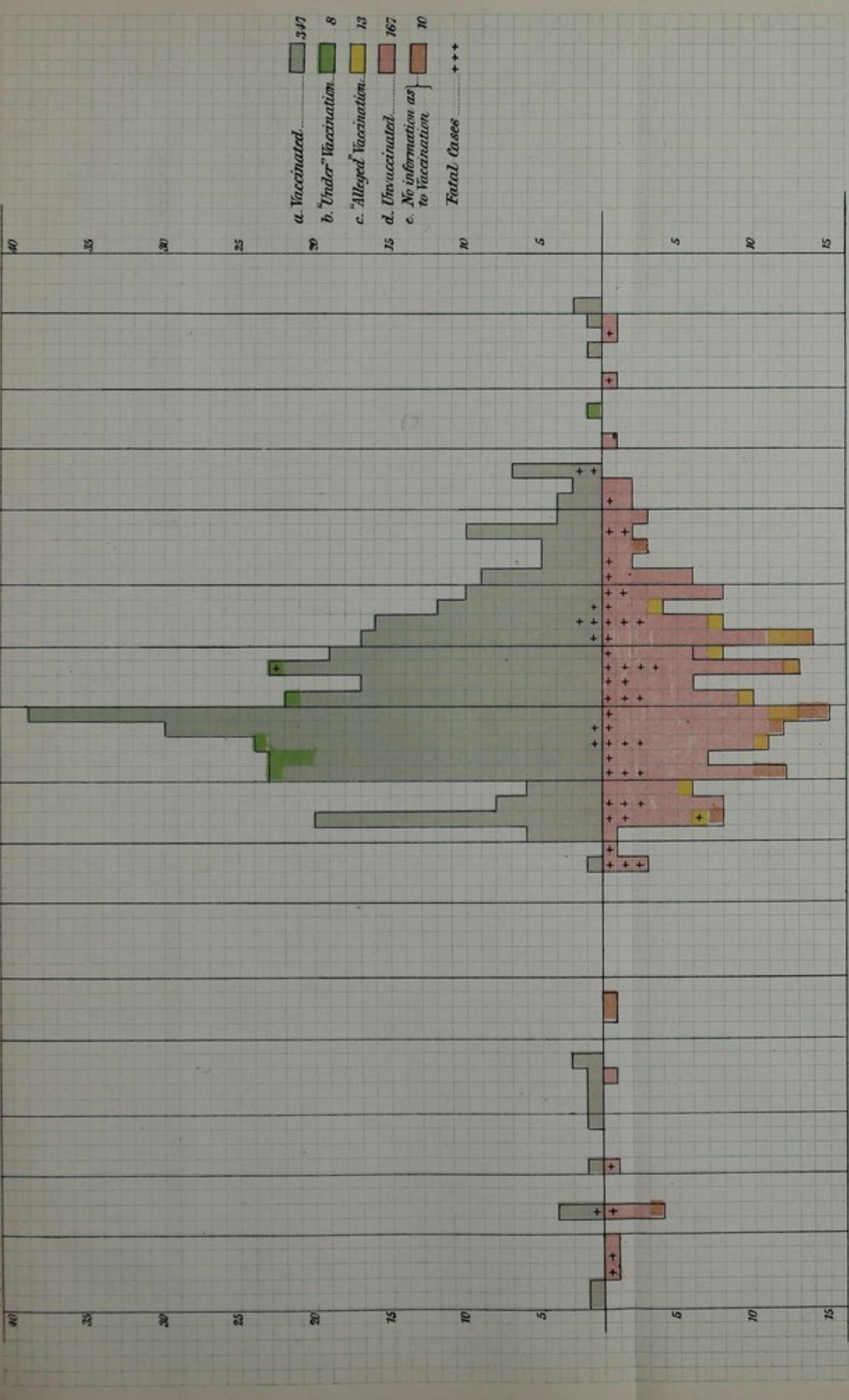
BATLEY SMALL-POX, 1891-92.

No. of Week of Outbreak.	Vaccinated.		No Information.		"Alleged" Vaccination.		"Under" Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
i.	1	—									1	—
ii.	1	—									1	—
iii.									1	1	1	1
iv.									1	1	1	1
v.									1	—	1	—
vi.												
vii.	3	1	1	—					3	1	7	2
viii.												
ix.												
x.	1	—							1	1	2	1
xi.												
xii.												
xiii.	1	—									1	—
xiv.	1	—									1	—
xv.	1	—									1	—
xvi.	1	—							1	—	2	—
xvii.	2	—									2	—
.....										
xx.			1	—							1	—
xxi.			1	—							1	—
.....										
xxx.	1	—							3	3	4	3
xxxi.									1	1	1	1
xxxii.	5	—							1	—	6	—
xxxiii.	19	—	1	—	1	1			6	2	27	3
xxxiv.	7	—							8	3	15	3
xxxv.	5	—			1	—			5	—	11	—
xxxvi.	21	—	2	—			1	—	10	3	34	3
xxxvii.	19	—					3	—	7	1	29	1
xxxviii.	22	1			1	—	1	—	10	3	34	4
xxxix.	29	1	1	—					11	1	41	2
xl.	38	—	2	—	2	—			11	1	53	1
xli.	20	—			1	—	1	—	9	3	31	3
xlii.	16	—							6	2	22	2
xliii.	21	—			1	—	1	1	15	4	35	5
xliiv.	18	—			1	—			7	1	26	1
xli v.	16	1			3	—			11	1	30	2
xli vi.	15	2			1	—			7	3	23	5
xli vii.	11	1			1	—			3	1	15	2
xli viii.	9	—							8	2	17	2
xli ix.	8	—							6	1	14	1
l.	4	—							2	1	6	1
li.	4	—	1	—					2	—	7	—
lii.	9	—							2	2	11	2
liii.	3	—							3	—	6	—
li v.	3	—							2	1	5	1
li v i.	2	—							2	—	4	—
li v ii.	6	2									6	2
li v iii.												
li v i v.									1	—	1	—
li v i v i.												
li x.							1	—			1	—
li x i.												
									1	1	1	1

Chart IX.

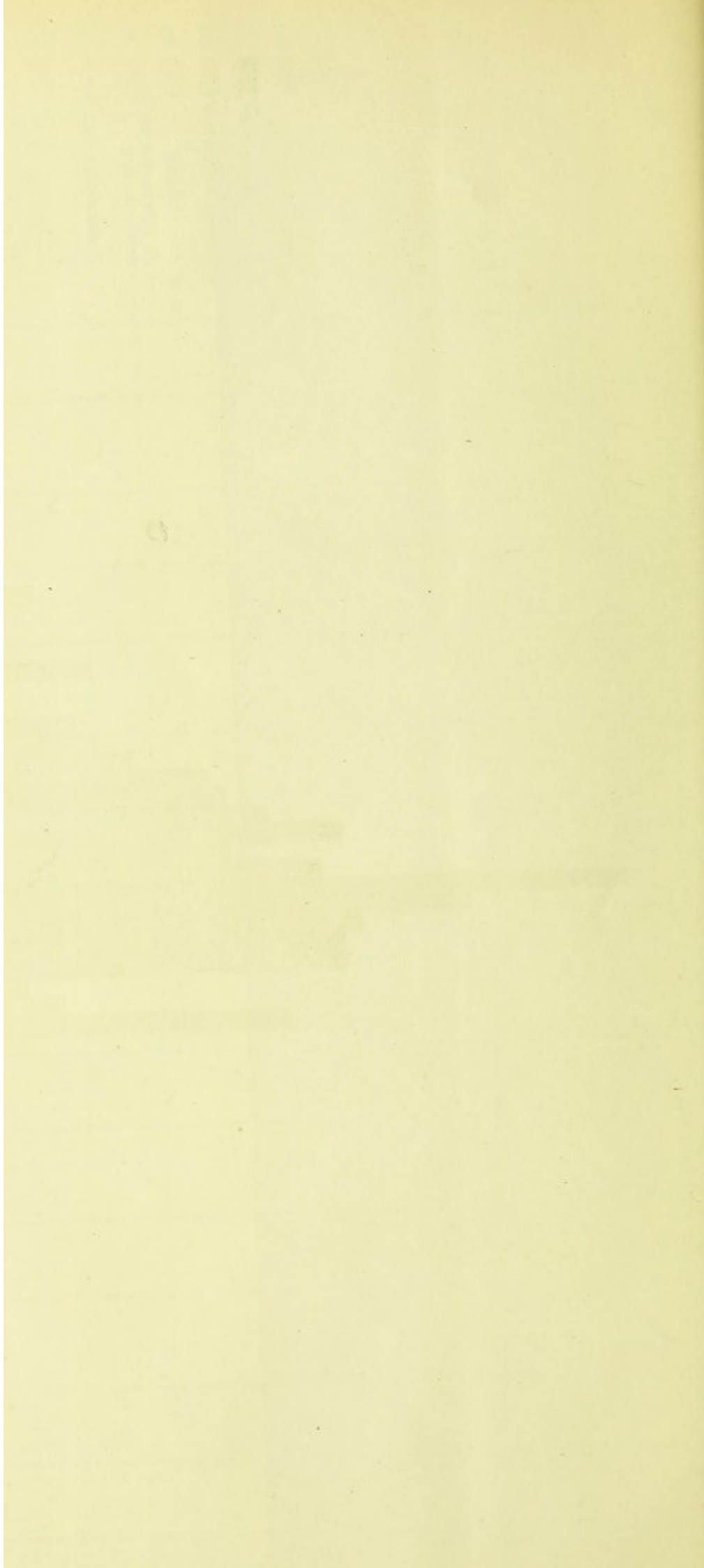
DISTRIBUTION OF CASES WITH RESPECT TO VACCINATION. 1892.

1891. *May.* 2 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70
Week ending 2 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70



BATLEY.

To face page 56.



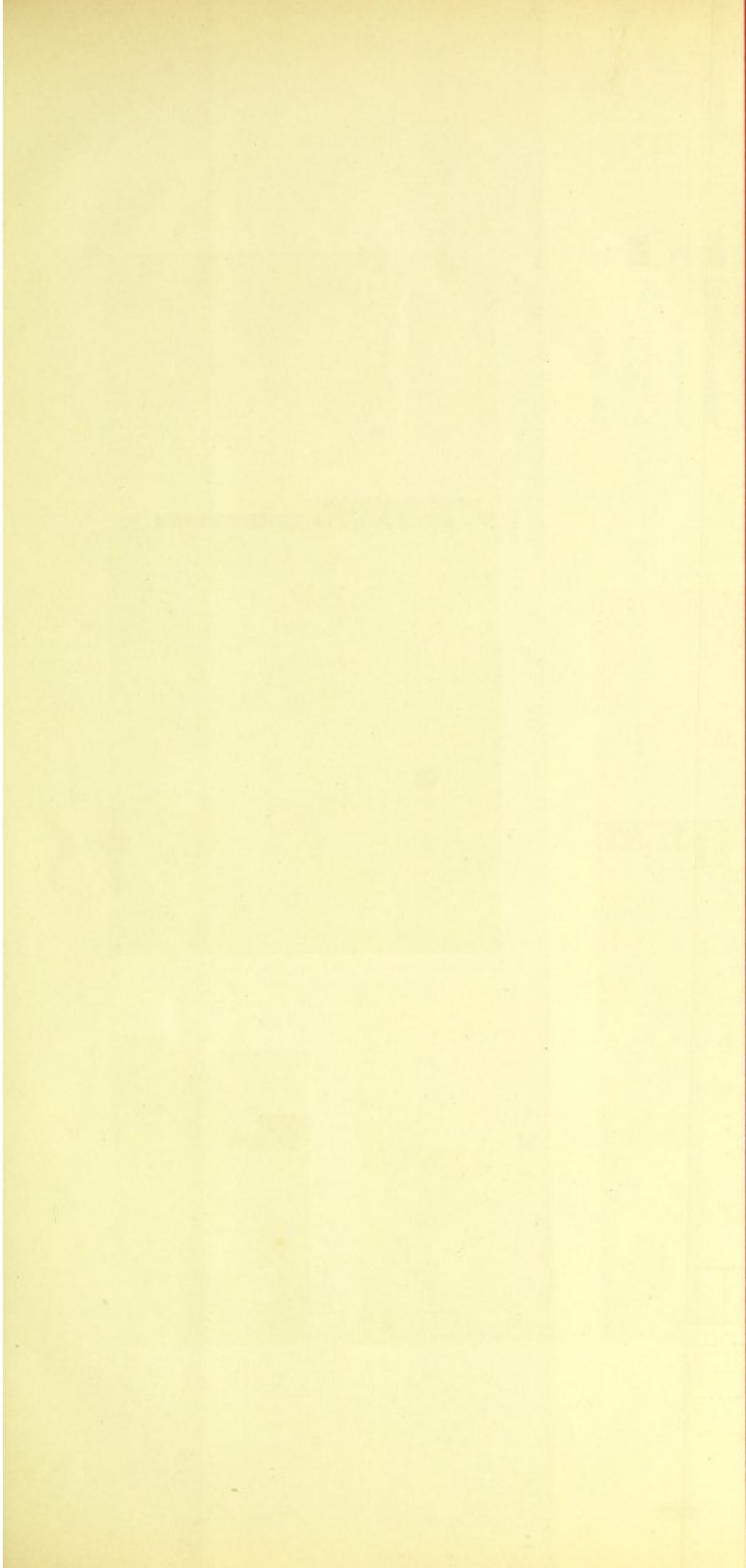
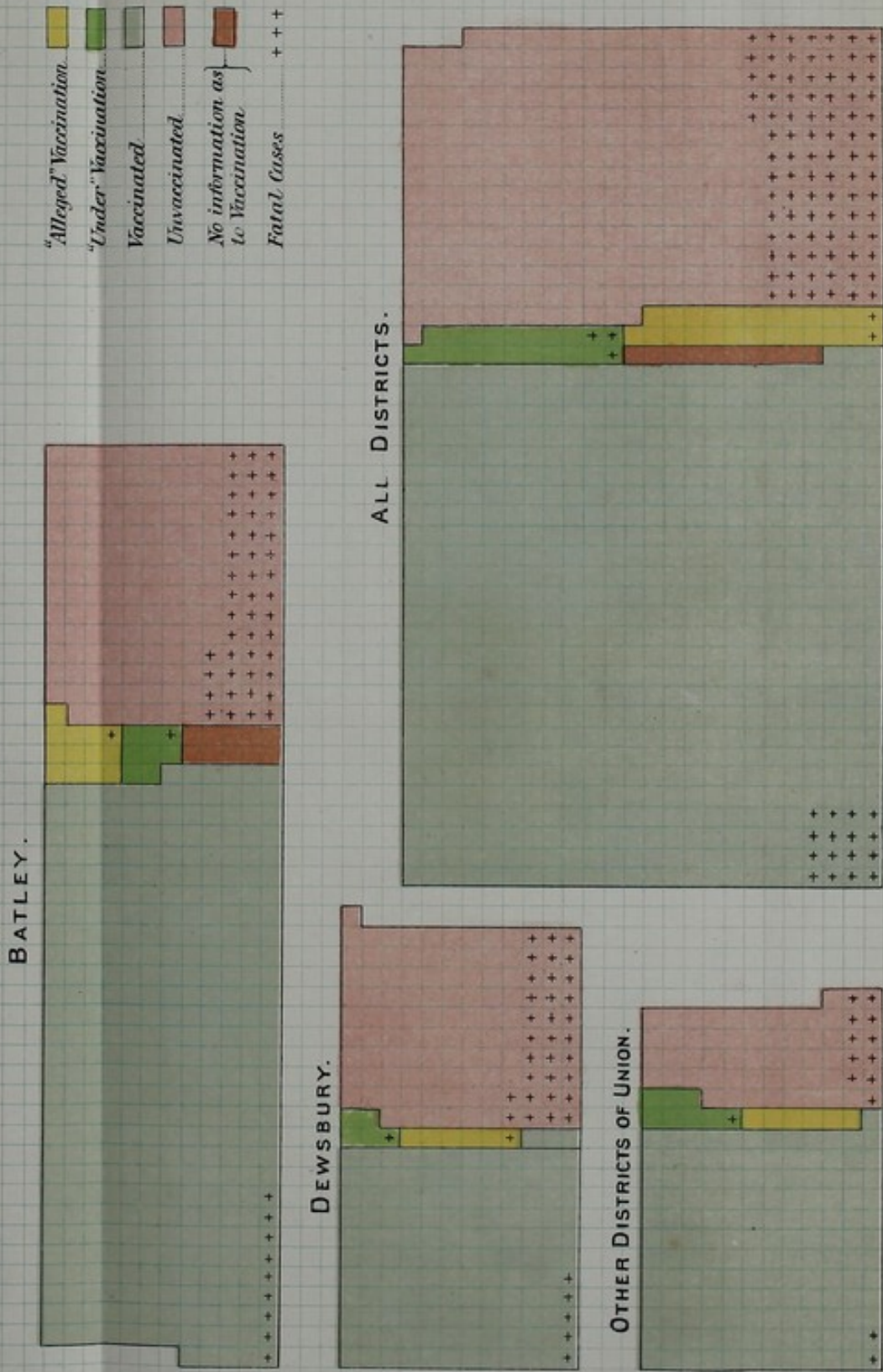


CHART SHEWING VACCINATION-RELATIONS OF CASES OF SMALL POX.



BATLEY SMALL-POX, 1891-92—cont.

No. of Week of Outbreak.	Vaccinated.		No Information.		"Alleged" Vaccination.		"Under" Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	lxiii.											1
lxiv.	1	—							1	1	1	1
lxv.											2	—
lxvi.	1	—							1	—	1	—
lxvii.	2	—									2	—
	547	9	10	—	13	1	8	1	167	46	545	57

In Chart X. the distribution of cases of small-pox amongst the several classes of vaccinated or unvaccinated is depicted*.
The vaccination-relations of those attacked with small-pox at various ages, are given in the annexed Table :—

TABLE XLIX.

Ages of those attacked with Small-Pox in respect to Vaccination.

—	Vaccinated.		No information as to Vaccination.		Alleged Vaccination.		"Under" Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	Under 1 year	1	—	—	—	—	—	3	1	15	12	19
1 to 5 years	5	—	2	—	—	—	—	—	34	13	41	13
5 to 10 "	11	1	2	—	1	—	1	—	24	3	30	4
10 to 15 "	40	—	—	—	1	—	2	—	11	2	54	2
15 to 20 "	59	2	1	—	—	—	1	—	45	5	105	7
20 to 30 "	124	1	2	—	6	1	1	—	125	7	158	9
30 to 40 "	68	3	—	—	3	—	—	—	7	2	78	5
40 to 50 "	19	—	3	—	—	—	—	—	3	2	25	2
50 to 60 "	16	2	—	—	1	—	—	—	1	—	18	2
60 to 70 "	3	—	—	—	—	—	—	—	1	—	4	—
70 years and over	1	—	—	—	1	—	—	—	1	—	3	—
	547	9	10	—	13	1	8	1	167	46	545	57

* Explanation of Chart X. :—
This Chart shows the actual numbers attacked with small-pox in the period under inquiry, in each of the three divisions employed in the Report, and in all the districts combined; giving the vaccination condition and the mortality amongst these cases.
The chart as expressed in tabular form is as follows :—

—	Vaccinated.		No information as to Vaccination.		"Under" Vaccination.		"Alleged" Vaccination.		Unvaccinated.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	Batley	317	9	10	—	8	1	13	1	167
Dewsbury	125	5	—	—	5	1	6	1	119	32
Other Districts	115	2	—	—	8	1	6	—	60	11
All Districts	547	16	10	—	21	3	25	2	346	89

or grouped in age-periods :—

—	Under 1 Year.		1 to 10 Years.		10 to 30 Years.		30 and over.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
	Vaccinated	1	—	16	1	223	3	107	5	347
No information as to vaccination.	—	—	4	—	3	—	3	—	10	—
Alleged vaccination	—	—	1	—	7	1	5	—	13	1
"Under" vaccination	3	1	1	—	4	—	—	—	8	1
Unvaccinated	15	12	58	16	81	14	13	4	167	46
	19	13	80	17	318	15	128	9	545	57

It will be observed that the proportion of the vaccinated increases with the years of age of the subjects, whilst that of the unvaccinated decreases. For at ages—

—	Vaccinated.	Unvaccinated.
Under 1 year	Per Cent. 5.2	Per Cent. 78.9
1 to 10 years	Per Cent. 20.5	Per Cent. 74.3
10 to 30 years	Per Cent. 70.	Per Cent. 25.5
30 years and over	Per Cent. 83.7	Per Cent. 10.

whilst conversely :—

Of the vaccinated :—

- 0.2 per cent. were at ages under 1 year.
- 4.6 " " " " 1 to 10 years.
- 64.2 " " " " 10 to 30 years.
- 31.1 " " " " 30 years and under.

Of the unvaccinated :—

- 9 per cent. were at ages under 1 year.
- 34.7 " " " " 1 to 10 years.
- 48.5 " " " " 10 to 30 years.
- 7.7 " " " " 30 years and over.

As to the relation between the type of the attack of small-pox, and the condition of the attacked persons in regard to vaccination, the following is a summary analysis :—

TABLE L.
TYPE OF SMALL-POX. (See Chart XI.)

Confluent.	Confluent.	Coherent.	Discrete.	Mild.	Type not ascertained.
Vaccinated	23	37	158	119	1
No information as to vaccination.	1	1	2	2	4
Alleged vaccination	3	1	6	3	—
"Under" vaccination	3	2	1	2	—
Unvaccinated	97	34	30	6	—

In other words, at all ages.

- (a.) Among the vaccinated 6.4 per cent. had confluent small-pox; 10.6 per cent. coherent; 45.5 per cent. discrete; 37.1 per cent. mild.
- (b.) Among the unvaccinated 58 per cent. had confluent small-pox; 20.3 per cent. coherent; 18 per cent. discrete; 3.6 per cent. mild.

And conversely :—

- (a.) Of the confluent cases, 17.4 were vaccinated; 77 per cent. were unvaccinated.
- (b.) Of the coherent cases, 49.3 per cent. were vaccinated; 45.3 per cent. were unvaccinated.
- (c.) Of the discrete cases, 80.2 per cent. were vaccinated; 15.2 per cent. were unvaccinated.
- (d.) Of the mild cases, 90.8 per cent. were vaccinated; 4.2 per cent. were unvaccinated.

Comparing the vaccination condition of the inmates of 267 invaded houses visited during the inquiry with that of those amongst them who were attacked with small-pox, we find :—

At all ages of 1,456 inmates of the houses :—
1,125 were vaccinated or 77.2 per cent.
18 "alleged" to have been vaccinated.

50 undergoing primary vaccination at time of exposure.
 232 un-vaccinated or 15·2 per cent.
 and in 31 no information as to vaccination could be obtained.

In the same households amongst the 465 cases of small-pox arising therein, there were:—
 296 vaccinated or 63·8 per cent.
 13 "alleged" to have been vaccinated.
 8 undergoing primary vaccination at time of attack.
 144 un-vaccinated or 30·9 per cent.

and in four cases no information as to vaccination could be obtained.
 The actual numbers at each age-period being:—

	Vaccinated.	Alleged Vaccination.	Under Vaccination.	Un-vaccinated.	No information on Vaccination.
Under 1 year.					
Inmates	12	0	9	24	0
Cases	1	0	3	13	0
1 to 10 years					
Inmates	208	1	24	76	4
Cases	13	1	1	51	2
10 to 30 years.					
Inmates	557	8	15	92	10
Cases	195	7	4	71	1
30 years and over.					
Inmates	362	9	2	41	14
Cases	87	5	0	9	1
Age not ascertained.					
Inmates	6	—	—	—	3
Cases	—	—	—	—	—

Explanation of Chart XI:—
 In this Chart the cases of small-pox occurring in each of the three divisions of the Unions employed in this Report, are analysed with respect (1st) to the type of the attack, and (2nd) with respect to the condition of the subject as regards vaccination.
 The particulars upon which the Chart is drawn will be found in Tables XXXIV., L., LXXII., and LXXIX.
 It will be seen that the figures at all ages in each district are as follows:—

	Confluent.		Cokerent.		Discrete.		Mild.		Type?	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Batley:										
Vaccinated	22	8	37	—	128	1	129	—	1	—
Under Vaccination.	3	1	2	—	1	—	3	—	—	—
Alleged Vaccination.	3	1	1	—	6	—	3	—	—	—
No Information.	1	—	1	—	2	—	2	—	4	—
Unvaccinated	97	45	35	—	20	2	6	—	—	—
Total	126	54	75	—	157	3	158	—	5	—
Doncaster:										
Vaccinated	49	5	11	—	40	—	63	—	2	—
Under Vaccination.	2	1	1	—	—	—	1	—	1	—
Alleged Vaccination.	3	1	1	—	1	—	1	—	—	—
Unvaccinated	61	32	19	—	47	—	2	—	—	—
Total	115	39	32	—	88	—	67	—	3	—
Other Districts:										
Vaccinated	3	1	11	—	62	—	65	—	5	1
Under Vaccination.	3	1	—	—	—	—	3	—	—	—
Alleged Vaccination.	3	—	2	—	1	—	—	—	—	—
Unvaccinated	37	10	5	—	45	—	5	—	2	1
Total	46	12	18	—	78	—	73	—	7	2

On the assumption that these individuals were all equally exposed to the chances of infection, (which is of course not absolutely the case) these figures show:—

- 1st. That of the vaccinated class, the proclivity to the disease under one year of age was as 1 : 12; between 1 and 10 years, as 1 : 16; between 10 and 30 years, as 1 : 2·7; at 30 years and upwards, as 1 : 4·1.
- 2nd. That of the un-vaccinated class, the proclivity under one year of age, was as 1 : 2; from 1 to 10 years as 1 : 1·4; from 10 to 30 years, as 1 : 1·3; at 30 years and upwards, 1 : 4·5.
- 3rd. That the general proclivity of all classes at—
 "under" 1 year was 1 : 2·6.
 1 to 10 years was 1 : 4·5.
 10 to 30 years was 1 : 2·4.
 30 years upwards was 1 : 4·1.
- 4th. As regards the other classes, at all ages the proclivity amongst the "alleged vaccination" class was, 1 : 1·8; and amongst the "under" vaccination class, was 1 : 12·1.

A previous attack of small-pox had been experienced by 66 of these individuals, viz., 16, between 10 and 30 years of age and 50 at 30 years and over. Of the former, four were vaccinated subjects (including one who was again attacked); in three no information was obtainable as to vaccination (and one of these was again attacked); nine were un-vaccinated. Of the latter, 24 were vaccinated subjects, one belonged to the "alleged" group, and 25 were un-vaccinated (including two who were again attacked.) If one may assume that those who have been vaccinated are on the same plane as to liability to attack as those who have previously had small-pox, the proportions above given may be thus modified:—

Vaccinated or previously had Small-pox.		Not Vaccinated nor had Small-pox.	
10 to 30 years.			
Inmates	549	83	} or 1 : 1·1
Cases	195	71	
30 years upwards.			
Inmates	388	16	} or 1 : 2·3
Cases	82	7	

As regards the question whether vaccinations had any influence in limiting the number of cases of small-pox in households, where the cases were treated at home, and not sent to hospital, I may give here, an analysis similar to that previously given, in respect to the isolation question.

Single Cases in Houses.

(a) It may be recalled that facts were obtained, concerning 159 households, in which one member alone suffered from small-pox; and that in 82 of these, the patient was removed to infirmary or hospital, leaving 332 persons who had been more or less intimately in contact with the case.

Of these 82 cases, 56 were vaccinated subjects, 2 were alleged to have been vaccinated, but showed no evidence of it, in 1 case, there is no information as to vaccination. One was undergoing primary vaccination when attacked, and 22 were unvaccinated (one of these being said to have suffered from small-pox in early life).

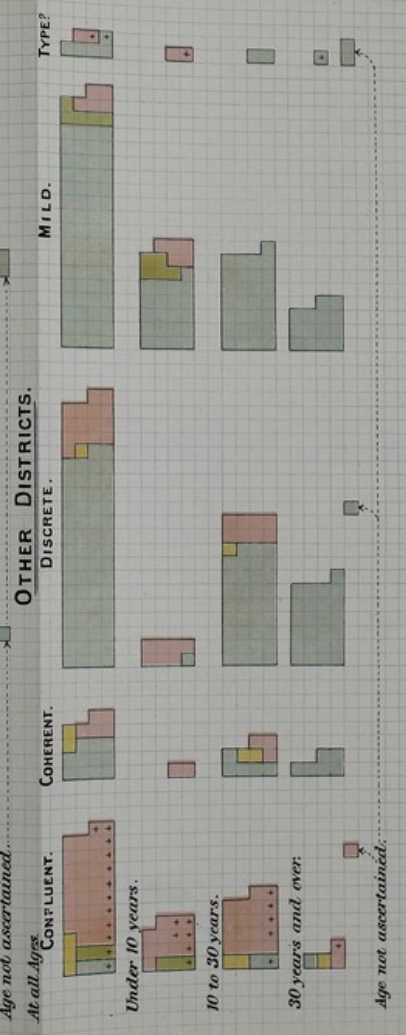
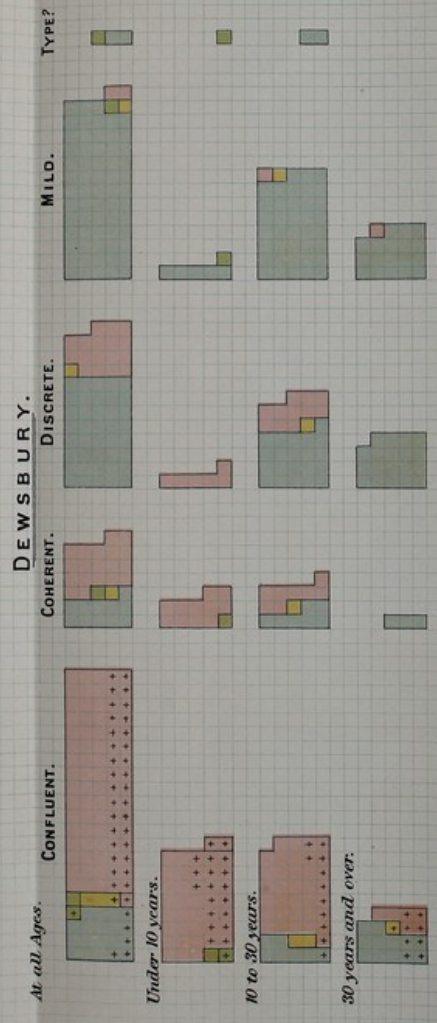
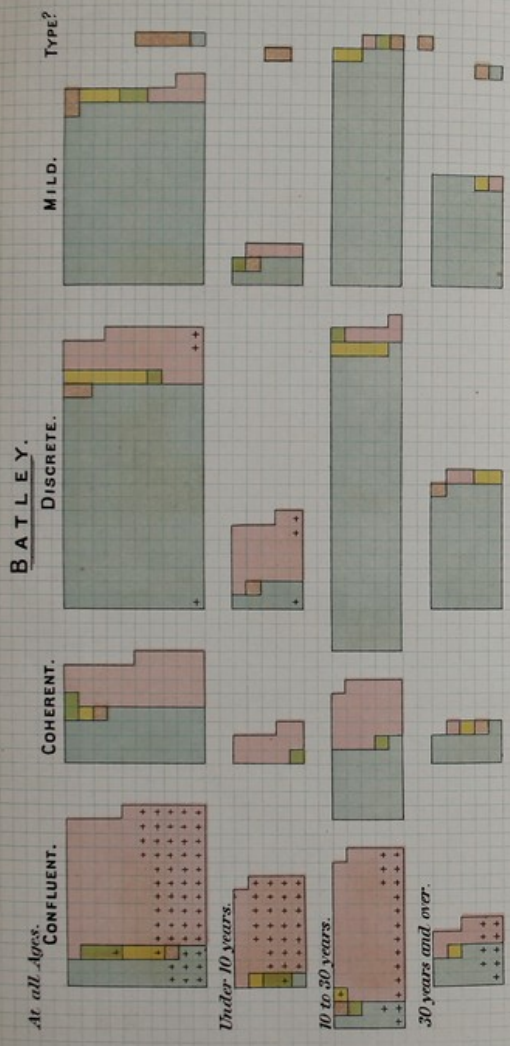
Of the 332 co-dwellers with these patients, 279 were vaccinated, and 20 of them were successfully re-vaccinated on the removal of the patient; 9 were undergoing vaccination before the case was removed; 2 were alleged to have been vaccinated, and in 3 no information could be obtained. There remain 39 unvaccinated persons, 14 of whom, were submitted to vaccination almost immediately on or after the removal of the case. Lastly of the vaccinated subjects, 6 had previously suffered from small-pox, as also had 13 of the unvaccinated.

(b) In 77 households, where a single case occurred, the patient remained at home, together with 310 other persons and in more or less intimate contact with them.

Of these 77 cases, 54 were vaccinated subjects, 2 were undergoing primary vaccination, when attacked with small-pox, and 2 were alleged to have been vaccinated, but showed no evidence; 19 were unvaccinated.

Of the 310 co-dwellers with these patients, 260 were vaccinated, and 31 of them were re-vaccinated successfully shortly after the nature of the case was recognised; 18 were "undergoing vaccination," during the patient's illness

* It should be remembered that this class would probably include more members, if it had been possible to inspect the arms of every person.



DEMANNA

having previously been unvaccinated; one was alleged to have been vaccinated, and in 11, no information in this head was obtainable; the remaining 20 were unvaccinated, but 9 of them had previously suffered from small-pox, as also had 13 of the vaccinated persons, and the one "alleged" subject.

In tabular form these facts may be thus stated:—

	Cases removed to Hospital or Infirmary.		Cases treated at Home.	
	Inmates.		Inmates.	
	Attacked.	Not Attacked.	Attacked.	Not Attacked.
Vaccinated	56	279	54	280
Re-vaccinated	—	29	—	31
Previous small-pox	—	6	1	13
"Under" vaccination	1	9	3	18
"Alleged" vaccination	2	2	2	1
Previous small-pox	—	—	—	1
No information as to vaccination	1	3	—	11
Previous small-pox	1	—	—	—
Unvaccinated	22	39	19	29
Vaccinated on removal of case	—	14	—	—
Previous small-pox	—	12	2	10

Multiple Cases in Houses.

Following the plan previously adopted of dividing the families in which more than one case of small-pox occurred into groups—according to whether the cases were isolated at home or in hospital, the following analysis may be made.

Series A.—in which every "initial case" was removed to hospital and nearly all of the later cases; there were:—
32 houses containing 194 members, from which 38 "initial cases" proceeded. Of these 38 patients 25 were vaccinated.
1 was alleged to be vaccinated but showed no evidence of it.
12 were unvaccinated.

The remaining 156 persons in these houses comprised:—
107 vaccinated, of whom 24 contracted small-pox including three out of five who were re-vaccinated on the removal of the first case. Two had previously had small-pox.
4 were "under" vaccination whilst the initial case was still at home; not one of them contracted small-pox.
6, no information obtainable, no case of small-pox.
1 who was attacked, was said to have been vaccinated, but showed no evidence.
38 were unvaccinated, 25 contracted small-pox and 3 had previously suffered from it;

or stated in tabular form,—

	Initial Cases removed to Hospital.	Remaining Inmates of 32 houses after removal of Initial Cases.	
		Attacked.	Not Attacked.
Vaccinated	25	24	82
Re-vaccinated	—	—	7
Previous small-pox	—	—	3
Under vaccination	—	—	4
Alleged vaccination	1	1	1
No information as to vaccination	—	—	6
Unvaccinated	12	25	13
Previous small-pox	—	—	3

Series B.—The same method of analysis applied to the comparatively small group of households (21 in number) in which the first to be attacked with small-pox remained at

home, the subsequent cases being removed to infirmary or hospitals, yields the following:—

21 houses containing 134 inmates; 57 cases of small-pox of whom 23 may be regarded as "initial cases" of small-pox. Of these 23 patients:—
14 were vaccinated.
9 unvaccinated.

The remaining 111 persons in these houses included—
91 who were vaccinated, of whom 23 contracted small-pox. One of the others was re-vaccinated at the time of outbreak of the initial case. Two had had small-pox previously.
2 were "under vaccination" when the initial case was in progress, and one of these contracted small-pox. In one no information as to vaccination could be obtained.
17 were unvaccinated of whom 10 contracted small-pox, and two had had the disease previously.

Stated in tabular form:—

	Initial Cases kept at Home.	Other Inmates of 21 houses.	
		Attacked.	Not Attacked.
Vaccinated	14	23	68
Re-vaccinated	—	—	2
Previous small-pox	—	—	4
"Under" vaccination	—	1	1
"Alleged" vaccination	—	—	—
No information as to vaccination	—	—	1
Unvaccinated	9	10	7
Previous small-pox	—	—	2

Series C.—In this series of households having more than one case of small-pox amongst their members, every case being nursed at home, the analysis of vaccination relations is the following:—

50 houses containing 295 inmates of whom 145 had small-pox. 69 of these may be regarded as "initial cases," and of them—
45 were vaccinated.
2 were stated to have been vaccinated, but showed no evidence.
22 were unvaccinated.
The other inmates (226) of these infected houses comprised—

170 who were vaccinated, of whom 46 contracted small-pox. One who was attacked had recently (within a month) been re-vaccinated, and another had been re-vaccinated some years previously; and one had previously had small-pox^(?). 12 of those who were not attacked were re-vaccinated on this occasion.
14 were "under" vaccination at the time there was small-pox in the house, and 4 of them took the disease.
5 were said to have been vaccinated, but had no evidence. 4 contracted small-pox.
In 9 no information as to vaccinations was obtained. Three contracted small-pox; two others had previously had the disease.
28 were unvaccinated, of whom 19 contracted small-pox and five had previously suffered from it.

In tabular form:—

	Initial Cases.	Other Inmates of 50 houses.	
		Attacked.	Not Attacked.
Vaccinated	45	46	124
Re-vaccinated	—	1	12
Previous small-pox	—	—	1
Under vaccination	—	4	10
Alleged vaccination	2	4	1
No information as to vaccination	—	3	6
Previous small-pox	—	—	2
Unvaccinated	22	19	9
Previous small-pox	—	—	5

^(?) This person had been employed formerly as a nurse at a small-pox hospital, where she said that she had seven (sic) mild attacks.

* With one exception, viz., No. 244. *Vide supra.*

It may be instructive to contrast these various series of persons exposed to infection, under varied conditions of preventive measures, by a comparison of their respective attack-rates.

For this purpose one may take the group of multiple cases with the exclusion of those denoted "initial cases" as gauging perhaps more accurately the degree of liability to infection after known exposure. Although this necessitates a separation of the "single cases" from the "multiple series," I will add subsequently the figures relating to the former class, and contrast them with the total liability.

ATTACK RATES OF SMALL-POX IN HOUSEHOLDS OF WHICH THE MEMBERS WERE EXPOSED TO INFECTION FROM A PREVIOUS CASE OCCURRING IN THE HOUSE.

—	All Classes.	Vaccinated.	Unvaccinated.
Whole number	32.7	25.3	67
Per cent.	32.7	25.3	67
Series A	32	22.4	65.8
.. B	30.6	25.2	58.8
.. C	34.2	27.0	74.0

Several, however, had previously suffered from small-pox and deducting these will considerably modify the attack-rates.

—	Proportion of those not attacked, who had had small-pox previously.		Attack Rates, exclusive of those who had had small-pox previously.		
	Vaccinated.	Unvaccinated.	All Classes.	Vaccinated.	Unvaccinated.
Whole number	2.9	34.4	33.8	25.7	74
Per cent.	2.9	34.4	33.8	25.7	74
Series A	3.6	23	33.3	23.3	71.1
.. B	5.8	28.5	32.3	26.4	66.6
.. C	0.8	55.5	34.8	27.2	82.6

Apart from the marked difference in incidence upon the vaccinated and unvaccinated, a subject more fully dealt with hereafter, the most striking fact shown by these statistics is that of the increasing liability to attack as the conditions of exposure are more marked. For it may be remembered that series A. comprises those households from which each case, as it arose, was removed to hospital, that series B. comprises those households in which the initial case (at least) was retained at home, the remainder mostly being removed; whilst in series C. each case as it arose was kept at home.

It will be observed that the above calculations take no note of those "undergoing primary vaccination" when exposed to or attacked by small-pox, nor of those alleged to have been vaccinated, nor of those of whom no information as to vaccination could be obtained. The numbers are too small to be of much significance, but it may be stated that of those "under" vaccination, all of which were really unvaccinated when small-pox first invaded the household viz., 20, only 5 or 25.5 per cent. were attacked, viz., one out of two in series B., and four out of ten in series C. Thus, so far as the figures go, their liability is almost precisely as that of the "vaccinated class."

Finally reverting to the group of "single cases in houses" it is interesting to observe that the parallelism in the attack rates of (a) those households from which the case was removed, and (b) those in which it was kept at home, obtains throughout each class. For the sake of comparison I have appended to this table the attack-rates of the other ("multiple") series inclusive of the initial cases:—

ATTACK RATES OF SMALL-POX IN HOUSEHOLDS IN WHICH A SINGLE CASE OCCURRED, AND THOSE IN WHICH THERE WERE MULTIPLE CASES.

—	All Classes.	Vaccinated.	Unvaccinated.
<i>Single Cases.</i>			
Whole number	19.8	16.9	41.0
Per cent.	19.8	16.9	41.0
Cases removed	19.8	16.7	36.0
Per cent.	19.8	16.7	36.0
Cases retained	20.0	17.2	48.7
Per cent.	20.0	17.2	48.7
<i>Multiple Cases.</i>			
Whole number including "initial cases."	46.5	39.2	77.0
Per cent.	46.5	39.2	77.0

or excluding persons who had previously had small-pox,—

—	All Classes.	Vaccinated.	Unvaccinated.
<i>Single Cases.</i>			
Whole number	20.5	17.3	50.5
Per cent.	20.5	17.3	50.5
Cases removed	20.5	17.0	45.8
Per cent.	20.5	17.0	45.8
Cases retained	20.5	17.6	60.7
Per cent.	20.5	17.6	60.7
<i>Multiple Cases.</i>			
Whole number	49.0	40.0	83.6
Per cent.	49.0	40.0	83.6

I may conclude this part by the following list drawn up on the same plan as the previous one, which contains the data on which much that has been given is based. This list is graphically shown in Chart XII,* where the vaccination facts of the inmates of invaded houses are made plain.

TABLE LI.

BATLEY.

LIST OF HOUSEHOLDS INVADDED BY SMALL-POX GIVING THE VACCINATION DATA OF THEIR MEMBERS AND OF THE CASES OF SMALL-POX OCCURRING AMONGST THEM (Chart XII.).

—	INMATES.					CASES OF SMALL-POX.†				
	Vaccinated.	No Information as to Vaccination.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	No Information as to Vaccination.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.
296	1					538				
288	2					71				
66	2					200				
37	2					213				
285	2					214				
10	2					215				
183	2					232				
162	2					248				
137				2						298
148	2					340				
86	1			1		361				
7	2					367				
80	1			1						418
24			1	1				454		
200	1			1		92				50
116	1			1		377				164
58	2					250,360				
176	2					442,443				
147	2					600,503				
169	2					411,462				
222	3					98				
9	2			1		123				

* Explanation of Chart XII. :—

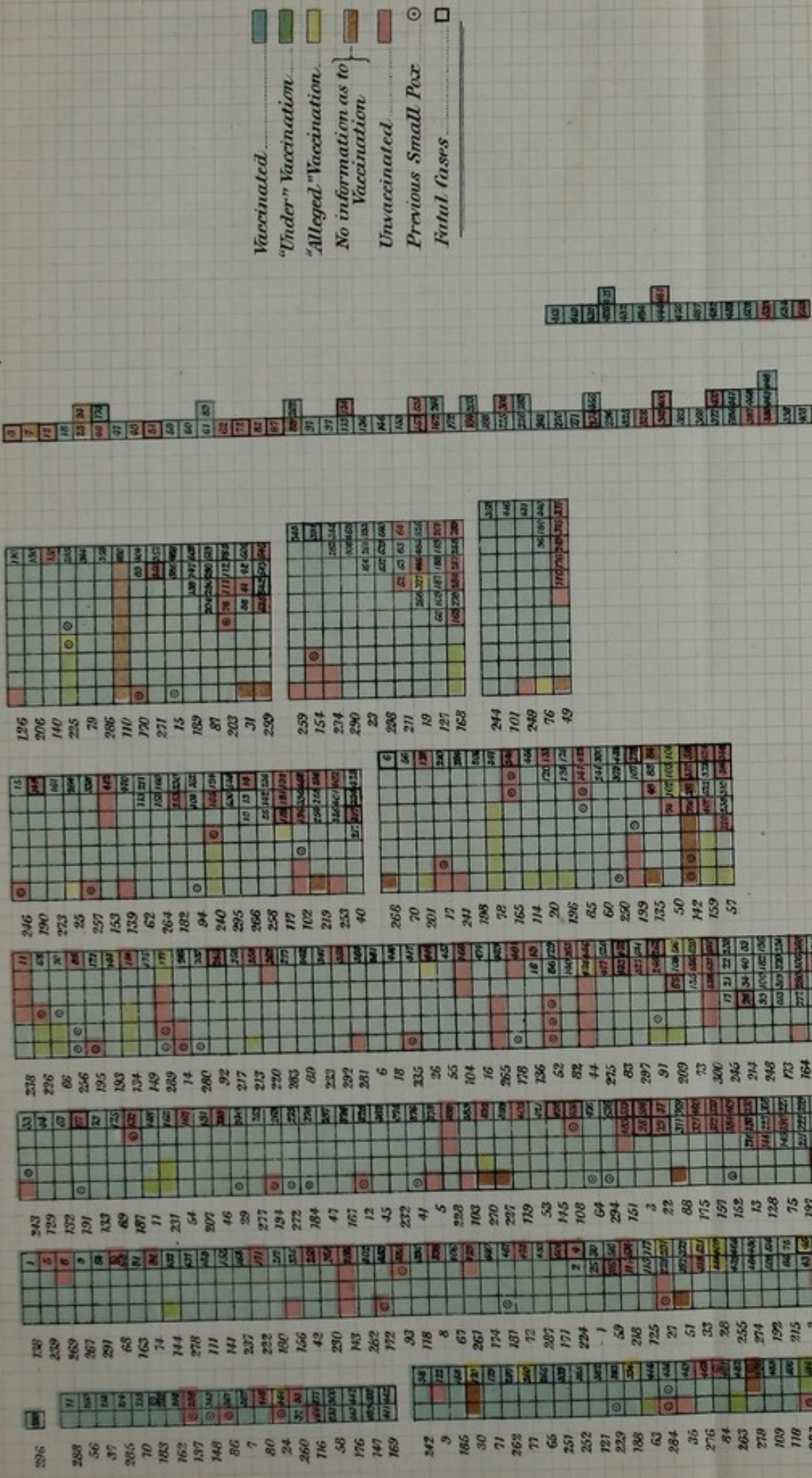
This Chart is the counterpart of Chart VII., viz., that in which each household of which there are particulars is represented. But this chart is coloured so as to indicate the condition of every inmate as regards vaccination, the tints employed being the same as those in Charts IX., X., XI., &c.

† The numerals refer to the register of cases.

CHART SHEWING THE CONDITION AS TO VACCINATION OF CASES OF SMALL POX & OF INMATES OF INVADDED HOUSES IN BATLEY.

Chart XII.

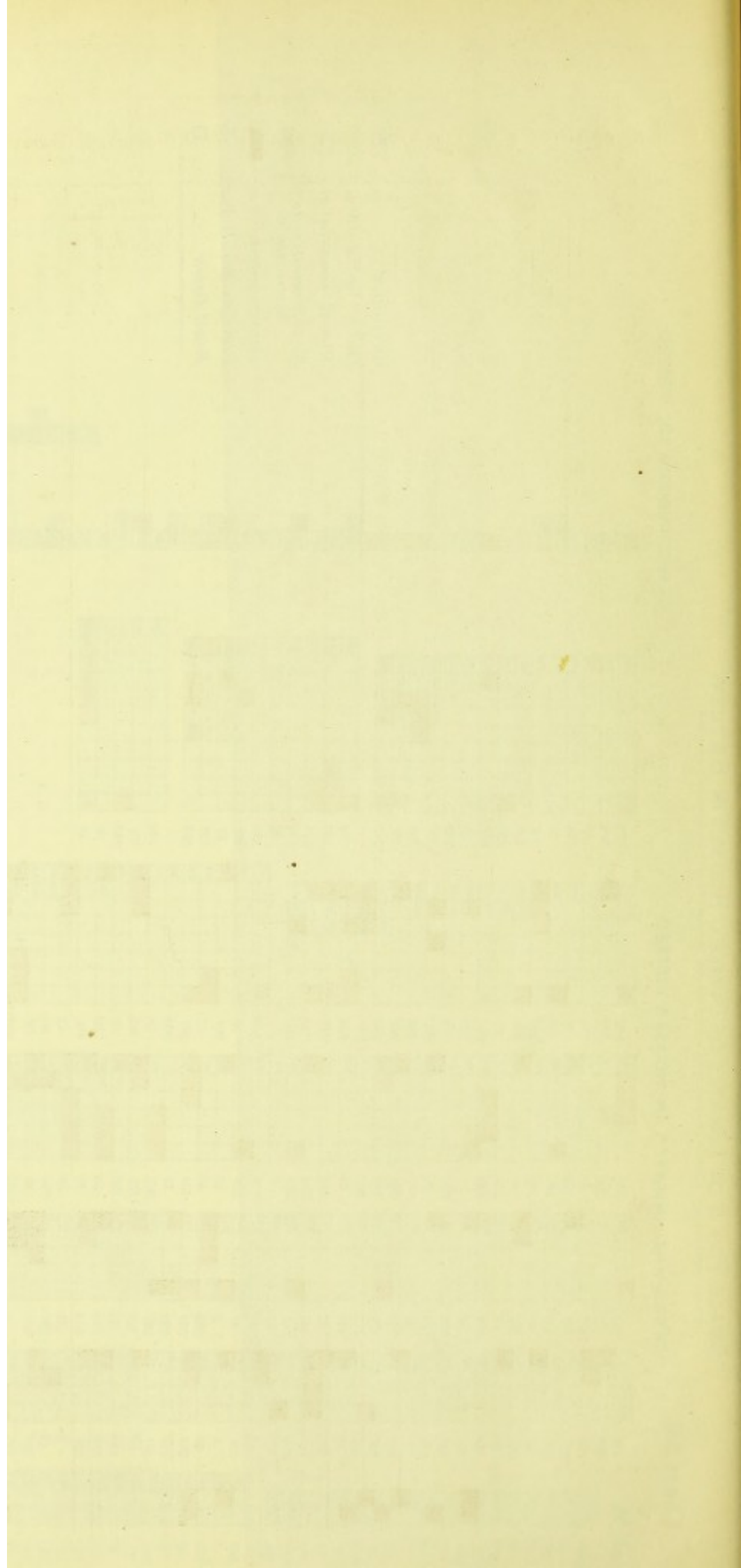
CASES IN HOUSES NOT VISITED



CASES AND INMATES IN HOUSES VISITED

CASES IN HOUSES NOT VISITED

- Vaccinated
- "Under" Vaccination
- "Alleged" Vaccination
- No information as to Vaccination
- Unvaccinated
- Previous Small Pox
- Fatal Cases



LIST OF HOUSEHOLDS INVADED BY SMALL-POX, &c.—
continued.

	INMATES.					CASES OF SMALL-POX.				
	Vaccinated.	No Information as to Vaccination.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	No Information as to Vaccination.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.
185	3					158				
30		2		1					170	
71	5					179				
202	2					207				
77	2			1					250	
65	3					205				
251	3					339				
253	3					363				
121	3					382				
229	3					383				
188	2			1					304	
63	2		1			415				
254	2			1		436				
35	2			1		459				
276	2			1					463	
84	2			1					481	
263	2		1			482				
279	1	2					486			
100	3					489				
115	3					500				
293			2	1				546		
96	2		1			151,209				
155	2			1		205			462	
43	2			1		209,264				
294	3					235,301				
298	3					367,423				
138	4					1				
230	5			1					5	
269	2			2					8	
207	4					9				
231	4					54				
68	3			1					68	
163	4					81				
74	3			1					90	
144	3		1			133				
278	4					137				
111	4					139				
141	4					155				
237	4					168				
222	3			1					171	
180	4					212				
166	3			1		235				
42	3			1					250	
220	3			1					251	
143				4					285	
282	4					302				
172	3			1		353				
93	2			2					380	
118	4					326				
8	3			1					399	
67	4					406				
261	2			2					429	
174	4					440				
181	4					467				

LIST OF HOUSEHOLDS INVADED BY SMALL-POX, &c.—
continued.

	INMATES.					CASES OF SMALL-POX.				
	Vaccinated.	No Information as to Vaccination.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	No Information as to Vaccination.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.
72	3				1					473
287	4					493				
171	2				1					501
224	2				1					2
1	4					25,30				
59	3				1	519				116
218	2				2					114,514
125	4					115,117				
27	1				1	228			291	
51	3	1				292,373				
33	2				1				521	318
28	2				2				554,460	
255	4					435,663				
274	4					464,490				
192	4					608,615				
215	4					66,75				
2	3				1	43			45	
124	2				2	229				04,102
177	3				1	173,178				197
21	2				2	517				329,397
100	1	1			2	451				414,460
150	1	1			2	439				471,472
243	4				1	33				
129	5					44				
132	5					57				
191	4				1					67
133	5					73				
69	5					125				
187	3				2					132
11	4				1	148				
231	3			2		163				
54	4				1					167
207	5					191				
45	4				1					210
29	5					240				
277	5					252				
194	4				1	263				
272	5					275				
184	5					276				
47	5					297				
167	5					324				
12	4				1	326				
45	5					362				
232	5					375				
41	5					376				
5	4				1	378				
223	2				3					
103	4				1	389				388
270	2	1	1		1					392
227	4		1			395				
119	4				1					405
53	5					421				
145	4				1					426
108	3				2					430

LIST of HOUSEHOLDS INVADED by SMALL-POX, &c.—
continued.

	INMATES.					CASES OF SMALL-POX.				
	Vaccinated.	No Information as to Vaccination.	" Under " Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	No Information as to Vaccination.	" Under " Vaccination.	Alleged Vaccination.	Unvaccinated.
64	5					476				
294	5					530				
151	2			3					485	533
3	3			2					28	504
22	3			2					29	31
85	4	1				311,369				
175	3			2					321	460
157	3			2					322	323
152	3			2					384	469
15	3			2		216			131	230
128	4			1		223,308			144	
75	4			1		145,227			190	
197	5					221,222 229				
131	4			1		32,35,36			27	
210	4			1		204,512 513			133	
212	4			1		224,231 281,507				
113	5					204,307 302,312 336				
36	1			4					273,366 374	
39	2			1	2	79,606		77	78,80	
238	2			4					11	
295	3	2		1		68				
65	4	2				70				
256	5			1					85	
195	5			1		121				
160	5	1						145		
134	2	3		1					154	
149	6					175				
289	1	2		3				177		
14	4			2		218				
260	6					237				
92	5			1					245	
217	6					258				
213	4	1		1					259	
250	4			2					263	
283	6					277				
89	6					342				
235	6					347				
292	5			1					350	
281	5			1		354				
6	6					381				
18	6					410				
235	5			1		417				
26	4			1	1				447	
85	6					457				
164	3			3					466	
16	6					474				
265	3			3		479				
178	4			2					491	
156	5			1		16			19	
82	3			3		86,129				
82	5			1		140			233	
44				1	5			424	446	
275	5			1		526			477	
83	4			2					533, 578	

LIST of HOUSEHOLDS INVADED by SMALL-POX, &c.—
continued.

	INMATES.					CASES OF SMALL-POX.				
	Vaccinated.	No Information as to Vaccination.	" Under " Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	No Information as to Vaccination.	" Under " Vaccination.	Alleged Vaccination.	Unvaccinated.
297	5				1	541				527
91	3		1	2						246,267
209	3		1	1	1	108			516	65
73	4		1	1	1	135		520		186
300	1			5						528,537
245	6					17,21,22, 238				547
314	5			1		34,39,40				26
248	6					99,100, 182,195				
173	4					234,313, 319,320				
164	3			3		272,305				280,360
98	5			1		95,101, 165,511				397
166	5			1		404,405, 407,408				496
301	5			1		548,551, 552,553				550
246	6			1		15				
190	6			1						149
273	7					161				
25	6			1		264				
257	6			1		338				
153	4			3						411
139	6			1		470				
62	7					119,211				
264	7					159,160				
182	6			1		330				253
94	7					303,352				
240	2		3	2		184				166
295	7					530,544				
266	6			1		10,13				14
258	7					55,142, 236				
117	3			1	3					118,181
102	3			4		396				192
219	5	1		1		254,256				196,458
253	5			2		356,401				516
40	5		1	1		217,428		336		462
268	7	1				6				317
70	8					56				
201	6		1	1						128
17	6			2		210				
241	7			1		284				
198	8					366				
78	3		5			341				
165	5			3						346
114	7		1			456				
20	6		1	1		120				195
196	7		1			124,126				141,422
85	5			3						
60	8					241,370				
250	8					379,438				
199	4			4		107				278
135	5	2		1		83		84		48
50	4		3	1						74
142	6			2				227, 518		156, 332
159	3		3	2		522,523				407, 524
57	4		1	3		259,510				526,514, 348

LIST of HOUSEHOLDS INVADIED by SMALL-POX, &c.—
continued.

—	INMATES.					CASES OF SMALL-POX.				
	Vaccinated.	No Information as to Vaccination.	Under Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	No Information as to Vaccination.	Under Vaccination.	Alleged Vaccination.	Unvaccinated.
126	8				1	110				
206	9					130				
140	8				1					120
225	5	3	1			295				
79	9					344				
286	9					356				
110	1	8				490				
170	8			1		62,464				
271	8			1		351				350
15	9					386,488				
189	9					138,147,569				
87	9					295,290,295,519				
203	6			3		112,185				76,111
31	7	1		1		38,42,505				41
299	6	1		2		542,543				535,545
239	9			1		345				
154	7			3		391				
234	8			2		283,355				
290	10					408,453				
23	10					165,261,333				
298	10					532,539,549				
211	8			2		53,63				52,64
19	8			1	1	266,494,525			327	445
127	9			1	1	50,100,187,188,189				201
168	3	3		4		279,288				169,295,287,289
244	11					358				
191	11					416				
249	10			1		431				
76	10			1		96,180,349				
49	4	1		6						106,176,249,315,331
1125	31	50	18	232		295	4	8	13	144

SUPPLEMENTARY LIST of CASES of SMALL-POX from HOUSES, Particulars of whose Inmates were not obtained.

—	Vaccinated.	No Information.	Under Vaccination.	Alleged Vaccination.	Unvaccinated.
High Street					3
Callington Street		7			
Upper North Street					12
Clay Fold	18				
Back Chapel Street		23,24			
Hume Street	174				46
Ward's Hill	47				
Grosvenor Cottage		49			
Billeliff Buildings					51
Whesteroff	59				
Hanover Street	60				
Crescent Street	61,89				
Dark Lane					62

SUPPLEMENTARY LIST of CASES of SMALL-POX from HOUSES, Particulars of whose Inmates were not obtained—cont.

—	Vaccinated.	No Information.	Under Vaccination.	Alleged Vaccination.	Unvaccinated.
Union Street					72
Hume Street					82
Brown's Buildings					87
Carlinghow Lane	202	88			
Grafton Street	91				
Staincliffe	97				
Wetherall Street	113				134
Parker's Place	156				
Wilton Street	146				
Harrison's Fold	153				
Woodwell Street					157,331
Dark Lane	247				162
Wilson's Buildings	172				
Charles Street	203	194			
Purlwell Lane	198				
Henry Street, B. C.	225				364
Victoria Street, B. C.	226,282				
Hick Lane	243				
Woodwell Street	270				
Warwick Mount	271				
Brown's Buildings	455				274
Clay Fold	294				
Suffolk Street	325				
Victoria Street					328
Spa Street					343,400
Hosley Lane	363				
Havercroft Fold	368				
Fearnside's Yard	372				437
Field Hill	385,441				
Jacob Street	468				587
King Street, B. C.	448,440				310
Wood Street	398				
Back Henrietta Street	413				
North Street	419				
Track Quarry	420				
Back Hume Street	425,427				
Cross Bank	432				
Taylor Street	434				
New Street	444				461
Balk Street	475				
Providence Street	487				
Bradford Road	492				
Albion Street	483				
Providence Street	502				
Bayldon's Place					629
Ambler Street	534				
Bradford Road					549
	50	6	—	—	23
Small-pox hospital	403				
	51	6	—	—	23

DEWSBURY.

Number of cases of small-pox in Dewsbury. First case in 8th week of the epidemic. The outbreak among inmates of workhouse infirmary. Particulars of infection of some of the cases. The outbreak in a Board School. List of households invaded, with particulars of ages of members, and those attacked. The sanitary condition of infected houses. Weekly incidence—monthly prevalence. Age and sex, distribution. Occupations of those attacked. Types of the disease. Number of cases removed to Fever Hospital. Analysis of incidence in 130 households. Comparison of occupations of all inmates of those houses and of those attacked with small-pox. Single and multiple cases in houses. Vaccination statistics of those attacked (a) according to order of attack, (b) according to age, (c) according to type of disease, (d) according to those exposed but not affected, (e) single or multiple cases in houses. Previous attack of small-pox. List of households and vaccination data of their inmates.

During the period covered by this inquiry there were known to have occurred in Dewsbury 265 cases of small-pox, inclusive of 6 of the inmates of the workhouse infirmary at Staincliffe, the notifications of infectious disease arising in that institution being made to the Dewsbury Authority.

It was in the 8th week of the outbreak in the Dewsbury Union that the first case occurred in the town. This was the case of a young man, J. L., living in Whitley Street, who was employed at F.'s mill at Staincliffe, adjacent to the Union Workhouse, in the fever block of which there were at the time four cases of small-pox. He was attacked on June 14th, 1891, and a girl working in the same mill from Batley was attacked on June 7th (Batley, Reg. No. 5). On June 23, W. S. (No. 2), a fellow-worker at the same mill, living in Nowell Street, was also attacked. He may have been infected by the preceding case, but that these workers should have been infected from the cases in the workhouse is impossible to prove. At the presumed date of the infection of J. L. there were only two such cases in the fever block, and they had been there for two or three weeks. J. L. was unvaccinated, the rash appeared in his case on June 17, and he was removed to the Dewsbury Fever Hospital on June 19. His mother (No. 13) was attacked on June 30, evidently infected by him. It is remarkable that the third case (A. G. f., *et.* 21) notified in Dewsbury, lived at Staincliffe, in a dwelling about 50 or 60 yards from the workhouse infirmary, from which it was separated by fields in which she was accustomed to walk. This patient sickened on July 1st, and at the time of her supposed infection, there would be seven cases in the workhouse fever block, five admitted between June 12th and 16th.

It was at this time that some of the inmates of the workhouse infirmary came to be infected, and a few particulars of these cases (for which I am indebted to Dr. Halliwell, the medical officer to the workhouse) may here be given.

Prior to the appearance of small-pox amongst the inmates of the workhouse infirmary, the following patients had been admitted into the "fever" wards adjoining:—

From Batley, Case No. 1. Admitted May 7, discharged July 1.

From Batley, Case No. 2. Admitted May 12, discharged July 26.

From Batley, Case No. 4. Admitted May 26 (died May 30).

From Batley, Case No. 5. Admitted June 12, discharged August 14.

From Batley, Case No. 6. Admitted June 12 (died June 16).

The first patient in the infirmary to be attacked was Hannah D., *et.* 20, a cripple, who had long been an inmate. She did not occupy a ward contiguous to the small-pox block, but may possibly have been infected by frequenting the bath-room, which is so situated. She fell ill on June 16 (No. 180 in Dewsbury list), and had an attack of confluent small-pox. Allowing 14 days for the incubation of her illness, there would be at the time of her presumed infection only two small-pox patients in the "fever" block, who, moreover, would have passed the acute stage of their illness.

The next infirmary inmate to be attacked was Rawson D., *et.* 14 (No. 181 in Dewsbury list), a phthisical lad who had improved in health since coming to the infirmary, and who, at the time of his contracting small-pox, was engaged in the tailor's shop. He slept in ward 7 of the infirmary, *i.e.*, precisely opposite the fever block, occupying a bed at the opposite end of the ward

to that contiguous to the fever block. He sickened on June 24th, and at the time of his presumed infection (on June 11), there were only two cases of small-pox in the fever block. He had a confluent attack, and died on June 30.

The following cases of small-pox were admitted from June 12 to July 5, when the next infirmary inmate took ill:—

From Batley, Case No. 8. Admitted June 15, discharged August 15.

From Batley, Case No. 12. Admitted June 15 (died June 20).

From Soothill Upper, Case No. 1. Admitted June 15, discharged July 27.

From Birstal, Case No. 1. Admitted June 16, discharged about July 20.

From Heckmondwike, Case No. 1. Admitted June 20, discharged about July 20.

From Batley, Case No. 10. Admitted July 4 (convalescent).

From Batley, Case No. 13. Admitted July 4, discharged August 7.

From Batley, Case No. 14. Admitted July 4 (died July 8).

On July 5 a third inmate of the infirmary was attacked with small-pox, *viz.*, Wm. B., *et.* 27 (No. 182 in Dewsbury list), an epileptic, long an inmate (unvaccinated). He occupied a bed in Ward 5, beneath the window looking on to the small area that divides the main infirmary building from the fever block. Presuming that he was infected about June 22, he could hardly have contracted the disease from R. D., who did not sicken until the 24th, nor from H. D., who was sent to the fever block a week previously. At that time (June 22) there would be in the small-pox block eight cases of small-pox.

On July 7 two more infirmary inmates were attacked, *viz.*, Emily S., *et.* 24, and Hannah S., *et.* 29 (Nos. 183 and 184 in Dewsbury list). At the presumed date of their infection there would be nine cases in the small-pox wards. Both these women were engaged in the laundry which adjoins the small-pox block, and they slept in wards further removed from that building. H. S., an epileptic (unvaccinated), died on July 17 from her attack of small-pox. E. S. (vaccinated) had a bad confluent attack, and was not discharged until November 7th.

A month elapsed before any other of the infirmary inmates were attacked with small-pox, and, meanwhile, no fresh cases were being admitted to the fever block. This, the last inmate to be infected was Frank J., *et.* 20, who was convalescent from a severe attack of facial erysipelas when attacked with small-pox. He occupied a bed in No. 6 ward, beneath the window facing the fever block, and at the presumed date of his infection (he sickened on August 4), there were (probably) 10 cases of small-pox in the building.

Although in the month of December there were admitted from Batley 17 cases of small-pox (*viz.*, one on the 4th, one on 7th, three on 9th, five on 10th, one on 13th, one on 14th, five on 31st), no other infirmary inmate was attacked with the disease.

The following is a list of these admissions:—

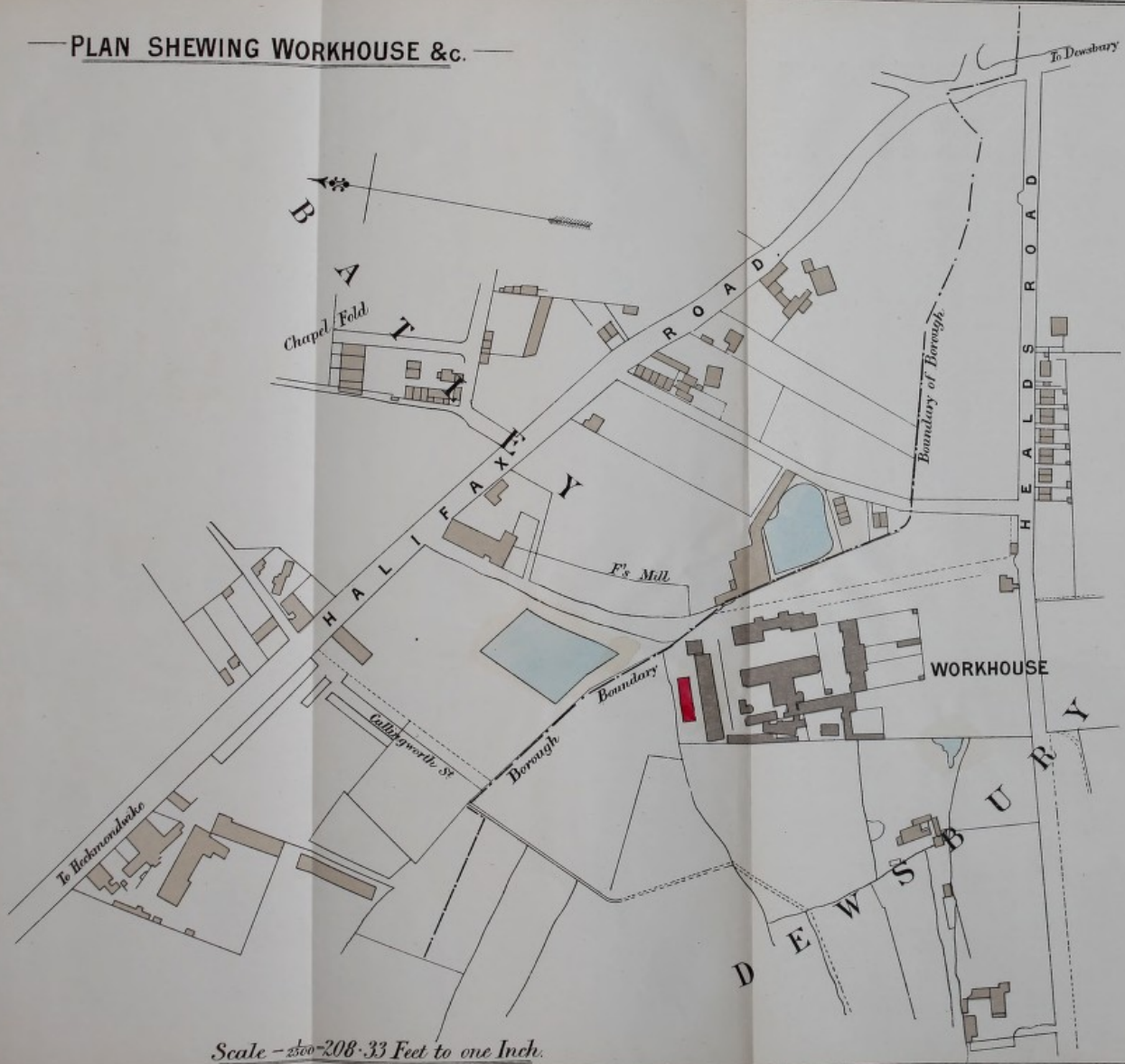
From Batley,	Case No. 34.	Admitted December 4th.
"	" No. 504.	Admitted December 7th.
"	" Nos. 38, 41, 42.	Admitted December 9th.
"	" Nos. 31, 35, 36, 39, 40.	Admitted December 10th.
"	" No. 51.	Admitted December 14th.
"	" Nos. 77, 78, 80, 505, 506.	Admitted December 31st.

Returning to the cases arising in Dewsbury, it is only possible to give particulars of a few of them, as to their sources of infection, gathered from personal inquiry made some months afterwards.

M. H., a girl, 15 years of age (No. 9), worked at a mill next to a woman who came from a house where a child had been taken ill (? No. 4, attacked August 1). M. H. was attacked on Aug. 14, and a fellow worker at the same mill (S. S., No. 10), attacked on the same day, died in the hospital. The mother of S. S. (No. 14) was attacked on August 29th, *i.e.*, 12 days after the removal of her daughter to hospital.

No. 12, a child of two years old, living in Nowell Hill Road contracted the disease by visiting a house in the

— PLAN SHEWING WORKHOUSE &c. —



same road where a miner (J. A., No. 174) was lying ill. This was one of the few cases not removed to hospital. The child (No. 12) was unvaccinated, she sickened on August 16th (J. A. was ill from July 25 to about August 12th), and died in the hospital on August 26th.

Mrs. H. (No. 17), attacked on September 19th, was inoculated on both nipples by the infant (No. 18) she was suckling at the time; this child being removed to hospital on the 10th three days after its rash appeared. The father (No. 19) was attacked on September 24.

T. M. (No. 24), a dealer in cast-off clothing, fell ill on September 11; he had possibly been infected in the course of his trade.

F. C. (No. 25), a lad employed in a large grocery store, was attacked simultaneously October 18-91, with a companion of his (No. 26), who lived in a district where some cases had recently occurred.

Mrs. W., *æt.* 75, had a mild attack of small-pox, which occurred on October 18th. She had been nursing some neighbour's children (Nos. 21 and 23), in one of whom the rash appeared on October 5th.

T. W., a delicate unvaccinated child of two years old was admitted into hospital (No. 133) on November 25th, in a moribund state. This case had been notified as variola, but was subsequently regarded by the medical attendant as one of "chicken-pox." A sister of this patient, *æt.* 5, had also had "chicken-pox" two days before. Her case is not included in this record.

R. S., m., *æt.* 19 (No. 41), a weaver employed in a mill at Batley, sickened on January 9, 1892. He stated that he was working next to a lad whose sister had died from small-pox. [This may be No. 72 in Batley Register, a child who developed the rash on December 21 and died on January 11.]

Mrs. D. (No. 48), living in an open district on high ground may have been infected through her husband who visited houses in Batley to collect rates. She was attacked on January 19. Her sister, Mrs. H. (No. 61), who came to see her before her removal on the 24th, sickened with small-pox on February 4th.

In this month a family of eight members living in the Vulcan Road all suffered excepting the father. The first to be attacked was a lad of 19 (W. H., No. 47), who complained of illness on January 15, and was removed to hospital on the 21st, the day following the appearance of his rash. He was employed as a teamer (carter). His mother and her other five children all developed the rash on February 1st, and were removed to hospital on the 2nd. The two youngest, *æt.* six and two years respectively, were unvaccinated. These two had confluent attacks; those of Mrs. H. and W. H. were of the coherent type, the rest were mild attacks.

P. H., a plumber, 17 years (No. 49), sickened on January 21. He had visited his brother-in-law in Batley (No. 118 in Batley Register) during the attack of small-pox from which the latter was suffering (rash appeared in this case January 5, and he was removed to hospital January 9, when he died). A brother of P. H. living in Batley (No. 164 in Batley Register) also took the disease (rash, January 16th).

P. H., a miner, *æt.* 18 (No. 51), attacked on January 29th; was probably infected by a fellow-miner (M. C., No. 45) with whom P. H. sat up one night before his removal to hospital on January 18.

In the month of February a considerable number of cases occurred amongst the children attending one of the largest and best managed elementary schools in Dewsbury. The first known to have sickened was L. N., a girl, 9 years of age (No. 173), living in Ernest Jones Street. She was attacked on February 3rd, and removed to hospital on the 11th; her two brothers, J. N., *æt.* 5, and E. N., *æt.* 7 (Nos. 89 and 86), were attacked on the 20th and 21st respectively. On February 5th, B. S., a girl of 12 (No. 68), was attacked and removed to hospital on the 12th. She was unvaccinated and her three sisters and one brother, also unvaccinated and also attending this school, took the disease, the dates of each of their illnesses being February 19th, 22nd, 24th, and 25th respectively (Nos. 88, 90, 91, 93). The father, E. S., a weaver, vaccinated (No. 87), fell ill on February 20th; the only member of the household of seven who escaped being Mrs. S., *æt.* 35, vaccinated. On February 5th also the head mistress, Miss G., *æt.* 34 (No. 62), was attacked. She had been in delicate health for the past two years; her infantile vaccination had been unsuccessful, but she was vaccinated successfully at the age of 17. She was removed to the hospital on February 10th, and died there on the 17th. Another teacher,

Miss D., of Liversedge, was attacked with discrete small-pox on February 6th (see "Liversedge"). On February 7th, T. S., *æt.* 7 (No. 75), unvaccinated, in the same school and living in Vulcan Road, was attacked; he died in hospital on the 23rd. E. E., a girl, *æt.* 11 (No. 67), living in Cossham Street, was attacked on February 8th, and removed to hospital on the 12th; she also was unvaccinated, and her brother, *æt.* 16 (No. 94), vaccinated, fell ill on February 25th. Lastly, on February 15th, a boy of eight years (A. S., No. 74), unvaccinated, living in Vulcan Road, next door but one to his schoolmate, T. S., was attacked with confluent small-pox. The origin of this outbreak is not quite clear. It may have been due to children attending the school from an infected house. I was informed by Mr. A. (brother-in-law to Miss G.) that about a fortnight before her illness, Miss G. noticed that two children were ailing and feverish. She sent them home, and learnt subsequently that there was small-pox in their house; but I have no record of any child at this school having the disease prior to February 3rd in this year; two of the earlier cases in the epidemic (July 1891) were children who did attend there; and subsequent to this period others of the same school were attacked from time to time, but without any such marked evidence of infection at the school as in this series of cases. It is noteworthy, however, that of 57 school children (from all schools) who had small-pox 34 were the first (in 16 instances the *only* case) cases that arose in their respective families.

F. P., *æt.* 18 (No. 70), engaged as a charwoman said that two weeks before she was taken ill (February 8th) she was visited by a friend from Batley, who brought her a present of a fur cape. This friend was employed at a mill where some cases of small-pox had recently occurred. F. P. also stated that Mr. and Mrs. A. at whose house she was working were ill about a week after she was removed to hospital. If their illness was small-pox it must have been so mild as to have passed unrecognised, for there was no notification made of it.

A friend of H. P., viz., K. C. (No. 98), was attacked on February 29th.

H. T., *æt.* 16 (No. 71), engaged in Postal Telegraph service, living at Woodville, Leeds Road, was attacked February 12th. He had been re-vaccinated a year previously, but it did not take, and he had no clear marks of his primary vaccination. His sister, a dressmaker, *æt.* 37 (No. 99), sickened on March 1—(H. T. had been removed to hospital on February 15th)—and his brother, *æt.* 27 (No. 101), on the 3rd. The infection may have been brought to this house by a neighbour (No. 69), who sickened about the same time, and who was occupied as an insurance agent in visiting parts of Dewsbury, then infected with small-pox.

An instance of re-infection of a house may here be cited. It is in a court off High Street, Dawgreen, a block of eight privies, being situated in the centre of the unpaved area, surrounded by houses. One of them, a tenement of two rooms, was occupied by a family of nine, of whom A. C., a schoolboy, *æt.* 10 (No. 73), unvaccinated, was attacked with small-pox on February 16th, and removed to hospital on the 19th, where he stayed for seven weeks. No other case occurred in this dwelling until May 24th, i.e., fully 6 weeks after H. C. had returned home. At this date (May 24th) S. E. C., a school girl, *æt.* 9 (No. 219), the only other unvaccinated inmate, fell ill, and was removed to hospital on May 28th, where she remained till July 4th.

E. B., f., 16 (No. 96), a weaver, living at Batley Carr, who fell ill on February 25th, worked at a mill next to the sister of a lad who had died in the Batley Small-pox Hospital. (? Batley Reg., 278, admitted to hospital February 6th.)

E. W., m., 20 (No. 97), attacked February 25th, may have been infected through W. H. L. (No. 94), whose sister (No. 67) was removed to hospital on February 12th.

M. A. B., f., 35 (No. 106), a friend of No. 98 (above referred to), was attacked on March 4th; she could hardly, however, have been directly infected by No. 98, but probably indirectly through her from No. 70.

No. 103 is the case of a miner, attacked on March 5th, attributed to infection of the house by a woman who came to stay there whilst her own house was being fumigated. He infected his younger brother, attacked March 19th (No. 126).

No. 111 is the case of the man who drove the hospital ambulance. He had not been re-vaccinated, and indeed bore no marks of the vaccination alleged to have been done in infancy. He was attacked on March 8th, removed

on the 12th, and remained there till May 7th, having had a confluent attack.

E. H., f., 16 (No. 123), a machinist at a mill in Batley Carr, attacked on March 17th. A fellow-worker living at Batley (Batley Reg., 383) had been taken ill at the end of February.

The occupant of Burgh Mill Farm (No. 136) was attacked on March 27th and died in the hospital on April 8th. He was 21 years of age and unvaccinated. The farm is the nearest dwelling to the hospital, the smoke from which was "often blown over the house."

No. 145 is the case of an infant who was being suckled by its mother, when the latter was attacked with small-pox. The child showed symptoms of the disease on the 14th day of the appearance of the rash on the mother (No. 138).

Mrs. D., wife of the cemetery lodge-keeper, the lodge being situated between the hospital and Crow Nest, was engaged for a month in the capacity of cook at Crow Nest, where convalescing small-pox patients were received. A week after returning home she was attacked with small-pox (No. 141) April 1st, and her husband (No. 147) fell ill on April 13th. His attack was a severe one.

No. 158, attacked April 14th, had visited her relations, the V.'s, at Heckmondwike, three of whom had had small-pox a month previously. (Nos. 11, 14, 15 in Heckmondwike list.)

No. 164 was apparently infected at the hospital where he was engaged in superintending the formation of a road.

In two instances cases of varicella were mistaken for small-pox (and the difficulty in distinguishing the mildest form of the latter from varicella is great), with the result that they were infected in the hospital to which they had been sent. In one of these, eight members of a family of 10 contracted small-pox. B. K., f., *æt.* 3 (No. 227), sickened on June 1st, 1892, a rash appeared, and she was sent into hospital on June 4th. F. K., f., 9 (No. 244), and F. K., f., 6 (No. 235), a rash in each appeared on the 20th when they were sent into hospital. No. 227 sickened with small-pox on June 25th in the hospital and died on July 3rd. No. 244 returned home on July 2nd, but on the 5th exhibited small-pox papules, and was sent back to hospital on the 8th. No. 235 was still in hospital when she sickened with small-pox on June 27th, and died on July 6th. In the interval (July 2nd to 8th), that F. K. (No. 244) was at home she probably infected the rest of the family who sickened as follows:—July 15, W. K., m., *æt.* 17 (No. 249); July 17th, L. K., f., 11 (No. 250); July 18, W. K., m., 14 months (No. 251); July 20th, A. K., m., 13 (No. 253); July 21st, F. K., f., 9 (No. 254). All but Nos. 253 and 254 were unvaccinated. The father had had small-

pox in boyhood; whilst Mrs. K., who accompanied her infant to the hospital, did not contract the disease.

V. G., f., *æt.* 23, a weaver, who had been suffering from neuralgia for three weeks, had a rash appear on the forearm on July 29, which was thought to be varicellous. The case was at once notified and removed. She was discharged from the hospital on August 8th, i.e., the 11th day of her residence there. She felt ill and weak on the 9th, and some undoubted small-pox papules appeared on the 13th, and she was re-admitted into the hospital on the 15th.

I have a few other facts gleaned by inquiry as to the infection of some of the cases, but they are not of material importance.

Infected Households.—In the following list the houses that were infected are ranged in the order in which the first cases were attacked, the table showing the proportions of the inmates in four age-periods (*viz.* under 1 year, 1 to 10 years, 10 to 30 years, and 30 years upwards). It will be seen that there were infected in—

	Houses.	Cases arising in these Houses.
1891.		
June - - - -	2	3
July - - - -	7	10
August - - - -	3	4
September - - - -	3	5
October - - - -	4	6
November - - - -	5	7
December - - - -	2	5
	26	40
1892.		
January - - - -	12	23
February - - - -	26	48
March - - - -	23*	36
April - - - -	28	46
May - - - -	17	26
June - - - -	10	20
July - - - -	10	12
August - - - -	7	7
	133	218

* Also one case at Infirmary.

LIST of HOUSEHOLDS in Dewsbury invaded by Small-pox, in Order of Incidence of the Disease, with Number and Ages of their Members, and of those attacked with Small-pox.

Date of Invasion.	Street.	Reference to House List.	All Inmates				Attacked with Small-pox.*			
			Under 1 year.	1 to 10.	10 to 30.	30 years and upwards.	Under 1 year.	1 to 10.	10 to 30.	30 years and upwards.
1891.										
June 15	Back Whitley Street	29		1	4	2			1	13
" 24	Nowell Street	56				2			2	
July 1	Staincliffe	83		3	2	2			3	
" 1	Whitley Street	—	—	—	—	—			4	
" 15	Boothroyd Lane	—	—	—	—	—			7, 8	
" 16	Thornton Street	12				2			30	
" 22	Whitley Street	28		1	4	2			6	
" 23	Scout Hill	—	—	—	—	—			11	10
" 23	Nowell Hill Road	46								14
" 23	Nowell Hill Road	46				4				174
August 14	Nowell Hill Road	58		1	5	1			9, 16	
" 16	Nowell Hill Road	45		1	3	2			12	
" 28	Whitley Street	26		2	2	1				15
September 3	Whitley Street	27		3	1	2			18	
" 4	Carlisle Street	66				4				20
" 11	Huddersfield Road	16				1				3
October 3	Fall Lane	35	1	3		2			23	21
" 18	Westgate	7		1	6	3				25
" 18	Fall Lane	34								2
" 19	Cliffe Road	6		1	4	2				26
November 3	Leeds Road	—	—	—	—	—				34
" 6	Commercial Street	—	—	—	—	—				32
" 8	Dewsbury Moor	—	—	—	—	—			29	31
" 20	Princes Street	51		3		2			133	
" 30	Middle Road, Daw Green	24	1	3	4	2				33
December 22	Quarry Road	72		3		2			36, 37, 38	
" 26	School Lane	48		—	1	2				35
1892.										
January 1	Heckmondwike Road	—	—	—	—	—				40, 46
" 7	Horsfield Street, Batley Carr	—	—	—	—	—				42
" 8	Back Lentham Street	—	—	—	—	—				43, 44
" 9	Boothroyd Lane	30				2				41
" 15	Curry Fold, High Street	41		2	3	4			66	45, 65
" 15	Vulcan Road	10		2	5	1			56, 57	47, 52, 53, 54, 48
" 19	Longlands	89	1	1	1	1				178 Age ? 179
" 19	— Lane	—	—	—	—	—				
" 21	Low Lane, Batley Carr	64				1				49
" 23	Newlands	—	—	—	—	—				50
" 28	Broughton Lane	61		3		2				58
" 29	Middle Street, Daw Green	23		1	3	2				61
February 2	Thornhill Road	39				1				59
" 3	Ernest Jones Street	81		4		2			86, 89, 173	
" 4	Back New Street	44		4	3	2			81	60
" 4	Thornhill Road	20		1		2				61
" 4	Upper Road	69		1	2	1				63
" 5	Victoria Road	90		2	1	3				62
" 5	South Woodbine Street	32		2	3	2			91, 93	68, 88, 90
" 7	Vulcan Road	8		2	3	2			75	
" 8	Cosham Street	75				3				67, 94
" 8	Kensington Street	13				3				70
" 9	Back New Street	43		2	4	2				64
" 12	Woodville Road	3				3				71, 101
" 12	Nowell Hill Road	59				4				72
" 13	Woodville	4		3	2	2			82, 83	69
" 15	Vulcan Road	9		2		2			74	
" 16	Ingham Street	42		1	6	2			219	73

* The numerals refer to the Register of Cases.

Date of Invasion.	Street.	Reference to House List.	All Inmates.				Attacked with Small-pox.*				
			Under 1 year.	1 to 10.	10 to 30.	30 years and upwards.	Under 1 year.	1 to 10.	10 to 30.	30 years and upwards.	
1892.											
February 16.	Fall Lane	—	—	—	—	—	76		95		
" 19.	Twedale Street	11		1	3	2			77		
" 20.	Scout Hill	78			6	2			78, 80, 84, 85		
" 22.	High Street	40		2	2	2				79	
" 23.	Thornhill Road	38		—	2	2					92
" 25.	Upper Road, Batley Carr	70		1	2	2			96		
" 25.	Scout Hill	70		2	4	2			97		
" 27.	Kensington Street	14		2	6	2			98, 115, 116, 117		
" 28.	Cemetery Road	86		1	4	2			100		
" 29.	Smith Road, Batley Carr	65		3	1	2		119			102
March 4.	Back Kensington Street	15		—	2	2					106
" 5.	Huddersfield Road	33		2	2	2		126	103		
" 5.	Scout Hill	79		1	1	3			104		
" 5.	Back Gladstone Street	55		2	3	1		107, 108	129		
" 5.	Quarry Road	73		1		4					110
" 7.	Back Lawson Street	2			1	1			105		
" 7.	Bradford Road, V— Hotel	—	—	—	—	—			100		
" 7.	Thornhill Road	17		2	4	2			132, 143		113
" 7.	Fall Lane	36			1	3					118
" 8.	Back Cliffe Street	5			2	1			111		
" 10.	Infirmary	—	—	—	—	—			112		
" 11.	Kiln Road	—	—	—	—	—					Age? 114
" 14.	Thomas Street, Batley Carr	67			2	2			134, 135		120
" 17.	Naylor Street, Batley Carr	68		1	5	2			123, 142		
" 17.	Raven Street	49			4	2			125		
" 17.	Gladstone Street	54			5	2			127		
" 18.	Manor Road	25		5	4	2		121, 122			
" 18.	Naylor's Fold, Batley Carr	63		2		2					150
" 20.	Halliley Street	31		1	1	2			128		
" 22.	Fall Lane	18		3	3	2		131, 140, 222			
" 27.	Burgh Mill Lane	80			1	4			136		
" 27.	Gladstone Street	52	1	1	2	—	145		138		
" 28.	Lawson Street	1	1	2	1	1		172			148
" 29.	High Street	22			3	? Age 2			137		
April 1.	Cemetery Road	85		1	2	2					141, 147
" 4.	Denton Yard, George Street	83			1	1			139		
" 4.	Middle Road	—	—	—	—	—			176		156
" 7.	G— L— Inn	—	—	—	—	—			144		
" 7.	Fall Lane	37		2	3				146		
" 13.	Central Street	82		3	2	2		215	152, 187		186
" 14.	Scout Hill	50			1	2					149
" 14.	Nowell Street	84	1	2	6	2			151		
" 14.	George Street	—	—	—	—	—			153		
" 14.	Moor End Lane	62		2	2				158		
" 15.	Scout Hill	77		3	2	2		150, 169, 170	168, 171		
" 15.	Back Cliffe Street	91		3	2			154			
" 15.	Staincliffe Road	60		3	2	1		176	194, 211		157
" 16.	Long Causeway	71		2	1	2		220			155, 201
" 18.	Fall Lane	19			2	2			159		
" 18.	George Street	—	—	—	—	—			160		
" 18.	Thornhill Road	21			1	2			161		
" 18.	Low Road	—	—	—	—	—					162
" 22.	Ashworth Road	74		1		2					164
" 22.	Gladstone Street	53		3	2	2					166, 167
" 23.	Wroce Street	47			3	2					163
" 23.	South Woodbine Street	—	—	—	—	—					Age? 165
" 26.	Whitworth Road	111		3	1	2		191, 202			
" 28.	George Street	100	1		2		190		189		

* The numerals refer to the Register of Cases.

Date of Invasion.	Street.	Reference to House List.	All Inmates				Attacked with Small-pox.*				
			Under 1 year.	1 to 10.	10 to 30.	30 years and upwards.	Under 1 year.	1 to 10.	10 to 30.	30 years and upwards.	
April 23 1892.	Central Street	99			2	2			156		
" 29	Ingham Street	113		1		2		188			
" 29	Long Causeway	107			2	2			192		
" 29	Staincliffe Road	121		1	1	2				193, 205	
May 1	Ashworth Road	97		3	1	3				195	
" 3	Cosham Street	98				2			216	198, 218	
" 3	Calder Bank Terrace	117		1		2				199	
" 4	Asylum Road	—	—	—	—	—		207	107, 208		
" 6	Bradford Road	124		1		2		209			
" 10	Back Lawson Street	132				1			204	20	
" 17	Whitworth Road	—	—	—	—	—		206			
" 19	Smith Road, Batley Carr	123		2	3	2			209		
" 20	Hanover Street	105		1	7	1			210		
" 20	Senior Street	112		3	4	1		213			
" 20	Pitt Street	109		1	3	2			214		
" 21	Middle Road	114				3			213		
" 22	High Street	95								217	
" 24	Lawson Street	125	1					264		221	
" 25	Fall Lane	120		2	3	2		229, 230		225	
" 28	West Vale	116		1	6	2			223, 227		
" 28	Back Whitley Street	—	—	—	—	—				224	
June 1	Bradford Road	—	—	—	—	—			226		
" 1	Caxton Square	127		5	3	2		227, 235, 244, 251, 254, 228	249, 250, 253.		
" 3	Upper Camroyd Street	126		1	1	1					
" 11	Whitley Street	104				2			231		
" 12	Back Wood Hill	122		2	3	3		232, 239	238		
" 17	Oastler Street	102		1	5	2			233		
" 25	Thernton Street	—	—	—	—	—			236	240	
" 29	Thornhill Road	115	1	2	1	2					
" 29	Huddersfield Road	93		2	3	2		242	241		
" 29	Burgh Mill Farm	—	—	—	—	—			243		
July 6	Calder Bank Buildings	118				6			245		
" 8	Huddersfield Road	94		3	3	2			246, 258	257	
" 8	Whitley Street	103				2			247		
" 11	Thornton Street	101		1	3	2		248			
" 19	Twoedale Street	—	—	—	—	—			252		
" 20	New Street	110		1	2	1			252		
" 20	Oates Street	106		4	1	1				256	
" 25	Huddersfield Road	92				1				261	
" 26	Back Fearnley Street	—	—	—	—	—		269			
" 30	Wellington Road	108				1			262		
August 1	Thornton Street	129		2	1	1			263		
" 7	Calder Bank Buildings	119		3		2		265			
" 7	Fall Lane	128				2				266	
" 9	Lacey Fold	96				1				267	
" 15	Back Belgrave Street	130				4			268		
" 21	High Street	—	—	—	—	—			269		
" 26	Swallow Road	231		1	1	2				270	
Summary.											
139 Houses visited			9	167	206	242		4	57	104	52
29 Houses not visited						Age ?		2	4	24	8 3
Infirmary										1	
Workhouse inmates (not in the above list), three fatal.										6	
								6	61	135	60 5

* The numerals refer to the Register of Cases.

As regards the *sanitary condition* of the houses which were invaded by small-pox, it is safe to say that it was neither better nor worse than houses situated in the same districts which were not so invaded. Indeed, as regards privy accommodation and ash-pits, the common practice of having one set of middens to a group of houses places many infected and non-infected houses in the same category of exposure to nuisance from defects in the construction or maintenance of such outbuildings.

It may, however, be stated that there were comparatively few infected houses in one of the oldest and worst quarters of Dewsbury, viz., Daw Green, where the streets and courts are narrow and irregular, old and dilapidated, and the sanitary accommodation equally defective. There have been some clearances in this neighbourhood, but it is still densely populated, especially by Irish folk. The neighbouring district of the Flatts, is more open, and covered (partly) by fairly wide paved streets of more modern construction (all, however, on the back-to-back system or in blocks of six, separated by narrow passages). Houses infected by small-pox were more numerous here than in the Daw Green quarter.

There were two parts where the cases were numerous within a small area, and sanitary defects very obvious, viz., in Fall Lane, Thornhill Road—where the privy middens and ashpits were in a very neglected state, and common to many houses, are situated on a higher level than the houses in an unpaved yard—and Scout Hill, off the Huddersfield Road, adjoining Ravensthorpe, where there are water-closets and drains obviously defective. Mr. Hemingway, the Sanitary Inspector of Ravensthorpe, who at the request of the owner had examined this property, told me that he found defects in some of the connexions between the closet soil pipes and the drains, there being nine closets situated in a passage between the houses, and in each case the junction of the soil pipe with the drain was by means of a 4-inch pipe joining the drain obliquely, and merely cemented to the vertical soil pipe by clay. The cellars were saturated with water. At his suggestion these closets were replaced by a trough water-closet, and the drain connexions rectified. These improvements were made subsequently to the time at which the cases of small-pox occurred in this district.

Of the 130 dwellings, of which we have notes, 30 were "through" houses, some being detached.

Six were "partly through," i.e., either having a back entry on the ground floor or a window at the back on the upper floor.

Twenty-two were "single" houses, i.e., with a dead wall at the back.

Seventy-one were "back-to-back" houses.

One was a cellar-dwelling.

So that in at least 94, or more than 70 per cent., there was no through ventilation.*

The proportion of cases was larger in those houses in which there was no through ventilation, for—

Ninety-four dwellings (522 inmates) with no through ventilation yielded 162 cases, or 1.72 per house, and 31 per cent. of all inmates.

Thirty-six dwellings (192 inmates) with partial or complete ventilation, yielded 55 cases, or 1.52 per house, and 28.6 per cent of all inmates; in other words, 100 houses of the first type would at this rate yield 172 cases, 100 houses of the second type 152 cases.

It may be of interest to learn that out of 99 of these houses 64 had privy-middens (49 in number) with ash-pits in connexion, 14 of these being at the time of inspection in bad condition. The remaining 35 had water-closets (26 in all), some on the trough system, others detached with automatic or voluntary flushing. Many of these were recently constructed, and few, if any, defects could be observed. The ash-pits in connexion were dry and covered. Indeed, there were but few open ash-pits observed.

TABLE LII.

TABLE showing WEEKLY INCIDENCE of CASES of SMALL-POX at Dewsbury (Chart V.).

Week of Epidemic.	Ending	Cases.	Deaths.
viii.	June 20 . 1801.	2	—
ix.	" 27	2	1
x.	July 4	3	—
xi.	" 11	3	1
xii.	" 18	2	—
xiii.	" 25	3	1
xiv.	August 1	—	—
xv.	" 8	1	—
xvi.	" 15	2	1
xvii.	" 22	2	2
xviii.	" 29	2	—
xix.	September 5	3	—
xx.	" 12	1	—
xxi.	" 19	1	—
xxii.	" 26	1	—
[xxiii.]	October 3	1	—
xxiv.	" 10	—	—
xxv.	" 17	1	1
xxvi.	" 24	4	—
xxvii.	" 31	—	—
xxviii.	November 7	2	1
xxix.	" 14	1	—
xxx.	" 21	2	1
xxxi.	" 28	—	—
xxxii.	December 5	2	—
xxxiii.	" 12	—	—
xxxiv.	" 19	—	—
xxxv.	" 26	2	—
xxxvi.	January 2 . 1802.	2	2
xxxvii.	" 9	6	—
xxxviii.	" 16	2	—
xxxix.	" 23	5	—
xl.	" 30	8	—
xli.	February 6	7	1
xlii.	" 13	10	2
xliiii.	" 20	12	1
xliiv.	" 27	13	1
xlv.	March 5	9	—
xlvi.	" 12	9	1
xlvii.	" 19	10	1
xlviii.	" 26	5	—
xlix.	April 2	7	1
l.	" 9	7	1
li.	" 16	13	—
lii.	" 23	9	1
liii.	" 30	14	3
liiv.	May 7	7	2
lv.	" 14	4	—
lvi.	" 21	10	2
lvii.	" 28	10	1
lviii.	June 4	3	1
lix.	" 11	3	1
lx.	" 18	2	1
lxi.	" 25	2	1
lxii.	July 2	9	3
lxiii.	" 9	3	—
lxiv.	" 16	2	—
lxv.	" 23	8	1

* The average numbers occupying one sleeping room were in houses with through ventilation, 1.2; in those with no through ventilation 3.3 per room.

Table LII.—continued.

Week of Epidemic.	Ending	Cases.	Deaths.
lxvi.	July 30 - 1892.	4	1
lxvii.	August 6	1	—
lxviii.	" 13	3	1
lxix.	" 20	1	—
lxx.	" 27	2	—
		265	39

The MONTHLY PREVALENCE was as follows:—

—	Cases.	Deaths.	
1891.			
June	5	1	
July	10	2	
August	8	3	
September	5	0	
October	6	1	
November	7	2	
December	2	0	
1892.			
January	23	2	
February	44	5	
March	37	3	
April	44	5	
May	31	5	
June	17	7	
July	19	2	
August	7	1	
		265	39

Of the 265 persons attacked with small-pox 131 were males and 134 females; the fatal attacks among the former amounting to 21, and among the latter to 18.

These were distributed according to their ages as follows:—

TABLE LIII.

—	Males.		Females.		Total.		
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
Under 1 year	3	1	3	3	6	4	
1 to 5 years	8	4	13	4	21	8	
5-10 "	17	4	23	4	40	8	
10-15 "	20	1	10		30	1	
15-20 "	23	1	27		50	1	
20-30 "	27	4	28	4	55	8	
30-40 "	19	2	15	2	34	4	
40-50 "	9	4	10	1	19	5	
50-60 "	2		2		4		
60-70 "	1		1		2		
70 and over			1		1		
Age not ascertained	2		1		3		
		131	21	134	18	265	39

Or, stated in age-periods:—

Under 1 year: 6 cases, 4 deaths; case mortality 66·6.
 1 to 10 years: 61 " 16 " " " 26·6.
 10 to 30 years: 135 " 10 " " " 7·3.
 30 years and over, 60 cases, 9 deaths, case mortality, 15·0.

In other words, the mortality at 30 years and over was twice as high as that of 10 to 30 years; but that from 1 to 10 years was nearly 4 times, and that under 1 year, more than 9 times.

TABLE LIV.
OCCUPATION TABLE—MALES.

—	Under 1 year.	1 to 10 years.	10 to 30 years.	30 years and over.	Age not ascertained.	Total.
AT HOME	3	7	3	7		20
Of no occupation	3	7		1		11
Catholic priest				1		1
Cemetery keeper				1		1
Clothier				1		1
Farmer			1			1
Greengrocer				1		1
Innkeeper				1		1
Joiner				1		1
Shopman			1			1
Tobacconist			1			1
AT SCHOOL		18	13			31
AT WORK			51	24	2	77
Mill hands				17	5	23
Miner				14	3	17
Cabdriver			1			1
Cellarman			1			1
Groom				1		1
Hardware dealer				1		1
Hawker				1		1
Fireman				2		2
Insurance agent				1		1
Joiner			1			1
Labourer			3	3		6
Messenger (P. O.)			1			1
Milkvender				1		1
Plumber			1			1
Teazer			4	1		5
Whitewasher				1		1
Occupation not ascertained				8	4	13
Workhouse inmate			3			3

OCCUPATION TABLE—FEMALES.

—	Under 1 year.	1 to 10 years.	10 to 30 years.	30 years and over.	Age not ascertained.	Total.
AT HOME	3	17	17	23	1	61
Of no occupation	3	17	5	1		
Housewife			10	21		
Confectioner				1		
Dressmaker			1			
Nurse			1		1	
AT SCHOOL		19	7			26
AT WORK			38	6		44
Mill hand				20	4	34
Ragsorter				6	1	7
Charwoman			1			1
School-teacher				1		1
Occupation not ascertained				1		
Workhouse inmate			3			3

Type of Attack.—On analysing these 265 cases according to their type it is found that there were—

105 confluent cases, or 39·6 per cent.			
32 coherent	“	12	“
58 discrete	“	21·9	“
67 mild	“	25·3	“

The confluent cases were therefore relatively more numerous than in the whole district (see p. 29).

The mortality of the whole number was 14·7 per cent., and was entirely limited to the confluent cases. It may be remembered that the average mortality in the whole district was about 10·7 per cent.

The distribution of these cases at different age-periods was as follows:—

—		Cases.	Per cent.
<i>Under 1 year of age</i>			
Confluent	- - -	6	
Coherent	- - -	4	66·6
Mild	- - -	1	16·6
<i>From 1 to 10 years</i>			
Confluent	- - -	61	
Coherent	- - -	38	62·1
Discrete	- - -	11	18·
Mild	- - -	6	9·8
Type not determined	- - -	5	8·2
<i>From 10 to 30 years</i>			
Confluent	- - -	135	
Coherent	- - -	44	32·6
Discrete	- - -	16	11·8
Mild	- - -	33	24·4
Type not determined	- - -	40	29·6
<i>At 30 years and upwards</i>			
Confluent	- - -	60	
Coherent	- - -	19	31·6
Discrete	- - -	3	5·
Mild	- - -	19	31·6
<i>At ages not ascertained</i>			
Confluent	- - -	3	
Coherent	- - -	1	33·3
Mild	- - -	2	66·6

All but five cases (two males and three females) were removed to the small-pox hospital, as soon as possible after the notification had been received by the Medical Officer. Subtracting further the six workhouse inmates (three males and three females) of whom three died, there remain 254 cases of small-pox admitted into the hospital during the period of 17 months, of whom 36 died (Chart VIII.).

TABLE LV.
Dewsbury Small-pox Hospital.

Ages.	Males.		Females.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	3	1	3	3	6	4
1 to 5 years	8	4	13	4	21	8
5 to 10	17	4	23	4	40	8
10 to 15	18	—	10	—	28	—
15 to 20	24	1	26	—	50	1
20 to 30	25	3	25	3	50	6
30 to 40	17	2	15	2	32	4
40 to 50	9	4	9	1	18	5
50 to 60	2	—	2	—	4	—
60 to 70	1	—	1	—	2	—
70 and over	—	—	1	—	1	1
Age not ascertained	2	—	—	—	2	—
Total	136	19	128	17	264	36

This hospital also received cases from:—

—	Cases.	Males.	Females.
Hockmondwike	29	19	10
Liversedge	1	—	1
Soothill Nether	13	9	4
Soothill Upper	14	8	6
Ravensthorpe	17	11	6
Thornhill	18	9	9

In regard to the question of promptitude in removal to hospital of a case of small-pox, acting as a safeguard against the infection of other members of a family, it is interesting to note that there is no marked difference in the dates of removal of the patients from (a) houses where only a single case occurred, and from (b) houses where cases followed upon the removal of the initial case. The data are to be found in the table (LVI.) that follows, and they may be summarised thus:—

Group A.

82 houses in which one case only occurred.

1 removed on 2nd day of illness, or 1·2 per cent.			
5	“	3rd	“
16	“	4th	“
20	“	5th	“
20	“	6th	“
9	“	7th	“
9	“	8th	“
1	“	9th	“
1	“	10th	“

Group B.

55 houses where multiple cases, the initial case was removed.

4 removed on 3rd day, or 7·2 per cent.

13	“	4th	“
11	“	5th	“
11	“	6th	“
8	“	7th	“
6	“	8th	“
2	“	9th	“

If anything, there was a prompter removal of the “initial” cases in Group B. than in Group A.*

TABLE LVI.

TABLE of HOUSEHOLDS in which one Case of SMALL-POX occurred and was removed to Hospital.

House Reference.	No. of Inmates.	Case No.	Date of Rash.	Date of Removal.	Day of Attack on which Removed.
2	2	105	March 9	March 10	4th
34	2	28	Oct. 20	Oct. 21	6th
83	2	129	April 5	April 7	4th
96	2	267†	August 12	August 15	7th
104	2	231	June 14	June 15	5th
5	3	111	March 11	March 12	5th
13	3	70	Feb. 9	Feb. 15	8th
20	3	61	“ 7	“ 9	6th
21	3	161	April 20	April 22	5th
39	3	59	Feb. 5	Feb. 5	3rd
48	3	35	Dec. 28	Jan. 4	10th
50	3	149	April 16	April 17	4th

* The reckoning is made in each case from the day of attack, and some allowance must, of course, be made for the difficulty of precisely fixing this in all cases. It may be remarked that should these data be correct, the time of appearance of varicellous rash is more variable than is generally admitted: for out of 254 cases, in three the rash was said to have appeared on the 1st day of illness, in 21 on the 2nd day, in 91 on the 3rd day, in 89 on the 4th day, in 26 on the 5th day, in 10 on the 6th day, and in 4 on the 7th day.

† Originally admitted July 29 and discharged August 9 for varicella. Contracted small-pox in hospital.

TABLE LVI.—continued.

House Reference.	No. of Inmates.	Case No.	Date of Rash.	Date of Removal.	Day of Attack on which Removed.
64	3	49	Jan. 24	Jan. 25	5th
74	3	164	April 24	April 24	3rd
95	3	217	May 25	May 27	6th
103	3	247	July 13	July 14	7th
108	3	262	August 2	August 6	8th
113	3	118	May 2	May 3	5th
117	3	199	" 7	" 9	7th
124	3	200	" 8	" 11	6th
126	3	228	June 3	June 10	8th
9	4	74	Feb. 18	Feb. 20	6th
15	4	105	March 8	March 11	8th
16	4	24	Sept. 14	Sept. 17	7th
19	4	159	April 20	April 22	5th
31	4	128	March 24	March 24	5th
36	4	118	" 9	" 10	4th
38	4	92	Feb. 25	Feb. 26	4th
56	4	2	June 28	July 1	9th
62	4	158	April 17	April 19	6th
63	4	130	March 24	March 25	8th
69	4	63	Feb. 8	Feb. 9	5th
89	4	48	Jan. 29	Jan. 31	3rd
99	4	196	May 3	May 5	8th
107	4	192	" 1	" 2	4th
110	4	255	July 22	July 25	6th
128	4	266	August 10	August 11	5th
129	4	263	" 5	" 6	6th
131	4	270	" 28	" 30	5th
12	5	30	July 13	July 20	5th
22	5	137	April 1	April 2	5th
26	5	15	Sept. 1	Sept. 4	8th
30	5	41	Jan. 10	Jan. 10	2nd
37	5	146	April 10	April 10	4th
47	5	163	" 25	" 25	3rd
51	5	133	Nov. 21	Nov. 25	6th
61	5	58	Jan. 30	Feb. 2	6th
66	5	20	Sept. 9	Sept. 9	6th
70	5	96	Feb. 28	March 1	6th
73	5	110	March 10	" 12	8th
79	5	194	" 7	" 9	5th
80	5	136	" 29	April 1	6th
91	5	154	April 17	" 19	5th
114	5	212	May 23	May 24	4th
119	5	265	August 9	August 10	4th
11	6	77	Feb. 23	Feb. 24	6th
23	6	51	" 1	" 2	5th
40	6	79	" 24	" 25	4th
45	6	12	August 17	August 19	4th
49	6	125	March 20	March 23	7th
50	6	72	Feb. 16	Feb. 18	7th
90	6	62	" 9	" 10	6th
101	6	248	July 14	July 16	6th

TABLE LVI.—continued.

House Reference.	No. of Inmates.	Case No.	Date of Rash.	Date of Removal.	Day of Attack on which Removed.
106	6	256	July 23	July 25	6th
115	6	249	" 1	" 3	5th
130	6	268	August 18	August 19	5th
6	7	26	Oct. 22	Oct. 22	4th
8	7	75	Feb. 18	Feb. 21	?
28	7	6	July 24	July 24	3rd
54	7	127	March 22	March 23	7th
86	7	109	" 4	" 5	7th
88	7	3	July 4	July 8	8th
97	7	195	May 4	May 6	6th
123	7	209	" 22	" 23	5th
43	8	64	Feb. 11	Feb. 12	4th
76	8	97	" 27	March 2	7th
102	8	233	June 19	June 21	5th
112	8	213	May 24	May 24	5th
118	8	245	July 9	July 11	6th
105	9	210	May 23	May 23	4th
7	10	25	Oct. 21	Oct. 23	6th
24	10	33	Dec. 3	Dec. 4	5th
84	11	151	April 16	April 17	4th
—	—	4	July 4	July 6	6th
—	—	32	Nov. 10	Nov. 11	6th
—	—	42	Jan. 11	Jan. 12	6th
—	—	59	" 26	" 26	4th
—	—	169	March 10	March 12	6th
—	—	112	" 12	" 13	4th
—	—	114	" 12	" 13	3rd
—	—	144	April 9	April 13	7th
—	—	153	" 16	" 18	5th
—	—	160	" 29	" 21	4th
—	—	162	" 22	" 23	6th
—	—	165	" 26	" 26	4th
—	—	206	May 19	May 21	5th
—	—	224	" 30	June 1	5th
—	—	226	June 1	" 2	2nd
—	—	236	" 28	" 29	5th
—	—	243	July 2	July 5	7th
—	—	252	" 21	" 22	6th
—	—	260	" 29	" 29	4th
—	—	269	August 25	August 28	8th

Households in which the Cases not removed to Hospital.

House Reference.	No. of Inmates.	Case.	Onset.	Rash.
46	4	174	July 23	July 25
92	4	261	" 25	" 28
109	6	214	May 20	?
—	—	{ 178	Jan. 19	Jan. 22
—	—	{ 179	Feb. 9	Feb. 12

TABLE LVII.

TABLE of HOUSEHOLDS in which more than one case of SMALL-POX occurred and were removed to Hospital.

Reference to Register.	House.	No. of inmates.	Initial Case.			Later Cases.				Remarks.	
			No. in Register.	Date of		Day of Attack on which removed.	No. in Register.	Date of Onset.	Day of Attack of Initial Case.		Date of Removal.
				Rash.	Removal.						
29	7	1	June 17.	June 19.	6th.	13	June 30.	17th.	July 1.		
—	—	7	July 17.	July 20.	6th.	8	Aug. 2.	19th.	Aug. 6.		
58	7	9	Aug. 16.	Aug. 17.	4th.	16	Aug. 30.	17th.	Sept. 3.		
—	—	27	Nov. 7.	Nov. 10.	8th.	34	Nov. 21.	19th.	Nov. 26.		
—	—	31	Nov. 12.	Nov. 14.	7th.	29	Nov. 29.	22nd.	Dec. 4.		
—	—	40	Jan. 4.	Jan. 6.	6th.	46	Jan. 17.	17th.	Jan. 23.		
—	—	44	Jan. 13.	Jan. 14.	7th.					Probably infected from same source.	
		43	" 12.	" 14.	6th.						
44	9	60	Feb. 5.	Feb. 6.	3rd.	81	Feb. 19.	16th.	Feb. 22.		
75	4	67	Feb. 11.	Feb. 12.	5th.	94	Feb. 25.	17th.	Feb. 27.		
—	—	76	Feb. 20.	Feb. 22.	7th.					Probably infected from same source.	
		95	" 25.	March 1.	8th.						
42	9	73	Feb. 18.	Feb. 19.	4th.	219	May 24.		May 28.	No. 73 left hospital, April 6.	
65	6	102	March 4.	March 7.	8th.	119	March 17.	18th.	March 21.		
33	6	103	March 7.	March 9.	5th.	126	March 20.	16th.	March 23.		
66	8	123	March 19.	March 22.	6th.	142	April 5.	20th.	April 19.		
25	11	121	March 19.	March 21.	4th.					Probably infected from same source.	
		122	" 19.	" 21.	4th.						
52	4	138	March 31.	April 2.	7th.	145	April 12.	19th.	April 2.		
1	5	172	March 30.	March 31.	6th.	148	April 13.	17th.	April 16.		
85	5	141	April 4.	April 4.	4th.	147	April 12.	12th.	April 16.		
—	—	175	April 7.	April 10.	7th.	156	April 14.	11th.	April 21.		
53	7	167	April 26.	April 27.	6th.					Probably infected from same source.	
		166	" 26.	" 27.	5th.						
111	6	191	April 29.	May 3.	8th.	203	May 10.	12th.	May 15.		
100	3	189	May 2.	May 4.	7th.					Probably infected from same source.	
		190	" 2.	" 4.	7th.						
121	4	193	May 3.	May 4.	6th.	206	May 12.	10th.	May 17.		
132	2	204	May 12.	May 15.	6th.					Probably infected from same source. Both were rag-pickers.	
		203	" 14.	" 15.	5th.						

Reference to Register.	House.		Initial Case.			Later Cases.				Remarks.
	No. of Inmates.	No. in Register.	Date of		Day of Attack on which removed.	No. in Register.	Date of Onset.	Day of Attack of Initial Case.	Date of Removal.	
			Rash.	Removal.						
125	3	221	May 25.	May 28.	5th.	--	Born in hospital, May 21.			
		264	June 4.	--						
116	9	223	May 30.	May 31.	4th.	237	June 28.	30th.	July 1.	
93	7	241	July 2.	July 4.	6th.					No. 242 might have brought infection from school.
		242	" 3.	" 4.	4th.					
--	--	11	July 24.	Aug. 1.	11th.	10	Aug. 14.	24th.	Aug. 17.	
			14	" 29.	30th.	Sept. 3.				
27	6	18	Sept. 7.	Sept. 10.	8th.	17	Sept. 19.	17th.	Sept. 20.	
			19	" 24.	22nd.	" 23.				
35	6	21	Oct. 5.	Oct. 5.	3rd.	23	Oct. 15.	13th.	Oct. 18.	
			22	" 20.	18th.	" 27.				
41	9	45	Jan. 17.	Jan. 18.	4th.	65	Feb. 10.	27th.	Feb. 13.	Possibly an intermediate case unrecognised.
			66	" 10.	27th.	" 13.				
81	6	173	Feb. 7.	Feb. 11.	9th.	86	Feb. 20.	20th.	Feb. 24.	
			89	" 21.	21st.	" 25.				
3	8	71	Feb. 15.	Feb. 16.	5th.	99	March 1.	19th.	March 5.	
			101	" 3.	21st.	" 6.				
4	7	69	Feb. 15.	Feb. 15.	3rd.					No. 69 probably brought contagion home with him.
		82	" 21.	" 22.	5th.					
		83	Feb. 21.	Feb. 22.	5th.					
55	6	108	March 8.	March 11.	7th.	129	March 21.	17th.	March 24.	Nos. 107 and 108 attended same school.
		107	" 10.	" 11.	6th.					
17	8	113	March 12.	March 13.	7th.	132	March 22.	10th.	March 27.	
			143	April 8.	33rd.	April 11.				
67	4	120	March 18.	March 21.	8th.	134	March 29.	16th.	April 1.	
			135	" 29.	16th.	" 1.				
16	8	131	March 24.	March 25.	4th.	160	April 3.	13th.	April 9.	No. 131 left hospital about May 7.
			222	May 25.	May 30.					
71	5	155	April 19.	April 21.	6th.	201	May 3.	18th.	May 12.	
			220	" 25.	40th.	" 28.				
98	4	128	May 5.	May 7.	5th.	216	May 21.	19th.	May 26.	
			218	May 25.	23rd.	" 27.				
--	--	107	May 6.	May 8.	5th.	207	May 17.	14th.	May 21.	
			208	" 17.	14th.	" 21.				
120	7	225	May 31.	June 1.	8th.	229	June 9.	16th.	June 11.	
			230	" 10.	17th.	" 14.				

ROYAL COMMISSION ON VACCINATION:

Reference to Register.	House.	No. of Inmates.	Initial Case.			Later Cases.				Remarks.	
			No. in Register.	Date of		Day of Attack on which removed.	No. in Register.	Date of Onset.	Day of Attack of Initial Case.		Date of Removal.
				Haab.	Removal.						
122	8	232	June 14.	June 17.	6th.	238	June 29.	18th.	July 2.		
						239	" 29.	18th.	" 2.		
94	8	246	July 10.	July 13.	6th.	258	July 23.	16th.	July 28.		
						257	" 25.	18th.	" 28.		
72	8	39	Dec. 24.	Dec. 29.	8th.	37	Jan. 2.	12th.	Jan. 4.		
						38	" 4.	14th.	" 4.		
						36	" 5.	15th.	" 4.		
78	8	84	Feb. 23.	Feb. 24.	5th.					The disease probably introduced from school or workplace of one of those attacked.	
		85	" 23.	" 24.	5th.						
		78	" 23.	" 24.	4th.						
		80	" 26.	" 27.	4th.						
14	10	98	March 1.	March 4.	7th.	116	March 12.	15th.	March 17.		
						115	" 14.	17th.	" 17.		
						117	" 16.	19th.	" 20.		
82	7	152	April 15.	April 16.	4th.	187	April 26.	14th.	May 2.	No. 152 returned home from hospital, May 11.	
						186	" 28.	16th.	" 1.		
						215	May 22.	40th.	" 26.		
60	6	187	April 19.	April 20.	6th.	176	April 30.	16th.	May 5.		
						194	May 2.	18th.	" 5.		
						211	" 20.	36th.	" 23.		
77	7	169	April 16.	April 17.	3rd.	168	April 27.	13th.	April 29.		
						169	" 27.	13th.	" 29.		
						170	" 27.	13th.	" 29.		
						171	" 27.	13th.	" 30.		
32	7	68	Feb. 7.	Feb. 13.	9th.	87	Feb. 20.	16th.	Feb. 24.		
						88	" 20.	16th.	" 24.		
						90	" 22.	18th.	" 26.		
						91	" 22.	18th.	" 26.		
						95	" 24.	20th.	" 27.		
10	8	47	Jan. 21.	Jan. 21.	7th.	55	Jan. 28.	14th.	Feb. 2.		
						56	" 28.	14th.	"		
						57	" 28.	14th.	"		
						52	" 29.	15th.	"		
						53	" 29.	15th.	"		
						54	" 29.	15th.	"		
127	10	227	June 25.	June 4.	—	249	July 15.	14th.	July 20.	Nos. 227, 235, 244 sent to hospital suffering from varicella. No. 244 returned home, July 2.	
		244	July 5.	July 8.	7th.	250	" 17.	16th.	" 20.		
		235	June 29.	June 18.	—	251	" 18.	17th.	" 21.		
						253	" 20.	19th.	" 23.		
						254	" 21.	20th.	" 23.		

Of the 265 cases occurring at Dewsbury, six were inmates of the workhouse, one was a nurse at the infirmary, who had contracted small-pox from a man admitted when suffering from the early symptoms of the disease, and the rest, 258 in number, came from 159 houses.

Twenty-nine of these households were not seen from various causes; they contained 41 cases; viz. :—

19 houses having each 1 case, or 19 in all.
 8 „ „ 2 cases, or 16 „
 2 „ „ 3 „ 6 „

Particulars were obtained from personal visits to 130 households of the 716 inmates they furnished. The distribution of cases of small-pox amongst these households was as follows :—

TABLE LVIII.

Number of Houses.	Number of inmates to each House.	Number of Cases.								Total.	
		1.	2.	3.	4.	5.	6.	7.	8.	In-mates.	Cases.
2	11	1	1							22	3
4	10	2			1				1	40	14
5	9	1	3	1						45	10
13	8	5	1	5	1				1	104	33
17	7	8	4	2	1	1	1			119	37
20	6	12	3	4	1					120	34
20	5	10	2	1	1					109	37
25	4	20	3	2						109	32
18	3	16	2							54	20
6	2	5	1							12	7
130		86	20	15	5	1	1	1	1	716	217

The relative proportions of the numbers attacked with small-pox and those occupying the same house may be summarised in the two series of single and multiple (that is, two or more) cases of the disease.

Thus the proportions were in—

—	Single Cases.	Multiple.
Households of 11 members.	50 per cent.	50 per cent.
„ 10 „	50 „	50 „
„ 9 „	20 „	80 „
„ 8 „	38.5 „	61.5 „
„ 7 „	47 „	53 „
„ 6 „	60 „	40 „
„ 5 „	80 „	20 „
„ 4 „	80 „	20 „
„ 3 „	88.8 „	11.1 „
„ 2 „	83.3 „	16.6 „

With due allowance for the very small numbers this list shows an almost regular rise in the relative proportion of multiple cases with the increase in the number of inmates of the infected households.

Another line of comparison between the members of the invaded community and those of them who were attacked with small-pox may be made as regards the ages and occupations of each group, in order to ascertain whether there was a disproportionate incidence at any age-period, or in any of the three main "occupation-series."

With respect to age, the first of the two following tables gives in an extended form the figures which are condensed in the second of them.

—	Inmates.	Cases.	Per-centage of Cases at Age-Periods.
Under 1 year	9	4	44.4 (Under 1 year.)
1 to 5 years	59	20	
5 to 10 „	108	37	
	167	57	34.1 (1 to 10 years.)
10 to 15 years	94	23	
15-20 „	101	44	
20-30 „	101	37	
	296	104	35.1 (10-30 years.)
30-40 years	81	31	
40-50 „	88	15	
50-60 „	47	3	
60-70 „	21	2	
70 and over	5	1	
	242	82	21.5 (30 years & over.)
Age not ascertained	2	—	
	716	217	30.3 (All ages.)

And stated in per-centages of the total numbers the comparisons between those exposed to infection and those attacked at the different age-periods is—

—	Inmates.	Cases.
Under 1 Year	1.2 per cent.	1.8 per cent.
1 to 10 years	23.3 „	26.2 „
10 to 30 years	41.3 „	47.9 „
30 years and upwards	33.8 „	24.0 „

Occupation.—A comparison may also be made between the three classes of occupations in which the patients and their relatives may be grouped, and for this purpose the accompanying Chart (XIII.) has been drawn to indicate the class into which each member of an infected household falls.

TABLE LIX.

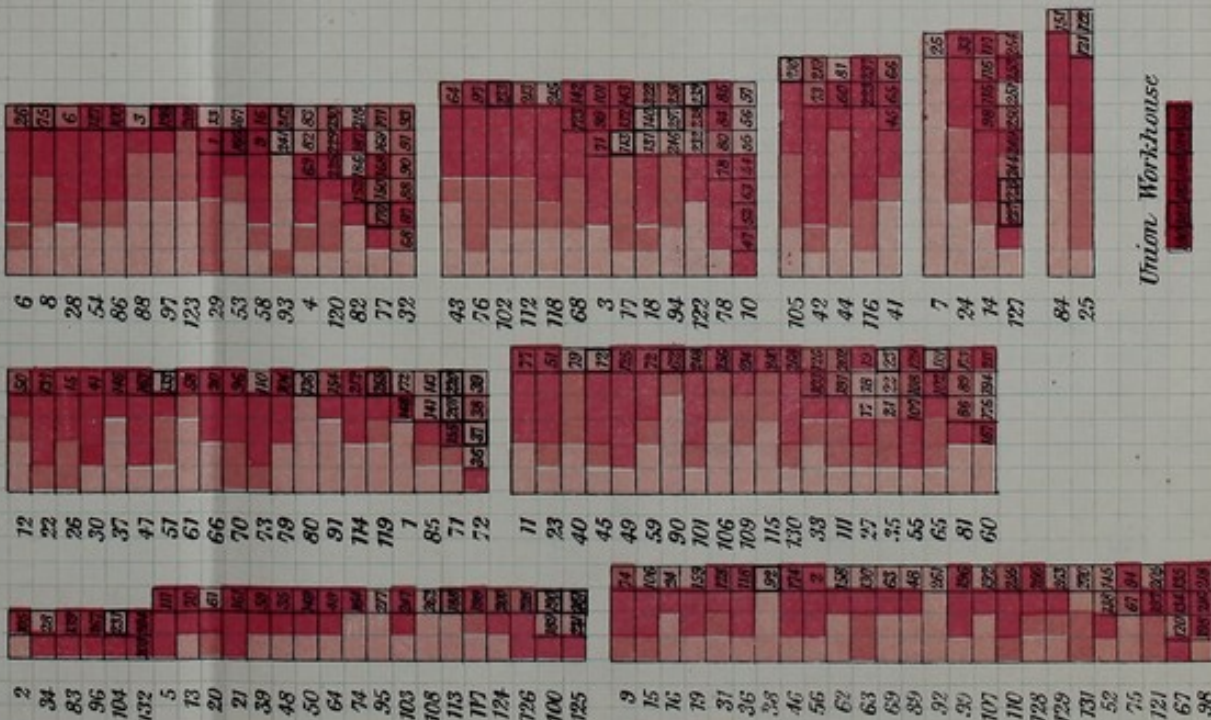
Occupations of Members of Infected Households.

Reference to House.	Register.	All Inmates.			Attacked with Small-pox.*		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
Back Lawson Street	2	1		1			105
Thornhill Road	34	1		1	28		
Denton's Yard, George Street.	83			2			139
Lacey Street, Boothroyd Lane.	96			2			267
Whitely Street	104	1		1	231		
Back Lawson Street	132			2			205-204
Back Cliffe Street	5			3			111
Kensington Street	13	1		2			70
Thornhill Road	20	1	1	1	61		
Thornhill Road	21			3			161
Thornhill Road	39	1		2			59
School Lane	48	1		2			36
Scout Hill	50	1		2			149

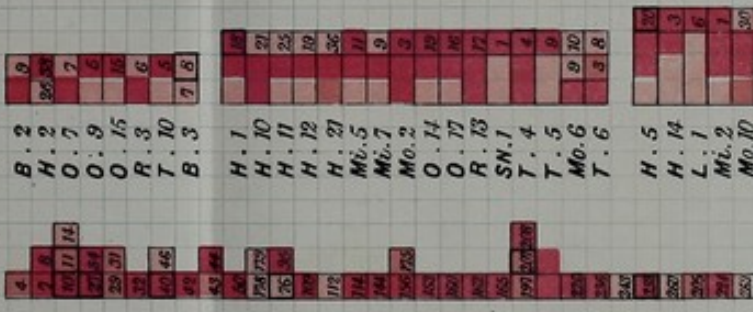
* The numerals refer to Case Register.

DEWSBURY.

Cases & Inmates in Houses visited.



Cases in Houses not visited.



OTHER DISTRICTS.

Cases & Inmates in Houses visited.



Cases in Houses not visited.



HOUSEHOLDS AND THEIR MEMBERS WITH RESPECT TO THEIR OCCUPATIONS.

- a. Home occupation.
- b. Attending School.
- c. Employed in daily work away from home.
- Inmates of Union Workhouse.



Reference to House.	Register.	All Inmates.			Attacked with Small-pox.		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
Middle Street	24	3	3	4			33
Kensington Street	14	2	2	6		116	98, 115, 117
Caxton Square	127	2	5	3	251	227, 235, 254, 250, 254	249, 253
Boothroyd Lane	84	5	2	4			151
Manor Road	25	3	4	4	121, 122		
<i>Summary.</i>							
130 Houses visited		267	159	290	72	48	97
19 Houses not visited.		See appended list.			8	9	24
					80	57	121
Infirmary					1		
Workhouse		Not in list. 6 cases.					

The following is a list of the infected houses which were not visited, so that the particulars are limited to those of the inmates who were attacked with small-pox:—

	At Home.	At School.	At Work.
Whitley Street		4	
Boothroyd Lane			7, 8
Scout Hill Road	14	11	10
Leeds Road			27, 34
Dewsbury Moor		29, 31	
Commercial Street			32
Hockmondwike Road	46		40
Horsfield Street, Batley Carr			42
Back Leatham Street		43	44
Newlands			50
— Lane	178, 179		
Fall Lane	76		95
Bradford Road			109
The Infirmary	112		
Kilm Road			114
G—L—Inn			144
Middle Road		175	156
George Street			153
George Street			160
Dewsbury Moor			162
South Woodbine Street			165
Asylum Road		197, 207	208
Whitworth Road		205	
Back Whitley Street			224
Bradford Road			226
Thornton Street			236
Burgh Mill Farm	243		
Tweedale Street			252
Back Fearnley Street	260		
High Street	260		

Explanation of Chart XIII. :—
 In this chart, as in Chart VII., an attempt is made to represent graphically the occupation of the inmates of houses, of which particulars were obtained. It contains in all 277 houses, viz., 129 in Dewsbury and 147 in other districts (excluding Batley) of the Union.
 As in Charts IV., VI., and VII., the population is divided into three groups: (1) those at home; (2) those attending school; and (3) those engaged in daily work away from home.
 The houses are arranged in consecutive series, according to the number of their inmates, and the numerals prefixed to them indicate the reference to the "House Register" compiled in the inquiry. The figures printed upon the square areas (each of which denotes one individual) are those of the "Case List" of small-pox cases.
 The "Other districts" comprise:—
 Birstal (B), Hockmondwike (H), Liversedge (L), Mirfield (M), Morley (Mo), Ossett (O), Erenssthorpe (R), Southill Nether (SN), Southill Upper (SU), Thornhill (T).
 The details are to be found in Tables LIX. and LXXVI.
 N.B.—The fatal cases are denoted by a thick-lined border.

Thus:—
 Of the 716 persons inhabiting 130 houses invaded by small-pox there were—
 267 living at home or engaged in home occupations.
 159 attending school.
 290 engaged in daily work away from home.

The number of cases of small-pox in these houses comprised—
 72 living at home, or about 27 per cent.
 48 attending school, or about 30 per cent.
 97 engaged in outside work, or about 33 per cent.

The same numbers analysed according to the size of the households give:—

TABLE LX.

Number of Inmates per House.	Number of Houses.	Total Inmates.			Total Cases.		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
11	2	8	6	8	2		1
10	4	17	10	13	2	6	6
9	5	10	14	21	1	3	6
8	13	34	25	45	12	6	15
7	17	41	35	43	9	14	14
6	20	44	32	44	10	9	15
5	29	42	17	41	11	4	12
4	25	45	15	40	16	3	13
3	18	23	5	26	7	3	10
2	6	3		9	2		5
	130	267	159	290	72	48	97

It is a question of some interest to determine whether any difference existed in the class of persons primarily attacked with small-pox in a family and those who were subsequently (and for the most part secondarily) attacked. In an industrial community such as this, the chances of infection at the places of work might, one would think, lead to a greater proportion of those primarily attacked being engaged in work away from home. Such individuals might introduce the disease into their families, and therefore the divergence between the classes might not be so great amongst the later occurring cases than amongst the "initial" ones. Similarly the influence of schools as centres of infection might *a priori* find expression in a greater morbidity among this class of "initial" cases, than among the later cases. It will be seen, however, from the analysis given below that although the proclivity to attack was about equal in those remaining "at home" and those attending "school," the relative incidence was much less in the latter class.

SINGLE CASES IN HOUSE.

Occupation.	All Inmates.		Attacked and sent to Hospital.	Not Attacked.
	Attacked and kept at Home.	Not Attacked.		
86 houses visited:				
At home	1	6	24	132
At school	—	2	14	65
At work	2	3	45	132
29 houses not visited:				
At home	—	—	4	
At school	—	—	2	
At work	—	—	14	

MULTIPLE CASES IN HOUSES.

Occupation.	Attacked, and kept at Home.		Not attacked.	Attacked and sent to Hospital.		Not attacked.
	Initial.	Later.		Initial.	Later.	
At home	—	—	—	21	26	57
At school	—	—	—	13	21	44
At work	—	—	—	24	26	58
At home	1	1	—	1	2	
At school	—	—	—	5	2	
At work	—	—	—	4	4	

From this summary one may calculate the "attacks rates" among those households of which particulars were obtained:—

Occupation.	Cases kept at Home.		Cases sent to Hospital.	
	Single.	Multiple (exclusive of Initial Cases.)	Single.	Multiple (exclusive of Initial Cases.)
At home	Per cent. 14.2	—	Per cent. 15.3	Per cent. 31.4
At school	—	—	17.7	32.3
At work	40.0	—	25.4	50.9

From which it appears that a greater proportion of those engaged "at work" suffered primarily, but that the proclivity was about equal in all three classes among those attacked subsequent to the introduction of the disease into the household.

Lastly, the relative proportion of each class of all attacked shows a marked preponderance of the "workers" in those where only single cases occurred in a house, thus:—

—	Single Cases.	Multiple (Initial).	Multiple (Later).
At home	Per cent. 29 cases or 27.3	Per cent. 23 cases or 33.3	Per cent. 29 cases or 35.3
At school	16 " 15.1	18 " 26.1	23 " 28.
At work	61 " 57.5	28 " 40.5	30 " 36.6

Of the 265 patients at Dewsbury there were—

- (A.) Vaccinated - - - 135, of whom 5 died.
 (B.) Alleged to have been vaccinated but presenting no marks - 6 " 1 "
 (C.) Undergoing primary vaccination when attacked with small-pox - - - 5 " 1 "
 (D.) Unvaccinated - - - 119 " 32 "

The mortality in each of these classes was therefore—

- A. Vaccinated - - - 3.7 per cent.
 B. Alleged vaccination - 16.6 "
 C. Under vaccination - 20 "
 D. Unvaccinated - - - 26.9 "

In the accompanying table and diagram (Chart XIV.) the incidence of these respective classes of subjects are illustrated; and it will be seen that they maintained fairly the same proportions to one another throughout the epidemic. (See also Chart X.)

TABLE LXI.

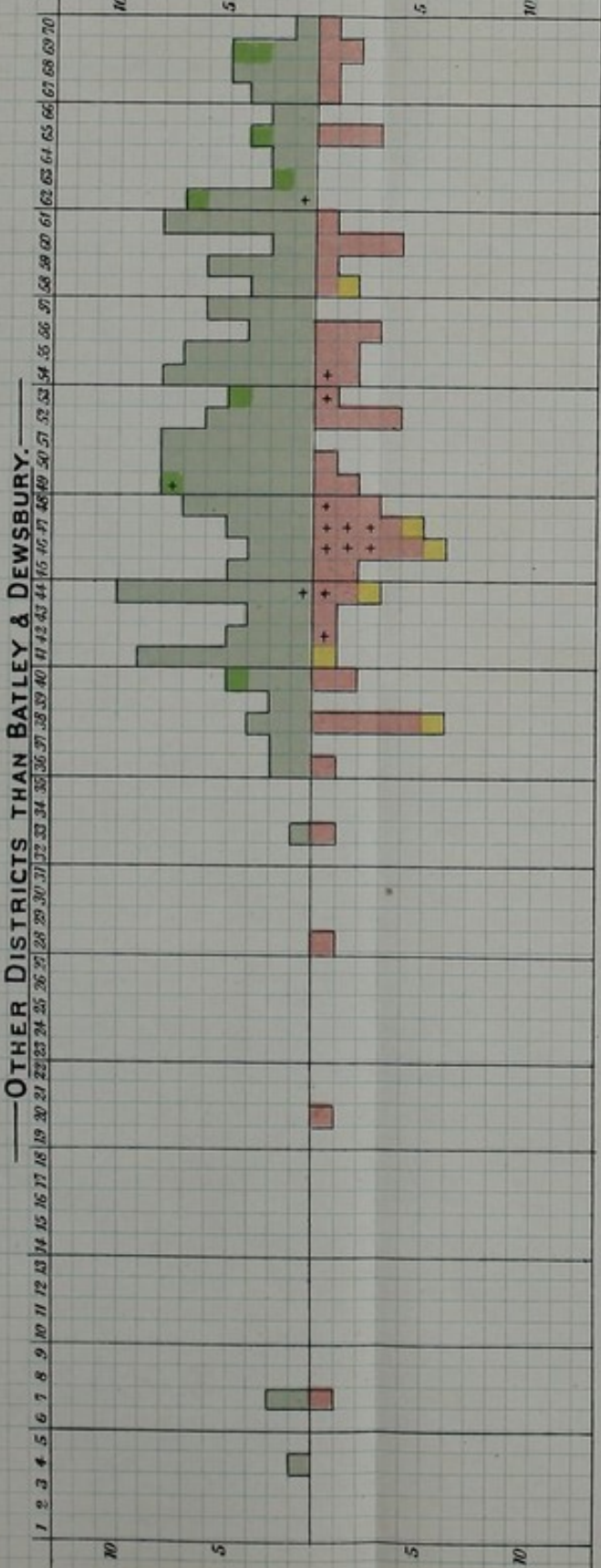
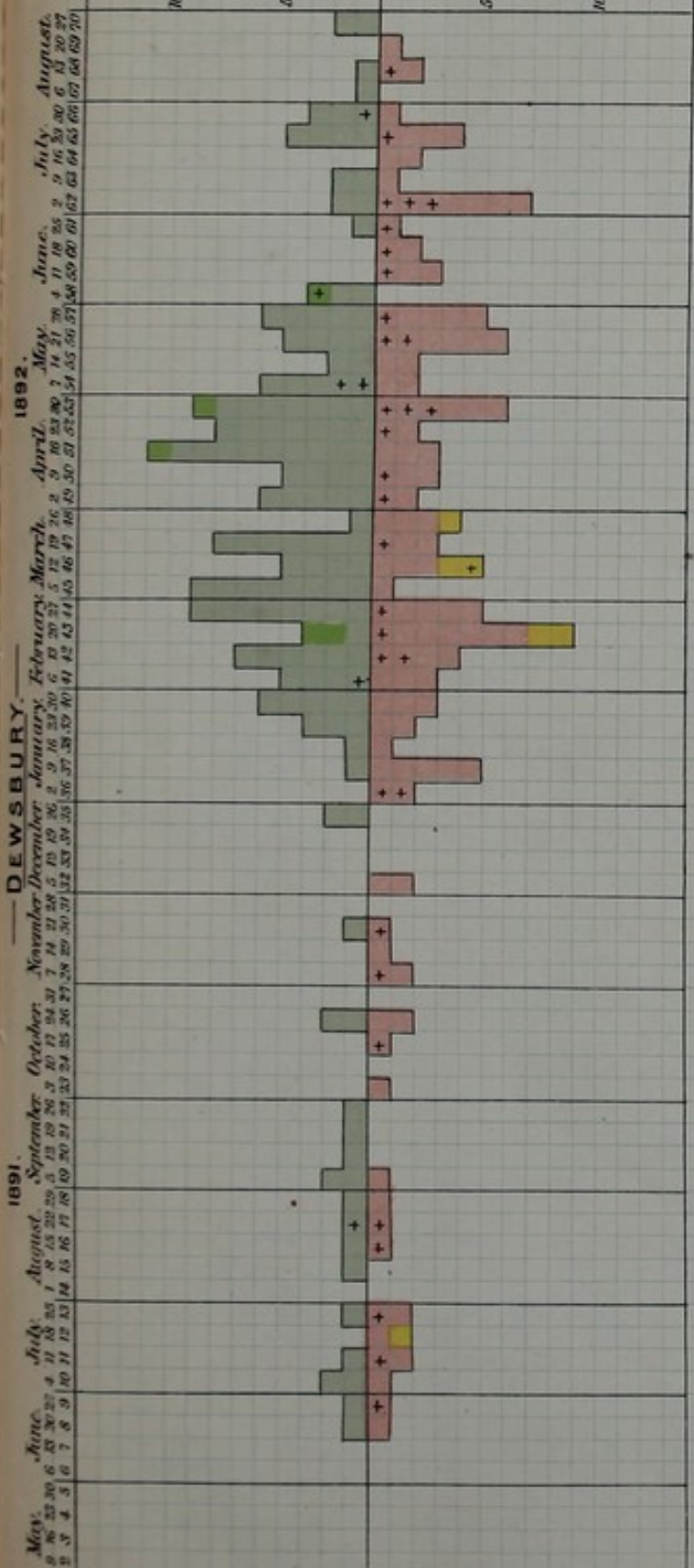
DEWSBURY.—SMALL-POX, 1891-92.

Weekly Distribution of Cases according to Vaccination—Relations (Chart XIV.*).

No. of Week of Out-break.	Vaccinated.		"Alleged" Vaccination.		"Under" Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	C.	D.
viii.	1						1		2	
ix.	1						1	1	2	1
x.	2						1		3	
xi.	1						2	1	3	1
xii.			1				1		2	
xiii.	1						2	1	3	1
xiv.	—									
xv.	1								1	
xvi.	1						1	1	2	1
xvii.	1	1					1	1	2	2
xviii.	1						1		2	
xix.	2						1		3	
xx.	1								1	
xxi.	1								1	
xxii.	1								1	
xxiii.	—						1		1	
xxiv.	—									
xxv.	—						1	1	1	1
xxvi.	2						2		4	
xxvii.	—									
xxviii.	—						2	1	2	1
xxix.	—						1		1	
xxx.	1						1	1	2	1
xxxi.	—									
xxxii.	—						2		2	
...								
xxxv.	2								2	
xxxvi.	—						2	2	2	2
xxxvii.	1						5		6	
xxxviii.	1						1		2	
xxxix.	3						2		5	
xl.	5						3		8	
xli.	4	1					3		7	1
xlii.	6						4	2	10	2
xliii.	1		2		2		7	1	12	1
xliv.	8						5	1	13	1
xlv.	8						1		9	
xlvi.	4		2	1			3		9	1
xlvii.	7						3	1	10	1
xlviii.	1		1				3		5	
xlix.	5						2	1	7	1
l.	4						3	1	7	1
li.	9				1		3		13	
lii.	7						2	1	9	1
liii.	7				1		6	3	14	3
liv.	5	2					2		7	2
lv.	2						2		4	
lvi.	4						6	2	10	2
lvii.	5						5	1	10	1

* Explanation of Chart XIV. :—

This Chart is drawn on the same principle as Chart IX., and represents the weekly incidence of small-pox in Dewsbury, and also in the other districts (both Batley and Dewsbury) which were invaded; the condition of each of the patients as regards vaccination is indicated as in that and other Charts.



- a. Vaccinated.
- b. Under Vaccination.
- c. Alleged Vaccination.
- d. Unvaccinated.

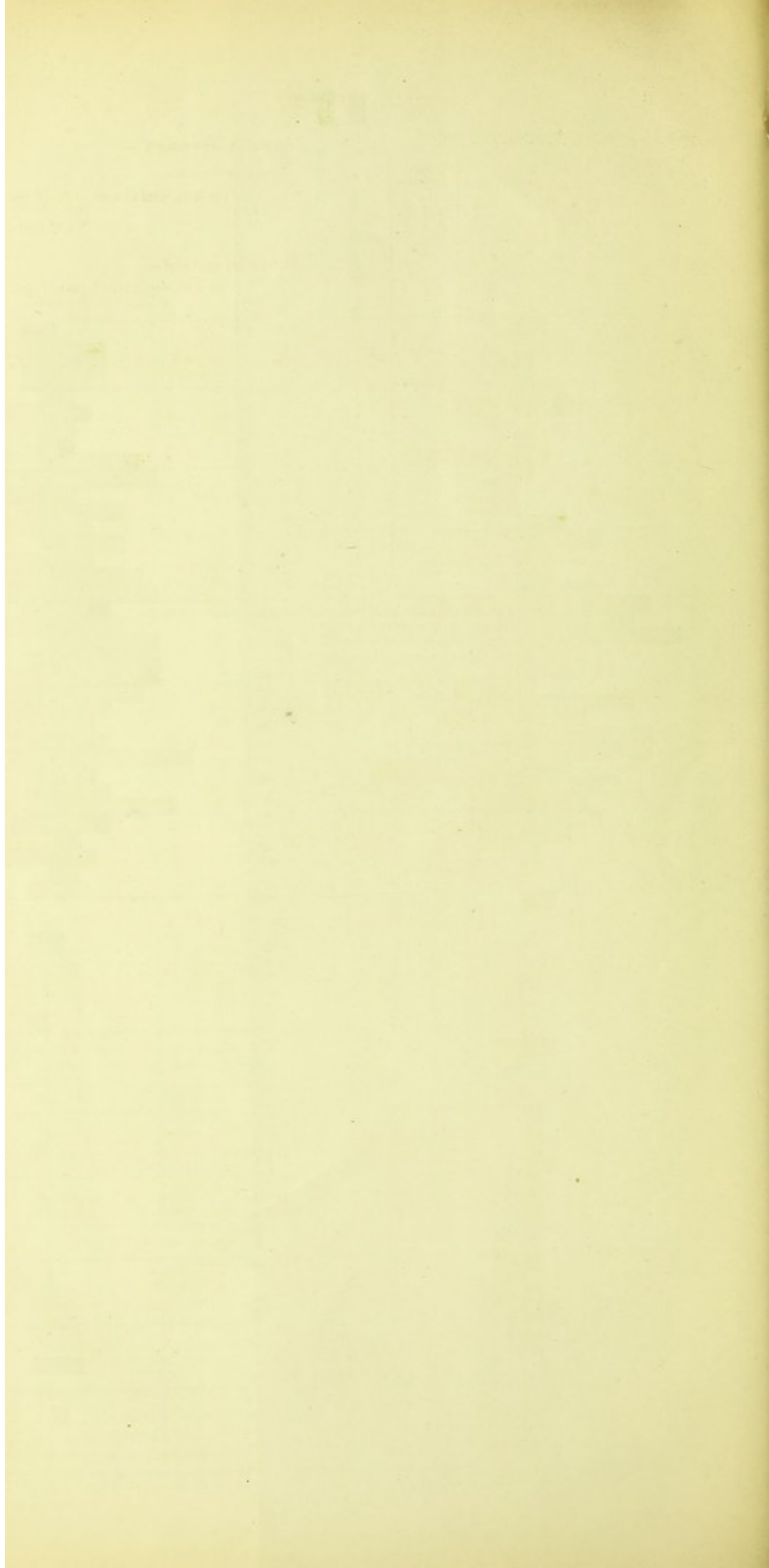


Table LXI—continued.

No. of Week of Outbreak.	Vaccinated.		"Alleged" Vaccination.		"Under" Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	C.	D.
lviii.	2				1	1			3	1
lix.							3	1	3	1
lx.							2	1	2	1
lxi.	1						1	1	2	1
lxii.	2						7	3	9	3
lxiii.	2						1		3	
lxiv.							2		2	
lxv.	4						4	1	8	1
lxvi.	3	1					1		4	1
lxvii.	1								1	
lxviii.	1						2	1	3	1
lix.							1		1	
lxx.	2								2	
	135	5	6	1	5	1	119	32	265	39

On examining the relation between the state as to vaccination and the ages of the subjects, it is seen that about one half of the unvaccinated class were under the age of 10 years, and about $\frac{3}{4}$ ths under 15 years. The following is a detailed statement :—

TABLE LXII.

	Vaccinated.		Alleged Vaccination.		Under Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year -					2	1	4	3	6	4
1 to 5 -	2				2		17	8	21	8
5 .. 10 -	3				1		36	8	40	8
10 .. 15 -	10		1				18	1	29	1
15 .. 20 -	26		4				21	1	51	1
20 .. 30 -	39	1					16	7	55	8
30 .. 40 -	31	3					3	1	34	4
40 .. 50 -	14	1	1	1			4	3	19	5
50 .. 60 -	4								4	
60 .. 70 -	2								2	
70 and over -	1								1	
Age not ascertained -	3								3	
Total -	135	5	6	1	5	1	119	32	265	39

which may be grouped in age-periods as—

	Under 1 year.		1 to 10 years.		10 to 20 years.		30 and over.		Age not ascertained.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Vaccinated -			5	—	75	1	52	4	3	—
Alleged vaccination.					5	—	1	1		
Under vaccination.	2	1	3	—						
Unvaccinated -	4	3	53	16	45	9	7	4		
Total -	6	4	61	16	135	10	60	9	3	—

or stated in per-centages :—

Of the vaccinated—

3.7 per cent. were at ages 1 to 10 years.
55.5 " " " 10 " 30 "
38.5 " " " 30 and over.

Of the unvaccinated—

3.3 per cent. were under 1 year of age.
44.5 " " at ages 1 to 10 years.
46.2 " " " 10 " 30 "
5.9 " " " 30 years and upwards.

On the other hand, at the age-period of—

Under 1 year - - None were vaccinated. 66.6 per cent. unvaccinated.
1 to 10 years - - 8.3 per cent. were vaccinated. 86.9 per cent. unvaccinated.
10 " 30 " - - 55.1 per cent. were vaccinated. 40.7 per cent. unvaccinated.
30 and upwards - - 86.6 per cent. were vaccinated. 11.6 per cent. unvaccinated.

Turning now to consider the question of vaccination in relation, not merely to the mortality from small-pox, but to the type of the attacks, the cases may be divided in the following manner (see Chart XI.) :—

TABLE LXIII.

	Confluent.	Coherent.	Discrete.	Mild.	Type undetermined.
Vaccinated -	19	11	40	63	2
Alleged vaccination.	3	1	1	1	
Under vaccination	2	1		1	1
Unvaccinated -	81	19	17	2	

or, in other words, at all ages—

- (a.) Among the vaccinated: 13.3 per cent. had confluent small-pox; 8.1 per cent. coherent; 29.6 per cent. discrete; 46.6 per cent. mild.
- (b.) Among the unvaccinated: 68 per cent. had confluent small-pox; 16 per cent. coherent; 14.3 per cent. discrete; 1.6 per cent. mild;

and conversely—

- (a.) Of confluent cases: 18 per cent. were vaccinated; 77 per cent. were unvaccinated.
- (b.) Of coherent cases: 34.4 per cent. were vaccinated; 59.4 per cent. were unvaccinated.
- (c.) Of discrete cases: 69 per cent. were vaccinated; 29.3 per cent. were unvaccinated.
- (d.) Of mild cases: 94 per cent. were vaccinated; 3 per cent. were unvaccinated.

It remains to contrast the condition *quâ* vaccination of the occupants of houses invaded with small-pox with that of those attacked with the disease.

At all ages there were of 716 inmates (of 130 houses)—
496 vaccinated, or 69.2 per cent.,
14 "alleged" vaccinated,
11 "under" vaccination,
168 unvaccinated, or 23.4 per cent.,

and in 27 instances no information was obtainable, whilst of the same households, amongst the 217 cases of small-pox—

113 were vaccinated, or 52 per cent.
5 "alleged" vaccinated.
5 "under" vaccination.
94 unvaccinated, or 43.3 per cent.

At each age-period the numbers of each class are :—

	Vac- cinated.	Alleged Vaccina- tion.	"Under" Vaccina- tion.	Unvac- cinated.	No In- forma- tion.
<i>4½ under one year :</i>					
Inmates - - -	2	—	2	5	—
Cases - - -	—	—	2	2	—
<i>1 to 10 years :</i>					
Inmates - - -	75	2	9	82	—
Cases - - -	5	—	3	40	—
<i>10 to 30 years :</i>					
Inmates - - -	213	5	—	70	8
Cases - - -	61	4	—	39	—
<i>30 years and over :</i>					
Inmates - - -	207	7	—	11	17
Cases - - -	47	1	—	4	—
<i>Age not ascertained :</i>					
Inmates - - -	—	—	—	—	2

Assuming that these individuals were equally exposed to the chances of infection, a postulate which has of course no basis in fact, these figures show—

- 1st. That of the vaccinated class, the proclivity to the disease was :—1 : 14·8 of the exposed between 1 and 10 years of age ; 1 : 3·5 between 10 and 30 ; and 1 : 4·4 over 30 years.
- 2nd. That of the unvaccinated class the proclivity was 1 : 1·7 between 1 and 10 years ; 1 : 1·8 between 10 and 30 years ; and 1 : 2·7 at 30 years and over.
- 3rd. As regards the classes of "alleged" and "under" vaccination, it may be remarked that 1 in 3 of the former and 1 in 1·8 of the latter contracted the disease.
- 4th. The number of infants below one year of age is too small to make any useful deduction. The two vaccinated children in infected houses escaped the disease, and so did three out of five of the unvaccinated. Two others were unvaccinated, but were vaccinated whilst incubating small-pox ; one of them, a new-born infant (No. 264), died.

Previous attack of small-pox.—The foregoing considerations require to be modified in view of the previous occurrence of small-pox in some of the individuals concerned.

The number thus protected amounts to 26, only four of whom were under 30 years of age. Of them, 17 belonged to the vaccinated class ; and five to the unvaccinated, in one vaccination was alleged, but had left no evidence, and in three no information as to vaccination could be obtained. The only striking difference arising from subtracting those cases is in respect to the "unvaccinated" class at 30 years and over ; for of the 11 inmates 3 had had small-pox, raising the proclivity from 1 in 2·7 to 1 in 2.

The full data upon which the preceding calculations have been made are to be found in the annexed table and Chart XV.

TABLE LXIV.

TABLE giving VACCINATION DATA of the members of Infected Households and those attacked with Small-pox (Chart XV*).

Reference to House List.	All Inmates.					Attacked with Small-pox.			
	Vaccinated.	No information as to Vaccination.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.
2	1				1				166
34	1	1				28			
85	2					139			
96	2					207			
104	1				1				231
122	1				1	204			203
5	2								111
13	2				1	70			
20	2					61			
21	2					1			161
20	1					2			50
48	3					35			
50	3					149			
64		1				2			40
74	3					164			
95	3					217			
103	1					2			547
100	3					202			
111	2				1				188
117	3					199			
124	1	1				1			200
126	3					228			
100	2				1	139			190
155	2			1		221	264		
9	2					2			74
15	3					1			105
16	4					74			
19	4					109			
31	2					2			128
36	2	1				1			318
38	2				1	1			92
46	3				1	174			
66	3					1	2		
62	2					2			158
63	4								130
60	3					1			63
80	4								48
92	4								261
90	2					2			196
107	2					2			192
110		1				3			255
128		3				1			266
129	3					1			263
131	4								270

* Explanation of Chart XV. :—

This Chart is drawn up on precisely the same plan as Chart X., and represents each of the 277 houses in Dewsbury and other districts (exclusive of Batley) concerning whose inmates particulars were obtained.

The Chart is coloured to show the vaccination conditions of each inmate, and the tints employed are the same as those in Chart IX. A previous attack of small-pox is denoted by the sign © in the case of those who did not suffer in this outbreak. In two cases the attack was said to have been the second one experienced by the patient, viz., M. 4 (case 4), and L. 2 (case 19).

CHART SHEWING CONDITION AS TO VACCINATION OF CASES OF SMALL POX & OF INMATES OF INVADDED HOUSES IN DEWSBURY.

Chart XV.



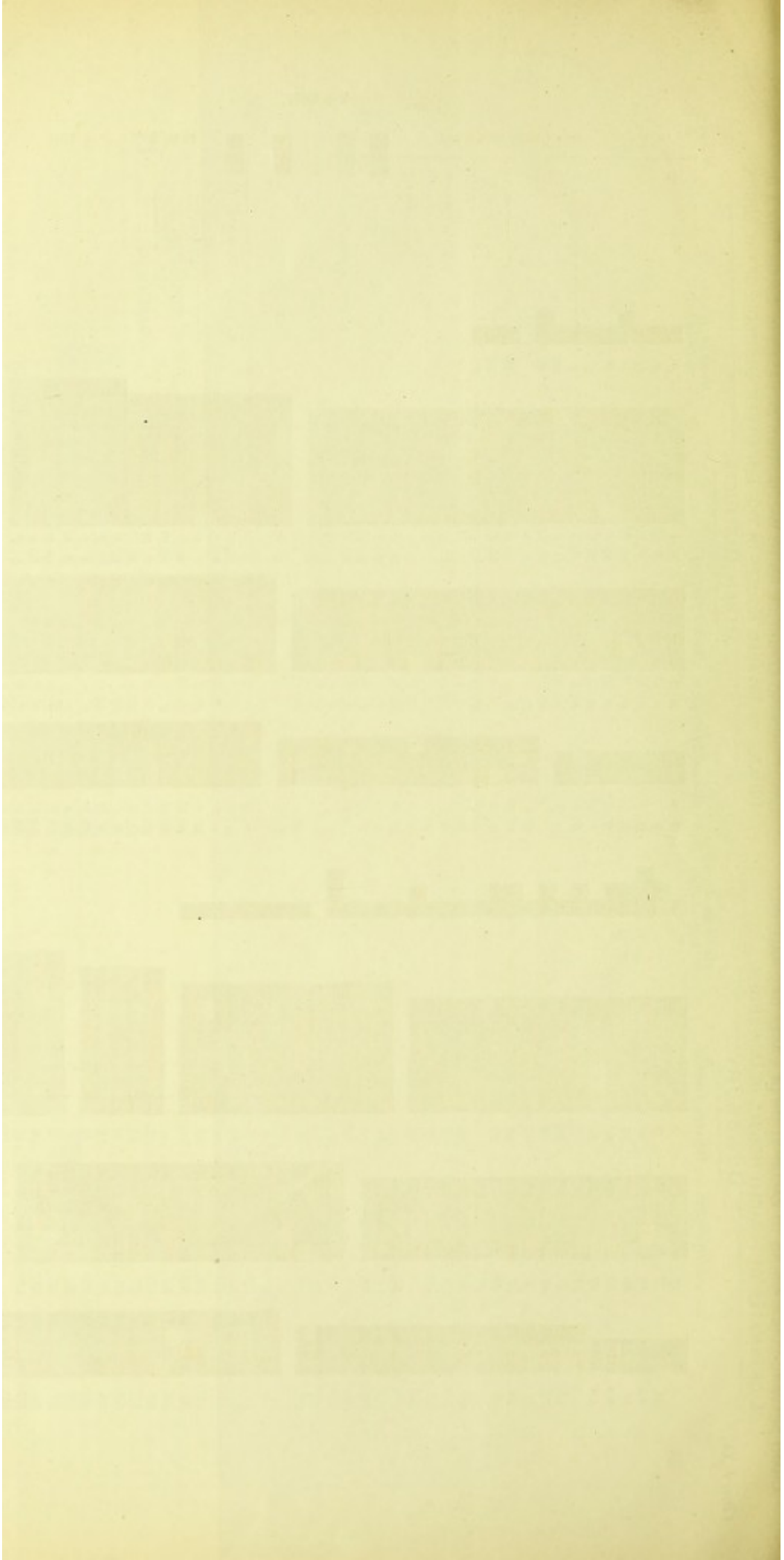


Table LXIV—continued.

Reference to House List.	All Inmates.					Attacked with Small-pox.			
	Vaccinated.	No information as to Vaccination.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.
53	3		1			138	145		
75	3				1	94		67	
121	4					195, 205			
67	4					120, 134, 135			
95	4					198, 216, 218			
12	4				1			39	
22	3	2				157			
36	1			1	3			15	
39	3	1			1			41	
37	3			1	1	146			
47	4			1		163			
51	4				1			133	
61	4				1	58			
65	4	1				20			
70	3				2	96			
73	5					110			
79	4	1				104			
80	4				1			136	
91	2				3			154	
114	5					212			
119	2	1			2			265	
1	1				4	143			
85	5					141, 147			
71	4				1	155, 201		220	
72	2				3	36, 39		37, 38	
11	1	3		2			77		
23	4	1			1			51	
43	5			1		79			
45	2				4			12	
49	4				2			125	
59	6					72			
90	6					62			
101	5				1			245	
105	5				1	256			
109	6					214			
115	4				2	240			
130	3	2			1			268	
33	6					103, 126			
111	4				2			100, 202	
27	5				1	17, 19		18	
35	4				2	22		21, 23	
55	3				3			107, 108, 129	
65	3	1			2	162		119	
81	1		1		4		86, 89, 173		
69	3		3			157, 194, 211	176		
6	6				1			26	
8	6				1			75	
25	5				2			6	
54	7					127			
86	7					160			
88	4		3			3			
97	6				1	195			
123	2				5			209	
29	3				4	13		1	

Table LXIV—continued.

Reference to House List.	All Inmates.					Attacked with Small-pox.			
	Vaccinated.	No information as to Vaccination.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	"Under" Vaccination.	Alleged Vaccination.	Unvaccinated.
53	5					2	167		166
58	7						9, 16		
93	6					2			241, 242
4	5		2				69	82, 83	
120	5					2	225		229, 230, 240
82	4					3	102, 156, 187		
77	4					3	168, 171		150, 169, 170
32	2					5	57		58, 59, 80, 91, 93
43	7					1	64		
76	8						97		
102	7					1			233
112	5					3			212
118	8						245		215
68	2					6			123, 145
3	8						71, 99, 101, 143		
17	6				2			113, 122	
18	2	1				5			131, 130, 232
94	8						246, 257, 258		
122	5					3			232, 238, 239
78	5				1	2	78, 80	84	85
10	6					2	47, 52, 53, 54, 55		56, 57
105	2					7			210
42	6	1				2			73, 219
44	7					2	60		81
116	8					1	223		237
41	3	1				5			45, 95, 66
7	5	3				2			25
24	7					1			35
14	10						98, 115, 116, 117		227, 235, 244, 249, 250, 251
127	4					6	253, 254		
84	10					1	151		
25	10					1	121, 122		
Summary.									
130 Houses	406	27	11	14	168	115	5	5	94
29 Houses not visited (see appended list)						19		1	22
Workhouse inmates (not in list)						3			3
						135	5	6	119

SUPPLEMENTAL LIST, giving Vaccination Data of those attacked with Small-pox in houses of which no further particulars were obtained.

Vaccinated.	"Under Vaccination."	Alleged Vaccination.	Unvaccinated.	—
			4	Whitley Street.
8		7		Boothroyd Lane.
14			10, 11	Scout Hill Road.
34			27	Leeds Road.
			29, 31	Dewsbury Moor.
			32	Commercial Street.
46			40	Heckmondwike Road.
			42	Horsfield Street.
4			43	Back Leatham Street.
			50	Newlands
178 179				— Lane.
95			76	Fall Lane.
			109	Bradford Road.
112				The Infirmary.
114				Kiln Road.
144				G—L—Inn.
156			175	Middle Road.
			153	George Street.
160				George Street.
162				Dewsbury Moor.
165				South Woodbine Street.
			97, 207,	Asylum Road.
			208	Whitworth Road.
			206	
			224	Back Whitley Street.
216				Bradford Road.
236				Thornton Street.
243				Burgh Mill Farm.
			252	Tyndale Street.
			260	Back Fearnley Street.
269				High Street.

The question as to how far the vaccination conditions of the members of a family influenced the occurrence of multiple cases in a household may be studied from the lists previously given, and the facts arising therefrom may be summarised as follows :—

GROUP A.—CASES REMOVED TO HOSPITAL.

(a.)—Households having a single case (83 in number).

—	Numbers Attacked.	Numbers not Attacked.
Vaccinated	46	243*
Re-vaccinated at the time	—	10†
Had small-pox previously	—	11
Under vaccination	0	3
Alleged vaccination	2	8
Had small-pox previously	—	1
No information on vaccination	0	23
Had small-pox previously	—	3
Unvaccinated	35	62
Had small-pox previously	—	3
	83	329
Re-vaccinated		10
Previous small-pox		18

* 1 "inoculated."

† And 3 re-vaccinated some years before.

(b.)—Households having multiple cases (44 houses).

—	Attacked.		Not Attacked.
	Initial Case.	Later Case.	
Vaccinated	28	36	130*
Re-vaccinated	—	—	6
Had small-pox previously	—	—	6
Under vaccination	3	2	3
Alleged vaccination	2	1	0
No information on vaccination	0	0	4
Unvaccinated	25	34	22
Had small-pox previously	—	—	2
	58	73	159
Re-vaccinated	—	—	6
Had small-pox previously	—	—	8

* 6 "inoculated."

GROUP B.—CASES TREATED AT HOME.

Single cases in households.

—	Attacked.	Not Attacked.
Vaccinated	3	10*
Re-vaccinated	—	4
Alleged vaccination	0	1
	3	11
Re-vaccinated	—	4

* 2 "inoculated."

And in the only instance of a family where more than one case of small-pox occurred and not removed to hospital, both the "initial" and the "later" cases (178 and 179) were vaccinated. Particulars of those in this house who were not attacked are wanting.

From these figures one may calculate the "attack-rates" amongst the vaccinated and unvaccinated classes respectively :—

- (a.) Of small-pox in families having a single case ;
 (b.) Of the cases arising in families subsequent to removal of the initial cases.

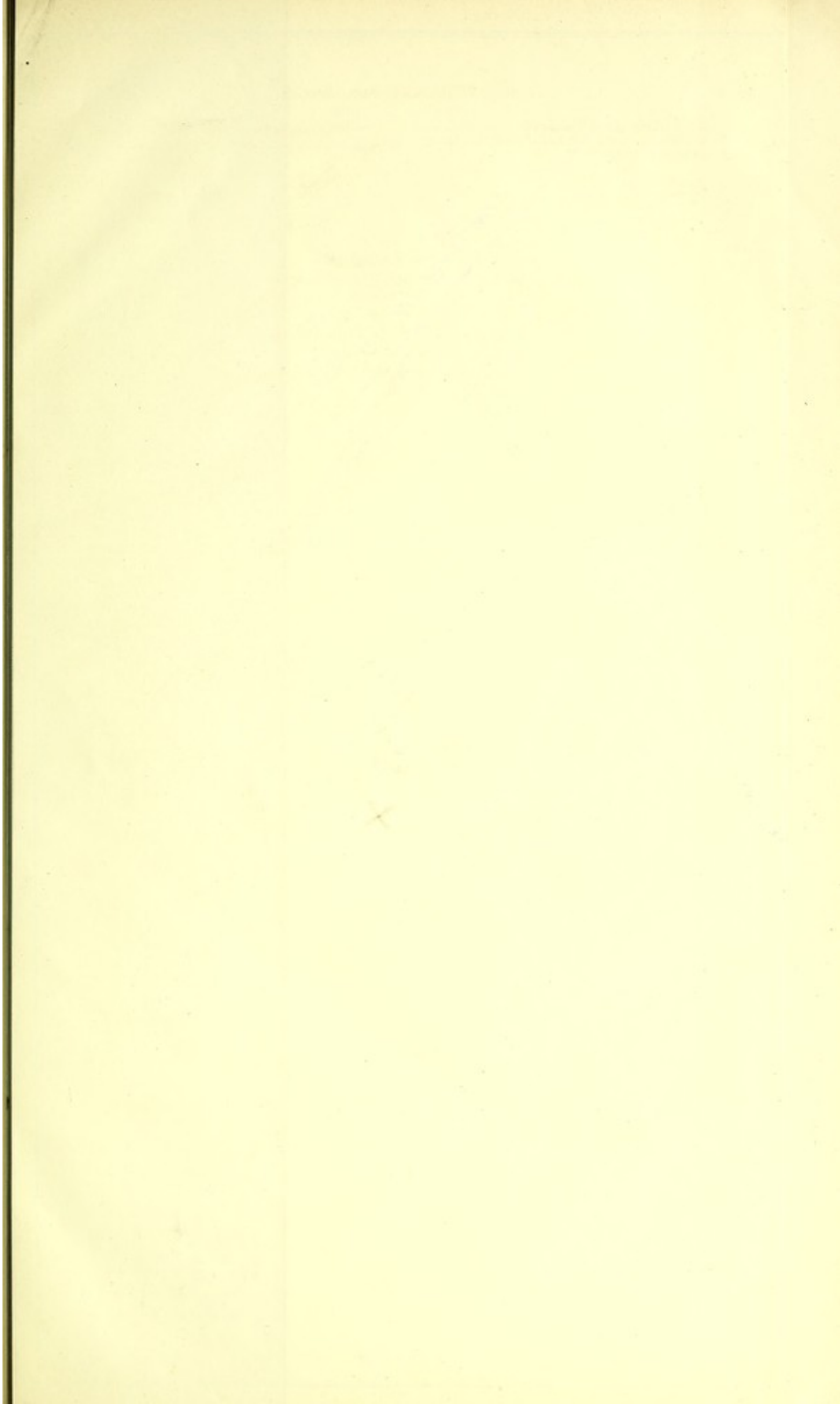
Attack Rates.

(a.) Of single cases.

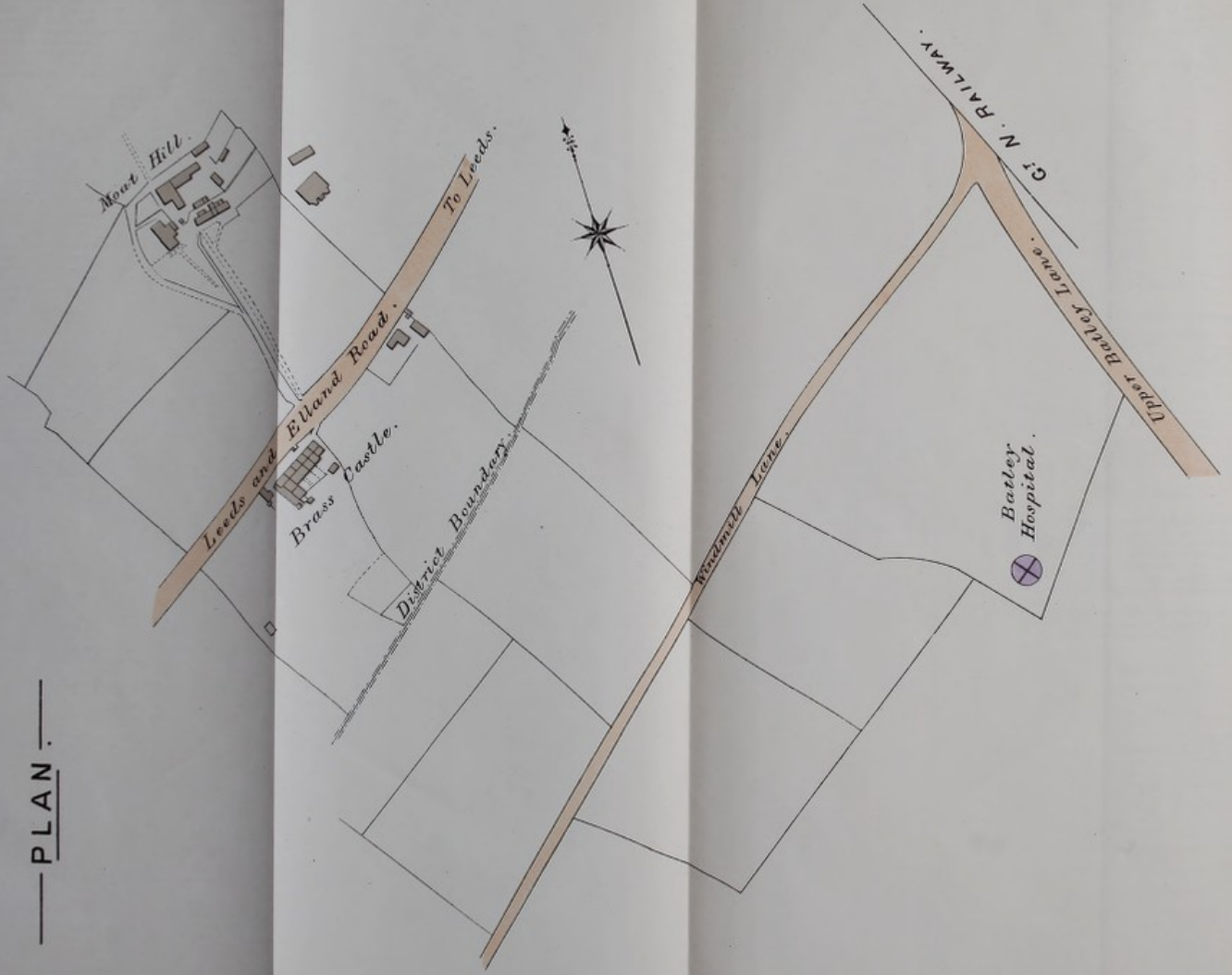
—	Case removed.		Case remained.
	All Members.	Exclusive of those having Small-pox previously.	
Vaccinated	Per cent. 15.9	Per cent. 16.6	Per cent. 23.0
Unvaccinated	40.2	41.6	—

(b.) Of multiple cases attacked subsequent to removal of the initial cases.

—	All Members.	Exclusive of those who had Small-pox previously.
	Vaccinated	Per cent. 21.7
Unvaccinated	69.7	63.0



— PLAN —



OTHER DISTRICTS OF THE DEWSBURY UNION
THAN BATLEY AND DEWSBURY.

Particulars of the occurrence of small-pox in Birstal, Heckmondwike, Liversedge, Mirfield, Morley Borough, Ossett Borough, Ravensthorpe, Soothill Nether, Soothill Upper, Thornhill—Invaded houses and their inmates—Sanitary conditions—Weekly incidence of small-pox in all these districts combined—Monthly prevalence—Age and sex incidence—Occupation tables—Types of the attacks and relative proportion at different ages—Measures of isolation—Single and multiple cases in houses—Number of houses invaded per month and of cases occurring therein—Particulars of size of households, &c. of 147 houses visited—Occupations of members of these households, proportion and attack rates among the several classes in houses having single and multiple cases—Vaccination statistics of the cases attacked with small-pox—The weekly incidence of cases with regard to their vaccination relations—Age and sex of the attacked with regard to their vaccination relations—Type of small-pox and vaccination condition—Vaccination data of inmates of houses—And of single and multiple cases.

BIRSTAL.

During the whole period covered by this inquiry only 10 cases of small-pox were known to have occurred within the limits of this sanitary district, viz., one case in June 1891, one in December, two in January 1892, one in February, three in March, and two in April. There was one death. These cases came from seven different houses, and particulars were obtained of five of these; there being eight cases of small-pox amongst the 20 inmates, two of whom were under one year of age (one attacked), two between one year and 10 years, 14 between 10 and 30 (six attacked), and four over 30 years (one attacked). The following is a list of these households:—

SMALL-POX AT BIRSTAL, 1891-2.

LIST OF INFECTED HOUSEHOLDS WITH AGES OF INMATES
AND OF THOSE ATTACKED.

Date of First Appearance of small-pox.	Street, &c.	Reference to House List.	All Inmates.					Attacked with Small-pox. (Nos. refer to Case Register.)				
			Under 1 year.	1 to 10 years.	10 to 30 years.	30 and upwards.	Under 1 year.	1 to 10 years.	10 to 30 years.	30 and upwards.		
1891.												
June 12	Collers Street	-	-	-	-	-						1
Dec. 9	Union Street	-	1	1	2	1			2-3			4
1892.												
Feb. 15	Low Lane	-	-	-	-	-						5
March 7	Moat Hill	-	4	1	1	3	2					6
" 22	Brasscastle	-	3	1	-	1	2					7
April 1	Brasscastle	-	2			2						9
" 5	Howden Clough Road.	-	5			6	1					10
	5 houses visited		2	2	14	4	1	-	6	1		
	2 " not visited									1		1
							1	-	7	2		

I am indebted to Dr. Forsyth for the particulars of the history of cases, so far as these could be ascertained.

The first case was that of E. W., a man *æt.* 43 (No. 1), who was attacked on June 12th, 1891, and removed to the union workhouse infirmary at Staincliffe on June 16. The source of infection in this case is unknown.

D. V. H., *æt.* 16 (No. 2), was engaged as a pawnbroker's assistant in Batley, and was attacked on December 9th. Although no direct infection could be traced in his case, it seems very probable that he may have come in contact with persons from infected houses, as at this time the disease was again spreading in Batley. He lived with his married sister at Birstal, whose husband kept an inn there, and he was nursed in the house, which was closed to

customers from that time forward. The family consisted of Mr. and Mrs. C., and their infant daughter, G. C., one year old. This child underwent vaccination in January, and was the only one of the four who escaped the disease; Mrs. C. was attacked on January 12th, and Mr. C. on the 15th; the former had been vaccinated in infancy, and only kept her bed for three days; the latter was unvaccinated, and was ill with a severe confluent attack for several weeks.

The next case was that of W. R., *æt.* 16, an assistant in an upholstery shop in Birstal, and living in the house; it is not known how he was infected. He was removed to the Batley Small-pox Hospital.

The cases that followed all occurred in dwellings on the outskirts of Birstal and in the vicinity of the Batley Hospital, which at that time (March 1892) was full of cases of small-pox. The accompanying sketch-map, for which I am indebted to the surveyor to the Borough of Batley, shows the relative position of these dwellings to the hospital. The latter, it will be remembered, was situated in a field off Upper Batley (or Howden Clough) Lane, a narrow lane skirting this field (Windmill Lane) on its N.W. side, about 160 yards from the hospital. In the same direction and 440 yards from the hospital runs the high road to Leeds, passing from Birstal proper to Howden Clough, just within the eastern (Birstal-Morley) boundary of the Birstal district. To the south of this road is a row of cottages called "Brasscastle," whilst on rising ground 160 yards to the N. of the road is a farm (Moat Hill Farm). A lad, C. D., *æt.* 10, one of the family of six persons who, together with a maid servant, lived in the farmhouse, was attacked with small-pox on March 7th. This boy, I was informed, had been "twice" vaccinated, but if so, the vaccination could hardly have been successful, for careful scrutiny failed to reveal any vaccination scars. It was suggested that he may have been infected from the hospital, as he was known to have been in the habit of playing in the fields adjacent to it, and with other children used to watch the cartage of refuse from the hospital. As soon as he developed the disease he was removed to the hospital, and all the inmates of the farm were re-vaccinated. The cattle on the farm were removed to another farm just below Brasscastle.

Mrs. D., *æt.* 20, occupying one of the Brasscastle cottages, was confined on March 20th. She must have been incubating small-pox at the time, for on the 22nd high fever set in, with intense headache and backache, and on the 23rd some papules appeared. She was not then in a condition to bear removal to the hospital; and her infant was at once vaccinated, but on the 29th, when nine days old (No. 8), it developed the rash of small-pox. Both mother and infant were then removed to the hospital, where the latter died on April 1st. The husband, J. D., *æt.* 21 (No. 10), the only other inmate of the cottage, on the development of small-pox in his wife, removed to his mother's house at Howden Clough, near to the mill where he was working. There was a family of six in this house, four of whom (females) were employed in the mill, and two attending school. J. D. did not, however, escape infection, for he sickened with small-pox on April 5th, *i.e.*, 14 days after the rash appeared in his wife's case, and was removed to the hospital on April 7th. Fortunately none of his relatives at Howden Clough were infected. Dr. Forsyth kept them at home for three days and had the house thoroughly disinfected. Mrs. D., at Brasscastle, was attended in her confinement and illness by a neighbour, Mrs. B. (No. 9), who complained of feeling ill on April 1st, and developed a rash on the 3rd.

No other cases were known to have occurred in Birstal after this date up to August 27th.

Thus of these 10 cases, one, an infant of nine days, died; three remained at home during the whole of their illness, one was removed to the union workhouse infirmary, and five to the Batley Small-pox Hospital.

The sanitary condition of the five houses inspected was fair; all had privy middens, in one only was this ill constructed and in a bad condition. Two of the houses were detached from other buildings, one (the farm) occupying an open elevated site; two were back-to-back two-roomed cottages (Brasscastle), and the other (Howden Clough) was one of a row of six houses, with no window at the back, and two sleeping rooms and one dwelling room.

HECKMONDWIKE.

There were 39 cases of small-pox in this sanitary district during the period covered by the inquiry.* Two occurred in 1891, in June and December respectively; seven in

* The total number notified was 40, but one of these (No. 25) was taken to hospital on suspicion, and did not develop small-pox.

January 1892, four in February, 13 in March, five in April, four in May, two in June, one in July, and one in August. There were four deaths. These cases came from 26 different houses which were infected in the following months:—

		Houses.	Cases.
1891.			
June	- - - -	1	1
December	- - - -	1	1
1892.			
January	- - - -	4	7
February	- - - -	2	6
March	- - - -	10	13
April	- - - -	2	5
May	- - - -	3	3
June	- - - -	1	1
July	- - - -	1	1
August	- - - -	1	1
		26	39

A list of these houses is given below from which it is seen that particulars were obtained of the inmates of 23 of them, comprising 117 individuals giving an attack rate of 117 : 39, or 33.3 per cent. Of these persons, 3 were under one year of age, 27 between one and 10 years (8 attacked), 49 between 10 and 30 (18 attacked), 34 aged 30 and upwards (9 attacked), whilst the age was not ascertained in the remaining four.

SMALL-POX at HECKMONDWIKE, 1891-92.
LIST OF INFECTED HOUSEHOLDS WITH AGES OF
INMATES and of those ATTACKED.

Date of First Appearance of Small-pox.	Street, &c.	Reference to House Register.	All Inmates.				Attacked with Small-pox. (Nos. refer to Case Register.)				
			Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.	Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.	
											Age?
1891.											
June 13	Heights Lane	—	—	—	—	—	—	—	—	—	1
Dec. 31	Lobley Street	14	—	—	3	1	—	—	—	—	2
1892.											
Jan. 3	Chapel Lane	13	—	—	—	—	3	—	—	—	2
.. 16	Brighton St.	3	—	2	6	—	—	—	2	4	8
.. 16	Lobley Street	16	1	2	2	—	—	—	—	—	7
.. 17	Bower Lane	—	—	—	—	—	—	—	—	—	Age? 6-6
Feb. 7	High Street	15	—	1	3	3	—	—	13	12	10
.. 24	Brighton St.	4	—	2	1	2	—	—	14	15	11
Mar. 9	Brighton St.	7	1	2	1	1	—	—	16	17	—
.. 12	Royle's Fold	1	—	—	1	—	—	—	—	18	—
.. 14	Milton Street	12	—	1	2	—	—	—	—	19	—
.. 15	Mt. Pleasant	10	—	—	2	1	—	—	—	21	—
.. 15	Brighton St.	5	—	—	3	1	—	—	—	20	—
.. 22	Brighton St.	8	—	1	3	1	—	—	22	—	—
.. 26	Brighton St.	6	—	3	1	2	—	—	—	—	24
.. 28	Mt. Pleasant	11	—	—	3	—	—	—	—	25	—
.. 28	Battye Street	2	—	—	1	1	—	—	—	38	26
.. 29	Brighton St.	9	1	1	2	2	—	—	—	27	33
Apr. 12	Cook Lane	18	—	3	3	2	—	—	30	31, 32	29
.. 18	Orford Street	19	—	2	2	2	—	—	28	—	—
May 1	Cook Lane	17	—	—	3	2	—	—	—	—	32
.. 2	Benuregard St.	20	—	3	—	4	—	—	—	—	34
.. 17	Cook Lane	21	—	1	7	—	—	—	—	—	35
June 11	Heights Lane	—	—	—	—	—	—	—	—	—	37
July 22	Tower Street	22	—	1	4	2	—	—	—	—	39
Aug. 17	Tower Street	23	—	2	1	2	—	—	—	—	40
	23 houses visited		3	27	49	34	—	—	8	18	9
	3 houses not visited.					4	—	—	—	—	Age? 2

The case in June 1891 was that of an unvaccinated girl, S.D., *æt.* 12, living on the Staincliffe side of Heckmondwike; she was removed to the workhouse infirmary on June 20, a week after the onset of her illness, and had a confluent attack. Almost exactly a year later (*viz.*, June 11, 1892) another case occurred in the same part (Heights Lane), a man of 24, who was removed to the Dewsbury Hospital; he was vaccinated and had a mild attack (No. 37).

On December 31, 1891, a mill hand, H. C. female, *æt.* 16 (No. 3), living in Lobley Street, also near the Batley boundary, sickened and was sent to the Dewsbury Hospital on the seventh day of the appearance of rash. She was the only unvaccinated member of the family, but it is not known how she contracted the disease. Up to within a fortnight of her illness her mother had been doing some laundry work for people in the same street, none coming from infected districts. On the removal of this patient the house was fumigated, and a neighbour, J.H.K., *æt.* 26 (No. 7), a miner at a large colliery at Dewsbury (where other cases occurred), assisted in cleansing it. At the same time it seems unlikely that he was infected there because he sickened on January 15th, only six days after the removal of H. C. He again was the only unvaccinated member of his family. He was sent to the Dewsbury Hospital on January 20th, and after his discharge acted as lodge-keeper to the Crow Nest Convalescent Home. His infant of five months was vaccinated about one week before he was taken ill, and did not have the disease.

Prior to these latter cases one was removed from an old house in Chapel Lane, inhabited by Mr. and Mrs. M. and two lodgers. Their son, A. M., who lived at Batley, had come to stay with his parents when his wife was removed to the Batley Small-pox Hospital (No. 112 in Batley Register). He (No. 2) was already suffering from small-pox, and was seen by a medical man on January 7th, and removed to Dewsbury Hospital on the 8th. The lodgers at the same time left the house.

Seven of the invaded houses were in three adjacent and parallel streets, *viz.*, Brighton Street, Back Brighton Street, and Battye (or Roebuck) Street, cases occurring in them from the middle of January until the end of March, and numbering 15 in all. The first family to be attacked was that of Mr. S., an insurance agent, engaged in travelling about, and who may have recently been in an infected district. His daughter, N. S., *æt.* 14 (unvaccinated), was the first to be attacked, *viz.*, on January 16th (No. 4). At the time of her attack there were three other children of the family of 10 who were unvaccinated; two of these, S. S., *æt.* 18, and R. S., *æt.* 15, were successfully vaccinated on January 21st, at the same time as the father and three other children (aged 21, 16, and 10) were re-vaccinated. The youngest child, M. S., *æt.* 3, had been vaccinated in infancy, and was not re-vaccinated. The two remaining members of the family, Mrs. S., *æt.* 40 (No. 8), who had two foveate marks of infantile vaccination, and who was not re-vaccinated, and a boy T. S., *æt.* 9 (No. 9), who remained unvaccinated, were attacked with small-pox on January 28th. It is uncertain whether they could have been infected by the first case (No. 4), as her rash only appeared on the 19th, and the mother's notion that the infection was conveyed in her daughter's clothes sent back from the hospital on the 21st is even less probable on the accepted term of incubation. Yet this may not be impossible. Nos. 8 and 9 were not removed, but were kept in a room separate from the rest, and attended only by a daughter of Mrs. S., *æt.* 16 (one of the re-vaccinated).

The next family to be attacked in this street was that of the V's.; the father, G. V., *æt.* 33 (No. 11), being attacked on February 24th, and being nursed at home throughout his illness. His wife was re-vaccinated during his illness on two occasions, both unsuccessful. The three children (*æt.* 10, 8, and 6) were unvaccinated, and two of them (G. C., a boy, *æt.* eight (No. 15), and F. C., a girl, *æt.* 6 (No. 14), both sickened of small-pox on March 6, the rash appearing in the one (No. 14) on the 8th, on the other (No. 15) on the 10th. They were removed to Dewsbury Hospital on the 13th, where G. C. died on the 15th; and where F. V. remained until April 11th. The other child was twice attempted to be vaccinated, but both attempts failed.

On March 9, L. C., *æt.* 6 (No. 16), fell ill, and next day his mother, S. C., *æt.* 27. The boy was a delicate child and had never been vaccinated, and they were both removed to Dewsbury Hospital on the 15th. Of the other members of the family—the father—a miner, had been vaccinated in infancy, and had had small-pox in boyhood, but was successfully re-vaccinated on March 14th; a boy, *æt.* four, had been vaccinated in infancy, whilst an infant, two months, was not vaccinated until the 16th, and had therefore been unvaccinated when exposed to infection.

On March 18th J. R., *æt.* 20 (No. 20), engaged as a baker in the town, and living in Back Brighton Street, was attacked; he was removed to Dewsbury Hospital on March 21st, and died there on the 27th. He was unvaccinated. There were three other persons (adults) in the house, two of whom (aged 23 and 20) were re-vaccinated on the 21st.

In another family, G. F., a schoolboy, *æt.* 8 (No. 22), the only unvaccinated member, was attacked with small-pox on March 23rd, and sent to the Dewsbury Hospital on the 26th. His brother (vaccinated), H. F., a weaver, *æt.* 13, having slept in the same bed, was sent with him to the hospital "as a precaution, but not developing the disease" was returned to his home in a fortnight (Mr. Fardon's note).

J. A., *æt.* 36, a miner, in another family (six persons) in this street, was attacked on March 26, and removed to Dewsbury Hospital on the 31st.

F. K., m., 13 (No. 27), a weaver, was attacked on March 29th, and removed to Dewsbury Hospital on April 1st. His father, J. K., *æt.* 42 (No. 33), sickened on April 16, and was removed on April 21st; on him there had been an unsuccessful attempt at re-vaccination on April 1st. There was a similar failure in a lad *æt.* 15; but in Mrs. K., *æt.* 44, the re-vaccination was successful. [She was confined on April 19th.]

In connection with this group may be mentioned the case of C. C., m., *æt.* 5 (No. 28), living in Oxford Street (off Roebuck Street), who attended the same school in Battye Street, as children coming from the Brighton Street houses. He was attacked on April 18 and sent to Dewsbury Hospital on the 23rd. He was unvaccinated, as was his younger brother (*æt.* two), who was, however, successfully vaccinated on April 22 (but was therefore unvaccinated when exposed to chances of infection). Three of the remaining four inmates of this house were re-vaccinated on the 22nd, but in no case with success.

In Battye Street, adjoining Brighton Street, Mrs. K., *æt.* 31, was attacked on March 28th (No. 26), and removed to Dewsbury Hospital on April 2nd. Her husband, who was often away from home, in his capacity as a coal agent (travelling), and who was the only other occupant of the dwelling, contracted the disease (No. 28) three months later, being attacked on June 16, clearly having been infected from another source.

Returning to cases which occurred at an earlier period, it may be noted that in the middle of January two cases (a woman and her infant) living in Bower Lane, at quite another part of the district, were attacked. On February 7th Mrs. N. (No. 10), living in High Street (near Lobley Street, where there had been cases), was attacked; on the 26th her two children, A. N., f., *æt.* 12 (No. 12), and A. N., m., *æt.* 1, this infant being unvaccinated (an unsuccessful attempt at vaccination was made on February 12). These patients were all treated at home. The house contained four other inmates, one of whom, the father of Mrs. S., had had small-pox in childhood.

In the centre of the town, near the market-place, there is a court (Royle's Fold), dirty and ill-paved, and occupied by old, neglected single-roomed shanties. In one of these, a young man, M. C. (No. 18), was removed to the Dewsbury Hospital on the seventh day of his illness, and died there on the 19th. He and his parents lived here, but Mrs. C. declined to give any information at all, beyond the fact that her son was unvaccinated.

In contrast to this, in every respect, was the case of Mrs. D. (No. 19), who occupied, with her husband and child (*æt.* 2), a four-roomed detached house in Milton Street. She sickened on March 14th, and was kept in one room, her husband (who was re-vaccinated on the 17th) and child leaving the house for a fortnight from March 17th.

About the same time two adjacent houses of a similar class and in the vicinity of Milton Street, viz., the district called Mount Pleasant, each had a case of small-pox. The first to be attacked was H. I., *æt.* 26, a domestic servant, in a house of five rooms, and two other inmates. At the back of this house is a large well-paved yard, and there is some open ground between this site and Brighton Street, where, as we have seen, so large a proportion of the cases were. H. T. (No. 21) may have been infected by frequenting this region. She was unvaccinated, sickened on March 15, and was removed to Dewsbury Hospital on the 21st. Her friend, E. B., *æt.* 16 (No. 25), a servant in the adjacent house, sharing the same yard, was attacked on March 28th (she had been vaccinated), and was removed to Dewsbury Hospital on April 1st. Of the two other inmates of this house, Mr. S., *æt.* 24, was re-vaccinated on March 31, and his wife, *æt.* 25, who showed no evidence of having been vaccinated in infancy, as stated, was also vaccinated on that day. In neither did this vaccination "take."

A short distance further west from these streets is Cook Lane, where three adjoining houses next became infected. These houses were built back to back, containing only two rooms, and were in an insanitary, neglected state. W. S., *æt.* 36 (No. 29), a labourer employed by the Local Board, had slight initial symptoms on April 12, and a rash on the 15th, but he went about his work (work in connexion with laying drains) the whole time, and no steps were taken to isolate him. The small dwelling contained eight inmates, and three of these, viz., C. S., f., *æt.* 14 (vaccinated), E. S., f., 11 (unvaccinated), and T. S., *æt.* 3 (unvaccinated), C. S., and T. S. (Nos. 31 and 30) were attacked on April 29th, and removed to Dewsbury Hospital on May 3 and 4 respectively, where T. S. died on May 9. A fortnight after their removal E. S. (No. 35) sickened on May 18, and was removed on May 21. The rest of family (ages 36, 16, 7, and 5) had all been vaccinated in infancy. In the adjoining house, J. G., *æt.* 16 (No. 32), a miner, was attacked on May 1 and removed to Dewsbury Hospital on May 4. He was unvaccinated, as were also his brothers (aged 26 and 11), who escaped the disease. The mother (*æt.* 51) was said to have been vaccinated in infancy, but had no marks. Mrs. B. (No. 36), living in the house at the back of the preceding, was attacked on May 17 (she had been confined nine days before of a stillborn infant), and was taken to the Dewsbury Hospital on the 21st, i.e., on the third day of her rash. Although up to the time of her removal her unvaccinated child, H. B., *æt.* 5, slept in the same room, the latter did not contract the disease.

Of the three remaining cases, one, J. T., *æt.* 30, a carpet-weaver (No. 34), lived in Upper Beauregard Street near the western (Liversedge) boundary. He sickened on May 2nd, and was removed to Dewsbury Hospital on May 6th. Two adult females (*æt.* 32 and 33) of this household of seven persons had never been vaccinated; they had both suffered from small-pox in childhood.

In June, as stated, one case occurred at the opposite end of the district in Heights Lane; and on July 27 there occurred the case of H. H., *æt.* 10, an unvaccinated school-boy (No. 39), living in Tower Street (off High Street, near centre of the town). He was removed to Dewsbury Hospital on the 27th, and on the same day his brother (*æt.* 13) and his sister (*æt.* 5) were successfully vaccinated (therefore unvaccinated when exposed to chances of infection). On the 28th each of the remaining four inmates of the house were successfully re-vaccinated. On August 17th (i.e., 20 days from removal of H. H.) C. G. H., *æt.* 11 (No. 40), in an adjacent house in Tower Street was attacked and removed to Dewsbury Hospital on August 22. This boy was unvaccinated; it was said that there had been three unsuccessful attempts made to vaccinate in infancy. On the day of his removal the remaining four inmates (including two children, *æt.* 9 and 3) were all re-vaccinated.

Thus of the 39 cases, 8 remained at home during their illness, 1 was removed to the workhouse infirmary at Staincliffe, and 30 were removed to the Dewsbury Infection Hospital.

As to the sanitary condition it may be remarked that the privy-midden system prevailed universally; that some of these middens were common to several houses, and (especially in Brighton Street) were only a few feet distant from the houses. Three at least were below the ground level, and many were neglected and foul. Royle's Fold and Cook Lane houses were the worst and most insanitary. Of all the houses visited, six were "through" houses, one was provided with a single window at the back looking on to a narrow dirty court, the rest were "not through" houses; 14 of these being built on the "back-to-back" system. The proportion of rooms (sleeping and living to inmates) was—

	Rooms.	Inmates.	Per Room.
6 through houses - - -	25	31	1.2
14 back-to-back houses - - -	30	77	2.5
3 single houses - - - -	5	14	2.8

LIVERSEDGE.

In this district, contiguous to Heckmondwike, and embracing a wide area of open upland country, there were 20 cases of small-pox (one fatal) known to have occurred

within the period named, viz., 1 in December 1891, 3 in January 1892, 4 in February, 11 in June, 1 in July, coming from 10 different houses, a list of which is given below. It will be seen from this list that particulars were obtained of the inmates of the houses whence 18 cases proceeded; that of the total of 56 inmates, 2 were under 1 year of age (1 attacked), 7 between 1 and 10 years (5 attacked), 26 between 10 and 30 years (5 attacked), 16 aged 30 and upwards (7 attacked), and in 5 the age was not ascertained.

SMALL-POX AT LIVERSEDGE, 1891-92.

LIST OF INFECTED HOUSEHOLDS WITH AGES OF INMATES and of those ATTACKED.

Date of first appearance of Small-pox.	Road or Street.	Refer to House Register.				All Inmates.				Attacked with Small-pox. (Nos. refer to Cases Register.)			
		Under year.	1 to 10.	10 to 30.	30 and upwards.	Under year.	1 to 10.	10 to 30.	30 and upwards.	Under year.	1 to 10.	10 to 30.	30 and upwards.
1892. Dec. 23	Lumb Lane	4	1	5	2								1
Jan. 14	Lumb Lane	3			1								2
" 16	Station Lane	5	2	3	1					4			3
Feb. 2	Lumb Lane												5
" 5	Lower Hall, High Town.	1		3	1								6
" 1	Quaker Lane	2		6	2								7
" 29	?												8
June 10	Liversedge Hall Lane.	6	1	5	2					9, 10, 11			19
" 13	Huddersfield Road.	7		1	3	2				12			19
" 24	Robert Town	8	1	3	1	4	20	13, 14, 15					16, 17, 18
	8 houses visited	2	7	26	16	1	5	5	7				
	2 houses not visited.				Age? c							2	
						1	5	7	7				

For most of the following particulars I am indebted to Dr. Shives, the Medical Officer of Health to the Local Board. The first case was that of A. J., *æt.* 35, a miner at a large pit near Dewsbury.* He (No. 1) was attacked with small-pox on December 28, 1891, the rash appearing on the 30th. The remaining seven members of the family were all successfully re-vaccinated by Dr. Shives on December 31st, and A. J. was isolated in an upstairs room communicating by a staircase directly with the outside, so that there was no necessity to pass through the living room. He was kept there for three weeks, being attended by Mrs. J.; and on January 12, his brother, G. J., *æt.* 33, living in another house in the same road, who assisted to carry A. J. to the room, was himself attacked. G. J. (No. 2) was brought to this room on the 17th and looked after by A. J., whilst all the family of the former, with the exception of the youngest child, were re-vaccinated on January 17th.

The next case in the district was that of Mrs. G., *æt.* 35 (No. 3), who was attacked on January 16th. She may have been infected through her husband visiting houses in Batley and elsewhere in his capacity as clerk to Co-operative Stores Company. She was kept at home, all the rest of the family being successfully re-vaccinated by Dr. Shives on January 20th. The youngest of these, however, C. G., *æt.* 4 (No. 4), had a very scanty eruption of spots on February 2; his case being so mild as to be almost "doubtful." The rash quite cleared off and he was never really ill.

On February 2nd, another miner in the same pit as No. 1 was attacked, F. H., *æt.* 21 (No. 5).

On February 5 Miss M. E. D., *æt.* 25, employed as teacher in a large school at Dewsbury, fell ill. At the

same time the head mistress (Miss G., No. 62 in Dewsbury list) was attacked and subsequently died. I have already mentioned the cases of the pupils at the school who were also attacked with small-pox at this period (i.e. "Dewsbury," page 65). Miss D. was kept at home during her illness, the three other inmates of the house (aged 48, 27, and 22) being re-vaccinated on February 9th, all successfully. The house was attached to a shop and post office, which were accordingly closed; and one of the inmates removed to another dwelling.

R. G., *æt.* 27 (No. 7), employed as potman at an inn in Commercial Street, Batley, was attacked on February 1st; came home to Quaker Lane, Liversedge, and developed a rash on February 3rd. There were, including the patient, eight inmates of this house, and all, except the parents, were sent away during his illness; Mrs. G., and her five children being successfully re-vaccinated on February 6th.

Mrs. S., *æt.* 26 (No. 8), attacked on February 29th, was removed to the Dewsbury Hospital on March 5th. She may have been infected through her husband, a groom, visiting infected districts.

From this date no other cases occurred for more than three months. On June 10th and 11th three members of one family were attacked (Nos. 9, 10, and 11), one, G. M., *æt.* 29, employed as a labourer, another, C. S., as a railway clerk, and the third, L. S., *æt.* 19, living at home. It is not known how the infection was brought to the house, which contained in all eight inmates. The patients were kept at home, two of the family being sent away; the father, *æt.* 52, was re-vaccinated on June 14th, as also were a nursemaid and the nurse in attendance on the cases; whilst an infant, five months old, was primarily vaccinated at the same time. It is noteworthy that within a day or two of this house being infected, that of some relatives was also invaded, where the first to be taken ill was an unvaccinated girl, G. M., *æt.* 8 (No. 12), on June 13th. Her rash developed on June 16th, and on the 29th her mother, *æt.* 44, (No. 19), who had suffered from small-pox when four years of age, was also attacked. She was the only one of the family (five) who was not re-vaccinated; three of them were re-vaccinated on July 5th (one being unsuccessful), and one on the 10th, unsuccessful.

Seven members of a family of nine persons living in a detached dwelling, in a high and open situation, were attacked with small-pox between June 24th and July 7th. One of these cases, that of Mrs. N., *æt.* 33 (No. 18), was rapidly fatal, death occurring before the rash was fully out; yet it had not "hæmorrhagic" characters. Another was the case of her infant, who was vaccinated two days before the rash appeared, and had a mild attack. All the other cases were of mild type.

It will be seen that of the whole number of cases only one was removed to hospital, and that measures were taken for the isolation of the patients in their own homes, and the re-vaccination of other inmates. These measures were always promptly carried out by Dr. Shives, and this may account for the limitation of the disease in the district.

The sanitary state of the houses that were inspected was good in all cases. Only two of these houses were on the "back-to-back" system; and of the rest, most occupied high and open situations. The privy-midden system obtained in all. As to proportion of rooms to inmates:—

	Rooms.	Inmates.	Per Room.
6 "through" houses	31	43	1.3
2 back-to-back houses	6	13	2.1

MIRFIELD.

No case occurred in any Mirfield household before the end of February, in the 44th week of the outbreak in the Dewsbury Union. From that time until August 27th there were in all 12 cases, coming from 11 houses, viz., one in February, one in March, five in April, and five in August. One case was fatal.

The subjoined list of the houses invaded, in order of their infection, shows that in the nine of which particulars were obtained there were 53 inmates, none under one year of age, eight between one and ten years, 29 between 10 and 30 (seven attacked), 16 at 30 and upwards (two attacked).

* I find that 10 other miners in this pit were attacked with small-pox, viz.:—8 from Dewsbury (Nos. 35, 45, 51, 58, 97, 127, 129, 146), attacked on December 26, 1891, January 15, 28, 22, February 25, March 19, 20, and April 7, respectively; 1 from Hockmondwike (No. 7), attacked on January 15, and another from Liversedge on February 2. The above case was one of the first to fall ill.

SMALL-POX AT MIRFIELD, 1891-92.

LIST OF INFECTED HOUSEHOLDS WITH AGES OF INMATES and of those ATTACKED.

Date of First Appearance of Small-pox.	Road or Street.	References to House Register.	All Inmates.				Attacked with Small-pox. (Nos. refer to Case Register).			
			Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.	Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.
1892.										
Feb. 27	West Mill Cottages.	2		2	1					1
March 14	Lee Green	4	1	4	2					2
April 4	Sunny Bank	3	2	2	2					3
" 11	" ?	-	-	-	-					Age? 6-7
" 16	Stocks Bank	1		3	3					4
" 24	Knowle	-	-	-	-					5
Aug. 2	Northorpe	9		5	3					8
" 2	Cross Key Lane	7	1	2						9
" 7	Stocks Bank	8	2	5	2					10
" 10	Lee Green	5		1	2					11
" 9	Shill Bank Lane	6	2	4	1					12
	9 houses visited	-	8	29	16	-	-	-	-	7
	2 .. not ..	-								Age? 2

The first case in the district was that of J. S., *æt.* 35, a maltster, who could not account for his infection. He (No. 1) was attacked on February 27th, developed a rash on March 1st, and was removed to the Batley Small-pox Hospital on the 5th. The three remaining inmates (aged 28, 15, and 13) were re-vaccinated on March 4th, but in only one was it successful and that slightly.

P. L., *f.*, *æt.* 18 (No. 2), living in another part of this wide and thinly peopled district, was attacked on March 11th. She was a weaver at a mill in Ravensthorpe, where some of the workers were said to have come from infected houses. I find that one of the Dewsbury cases (No. 10), who was attacked on August 14th, 1891, and died in hospital on August 31st, worked at this mill, as also did No. 125 (Dewsbury), who was attacked on March 17th, 1892; and one of the Southill Nether cases (No. 7) attacked on April 17th. But I am unable to verify the statement that at the time of P. L.'s illness some of her co-workers were coming from infected houses. She was taken to the Batley Hospital on March 22nd. This patient was unvaccinated as also was H. L., *æt.* 3; the latter was away from home when his sister took ill; he was vaccinated on March 14th, at the same time as the other five members of the family, all being successful.

F. D., a schoolboy, *æt.* 13 (No. 3), developed a rash on April 8th, and was removed to Batley Hospital on the 9th. The house is on high ground, one of a recently built block of four back-to-back houses, surrounded by fields. It was thought possible that his father and brother, who were working at a pit where others came from infected houses, may have brought the infection home. All the other five inmates were re-vaccinated on April 6 and 7, in one case only (a child of three) without success.

E. R., *f.*, 17 (No. 4), was attacked on April 16. She attended the same Sunday school as No. 3, and may have been infected through him, although probably not directly, as she fell ill on the ninth day of his rash. She was removed to Batley Hospital on April 20.

Of the remaining cases I have nothing material to add beyond what is given in the lists and tables. In one household of nine inmates there were persons aged 45, 18, and 7 years respectively. The patient, J.O., a miner, *æt.* 23 (No. 10), was removed to Batley Hospital on August 12th; and the foregoing persons were vaccinated on the 11th, that is to say, they were unvaccinated during the time of exposure to chances of infection. On the same day another inmate

was re-vaccinated. In another family seven inmates remaining after removal of the case (No. 8) on August 8th were all re-vaccinated. Re-vaccinations were done also in the case of the two other households.

Of the whole number of cases all but one were removed to Batley Hospital.

The sanitary conditions of the houses are, on the whole, good; the worst were two in Stocks Bank, single houses and rather surrounded. Of seven houses of which I have these particulars, two were "through" houses, and six "not through," three of them being back to back. The proportion of rooms to inmates was:—

	Rooms.	Inmates.	Per Room.
2 through houses	11	7	1.5
6 "single" and "back-to-back" houses and ashpits	13	34	2.6

The privy-middens and ashpits in all cases were in good condition.

MORLEY BOROUGH.

There was no case of small-pox in Morley in 1891, but in 1892 (up to August 27, the 70th week of the whole outbreak) there were 41 cases regarded as instances of this disease, the number being largely made up of a series of cases of anomalous type occurring amongst children in the months of May, June, and July. Some of these cases had certainly variolous characters, but in a very mild form, whilst others intimately connected with them might pardonably have been regarded as varicella. Indeed, had it not been for their associations I might have felt justified in excluding them from the list, as I have done in all cases where varicella has been beyond doubt. I do not think, however, that it would be right to do so in regard to these Morley children. The 41 cases came from 22 households, the incidence of the cases being: January 2, March 1, April 8, May 6, June 7, July 11, August 6, and of the houses,—

	House invaded.	Yielding Cases.
January	1	2
March	1	1
April	7	13
May	1	1
June	4	11
July	5	8
August	3	5
	22	41

The total number of inmates of these houses was 127, of whom four were under one year of age (one attacked), 43 between one and 10 years (27 attacked), 53 between 10 and 30 years (11 attacked), and 27 at 30 years and upwards (two attacked). The large proportion of children attacked is accounted for by the fact above stated. There were no deaths.

SMALL-POX AT MORLEY, 1892.

LIST OF INFECTED HOUSEHOLDS WITH AGES OF INMATES and of those ATTACKED.

Date of First Appearance of Small-pox.	Street or Road.	Reference to House Register.	All Inmates.				Attacked with Small-pox. (Nos. refer to Case Register).				
			Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.	Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.	
1892.											
Jan. 18	Bruntcliffe	7	3	1	2	1, 2					
March 17	Lobley's Yard, Queen Street.	2		2	1					3	
April 2	Back Poster St.	4		4	1				4		
" 4	Marshall Street	3		1	5	1			5		
" 8	Bruntcliffe	5		4	1				6		
" 11	Gisborne Court, Queen Street.	1		2	3	1			8	7	
" 14	Wordsworth Sq.	8		1	4	2			11, 14, 18, 22, 23, 29.		
" 14	King Street	11			5	1					
" 27	Howden Clough Road.	6		1	2	2			9		10
May 26	Bruntcliffe	17		3	6	2			15		
June 11	Bruntcliffe	18		3	2	1			16, 25		
" 18	King Street	12	1	2	2		19	18	17		
" 23	Garnet's Buildings.	13		3	1	1			20, 21, 22.		
" 20	Victoria Road	9	1	3	1	3			24, 25, 27.		
July 4	Bruntcliffe	14		2	1	1			23, 27		
" 17	St. Paul's Street	10		2	2				30		
" 18	Bruntcliffe	20		1	2	2			31		
" 23	Howden Clough Road.	21	1	4	1	2			32		
" 24	Bruntcliffe	15		4	1	2			33, 34, 38.		
Aug. 3	Bruntcliffe	19	1	3	3				35, 39, 40.		
" 7	Bruntcliffe	16		2	1	1			36		
" 27	Newsonne Street, Town End.	22		3	2				41		
	22 houses		4	43	53	27	1	27	11	2	

The first cases occurred at Bruntcliffe, a part of the borough situated to the south, in the direction of Batley, the ground being high and open. In a miner's family an unvaccinated girl, H. D., five years old (No. 1), sickened on January 16, developed a rash on the 18th, and was sent to Leeds Small-pox Hospital on the 21st; on the 20th Mr. Steele, the medical officer of health (who kindly accompanied me in my visits to the infected houses) re-vaccinated the parents and a child aged 13, each successfully, and at the same time vaccinated L. D. (No. 2), a schoolgirl *æt.* seven, who five days later sickened with small-pox, and was sent to the Leeds Small-pox Hospital on January 29th. An infant of 20 months remained unvaccinated. It was thought possible that infection had been introduced to this house from Batley.

The case in March was that of a weaver, H. J., *æt.* 55 (No. 3), who sickened on the 17th. She was said to have been vaccinated in infancy, but had no marks; her son and daughter were both re-vaccinated by Mr. Steele on the 20th, the latter accompanying her mother to the temporary isolation hospital at the Cemetery Lodge, Bruntcliffe. Connected with this case is that of A. G., *æt.* 20, who worked next to Mrs. J. at the mill. A. G. (No. 5) sickened on the 4th, her rash appearing on the 7th. She may, however, have been infected through a visit of Mrs. J.'s daughter to the house (where dressmaking is carried on) on March 21st, *i.e.*, 14 days previously. From this case two other houses were infected, the initial cases in each being so slight as to pass unnoticed. One of them was H. B., *æt.* 18 (No. 28), a milliner living at Wordsworth Square. She visited A. G. before her removal to hospital on April 11th (*i.e.*, between the 4th and the 11th), and although unsuccessfully re-vaccinated on the 13th, had a pustular rash on or about the 17th April; she did not feel ill nor seek medical advice. Her sister, R. B., *æt.* 20 (No. 11), and a brother, G. B., *æt.* 12 (No. 14), sickened on May 9 and 14 respectively. There were seven members

of this household, and on the occurrence of these cases three were re-vaccinated, and another attempt (which failed) was made to re-vaccinate H. B. About the same time as H. B. was attacked with what no doubt was small-pox, H. S., *m.*, *æt.* 20, weaver (No. 29), living in King Street, also had a slight rash which passed unrecognised; he was engaged to H. B., and in all probability was infected through her visit to A. G. The fact of his having had a rash was not known until on May 9, two of his brothers, J. S., *æt.* 21 (No. 12), and W. S., *æt.* 19 (No. 13), sickened and developed a rash on the 14th. The three remaining inmates of this house were re-vaccinated successfully on the 15th. The connexion between these cases may be thus given:—

H. J. No. 3. Attack, 17. iii. Removal, 20. iii.	A. G. No. 5. 4. iv.	}	R. B. No. 11. 9. v.
			G. B. No. 14. 14. 5.
H. S. (No. 29). About 17. iv.	}	J. S. No. 12. 9. v.	
		W. S. No. 13. 9. v.	

A miner, J. A., *æt.* 26 (No. 4), who said that he had had small-pox when four months old, and who had never been vaccinated, was attacked on April 3rd. He may have been infected at Keighley, which he had visited about 10 or 12 days before. Mr. Steele re-vaccinated three of the remaining four inmates of the house on April 9, and vaccinated primarily M. H., *f.*, 24, who had escaped infantile vaccination ("because she was delicate"). This young woman was, therefore, unvaccinated when exposed to infection from J. A., who was removed to hospital on April 6.

M. S., *f.*, 29, weaver (No. 6), living at Bruntcliffe, sickened on April 8th. Two of her brothers were engaged at work in Howden Clough Mill, where, it may be remembered, there were some workers from an infected Birstal household (*see* Birstal); the man who might have been the medium of infection (Birstal list, No. 10) attending the mill during the early days of his wife's illness (March 22, 23), and afterwards from his mother's house until he himself took ill on April 5th. If the contagion was really thus conveyed it would be remarkable, and one would rather believe that the approximation of dates is only a coincidence. It is just as likely that the workers at Howden Clough conveyed the contagion from the neighbouring small-pox hospital.

The infant child, *æt.* 2, (No. 9), of Mr. and Mrs. H., living in the Howden Clough Road, was taken charge of by her grandmother, Mrs. S., during the day, and was probably infected by Mr. S. (No. 6), between April 8th and 14th, when Mr. S. was removed. This infant was vaccinated on April 15th, and sickened with small-pox on the 27th (she was therefore "under" vaccination when attacked).

[N.B.—Mr. Steele told me that one of these vesicles resulting from this vaccination did not "rise" until the 11th day of vaccination.]

The infant was removed to the hospital with her mother S. H., *æt.* 31, on April 29th, and on the 30th Mrs. H. was re-vaccinated by Mr. Steele, two large vesicles resulting. However, Mrs. H. had on May 8, two large papules appear on her face, and a day or two later other spots. It was highly probable that she had been inoculated with small-pox by her infant; she had no prodromata and did not feel ill; and had, moreover, been successfully re-vaccinated eight days previously.

E. H., *æt.* 24, working in Morley Main Colliery, was taken ill on April 11th; when his rash appeared on the 13th he felt so much better that he attended a football match at Bradford on the 16th, and may thus have been the means of unwittingly causing a diffusion of the disease. His case, however, was notified on the 17th, when he was removed to hospital. An infant, one year of age, whom he used to nurse developed small-pox on April 23rd. This child had been successfully vaccinated by Mr. Steele in November 1891, and presented four "scarred" marks. She had suffered from varicella and measles since being vaccinated; and is one of the few instances of a vaccinated child under five years of age who had small-pox in this epidemic. The four other inmates (including a boy of four, who had equivocal primary marks) were all re-vaccinated on April 18, and successfully.

There remain to be considered 13 households, and with regard to them it is noteworthy that of the 25 cases proceeding therefrom, 24 were children under the age of 10.

years, viz., one under one year (unvaccinated), 12 between one and five years (three unvaccinated), 11 aged five to 10 years (one unvaccinated); four of the remainder were undergoing vaccination when attacked. Again, all the cases, with two exceptions, were of the "mild" type, and in not a few the question of varicella was raised with reason. But they were all removed to the small-pox hospital, and not one of them was infected there, as had been the case elsewhere when a child suffering from varicella had been taken into small-pox wards. The majority of the children lived at Bruntcliffe, and either attended the same school there or had brothers and sisters attending it. Thus of 15 pupils of this school in eight families, 10 had this singularly anomalous form of small-pox, and in the same houses six other cases occurred. I saw some of these cases with Mr. Steele, and was struck by their varicellous aspect (one, No. 36, in which the eruption was more profuse and discrete had some resemblance to varicella gangrenosa). In spite of these anomalies I have felt compelled to retain them in my lists, and it is needless to say that this inclusion has materially influenced the statistics of the children affected. I do not propose to give details of each of these families, but I may mention the following as a curious example:—

H. B., *æt.* 29, living in King Street, and his two unvaccinated children were taken ill on June 18. He (No. 17) and the elder child (No. 18), aged two years, were removed to the hospital on June 26; the other child, an infant of seven months, was left at home. The characters of the rash in the father's case were those of a mild form of variola, and so was that of No. 18; yet the rash on the infant, Mr. Steele informs me, more resembled varicella. This was on June 21st. However, six weeks later, viz., on August 3, the only child (vaccinated) who escaped the previous time had a papular rash with no constitutional disturbance, and three days later No. 19 was similarly affected. This eruption was considered to be varicella.

H. L., a child of two years (vaccinated), had a mild eruptive attack on July 19. This was termed "varioid" by Mr. Steele, who says it was "certainly not varicella."

Three school children (ages six to nine) of a family living in a large semi-detached villa were attacked—the one on June 29, and the others on July 13 and 14 respectively; in the last to suffer the rash was said to have come out in crops; they remained in hospital until August 6th. Two of them had been unsuccessfully re-vaccinated on June 30, as also were the five other inmates of the house, four of whom were again re-vaccinated on July 15.

N. H., a boy, five years old (No. 20), attending the school referred to, was taken ill on June 20, a rash appeared on the 25th, when he was taken to the hospital. His sister *æt.* three (No. 21), sickened on June 27, rash June 29; and the infant W. H., one year (No. 22), who was vaccinated on June 25, became feverish on July 3, and had a rash on the 4th.

E. C., *f.*, *æt.* 5 (No. 23), attending the same school, developed a rash on July 4; her sister, A. C., *æt.* 3 (No. 37), was vaccinated on July 12, and on the 21st had a similar rash.

Three cases of this class occurred in a family at Bruntcliffe, living opposite to another where two cases (H. K., *æt.* 4, and H. H., *æt.* 17 months) had occurred on June 11 hospital, June 16; and July 2 (hospital, July 2). The family consisted of a miner, G. K., *æt.* 25, his wife, E. K., *æt.* 24, her sister, L. C., *æt.* 17, and four children aged from five years to two months. Mrs. K. and her sister were the only ones who had been vaccinated in infancy, and the former had no marks of that vaccination. The first to be attacked was M. K., *æt.* 4 (No. 35), with a discrete rash on August 4, when he was removed to the hospital on the 6th. The father and other children were vaccinated on August 7th, and the two women were re-vaccinated. On the 20th, *i.e.*, 14 days after the removal of No. 35, E. K., *æt.* 5 (No. 30), and J. K., *æt.* 2 (No. 34), were attacked with a rash and removed.

To sum up, of the 41 cases, three remained at home during the attack (two unrecognised till later cases arose), two were removed to the Leeds Small-pox Hospital, and 36 were isolated in the temporary hospital at the Cemetery Lodge.

The sanitary condition of the houses was good; in none did I observe any marked defects, and the privy-middens (which were the rule, in one the pail system, and two had w.c.s. within the house) were well kept, and the ashpits well looked after. Seven were "through" houses, well ventilated; three were single houses with no through ventilation, and 12 were back to back; the more recently

constructed being in blocks of four. The proportion of inmates to rooms was as follows:—

	Rooms.	Inmates.	Per Room.
7 through houses containing	32	43	1.3
15 "single" and back-to-back houses containing.	42	84	2.0

OSSETT BOROUGH.

One case of small-pox occurred in Ossett in May 1891, in the fourth week of the general outbreak, and one in September; from that time there were no cases until February. In all 20 cases arose in the period under review, viz., one in May 1891, one in September, eight in February 1892, one in April, six in May, two in June, and one in August, the number of houses invaded being 18, there being only two houses with more than one case, one infected in February and one in May. There were no deaths.

The subjoined list gives the site of these houses and their order of infection. It will appear that they contained 89 inmates, of whom two were under one year of age, 13 between one and 10 years, 45 between 10 and 30 (14 attacked), 28 aged 30 and upwards (6 attacked), and of one the age could not be ascertained.

SMALL-POX AT OSSETT, 1891-92.

LIST OF INFECTED HOUSEHOLDS WITH AGES OF INMATES AND OF THOSE ATTACKED.

First Appearance of Small Pox.	Road or Street.	Reference to Home Register.	All Inmates.				Attacked with Small-pox. (Nos. refer to Case Register.)			
			Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.	Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.
1891. May 19	Wakefield Road	5	1	5	2	1				
Sept. 11	Flushdyke	4	2	2	1	2				
1892. Feb. 6	Teall Town	6	1	4	2			3, 4		
" 6	S. Parade Road	9		1	1			5		
" 8	Teall Town	7		1	1			7		
" 9	S. Parade Road	8		4	1			6		
" 18	Pickering Lane, Gawthorpe.	3	2		2				9	
" 23	Cross Rycroft St.	1	2	2	1				8	
" 26	Zion Street, Gawthorpe.	2	1	2	2				10	
April 15	High Street, Gawthorpe.	10		4	2				11	
May 4	Dale Street	18		5	2				12, 13	
" 13	Hesley Lane	12		3	2				14	
" 23	Westwood Street	15		2					15	
" 29	Dale Street	17	1		2				16	
" 31	Radley Street	13		2	3	2			17	
June 3	Rycroft Street	16	1	3	1				18	
" 19	Westwood Street	14		1	2				19	
Aug. 2	Henley Lane	11		3	3				20	
	18 houses		2	13	45	28			14	
						Age 1			6	

The case which occurred in May 1891 was that of the son of an innkeeper in the Wakefield Road, just within the Ossett boundary. This young man, W. D., *æt.* 21 (No. 1), had a butcher's stall in another part of the road. At the time of his attack there were cases of small-pox in Wakefield, and it is supposed that he was infected from there. His attack, which was a mild one, commenced on May 19; he was removed to the isolation hospital on the 20th, and discharged recovered on June 6th. There were eight other inmates of the house he lived in.

On September 11, a miner, *æt.* 27 (No. 2), unvaccinated, fell ill, and on the 14th developed a variolous rash. He occupied a back-to-back tenement in "Flushdyke," also off the Wakefield Road, but nearer the more populated part of Ossett. He had not been out of the district, and it could not be ascertained how he contracted the disease. He was in hospital from September 15 to October 25, his attack being complicated with pneumonia. When attacked with small-pox he had but recently recovered from influenza.

In February a group of cases occurred in Teall's Town, an outlying part of Ossett, in the south-east of the district. (a.) S. E. T., *æt.* 14, a dressmaker, and her brother E. T., *æt.* 12, a schoolboy (Nos. 3 and 4), were both attacked on February 4th, and removed to hospital on the 8th, on which day four other inmates of the house were re-vaccinated, only one (a boy of 11 years) successfully. It appears that—the mother, who keeps a general dealer's shop at this house, had purchased some clothing from a secondhand clothier at Leeds about three weeks previously, and No. 3 stayed at home from her work to make up a dress for herself from some of this material about a week before she and her brother were attacked. It could not, however, be proved that this clothing came from an infected house. (b.) T. T., *æt.* 19 (No. 5), a miner, living in South Parade close by, and a cousin of the preceding, was attacked on February 6. He was well vaccinated, having seven excellent foveate marks. (c.) Mrs. R., *æt.* 36 (No. 7), a friend and neighbour of the (a) family, sickened on February 8th, and was removed to hospital on the 11th, the day after the rash appeared. Her husband was re-vaccinated on the 12th, but it did not take. (d.) A. C., *æt.* 19 (No. 6), a plumber's assistant, living at South Parade, also a relation of the first family, and frequently at their house, was attacked on February 9, and removed to hospital on the 11th. There were four other inmates of the house he dwelt in who were re-vaccinated on February 10, one succeeded well (*f.*, *æt.* 28), one doubtfully (*m.*, *æt.* 16), and two failed (*f.*, *æt.* 24; *m.*, *æt.* 14). There can be little doubt that these cases were all infected about the same time from a common source.

The next case was that of a mason, *æt.* 42 (No. 9), living at Gawthorpe, which forms part of the north-western part of the borough adjoining Southhill Upper. He was attacked on February 18, removed to hospital on 21st, and his two children, *æt.* 7 and 4 years, were vaccinated successfully on the 23rd. They were, therefore, unvaccinated when exposed to the chance of infection. The man had been at work in Saville Town, adjoining Dewsbury.

W. P., an engineer, *æt.* 32 (No. 8), living in Cross Ryecroft Street, in the north-eastern part of the town of Ossett, was attacked on February 23, and removed to hospital on 25th. He had been shortly before his illness visited by a friend from Dewsbury. His wife, *æt.* 29, was re-vaccinated on the 25th; and there were children (ages 10 to 5), one of whom had been unsuccessfully vaccinated in infancy, and the others, not previously vaccinated, were vaccinated at the same time.

No. 10 was a man, *æt.* 29, living in Gawthorpe, who was attacked on February 26. He was said to have been vaccinated in infancy, but had no marks. On his removal to hospital (February 29) his two youngest children (*æt.* three years and nine months respectively) were primarily vaccinated successfully. It is not known where he was infected.

No. 11, *æt.* 48, a butcher in High Street, Gawthorpe, sickened on April 15th, the rash appeared on the 18th, and he was removed on the 19th. Re-vaccination was offered to the other inmates, but declined; they were kept at home for five days after his removal.

Of the remaining cases it may suffice to say that the source of infection could not be clearly traced in any, although one or two were probably infected from a single source. Thus No. 15, H. R., *æt.* 23, a rag merchant, was attacked on May 25; No. 16, S. J. S., *æt.* 34, a rag-sorter at R's mills, was attacked on May 24, the coincidence suggesting exposure to a common focus. There were three other persons engaged in the rag trade (each at different mills) who were attacked, viz., C. M., *æt.* 16, *f.* (No. 17), a rag-sorter, attacked May 31; J. S., *æt.* 25 (No. 19), rag merchant, attacked June 3rd; J. A. T., *f.*, *æt.* 20 (No. 20), a rag-sorter, attacked August 3rd.

It may be observed that every case was removed to hospital with great promptitude, never later than the day following the appearance of rash. Of 26 persons who were re-vaccinated after being in contact with the case, 12 only "took," eight children, who were unvaccinated at the time that the case of small-pox was in the house, were successfully vaccinated on the removal of the case.

As regards sanitary conditions, at least four of the privy-middens were in a bad state, two on the old "open" plan, with ashpits also open and much below the surface, only

one house had a w.c.: eight were through houses, one a "single" house, and nine "back-to-back" houses. The proportion of inmates to rooms (both sleeping and dwelling) was —

	Rooms.	Inmates.	Per Room.
8 "through" houses	36	47	1.3
9 "back-to-back" and single houses.	25	42	1.6

RAVENSTHORPE.

There was one case of small-pox in 1891, and 16 in 1892 in the period here reviewed. The cases were distributed thus:—One in November 1891, one in February 1892, two in March, two in April, eight in May, one in June, two in August. They came from 14 houses, in three of which there was more than one case. There were no deaths.

The place and order of infection of these houses are given in the subjoined list, from which it appears that they contained 90 inmates, viz., three under one year of age, 20 between one and ten years (three attacked), 44 between 10 and 30 years (seven attacked), 23 aged 30 and upwards (seven attacked).

SMALL-POX AT RAVENSTHORPE, 1891-92.

LIST OF INFECTED HOUSEHOLDS WITH AGES OF INMATES and of those ATTACKED.

First Appearance of Small-pox.	Street.	Reference to House Register.	All Inmates.				Attacked with Small-pox. (Nos. refer to Case Register.)			
			Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.	Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.
1891. Nov. 3	Albion Street	5			7	2				1
1892. Feb. 6	Commercial Street	5	1	3	4	2				2
March 15	Queen Street	1		2	2					4
" 16	Queen Street	2	1	1	2			9	3	
April 3	Day Street	4		1	6	2				5
" 4	North Road	3			2					6
May 1	Union Street	9		2	2	2				7, 11
" 7	Commercial Street	11	1	4	4	2				8
" 8	Raven Street	12		1	1	2		10		
" 20	Sackville Street	8		1	2	2				12
" 27	Fox's Mill	10		3	1	2		14	13	
June 1	Queen Street	7		2	6	2				15
Aug. 20	Dannley Street	14			5	2				16
" 25	Albion Street	13			2	1				17
	14 houses		3	20	44	23		3	7	7

The first case known to occur in Ravensthorpe was that of E. K. *æt.* 15, a domestic servant, who came to her home in Albion Street every night. The origin of her illness could not be ascertained, for although her master had duties at a large mill where cases of small-pox occurred three months subsequently, there were none at this date, so far as I can make out, among the workers at this mill or their families. She (No. 1) was attacked on November 3rd, the rash appeared on the 6th, and she was removed to the Dewsbury Hospital the same day. She was unvaccinated, as also was her brother, G. K., who was not vaccinated until January 1892. [Albion Street is one of a group of streets which were formerly much neglected, ending blindly; but within the past two years they have been opened out and repaved. Ravensthorpe is on low ground.

quite in the Calder basin; but of late years its drainage has been much improved.]

No other case occurred until February 6th, when M. P., *æt.* 40 (No. 2), a mason engaged at Dewsbury Moor (where he may have been infected) was attacked. Commercial Street, where he lived, is parallel to Albion Street, and cases occurred in both these streets again much later (May and August). The four-roomed house (two of which only were sleeping rooms) contained 10 inmates, the ages of the eight children ranging from 18 years to two weeks, this infant being the only unvaccinated member of the family. M. P. was removed on February 13th for isolation to the Engine House at the Sewage Pumping Station, where he was nursed by his wife and where he remained until March 14th.

R. C., *æt.* 30, a house painter (No. 4) who had been employed in painting the annex then in course of erection to the Dewsbury Fever Hospital, was attacked on March 15th, and removed to the hospital on the 23rd. E. C., *f.* 24 (No. 3), living in the same street, was attacked on the 16th and removed to the hospital on the 19th. She had two unvaccinated children, *æt.* four years and five weeks respectively; and on the 10th day of her return home (April 29) after a fortnight's stay at Crow Nest, one of these, A. C., *æt.* four (No. 9), was attacked (*i.e.*, on May 8), and was removed to hospital on the 11th. His attack was a discrete one, and he returned home on the 9th June. The infant was vaccinated when its mother was in hospital.

H. M., *æt.* 22, a miner at work recently at Barnsley returned to his home in Day Street, Ravensthorpe (he used to come home at the end of every week), when he was taken ill with small-pox on April 3rd. He was the only unvaccinated member of a family of nine, and was removed to the hospital on April 7th.

W. S., *æt.* 24 (No. 6), living with his wife in a back-to-back two-roomed house in the North Road, was attacked on April 4th. He was out of work at the time, but his wife was employed as a rag-sorter.

The next case was that of E. S., 37, a blanket-weaver, (No. 7), who sickened on May 1st and was removed to hospital on the 4th; his wife was attacked on the 17th; but their four children, including one unvaccinated (*æt.* eight), escaped. Similarly, in the house of T. M., *æt.* 36 (No. 8), who was attacked on May 7th and removed on the 10th; there was one unvaccinated child (*æt.* three months), and one who was alleged to have been vaccinated but had no marks (*æt.* three years), the remaining seven children all unvaccinated; and the father, who had had small-pox in childhood, unvaccinated. There was no second case in this house.

Per contra, A. D., *æt.* 10 (No. 10), a schoolboy, was the only unvaccinated member of a family of four; he was attacked on May 8, and removed to hospital on the 14th, the fourth day of his rash. His sister, H. D., *æt.* 17, was re-vaccinated (unsuccessfully) on the 20th June. J. L., *æt.* 36 (No. 12), was employed at a mill, amongst whose workers were some coming from infected houses, and where a worker (No. 5) had been attacked on April 3.* This man, J. L., was attacked on May 20, and removed on the 23rd.

Two children (H. H., *æt.* 10, vaccinated, No. 13; and P. H., *æt.* 3, unvaccinated, No. 14) of a mill overseer, and living in a house on the mill premises, were attacked on May 27 and 29. I was unable to ascertain whether at the time there were any of the mill hands infected or coming from infected houses. The parents both had small-pox in youth; and of the remaining two children who were not attacked, the youngest, aged one year, was unvaccinated.

The remaining cases were all of mill hands. One, A. D., *f.* 19 (No. 15), who had no marks of her alleged infantile vaccination, was attacked on June 1; she worked at a mill at which also worked one of the Dewsbury patients (No. 149), who had been attacked April 14. Another, O. W., *f.* 22 (No. 17), attacked August 23, worked at a mill where there also worked members of the households of No. 233 (Dewsbury), who was removed to hospital on June 21, and of No. 248 (Dewsbury) removed July 16.

Thus of the 17 cases occurring at Ravensthorpe, none were kept at home; one was isolated at the Sewage Works engine house, and the rest taken to Dewsbury Hospital.

As to the sanitary conditions, there were privy-middens in connexion with all the houses, mostly, however, in well-kept state. There were 5 "through" houses, 6 "single"

houses without through ventilation, and 3 "back-to-back" houses. The proportion of inmates to rooms are—

	Rooms.	Inmates.	Per Room.
5 through houses	27	41	1.5
9 "single" and "back-to-back" houses.	24	49	2.

SOOTHILL NETHER.

There were 14 cases of small-pox in the district of Soothill Nether during the year 1892, viz., January 2, February 2, March 1, April 5, May 2, June 2, each coming from a different house. There were no deaths.

In the subjoined list of these households it will be seen that in the 12 of which particulars were obtained there were 68 inmates, viz., 11 between the ages of 1 and 10 years (two attacked), 32 between 10 and 30 (six attacked), and 25 aged 30 and upwards (four attacked).

SMALL-POX AT SOOTHILL NETHER, 1892.

LIST OF INFECTED HOUSEHOLDS WITH AGES OF INMATES and of those ATTACKED.

First Appearance of Small-pox.	Street, &c.	Reference to House Register.	All Inmates.					Attacked with Small-pox. (Nos. refer to Case Register.)				
			Under 1 year.	1 to 10 years.	10 to 20 years.	20 years upwards.	Under 1 year.	1 to 10 years.	10 to 20 years.	20 years upwards.		
1892.												
Jan. 27	Church Hill, Earlsheston.	1		1	2				1			
- 27	Cross Street, Earlsheston.	9			4						2	
Feb. 18	Walker Street	2		2	2							3
- 25	Town Street	4		2	2				4			
March 15	High Road, Earlsheston.	3	1	7	2				5			
April 2	Town Green	8		3	3				6			
- 17	Chickenley Heath	6	1	1	2				7			
- 20	Chickenley Lane	5		5	2				8			
- 23	Stocks Fold, Earlsheston.	7		2	2							9
- 28	Brook's Buildings, Chickenley.	10		2	5	2						10
May 2	Chickenley Heath	-	-	-	-	-						11
- 24	Bank Foot, Earlsheston.	11		2	4	2			12			
June 6	Commonside, Earlsheston.	12		3	2				13			
- 14	Robinson's Yard, Earlsheston.	-	-	-	-	-						14
	12 houses	-	-	11	32	25			2	6		4
	2 houses	-	-	-	-	-			1			1

The first case was that of H. C., *æt.* 17 (No. 1), a "piecener" in a large mill at Dewsbury. He was attacked on January 27, and removed to Dewsbury Hospital on February 6. A man employed at the same mill had his wife and children down with small-pox (Nos. 36 to 39 in Dewsbury Register) 3 weeks before, the last to be removed to hospital being on January 4th; and a case (No. 41 in Dewsbury Register) was removed on January 11 from a house where another worker at this mill lived.* H. C. was unvaccinated.

On the same day as No. 1, J. S., *æt.* 32, also a mill hand, and living also in the Earlsheston quarter of Soothill Nether was attacked, and removed to Dewsbury Hospital on February 6, seven days after appearance of rash. His sister worked at the same mill, as did a subsequent case (No. 4), and also some inmates of houses whence Nos. 5 and 10 were removed in March and May.

* Other cases amongst the families of the hands at this mill occurred at later dates, viz.:—Soothill Nether, No. 8, attacked March 15 (four workers); Soothill Upper, No. 7, attacked February 8, where there were two such workers; No. 20, attacked April 9 (one worker from this mill in house); Nos. 24 to 26, attacked from May 17 to June 9 (two workers at this mill in house).

* The sister of a man at Soothill Nether (S.N. 7), who was attacked on April 17th, and removed to hospital on the 21st, worked at this mill.

Mr. H. S., the sanitary inspector to the district, had assisted in the removal of Cases 1 and 2 to the hospital on February 6th, and on the 18th was himself attacked. He was nursed at home and made a good recovery; the three other members of his family being re-vaccinated successfully by Mr. Clay on February 20th.

J. E., m., 27 (No. 4), was attacked on February 25; his fellow-worker at T—'s mill returned to his work from the hospital on the 15th, and J. E. "felt afraid on seeing him that he himself would be attacked."

L. S., f., 27 (No. 5), is also a mill hand, her father and brother being employed at T—'s mill, and two brothers and sisters at the mill in Dewsbury where No. 1 worked. She was attacked on March 15th and removed to hospital on the 19th. There are 10 in the family (three sleeping rooms), all vaccinated.

E. G., m., 27 (No. 6), a schoolboy, was attacked on April 2, but the cause of his infection is not clear. He was unvaccinated, and three of the remaining five members of the household had previously suffered from small-pox.

The next case was that of a miner, W. A., 21 (No. 7), living at Chickenley Heath, an open district bordering on Ossett. He was attacked on April 17th and thought that he might have been infected on a visit he had paid to Heckmondwike some 10 days previously.

Another case at Chickenley occurred on April 20th. This was a girl 15 (No. 8), a weaver, the only unvaccinated member of her family (seven individuals). She stated that on April 9th she had gone to Howden Clough with some friends and had been "much alarmed at seeing some of the convalescent patients of the small-pox hospital who were in the field adjoining the lane down which she passed." There is, however, no evidence that she came in contact with any infected person or visited any infected house.

A third case at Chickenley is that of G. S. D., 40 (No. 10), employed in a wool mill at Ossett. I cannot find that there were any persons from infected houses working at this mill at the time, but in June and August there were some. G. S. D. sickened on April 28, and was removed to Dewsbury Hospital on May 4th. He and all the members of his family were vaccinated.

E. P., f., 7 (No. 12), living at Earlsheaton, was attacked on May 24th. She attended a school at Eastboro', Dewsbury, where there had been a case the previous month (D. 154, attacked April 15), and where subsequently four children in another family (D. 235, 244, 250, 254) and of the same school were attacked (July 2nd to 27th) two of them after having had varicella, and another (D. 228) child from a third family attacked with very mild small-pox on June 3rd.

E. A., m., 25 (No. 13), probably was infected in the hospital, whither he had been removed on June 19th. He had been taken ill on the 6th, when a rash appeared, and on the 13th and 19th his sister (27) and brother (2) were attacked with varicella. When in hospital on June 20th (i.e., the 12th day of his residence) he was again taken ill, and a viruliferous rash appeared on the 23rd. This child attended the same school as his sister, and as G. H. (No. 14), an unvaccinated child, whose attack was comparatively mild, and who whilst in hospital (where she was taken on the 27th June) had an attack, supposed to be scarlet fever.

Thus of these 14 cases, one was treated at home, the rest removed to Dewsbury Hospital.

As to sanitary condition, all the houses had privies in connexion with them, and the state of these was good. Only two were through houses having together 9 rooms and 16 inmates, or 1.8 per room. There were nine "back-to-back houses," and one "single" house without through ventilation; these had in all 24 rooms and 52 inmates, or 2.1 per room.

SOOTHILL UPPER.

There were 26 cases of small-pox occurring in the district of Soothill Upper within the period covered by this inquiry. One of these was in June 1891, the rest occurred from January to June 1892, viz.:—January 4, February 4, March 3, April 4, May 3, June 1. Four cases were fatal. They proceeded from 19 different houses, and it may be convenient to group them according to the four several parts of the district in which they occurred. For Soothill Upper contains a large tract of agricultural upland, and its inhabited parts are gathered around four centres. To the north of the district, adjoining Batley, is Soothill Lane; to the east in much open country is Chidswell; to the west on a high cliff overlooking Batley Carr is Hanging Heaton, whilst south and passing into

Dewsbury and Soothill Nether is the Leeds Road. The number of houses and of the cases proceeding from them in each month in these four areas were as follows:—

	Soothill Lane.		Chidswell.		Hanging Heaton.		Leeds Road.		Total.	
	Houses.	Cases.	Houses.	Cases.	Houses.	Cases.	Houses.	Cases.	Houses.	Cases.
June 1891	—	—	—	—	1	1	—	—	1	1
January 1892	1	1	—	—	2	3	—	—	3	4
February 1892	1	1	—	—	—	—	2	3	3	4
March 1892	2	5	1	1	3	3	1	1	7	10
April 1892	—	—	1	1	1	1	1	1	3	3
May 1892	—	—	—	—	—	—	2	4	2	4
	4	7	2	2	7	8	6	9	19	26

Particulars of the size of these households are give in the subjoined list, from which it appears that the 19 houses contained 109 inmates, of whom two were under one year of age (1 attacked), 28 between 1 and 10 years (6 attacked) 49 between 10 and 30 (14 attacked) and 30 were aged 30 years and upwards (5 attacked).

SMALL-POX AT SOOTHILL UPPER, 1891-92.

LIST OF INFECTED HOUSEHOLDS WITH AGES OF INMATES AND OF THOSE ATTACKED.

First Appearance of Small-pox.	Street, &c.	Reference to House Register.	All Inmates.				Attacked with Small-pox. (Nos. refer to Case Register.)				
			Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.	Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.	
1891.											
June 13	G— Farm, Hanging Heaton.	16		3	2				1		
1892.											
Jan. 7	High St., Hanging Heaton.	14		2	2						2
" 16	Soothill Lane	3		3	6	2			3		
" 16	High St., Hanging Heaton.	15		3	1				6, 5		
Feb. 4	Soothill Lane	4		1	2	2			6		
" 8	Elizabeth Place, Leeds Road.	10		1	2	1			7		
" 11	Hollinroyd Road, Leeds Road.	9	1	1	1	1			23		8
Mar. 2	Clay's Buildings, Leeds Road.	1		3	1	1					9
" 11	Soothill Lane	12			4	2			15, 16		10
" 12	Chidswell	13		2	2						11
" 18	Town End, Hanging Heaton.	8		4	2	1			13		
" 20	High St., Hanging Heaton.	7		1	3	2					14
" 24	High St., Hanging Heaton.	6	1	3	3	2					17
" 27	Lady Anne Road	11		1	4	2					21
April 5	Chidswell	5		2	2	2			19		
" 9	Whitely's Buildings, Leeds Rd.	2			5	1					20
" 21	Nab End, Hanging Heaton.	17			2	2					22
May 9	Lumbfield Terrace, Leeds Road.	18		3	3	2			24, 26		25
" 16	Batty St., Leeds Road.	19		1	3	2			27		
	19 houses		2	28	49	30	1	6	14	5	

Soothill Lane Group.

H. I., 25 (No. 3), employed as a barber's assistant at Batley, was attacked with small-pox on January 16. In the course of his work he had to attend the workhouse at Staincliffe for the purpose of shaving the inmates; and it may be remembered that at the close of 1891 there were several cases of small-pox in the isolation wards. He did not, however, see any of these patients, and it is just as likely that he was infected through persons coming to his shop from infected houses. It is curious that only a few

days previously, viz., on January 11, another young man engaged as barber's assistant (in another Batley establishment) was attacked with small-pox (Batley Reg. 160); and a third one, described as a hairdresser (Batley Reg. 162), on January 10. Perhaps this occupation involving fairly close proximity to the customer may favour the transmission of contagia from the latter to the operator. H. I. belonged to a family of 11 individuals; 7 of the children, including himself, at ages ranging from 1 year to 18, being unvaccinated. Before his removal to the Dewsbury Hospital on January 19 he was isolated in the upstairs room and attended by his parents, three of the children (ages 2 to 10) being sent away from home for three weeks. There was no other case in this house.

M. H., f., *æt.* 25 (No. 6), was attacked on February 2nd. She was employed as weaver at one of the largest mills in Batley, whose workers had furnished several cases, including the first case that was attacked in May 1891.* She was not removed, but was nursed by her mother in a room upstairs, the rest of the family (ages 50, 19, and 4 years) remaining below.

There were three cases in the next house to be infected in this group. The first to be attacked was Mrs. E., *æt.* 55 (No. 10), unvaccinated. She sickened on March 11, and was removed to Dewsbury Hospital on the 18th (5th day of rash), where she died on the 23rd. Her two daughters, J. E., aged 16, and S. E., aged 13 (Nos. 15 and 16), the former being unvaccinated, were both attacked on the 24th and removed on the 28th.

On March 27, Mrs. H., *æt.* 45 (No. 18), living in Lady Anne Road (near the Batley Station), was attacked; she was removed to Dewsbury Hospital on April 2nd. Her eldest daughter, A. E. H., *æt.* 20 (No. 21), a weaver in Dewsbury, sickened on April 19 and was removed on the 17th. It is not known how the infection was introduced here.

Chidswell Group.

There were two infected houses in the whole hamlet of Chidswell. The first, Elliott's Buildings, was occupied by J. P., a miner, with his wife and two unvaccinated children. J. P., aged 24 (No. 11), was attacked on March 3rd and removed to Dewsbury Hospital on the 18th. He worked at Soothill Wood Colliery, which throughout the epidemic had furnished a considerable number of cases.†

Those in February preceding this case were Nos. 316 (Batley) attacked February 13, 346 attacked February 18, 350 attacked February 20, and 379 attacked February 25. It is clear that there must have been a common focus of infection for so many to have been affected.

The other case in Chidswell was that of a schoolgirl, *æt.* nine, vaccinated, two foveate marks (No. 19), living in Greave's Buildings, who sickened on April 4th. She was kept at home during her illness, the other inmates of the house being her father J. F., a miner at Soothill Wood (and possibly the medium of her infection), her mother, *æt.* 40, who was unvaccinated, but had suffered from small-pox in infancy, and her sister, four years of age, who had two large vaccination marks.

Hanging Heaton Group.

The first case in the district occurred in Hanging Heaton, at a farmhouse. The patient, A. F., *æt.* 16, was a weaver (No. 1) at a mill in Batley; four or five months later some other workers at this mill were attacked, but at this time (June 11th, 1891) she was apparently the only one of these mill-hands to suffer. It was in the seventh week of the outbreak in Batley, where ten cases only had occurred prior to this date. Like the others arising at this time, she was isolated in the union infirmary at Staincliffe on June 15th.

On January 7th, Mrs. B., *æt.* 33 (No. 2), was attacked. She had visited her sister Mrs. H. (No. 39 in Dewsbury Reg.) in Dewsbury a fortnight before; Mrs. H. was attacked with small-pox on December 22nd, a rash appearing on the 24th, and she was removed to hospital on the 29th. It is more probable that Mrs. B. was thus directly infected than

by the conveyance of infection through her husband, a miner at Soothill Wood. She was kept at home during her illness; her husband and two children (aged eight and five years) being all vaccinated.

M. S., *æt.* 19, a miner (at another pit than that above referred to), living in High Street, Hanging Heaton, was attacked on January 16th (No. 4) and his sister, H. G. S. (No. 5) on January 31st. Both were kept at home, and both although alleged to have been vaccinated in infancy bore no marks of this. They were nursed by their mother, whilst the only other member of the household, a miner, *æt.* 17, went away for three months on January 19th, the day on which his brother's rash appeared.

M. S., f., the unvaccinated infant child (*æt.* 16 months) of a miner living at Town End, was attacked (No. 13) with small-pox on March 18th. Her mother had visited J. P. (No. 11) before his removal to hospital on the 18th (he had been taken ill on the 12th), but if she had then conveyed infection to No. 13, it would make the incubation period of the latter's illness no longer than a week. It is therefore more likely that the contagion was introduced to the house in other ways, perhaps through the medium of the father, who had a fellow miner (No. 9) taken ill on March 2nd, and removed to hospital on the 7th. The child was removed to Dewsbury Hospital on the 27th, and died there on April 7th. At the time of its attack there were two other unvaccinated inmates of the two-roomed dwelling (four being vaccinated), viz., the father, who had suffered from small-pox when 10 years old, and a girl of seven years, who was vaccinated in April.

E. S., *æt.* 11, a schoolgirl, living next door to the house in High Street, inhabited by Nos. 4 and 5, who were kept at home during their illness. About ten days before E. S. (No. 14) sickened, that house was disinfected, the fumes penetrating the other dwelling. The families used a privy common to both houses. E. S. sickened on March 20th, the rash appearing on the 23rd. She was kept at home with her mother, the father and three other children being sent away during her illness.

H. P., f., *æt.* 21 (No. 17), weaver at the mill in Batley where No. 6 worked, was attacked on March 24th. She and her sister worked in the same hall at the mill as M. H., of Batley (No. 460 in Batley Reg.), who was attacked on the same day. There had been no other cases previously amongst the workers in this hall; but it is highly probable that some came from infected houses. H. P. was kept at home during her illness with her mother, who was confined about a week later, the same nurse attending to both; the mother was re-vaccinated on March 25th, and the infant was vaccinated shortly after its birth. The rest of the family (father and five children) were sent away from home.

S. D. D., *æt.* 24 (No. 22), the wife of a miner working at Soothill Wood, was attacked on April 21st. She was unvaccinated, and lived with her mother and grandfather at Nab End, Hanging Heaton, the former (*æt.* 64) bore no evidence of vaccination, and no information could be obtained as to the vaccination of the latter (*æt.* 89).

Leeds Road Group.

A child, J. R., *æt.* 7 (No. 7), attending the Eastboro' School and living in Elizabeth Place, was attacked on February 8th. He was unvaccinated, and it is probable that he was infected at the school, for on the 16th a school-fellow living at Thornhill (T. 3) was attacked, and another schoolfellow came from a house in Dewsbury where a case of small-pox occurred on the 10th (No. 69 in Dewsbury Register). I cannot find, however (in the houses of which I have particulars), any record of children at this school coming from infected houses prior to these dates. J. R. was removed to Dewsbury Hospital on February 13th, and died there on the 20th.

Mrs. S., *æt.* 26 (No. 8), living in Hollinroyd Road, sickened on February 11th; she was confined of a male child on the 14th, and next day she developed a variolous rash. Her infant died on the 26th, the certificate stating the cause of death as "Small-pox, 4 days."

T. E. C., *æt.* 31 (No. 9), a miner, working in the same pit as the father of the child M. S. (No. 13) already referred to. He was attacked on the 2nd, and removed to hospital on the 7th. His three children (aged 7, 4, and 2) were unvaccinated, two of them attended the school at Eastboro' above mentioned, and may possibly have been the medium of infection.

T. A., *æt.* 14 (No. 20), attacked on April 9th, and isolated in an upstairs room during his illness, was a very mild one. He was a delicate youth, subject to hæmoptysis, but once a week delivered greenococci in Batley and elsewhere, and may have been thus infected.

* In my Batley Register of small-pox cases I find there are 15 persons who were engaged at this mill in one capacity or another, and, of course, there are several other workers there who were members of households in which small-pox occurred. Of these 15 cases, 1 was attacked in April 1891, 1 in May, 2 in December, 6 in January, 3 in February, 1 in March, and 1 in April. So that most occurred just about the time that the above M. H. was in bed; indeed, two of the Batley patients (Nos. 279 and 286) sickened on February 3, and were therefore probably infected at the same time as M. H. Another case in Soothill Upper (No. 17), occurring in March, was that of a weaver in this mill.

† There were 28 miners engaged in this pit living in Batley who were attacked with small-pox, viz.:—1 in December 1891, 14 in January 1892, 5 in February, 3 in March, 2 in April, 3 in May.

On May 17th J. E. B., a boy of seven years (No. 24), one of a family of six children, living in a house on high open ground, was attacked. He and his brother both unvaccinated, *æt.* 5, attended the Eastboro' School, where cases of varicella and one or two of variola had recently broken out (see "Soothill Nether, Case 12), and at the same time a girl, A. D. (*æt.* 7), schoolfellow, was attacked also (*v.* below). J. E. B. was removed to the hospital on May 23rd, and on May 30th his mother, *æt.* 42 (No. 25), was attacked, and removed June 4th. On June 9th the youngest child, *æt.* one, unvaccinated (No. 26), fell ill, and was removed on the 13th. On June 11th three elder children (ages 16, 14, and 13) were re-vaccinated (unsuccessfully), and on the same day the younger brother, *æt.* 5, was successfully vaccinated.

A. D., *f.*, *æt.* 7, an unvaccinated child (No. 27), living in Battye Street, sickened on May 16th, developed a rash on the 17th, and was nursed at home. Her case was a mild one, and I am not certain that it should not be regarded as one of varicella, which was also prevalent in the Eastboro' School that she attended. The five other members of this family were re-vaccinated (successfully) on June 19th.

Thus of these 26 cases in Soothill Upper, 11 were kept at home, one was removed to the Union Infirmary, and 14 were removed to the Dewsbury Hospital.

As to the sanitary condition of the houses visited, there were privy-middens connected with all, five of these being in a more or less neglected state; two having open ashpits in connexion with them. There were six completely "through" houses, three in which through ventilation only effected by a back window, and 10 without through ventilation at all, five of these being "single" houses, (one of a row), and five "back-to-back." Many were in open situations and nearly all on high ground. The proportion of inmates to rooms for each class of house was:—

	Inmates.	Rooms.	Per Room.
6 "through" houses	32	44	1.3
3 "partly through" houses	8	12	1.5
10 "single" and "back-to-back" houses.	31	53	1.7

THORNHILL.

There were 20 cases of small-pox in the wide area of Thornhill during the period covered by this inquiry; and two of these occurred in December 1891, six in February 1892, six in March, one in April, two in May, one in July, two in August. Three cases were fatal.

These cases came from 18 different houses, particulars of 17 of which were obtained.

The district extends from the high ground of Thornhill Edge, which is sparsely inhabited, to the Calder at Dewsbury. It will be convenient to group the infected houses in each of the four chief centres of population into which the district may be divided. Passing from south to north, these are:—(a) Thornhill Edge, about 350 to 500 feet above sea level; (b) Thornhill, 300 to 400 feet above sea level; (c) Thornhill Lees, 150 feet above sea level; (d) Saville Town, about 100 feet above sea level. The months in which the houses in these centres were infected, and the cases proceeding therefrom, are as follow:—

	Thornhill Edge.		Thornhill.		Thornhill Lees.		Saville Town.		Total.	
	Houses.	Cases.	Houses.	Cases.	Houses.	Cases.	Houses.	Cases.	Houses.	Cases.
December 1891	—	—	—	—	—	—	1	2	1	2
February 1892	—	—	—	1	3	3	—	—	5	6
March	1	1	2	2	3	3	—	—	6	6
April	—	—	1	1	—	—	—	—	1	1
May	—	—	—	—	—	—	2	2	2	2
July	—	—	—	—	—	—	1*	1	1	1
August	—	—	—	—	1	1	1	1	2	2
	1	1	4	4	6	7	7	8	18	20

* Not visited.

The total number of inmates of the 17 houses of which I have particulars was 97, of whom 3 were under 1 year of age, 16 between 1 and 10 years (2 attacked), 50 between 10 and 30 (12 attacked), and 28 aged 30 and upwards (5 attacked).

SMALL-POX AT THORNHILL, 1891-92.

LIST OF INFECTED HOUSEHOLDS WITH AGES OF INMATES and of those ATTACKED.

First Appearance of Small-pox.	Street, &c.	Reference to House Register.	All Inmates.				Attacked with Small-pox. (Nos. refer to Case Register.)			
			Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.	Under 1 year.	1 to 10 years.	10 to 30 years.	30 years upwards.
1891.										
Dec. 7	Saville Green, Saville Town.	12		3	1			1, 2		
1892.										
Feb. 6	Mountain View, Thornhill Lees.	6		1	2			3		8
" 21	Coombs Road	4		2	1			4		
" 22	Scarboro' Terrace, Saville Town.	10			2					5
" 26	Forge View, Thornhill Lees.	7	1		4	1		6		
" 28	South Street, Saville Town.	11		3	4	4				7
March 1	Thornhill Edge	13			6	2				10
" 2	Thomas Street, Thornhill Lees.	5		1	2					9
" 5	Thornton Road, Thornhill Lees.	8		1	4	2		12		
" 10	Nursery Street, Thornhill Lees.	9			5	1				11
" 26	Coombs Road	1		4	2			13		
" 26	Hall Lane	3			4	1				14
April 1	Wells Street	2			1	3				15
May 5	Kaye Street, Saville Town.	14			4	3		16		
" 7	Leamington Terrace, Saville Town.	15			5	2				17
July 20	Saville Town.	—	—	—	—	—		18		
Aug. 14	South View, Saville Town.	16	1	2	1	1				19
" 14	Thornton Road, Thornhill Lees.	17	1	4	3	2				20
	17 houses visited		3	16	50	28		2	12	5
	1 house not visited							1		

The case at Thornhill Edge was that of a miner, *æt.* 25, who sickened on March 1, developed a rash on the 8th, and was removed to Dewsbury Hospital on the same day. No other case occurred in the family of seven persons, one of whom (*æt.* 19) was unvaccinated.

Thornhill Group.

H. B., *f.*, 22 (No. 4), a rag-picker in a Dewsbury mill, was attacked on February 21st. She had a confluent attack and died on March 7, having been treated at home. She was vaccinated, and Mr. Davies, medical officer of health, says that she had "two imperfect marks"; her sister says that she had "a very bad arm after vaccination."

This young woman was said to have contracted the disease from a fellow worker at the mill, who was removed to the hospital exactly a fortnight previously, but I have been unable to trace this case.

L. A. B., a schoolgirl, *æt.* 6 (No. 13) unvaccinated, sickened on March 26th, and removed to hospital on the 30th. The origin of her infection is doubtful. Two other children (aged two and one year), were also unvaccinated; the mother stating that all three were declared unfit to be vaccinated in infancy.

H. B., 24, a house painter (No. 14), was attacked on March 24. He had been engaged on the 9th and 10th in repapering, &c., the house occupied by No. 4. His mother and one sister (*æt.* 29) were unvaccinated. Another sister (*æt.* 21) was engaged during the week as a machinist in Huddersfield, coming home every week end. She went to Huddersfield on April 3, and on the 11th was removed to the infectious hospital there, suffering from small-pox.

L. C., 37 (No. 15), also a house painter, who sickened on April 1st, may have contracted small-pox by being engaged in limewashing an infected house at Thornhill Lees on

March 8th to 11th, but if so, the incubation period would have been prolonged beyond the usual term of 14 days. He was removed to Dewsbury Hospital on April 4th.

Thornhill Lees Group.

A. C., *æt.* 9 (No. 3), unvaccinated, was attacked on February 15, and was removed to the Dewsbury Hospital on March 4th. He was attending the school at Eastboro', one of his schoolfellows also being attacked about the same time (*viz.*, S. U. 7, on February 8). His foster mother, A. P., *æt.* 40, was attacked on February 26, and removed to hospital together with him. Her husband (the only other inmate of the house) had had small-pox in childhood.

E. S., *f.*, 24 (No. 6), a rag-picker at a mill in Dewsbury, where at the time no other cases occurred or others coming from infected houses, was attacked on February 20, and removed to Dewsbury Hospital on March 2nd. There was an unvaccinated child, *æt.* 7 months, in the family.

Another case, the origin of which could not be traced, is that of A. L., 24 (No. 9), employed in the bottle works at Thornhill. I cannot find that at this time (except from the house of No. 6) there was any other worker from an infected house at these works. A. L., who was unvaccinated, sickened on March 4, and was removed on the 6th.

L. J., *f.*, *æt.* 21 (No. 12), was a rag-picker and fellow worker with the girl, H. B. (No. 4), who died on March 7. H. B. was last at work on February 20th, and L. J. did not sicken until March 15. She was unvaccinated. Her mother, *æt.* 39, was also unvaccinated, and so were her two sisters (aged 12 and 3 respectively). These latter were vaccinated on March 25, *i.e.*, seven days after L. J. had gone to hospital. Mrs. J. had previously suffered from small-pox.

H. E., *f.*, 12 (No. 11), two of whose brothers were engaged in the same works as No. 9, was attacked on March 10, and removed to Dewsbury Hospital on the 12th.

No other case occurred at Thornhill Lees until August, when C. L., *f.* 13, one of a family of 10, and herself occupied in house work, was attacked on August 14th (No. 20), the source of her infection being unknown. She was removed on August 19; the only unvaccinated members of the family being a girl of three years and an infant of six months.

Saville Town Group.

This is a comparatively recently built over district, only separated from Dewsbury by the Calder. On December 7, 1892, T. C., *æt.* 15 (No. 1), who served at his father's fish stall in Dewsbury market-place, was attacked with small-pox. He was unvaccinated and was sent to Dewsbury Hospital on the 19th. On December 21st, his sister, M. A. C., (No. 2) *æt.* 20, vaccinated, who kept house, was also attacked; she was removed on January 1st. Another sister, a weaver, *æt.* 17, who had not been vaccinated in infancy was vaccinated on December 10th. It is noteworthy that the vaccinated sister who remained at home with her sick brother was infected, whilst the unvaccinated (at that time) sister, who went out to work daily, and did not come in contact with the patient, escaped.

W. A., *æt.* 42 (No. 5), engaged in a large confectionery establishment in the Bradford Road, fell ill on February 22, and had a very mild attack. He remained at home, the only other inmate of the house being his wife, who was re-vaccinated on March 3. He thinks he may have been infected by intervening applicants for work who came from Batley. None of the actual workers in the establishment had the disease.

S. K., *æt.* 30 (No. 7), sickened on February 28th. He had been employed for from four to six weeks in work at the new buildings at the Dewsbury Small-pox Hospital, where he doubtless received his infection. He was removed to the hospital on the 3rd; but on the 29th (*i.e.*, day after onset of illness, and two days before the rash appeared) a large party of friends assembled in the house, most of whom went up to his room to see him. No cases appear to have arisen from this exposure to an infected person in the prodromal stage of the disease.

The next case in this part of the district occurred on May 5. It is that of J. H. W., *æt.* 26 (No. 16), who followed the occupation of a carrier, and may have visited infected houses. He was unvaccinated and died in Dewsbury Hospital to which he had been taken on May 8. One other member of the household (a man *æt.* 31) was also unvaccinated.

T. B., *æt.* 52 (No. 17), was attacked on May 7th, and removed to Dewsbury Hospital on the 11th. The cause

of his infection is not known; he lived at home, but one of his daughters was a rag-sorter at a mill which had furnished cases.

The last case is that of Mrs. B., *æt.* 22 (No. 19), who was unvaccinated; she sickened on August 14th, and was removed on the 19th. Her three children (aged three years, two years, and 10 months) were also unvaccinated.

Thus of the 20 cases occurring at Thornhill, two only were treated at home, 18 were removed to Dewsbury Hospital.

As to the *sanitary condition* of the houses inspected, all seemed to be in a satisfactory state; in about one half the privies were of modern construction ("model" type). There were nine "through" houses, and eight in which there was no through ventilation, one of these being a "single" house, the rest "back-to-back." The proportion of inmates to rooms in each class was:—

—	Rooms.	Inmates.	Per Room.
9 "through" houses - - -	37	57	1.4
8 "back-to-back" and "single" houses	24	46	1.9

It will be convenient to consider the statistics of these cases proceeding from districts of the union other than Batley and Dewsbury in a collected form, and therefore in the various charts and tables I have used the phrase "other districts" to denote these places, which have just been discussed in turn.

The total number of cases of small-pox known to have occurred in the other districts of the Dewsbury Union besides Batley and Dewsbury amounted to 219, and for the sake of convenience these will now be dealt with under the one heading.

The attacks occurred in the following weeks dating from the first week in which cases appeared in the Union. (See Chart V.)

TABLE LXIV.

OTHER DISTRICTS.—WEEKLY INCIDENCE of CASES of SMALL-POX (Chart V.).

Week of Outbreak.	Ending.	Cases.	Deaths.
1891.			
iv.	May 23 - - -	1	—
v.	" 29 - - -	—	—
vi.	June 6 - - -	—	—
vii.	" 13 - - -	3	—
viii.	" 20 - - -	—	—
ix.	" 27 - - -	—	—
x.	July 4 - - -	—	—
xi.	" 11 - - -	—	—
xii.	" 18 - - -	—	—
xiii.	" 25 - - -	—	—
xiv.	August 1 - - -	—	—
xv.	" 8 - - -	—	—
xvi.	" 15 - - -	—	—
xvii.	" 22 - - -	—	—
xviii.	" 29 - - -	—	—
xix.	September 5 - - -	—	—
xx.	" 12 - - -	1	—
xxi.	" 19 - - -	—	—
xxii.	" 26 - - -	—	—
xxiii.	October 3 - - -	—	—
xxiv.	" 10 - - -	—	—
xxv.	" 17 - - -	—	—
xxvi.	" 24 - - -	—	—
xxvii.	" 31 - - -	—	—
xxviii.	November 7 - - -	1	—
xxix.	" 14 - - -	—	—

OTHER DISTRICTS.—WEEKLY INCIDENCE OF CASES OF SMALL-POX—*cont.*

Week of Outbreak.	Ending.	Cases.	Deaths.
xxx.	November 21	—	—
xxxi.	" 28	—	—
xxxii.	December 5	—	—
xxxiii.	" 12	2	—
xxxiv.	" 19	—	—
xxxv.	" 26	—	—
1892.			
xxxvi.	January 2	3	—
xxxvii.	" 9	2	—
xxxviii.	" 16	9	—
xxxix.	" 23	2	—
xl.	" 30	6	—
xli.	February 6	9	—
xlii.	" 13	5	1
xliii.	" 20	4	—
xliiv.	" 27	12	2
xlv.	March 5	6	—
xlvi.	" 12	9	3
xlvii.	" 19	9	3
xlviii.	" 26	9	1
xlix.	April 2	9	1
l.	" 9	8	—
li.	" 16	7	—
lii.	" 23	9	—
liii.	" 30	5	1
liv.	May 7	9	1
lv.	" 14	8	—
lvi.	" 21	6	—
lvii.	" 28	5	—
lviii.	June 4	5	—
lix.	" 11	6	—
lx.	" 18	6	—
lxi.	" 25	8	—
lxii.	July 2	6	1
lxiii.	" 9	2	—
lxiv.	" 16	2	—
lxv.	" 23	6	—
lxvi.	" 30	2	—
lxvii.	August 6	4	—
lxviii.	" 13	5	—
lxix.	" 20	6	—
lxx.	" 27	2	—
		219	14

The monthly record was—

1891.		1892.			
—	Cases.	Deaths.	—		
May	1	—	January	20	—
June	3	—	February	31	3
July	—	—	March	35	8
August	—	—	April	33	1
September	1	—	May	31	1
October	—	—	June	26	1
November	1	—	July	14	—
December	5	—	August	17	—
		11	—	268	14

Of this number 121 were males and 58 females, the fatal attacks amounting among the former to eight, among the latter to six.

They were distributed according to their ages as follows:—

TABLE LXV.

—	Males.		Females.		Total.		
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
Under 1 year	4	2	—	—	4	2	
1 to 5 years	12	1	10	1	22	2	
5 to 10 years	17	2	15	1	32	3	
10 to 15 years	12	—	12	—	24	—	
15 to 20 years	10	—	15	1	25	1	
20 to 30 years	31	3	27	1	58	4	
30 to 40 years	19	—	9	1	28	1	
40 to 50 years	10	—	5	—	15	—	
50 to 60 years	1	—	3	1	4	1	
60 to 70 years	3	—	—	—	3	—	
70 and over	—	—	—	—	—	—	
Age not ascertained	2	—	2	—	4	—	
		121	8	98	6	219	14

or stated in age periods:—

—	Cases.	Deaths.	Case Mortality.
Under 1 year	4	2	Per cent. 50
1 to 10 years	54	5	9
10 to 30	107	5	4.6
30 and upwards	50	2	4.1

The mortality on the whole number only amounted to 6.4 per cent.

Occupations.—The occupations of those who were attacked with small-pox are set forth in the accompanying tables. They are collected under three categories, viz., (a) those who lived all day at home, engaged in home occupations or in trade carried on at their houses. This class includes of course all the infants; (b) those who were in daily attendance at school, returning home to meals; (c) those who were engaged in occupations for the greater part of the day away from their home as rag-sorters, weavers, menders, &c. who mostly come home for the mid-day meal. The incidence of the disease on these several classes is illustrated in Chart VI.

TABLE LXVI.

OCCUPATION TABLE.—MALES.

—	Under 1 Year.	1 to 10 Years.	10 to 30 Years.	30 Years and over.	Are not ascertained.	Total.
AT HOME	4	10	4	8	1	27
Of no occupation	4	10	2	2	1	19
Butcher	—	—	—	1	—	1
Gasfitter	—	—	1	—	—	1
Joiner	—	—	—	1	—	1
Innkeeper	—	—	—	1	—	1
Painter	—	—	—	1	—	1

OCCUPATION TABLE.—MALES.—continued.

	Under 1 Year.	1 to 10 Years	10 to 30 Years	30 Years and over.	Age not ascertained.	Total.
Plumber				1		1
Shop assistant			1			1
Wheelwright				1		1
AT SCHOOL	—	19	7	—	—	26
AT WORK	—	—	42	25	1	68
Mill hand			10	6		16
Miner			14	4		18
Agent			1			1
Baker			1			1
Barber			1			1
Butcher			1			1
Carrier			1			1
Carter				1		1
Clerk (L. Y. R.)			1			1
Confectioner				1		1
Engineer				1		1
Fish dealer			1			1
Labourer			1	1		2
Maltster				1		1
Mason				3		3
Painter			2	1		3
Potman			1			1
Rag merchant			2			2
Sanitary inspector				1		1
Shop assistant			2			2
Watchman				1		1
Occupation not ascertained			3	4	1	8

OCCUPATION TABLE.—FEMALES.

	Under 1 Year.	1 to 10 Years	10 to 30 Years	30 Years and over.	Age not ascertained.	Total.
AT HOME	—	10	22	15	2	49
Of no occupation	—	10	6	1	—	17
Housewife	—	—	14	13	2	29
Domestic servant			2			2
Dressmaker				1		1
AT SCHOOL		15	7			22
AT WORK			25	2		27
Mill hand			15	1		16
Rag sorter			5	1		6
Domestic servant			1			1
Dressmaker			1			1
Milliner			1			1
School teacher			2			2

Type of Attack.

The type of the attack of small-pox from which these 219 patients suffered was as follows.—

	Cases.	Per cent.
Confluent	42	19·1
Coherent	18	8·2
Discrete	78	35·6
Mild	74	33·8

and in 7 cases no information could be obtained on this head, two of them being fatal attacks.

At different age-periods these proportions are:—

	Cases	Per cent.
Under 1 year of age	4	—
Confluent	1	25·4
Mild	2	50·
Type not known	1	—
From 1 to 10 years	54	—
Confluent	14	25·4
Coherent	2	3·6
Discrete	8	16·3
Mild	29	52·7
Type not known	1	—
From 10 to 30 years	107	—
Confluent	23	20·4
Coherent	10	10·2
Discrete	44	40·
Mild	29	27·7
Type not known	2	—
At 30 years upwards	50	—
Confluent	4	8·3
Coherent	6	10·4
Discrete	25	52·1
Mild	14	27·1
Type not known	1	—

At ages not ascertained there were— confluent, one case; discrete, one case, and in two cases the type was not known.

From the data already furnished in the description of each of these districts it will be remembered that three of the early cases were sent for isolation to the Dewsbury Union Workhouse at Staincliffe (viz., from Birstal, Heckmondwike, and Soothill Upper). Of the rest there were sent to—

(a.) Dewsbury Small-pox Hospital	92
(b.) Batley	17
(c.) Morley	36
(d.) Ossett	20
(e.) Leeds	2

Thus there were 48 cases left for treatment in their own homes, and one sent to Ravensthorpe Sewage Works (see Chart VIII.).

The analysis of the foregoing as regards age and sex is as follows:—

TABLE LXVII.
ISOLATION OF SMALL-POX CASES.
(Chart VIII.)

	Sent to								Remained at Home.			
	Workhouse.				Hospital.				Male.		Female.	
	Male.		Female.		Male.		Female.					
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
Under 1 year					1	1	—	—	3	1	—	—
1 to 5 years					9	1	10	1	3	—	—	—
5 to 10 years					14	2	12	1	3	—	3	—
10 to 15 "			1	—	11	—	8	—	1	—	3	—
15 to 20 "			1	—	8	—	12	1	2	—	2	—
20 to 30 "					26	3	29	—	5	—	7	1
30 to 40 "					13	—	5	—	6	—	4	1
40 to 50 "	1	—			6	—	3	—	3*	—	2	—
50 to 60 "					1	—	3	1	—	—	—	—
60 to 70 "					2	—	—	—	1	—	—	—
70 and over					—	—	—	—	—	—	—	—
Age not ascertained.					2	—	1	—	—	—	1	—
	1	—	2	—	93	7	74	4	27	1	22	2

* One isolated at Ravensthorpe Sewage Works.

The total number of houses invaded by small-pox during this period was 159, and the months of their "invasion," together with the number of cases arising in the households may be seen in the following table:—

TABLE LXVIII.
INCIDENCE OF SMALL-POX IN HOUSEHOLDS.

Month in which First Case arose.	Total Number of Houses invaded.	Number of Cases per House.							Percentage Proportion of Houses having Multiple Cases.
		1.	2.	3.	4.	5.	6.	7.	
		1891.							
May	1	1						—	
June	3	3						—	
July	—	—						—	
August	—	—						—	
September	1	1						—	
October	—	—						—	
November	1	1						—	
December	4	2	1	1				50	
1892.									
January	12	7	4	1				41.6	
February	26	21	3	2				19.2	
March	39	23	6	1				23.3	
April	27	21	3	2	1			25	
May	29	16	3	1				29	
June	13	6	2	4				53.8	
July	7	5	1	1				28.5	
August	14	13	—	1				7.1	
	159	120	23	14	1	—	—	1	

From this table it is seen that cases of small-pox came from 159 different houses, there being one case in each of 120 houses, two cases each in 23 houses, three cases each in 14 houses, four cases in one house, and seven cases in one house.

Particulars of the inmates of 147 houses, yielding 295 cases, were obtained on personal inquiry, the total number of inmates being 823.

Of the houses not visited, or of whose inmates no particulars were obtained, in—

10 there was 1 case per house or 10 cases in all.
2 „ were 2 cases „ „ 4 „ „
12 14

The distribution of the cases in the households of various sizes was as follows:—

TABLE LXIX.

Number of Houses.	Inmates per House.	Cases per House.							Total.	
		1.	2.	3.	4.	5.	6.	7.	Inmates.	Cases.
		4	11	4						
5	10	4		1				50	7	
7	9	6					1	63	13	
10	8	6		3	1			80	19	
23	7	15	4	4				161	35	
23	6	14	7	2				138	34	
24	5	29	1	5				120	31	
27	4	21	5	1				108	34	
16	3	14	2					48	18	
8	2	6	2					16	10	
147		110	21	14	1	—	—	828	295	

Thus in—

Households (No. of Members).	Single Cases.	Multiple.
	Per cent.	Per cent.
11	100	—
10	80	20
9	85	14.3
8	60	40
7	65.2	34.8
6	69.9	39.1
5	83.3	16.6
4	77.7	22.2
3	100	—
2	100	—

In the description of each district a table has been given showing the number of inmates (and of those attacked) in each house, grouped in age-periods.

The facts there given may be collated in the following comparison of the ages of all the inmates of the households visited, with those of them who contracted small-pox:—

—	Inmates.	Cases.	Proportion of those Attacked.
Under 1 year	21	4	
	21	4	19 per cent. (under 1 year).
1 to 5 years	84	22	
5 to 10 ..	91	31	
	175	53	30·8 per cent. (1 to 10 years).
10 to 15 ..	103	22	
15 to 20 ..	119	23	
20 to 30 ..	169	55	
	391	100	25·7 per cent. (10 to 30 years).
30 to 40 ..	87	28	
40 to 50 ..	82	15	
50 to 60 ..	40	4	
60 to 70 ..	19	3	
70 and over	3	—	
	231	48	{ 20 per cent. (30 years upwards).
Ages not ascertained.	10	—	

Stated in per-centages of the whole numbers of each series (viz., inmates 828, cases 205), the following is the comparison between those living at ages in houses visited and those attacked in like age-periods:—

—	Inmates.	Cases.
	Per cent.	Per cent.
Under 1 year	2·5	2· (nearly).
1 to 10 years	21·1	26·3
10 to 30 years	47·3	49·2
30 and over	27·7	22·4
Ages not ascertained	1·2	—

SINGLE and MULTIPLE CASES with respect to ISOLATION.

Of the 120 households in which only a single case occurred, the patient was kept at home during the period of illness in 18, and removed to hospital in 102.

Of the 39 households in which two or more cases occurred, the "initial cases" (and sometimes the later cases also) were kept at home in 14, removed to hospital in 34.

The particulars as to date of attack, appearance of rash, and of removal to hospital in these cases are given in the subjoined lists, which may be thus summarised:—

A.—INITIAL CASES retained at HOME.

Houses with Single Cases.			Houses with Multiple Cases.			
Number of Houses.	Cases.	Other In-mat.s.	No. of House.	Initial.	Later.	Other In-mat.s.
15	15	63	12	20	17	38
No details, 3	3	—	2	1	—	—

B.—INITIAL CASES removed to HOSPITAL.

Houses with Single Cases.			Houses with Multiple Cases.			
Number of Houses.	Cases.	Other In-mat.s.	No. of House.	Initial.	Later.	Other In-mat.s.
95	95	440	25	34	24	82
No details, 7	7	—	—	—	—	—

Dealing only with those houses of which details were obtained it appears from these figures that the attack-rate (i.e., the proportion of those attacked to the whole number of the household) was in the case of—

Single cases retained at home - - 19·2 per cent.
 " " removed to hospital - 17·7 " "

and that of the cases in houses where more than one occurred, which arose subsequently to the "initial cases":—

Initial cases retained at home - - 30·9 per cent.
 " " removed to hospital - 22·6 " "

TABLE LXX.

A. 1.

LIST OF HOUSEHOLDS in which a SINGLE CASE of SMALL-POX occurred and remained at home.

Reference to House Register.	No. of In-mates.	Reference to Case Register.	Date of Onset.	Date of Rash.
T. 10	2	5	Feb. 22	Feb. 25.
H. 12	3	19	Mar. 14	Mar. 17.
T. 4	3	4	Feb. 21	Feb. 23.
L. 1	4	6	" 6	" 9.
S. N. 2	4	3	" 18	" 20.
S. U. 5	4	19	Apr. 5	Apr. 7.
S. U. 14	4	2	Jan. 7	Jan. 10.
S. U. 4	5	6	Feb. 4	Feb. 8.
L. 3	6	2	Jan. 14	Jan. 17.
S. U. 2	6	20	Apr. 9	Apr. 10.
S. U. 7	6	14	Mar. 29	Mar. 23.
S. U. 19	6	27	May 16	May 17.
L. 2	8	7	Feb. 1	Feb. 3.
L. 4	8	1	Dec. 28	Dec. 30.
S. U. 6	9	17	Mar. 24	Mar. 28.

HOUSEHOLDS of which NUMBER OF MEMBERS not ascertained.

District.	—	Reference to Case Register.	Date of Onset.	Date of Rash.
Birstal	—	5	Feb. 15	Feb. 15.
Liversedge	—	5	" 2	" 5.
Liversedge	—	8	" 29	Mar. 3.

TABLE LXXI.

A 2.

HOUSEHOLDS in which MULTIPLE CASES occurred, the INITIAL CASES being treated at HOME.

House Reference.	Number of Inmates.	Initial Cases.			Later Cases.			
		Reference.	Date of Onset.	Date of Rash.	Reference.	Date of Onset.	Day of Attack of Initial Case.	Removed to Hospital.
L. 5	7	3	Jan. 16	Jan. 20	4	Jan. 29	14th	—
SU. 15	4	4	Jan. 16	Jan. 19	5	Jan. 31	16th	—
H. —	—	5	Jan. 17					
		6	Jan. 17					
SU. 9	4	8	Feb. 11	Feb. 15	23	Feb. 22	12th	—
Mi. —	—	6	April 11		7	April 22	12th	May 1.
L. 7	6	12	June 13	June 16	19	June 29	17th	—
B. 1	4	2	Dec. 9	Dec. 12	3	Jan. 12	35th	—
					4	Jan. 15	38th	—
H. 15	7	10	Feb. 7	Feb. 9	12	Feb. 26	20th	—
					13	Feb. 26	26th	—
H. 4	5	11	Feb. 24	March 1	14	March 6	12th	March 12.
					15	March 6	12th	March 12.
Mo. 11	6	29	April 17	April 17	12	May 9	23rd	May 14.
					13	May 9	23rd	May 14.
Mo. 8	7	28	April 17	April 17	11	May 9	23rd	May 13.
					14	May 14	28th	May 16.
L. 6	8	9	June 10	June 13.				
		10	June 11	June 13.				
		11	June 11	June 13.				
H. 18	8	29	April 12	April 18	30	April 29	18th	May 4.
					31	April 29	18th	May 3.
					35	May 18	37th	May 21.
L. 8	9	13	June 24	June 27.				
		14	June 24	June 27.				
		15	June 24	June 27.				
		16	June 25	June 28.				
		17	June 25	June 28.				
		18	June 27	June 30.				
		20	July 1	July 4.				

TABLE LXXII.

B. 1.

HOUSEHOLDS in which a SINGLE CASE of SMALL-POX occurred and was removed to HOSPITAL.

Reference to House Register.	No. of Inmates.	Case.			
		Reference to Case Register.	Date of Rash.	Date of Removal.	Day of Attack on which removed.
B. 2	15	9	April 3	April 3	3rd.
O. 7	"	7	Feb. 10	Feb. 10	3rd.
O. 9	"	5	" 9	" 9	4th.
O. 15	"	15	May 27	May 30	8th.
R. 3	"	6	April 6	April 7	4th.
H. 1	3	18	March 15	March 18	7th.
H. 10	"	21	" 19	" 21	7th.
H. 11	"	25	" 30	April 1	6th.
H. 21	"	36	May 19	May 21	5th.
Mi. 5	"	11	Aug. 13	Aug. 14	5th.
Mi. 7	"	9	" 5	" 7	6th.
Mo. 2	"	3	March 19	March 20	4th.
O. 14	"	19	June 22	June 23	5th.
O. 17	"	16	May 28	May 29	6th.
R. 13	"	17	Aug. 24	Aug. 25	3rd.
S.N. 1	"	1	Jan. 30	Feb. 6	11th.
T. 5	"	9	?	March 6	5th.
H. 5	4	20	March 21	" 21	4th.
H. 14	"	3	Jan. 2	Jan. 9	10th.
Mi. 2	"	1	March 1	March 5	8th.
Mo. 10	"	30	July 19	July 19	3rd.
Mo. 16	"	36	?	Aug. 10	4th.
O. 3	"	9	Feb. 21	Feb. 21	4th.
O. 4	"	2	Sept. 15	Sept. 15	5th.
R. 1	"	4	March 18	March 23	9th.
R. 12	"	10	May 9	May 11	4th.
S.N. 4	"	4	Feb. 28	Feb. 29	5th.
S.N. 6	"	7	April 20	April 21	5th.
S.N. 7	"	9	" 25	" 28	6th.
S.N. 9	"	2	Jan. 30	Feb. 6	16th.
S.U. 10	"	7	Feb. 10	" 13	6th.
S.U. 13	"	11	March 18	March 18	7th.
S.U. 17	"	22	April 24	April 27	7th.
T. 2	"	15	" 4	" 4	4th.
H. 8	5	22	March 26	March 26	5th.
H. 13	"	2	Jan. 5	Jan. 7	5th.
H. 16	"	7	" 21	" 21	7th.
H. 17	"	32	May 3	May 4	4th.
H. 23	"	40	Aug. 30	Aug. 22	6th.
Mo. 4	"	4	April 6	April 8	7th.
Mo. 5	"	6	" 11	" 14	7th.
Mo. 20	"	31	July 19	July 19	2nd.
Mo. 22	"	41	?	Aug. 29	3rd.
O. 1	"	8	Feb. 25	Feb. 25	3rd.
O. 8	"	6	?	" 11	3rd.
O. 12	"	14	May 17	May 18	6th.
O. 16	"	18	June 7	June 8	6th.
R. 8	"	12	May 22	May 22	3rd.
S.N. 12	"	13*	June 20	June 9	—
S.U. 1	"	9	March 6	March 7	6th.
S.U. 16	"	1	June 14	June 15	5th.
T. 3	"	14	March 30	April 4	16th.
T. 16	"	19	Aug. 16	Aug. 19	6th.
H. 6	6	34	May 5	May 6	5th.

* Infected in hospital.

HOUSEHOLDS in which a SINGLE CASE, &c.—continued.

Reference to House Register.	No. of Inmates.	Case.			
		Reference to Case Register.	Date of Rash.	Date of Removal.	Day of Attack on which removed.
H. 19	6	28	April 20	April 23	6th.
Mi. 1	"	4	" 17	" 20	5th.
Mi. 3	"	3	" 7	" 9	6th.
O. 10	"	11	" 17	" 18	4th.
O. 11	"	20	Aug. 5	Aug. 5	4th.
S.N. 8	"	6	April 6	April 9	8th.
T. 1	"	18	March 28	March 30	5th.
T. 7	"	6	" 1	" 2	6th.
T. 9	"	11	" 12	" 12	3rd.
B. 4	7	6	" 10	" 10	4th.
B. 5	"	10	April 6	April 7	3rd.
H. 20	"	34	May 5	May 6	5th.
H. 22	"	39	July 25	July 27	6th.
Mi. 4	"	2	March 15	March 15	2nd.
Mi. 6	"	12	Aug. 12	Aug. 15	7th.
Mo. 3	"	5	April 7	April 11	8th.
O. 2	"	10	Feb. 29	Feb. 29	4th.
O. 13	"	17	June 4	June 6	7th.
R. 14	"	16	Aug. 23	Aug. 23	4th.
S.N. 5	"	8	April 23	April 25	6th.
S.U. 8	"	13	March 29	March 27	16th.
T. 8	"	12	" 8	" 18	14th.
T. 14	"	16	May 7	May 8	4th.
T. 15	"	17	" 10	" 11	5th.
Mo. 21	8	32	July 25	July 25	3rd.
S.N. 11	"	12	May 27	May 28	5th.
T. 13	"	10	March 3	March 8	8th.
Mi. 9	"	8	Aug. 6	Aug. 8	7th.
Mi. 8	9	10	" 10	" 12	6th.
O. 5	"	1	May 20	May 20	2nd.
R. 4	"	5	April 6	April 7	5th.
R. 6	"	1	Nov. 6	Nov. 6	4th.
S.N. 10	"	10	May 2	May 4	7th.
R. 5	10	2	Feb. 11	Feb. 13*	8th.
R. 7	"	15	June 3	June 4	4th.
S.N. 3	"	5	March 17	March 19	5th.
T. 17	"	20	Aug. 16	Aug. 20	7th.
Mo. 17	11	15	May 29	May 29	4th.
R. 11	"	8	" 9	" 10	4th.
S.U. 4	"	3	Jan. 19	Jan. 19	4th.
T. 11	"	7	March 2	March 3	5th.

HOUSEHOLDS of which NUMBER of MEMBERS not ascertained.

District.	Case.			
	Reference to Case Register.	Date of Rash.	Date of Removal.	Day of Attack on which removed.
Birstal	1	June 16	June 16	5th.
Heckmondwike	1	?	" 20	8th.
Heckmondwike	37	June 13	" 18	8th.
Mirfield	5	April 27	April 28	5th.
Soothill Nether	11	May 3	May 3	2nd.
Soothill Nether	14	June 17	June 27	15th.
Thornhill	18	July 20	July 24	5th.

* Isolated at the Sewage Works.

TABLE LXXIII.

B. 2.

LIST of HOUSEHOLDS in which MULTIPLE CASES of SMALL-POX occurred and were removed to HOSPITAL.

House Reference.	No. of In-mates.	Initial Cases.				Later Cases.			
		Reference.	Date of Rash.	Date of Removal.	Day of Attack on which Removed.	Reference.	Date of Onset.	Day of Attack of Initial Cases.	Date of Removal.
T. 12	4	1	Dec. 9	Dec. 19	15th	2	Dec. 28	22nd	Jan. 1.
Mo. 7	6	1	Jan. 18	Jan. 21	6th	2	Jan. 25	10th	Jan. 29.
O. 6	3	3	Feb. 8	Feb. 8	3rd.				
	7	4	Feb. 8	Feb. 8	3rd.				
T. 6	3	3	Feb. 18	March 4	18th	8	Feb. 29	11th	March 4.
H. 7	16		March 11	March 15	7th.				
	5	17	March 12	March 15	6th.				
R. 2	4	3	March 18	March 19	4th	9	May 9		May 12.
B. 3	7		March 23	March 31	10th.				
	2	8	March 29	March 31	3rd.				
SU. 11	7	18	March 29	April 1	6th	21	April 10	15th	April 17.
H. 2	2	26	March 31	April 2	6th	38	June 16		June 21.
H. 9	6	27	March 31	April 1	4th	33	April 16	19th	April 21.
No. 1	6	7	April 13	April 17	7th	8	April 29	16th	April 23.
Mo. 6	3	9	April 28	April 29	3rd	10	May 8	12th	April 29.
R. 9	6	7	May 3	May 4	4th	11	May 19	19th	May 21.
O. 18	12		May 8	May 10	7th.				
	7	13	May 11	May 12	6th.				
R. 10	13		May 29	May 30	4th.				
	6	14	May 31	June 1	4th.				
Mo. 18	6	16	June 13	June 13	3rd	25	July 2	22nd	July 2.
Mo. 14	4	23	July 4	July 4	2nd	37	July 20	17th	July 22.
H. 3	4		Jan. 19	Jan. 21	6th	8	Jan. 28	13th	—
	19					9	Jan. 28	13th	—
S.U. 12	10		March 14	March 15	8th	15	March 24	14th	—
	6					16	March 24	14th	March 28.
S.U. 18	24		May 27	May 23	7th	25	May 30	14th	June 4.
	8					26	June 9	24th	June 13.
Mo. 12	17		June 21	June 21	4th.				
	5	18	June 21	June 21	4th.				
		19	June 21						

LIST of HOUSEHOLDS, &c.—continued.

House Reference.	No. of In-mates.	Initial Cases.				Later Cases.			
		Reference.	Date of Rash.	Date of Removal.	Day of Attack on which Removed.	Reference.	Date of Onset.	Day of Attack of Initial Cases.	Date of Removal.
Mo. 13	5	20	June 25	June 25	3rd	22	July 4	12th	July 3.
		21	June 29	June 29	3rd.				
Mo. 9	8	24	June 30	June 30	2nd	25	July 13	16th	July 14.
						27	July 14	17th	July 14.
Mo. 15	7	33	July 27	July 27	4th	38	August 8	16th	August 11.
		34	July 26	July 26	2nd.				
Mo. 19	7	35	August 4	August 6	4th	39	August 19	17th	August 20.
						40	August 19	17th	August 20.

It will be observed that of the households in which "multiple" cases occurred, the dates of their occurrence were so near together in some as to cause them all to be regarded as "initial" cases, i.e., probably exposed to a common source of infection. Eliminating these there are of such households in which the "initial case" remained at home, 11 instead of 14; and of those in which the "initial" cases

were removed to hospital, 19 instead of 25. It is important to remember this in endeavouring to estimate the value of hospital isolation, which may be done by comparing the two series of "single" and "multiple" cases with regard to the day of attack on which the "initial case" was removed to hospital.

TABLE LXXIV.

DAYS of REMOVAL to HOSPITAL of INITIAL CASES.

Day of Attack on which removed.	Single Cases in 26 Houses.											Multiple Cases in 19 Houses.											
	Number of In-mates.											Number of In-mates.											
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11	
2nd day	—	—	—	—	1	—	1	—	1	—	—	—	—	—	1	1	—	1	1	—	—	—	—
3rd "	—	2	1	1	4	1	1	1	—	—	—	—	1	—	—	2	1	—	—	—	—	—	—
4th "	—	2	1	5	1	2	4	—	1	1	3	—	—	—	1	—	2	—	—	—	—	—	—
5th "	—	—	4	3	3	3	2	1	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—
6th "	—	—	3	2	5	3	2	—	1	—	—	1	—	—	1	—	1	1	—	1	—	—	—
7th "	—	—	2	2	3	—	2	1	1	1	—	—	—	—	—	—	1	—	1	—	—	—	—
8th "	1	—	—	1	—	1	1	1	—	1	—	—	—	—	—	—	1	—	—	—	—	—	—
9th "	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10th "	—	—	—	2	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11th "	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
13th "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
14th "	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15th "	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Acquired in Hospital	—	5	12	17	18	10	15	4	5	4	4	1	2	4	3	6	2	2	2	1	—	—	—
Per cent.	—	5.3	12.7	18.1	19.1	10.6	16.7	4.2	5.3	4.2	4.2	4.7	9.5	19.1	14.3	20.5	9.5	9.5	4.7	—	—	—	—

As might be expected, there was a larger proportion of multiple than of single cases in the larger households, and as to the day of attack on which the initial case was removed this table shows that—

In 94 Houses having Single Cases (94 Cases).			In 19 Houses having Multiple Cases (21 initial Cases).		
—	Cases.	Per cent.	—	Cases.	Per cent.
Case removed on 2nd day.	3	3.1	Initial case removed on 2nd day.	4	19
Case removed on 3rd day.	11	11.7	Initial case removed on 3rd day.	4	19
Case removed on 4th day.	20	21.2	Initial case removed on 4th day.	3	14.2
Case removed on 5th day.	19	20.2			
Case removed on 6th day.	16	17	Initial case removed on 6th day.	5	23.8
Case removed on 7th day.	12	12.7	Initial case removed on 7th day.	2	9.5
Case removed on 8th day.	6	6.3	Initial case removed on 8th day.	1	4.7
Case removed on 9th day.	1	1			
Case removed on 10th day.	4	4.2			
Case removed on 11th day.	1	1			
Case removed on 12th day.			Initial case removed on 12th day.	1	4.7
Case removed on 13th day.					
Case removed on 14th day.	1	1	Initial case removed on 14th day.	1	4.7

In other words in the households in which no second case occurred after the removal of the patient, this removal took place in 81, or in 86.1 per cent., before the 8th day; whilst in the 19 houses in which cases occurred subsequent to the removal of 21 cases, this removal took place in 18, or 85.7 per cent., before the 8th day of the attack of small-pox—a difference too slight to be appreciable.

Comparison of Occupations of those attacked and not attacked.—Of the 828 persons inhabiting 147 houses invaded by small-pox there were—

315 living at home or engaged in home work.
163 attending school.
350 engaged daily in work away from home.

Of those attacked with small-pox there were—

71 at home, or 22.6 per cent.
45 at school, or 27.4 per cent.
89 at work, or 25.4 per cent.

The same series analysed according to the size of the households gives—

TABLE LXXV.

Number of Inmates per House.	Number of Houses.	Total Inmates.			Total Cases.		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
11	4	15	12	17	2	1	1
10	5	14	14	22	2	1	4
9	7	25	14	24	5	2	6
8	10	27	17	36	5	7	7
7	25	61	33	67	11	8	16
6	25	51	28	59	12	10	12
5	24	46	25	49	9	7	15
	27	48	18	42	11	8	15
3	16	19	2	27	8	1	9
2	8	9	—	7	6	—	4
	147	315	163	350	71	45	89

In Chart XIII. and in the following list information is given of the occupations under these heads of the members of every one of these households, those attacked being indicated by the numerals which refer to them in the case register.

TABLE LXXVI.

LIST of INVADIED HOUSES (grouped according to number of Inmates) giving the Number in each of Three Classes of Occupation.

(See also Chart XIII.)

District.	Reference to House List.	All Inmates.			Attacked with Small-pox (Numerals refer to Case Register).		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
Birstal	2	1		1	9		
Ossett	7	1		1	7		
"	9	1		1		5	
"	15	1		1		15	
Ravensthorpe	3	1		1	6		
Thornhill	10	1		1		5	
Birstal	3	2			7, 8		
Heckmondwike	2	1		1	20	33	
Heckmondwike	1	1		2		18	
"	10	1		2	21		
"	11	2		1	25		
"	12	2		1	19		
"	21	1	1	1	20		
Mirfield	5	1		2		11	
"	7	2		1	9		
Morley	2			3		5	
Ossett	14	1		2		19	
"	17	1		2		16	
Ravensthorpe	13			3		17	
Soothill Nether	1	2		1		1	
Thornhill	4			3		4	
"	5	2		1		5	
Morley	6	2		1	9, 10		
Thornhill	6	1	1	1	8	3	
Heckmondwike	5	1		3		20	
"	14	2		2		3	
Liversedge	1	3		1		6	
Mirfield	2	1		3		1	
Morley	10	1	1	2	30		
"	16	2	1	1		36	
Ossett	3	2	1	1		9	
"	4	3		1		2	
Ravensthorpe	1	1	2	1		4	
"	12	2	1	1		10	
Soothill Nether	2	1		3		5	
"	4	2		2		4	
"	6		1	3		7	
"	7	2	2		9		
"	9	1		3		2	
Soothill Upper	5	1	2	1		19	
"	10	1	1	2		7	
"	13	3		1		11	
"	14	1	2	1	2		
"	17	3		1	22		
Thornhill	2	4			15		
Morley	14	1	2	1		23, 27	
Ravensthorpe	2	2	1	1	3	9	
Soothill Upper	9	3		1	8, 23		
"	15	1	1	2		5	
Thornhill	12	1		3	2	1	
Birstal	1	3		1	3, 4	2	
Heckmondwike	8	1	1	3		22	

LIST of INVADED HOUSES, &c.—continued.

District.	Reference to House List.	All Inmates.			Attacked with Small-pox (Numerals refer to Case Register).		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
Heckmondwike	13	2	3			2	
"	16	4	1			7	
"	17	1	1	3		32	
"	23	1	3	1		40	
Morley	4	1	4			4	
"	5	1	4			6	
"	20	3	3	30			
"	22	1	3	1		41	
Osselt	1	1	3	1		8	
"	8	2	1	2		6	
"	12	2	1	2	14		
"	16	2	3			18	
Ravensthorpe	8	1	3	1		12	
Soothill Nether	12	2	2	1	13		
Soothill Upper	1	2	2	1		9	
"	4	1	1	3		6	
"	16	2	3			7	
Thornhill	3	2	3			14	
"	16	4	1	1	19		
Heckmondwike	7	3	1	1	17	16	
"	4	1	2	2	14	15	
Morley	12	4	1	18, 19		17	
"	13	3	1	1	21, 22	20	
Heckmondwike	6	3	2	1		24	
"	19	2	2	2	28		
Liversedge	3	3	2	1		2	
Mirfield	1	2	4			4	
"	3	3	1	2	3		
Osselt	10	2	4	11		20	
"	11	2	4				
Soothill Nether	8	1	1	4		6	
Soothill Upper	2	1	5	20		14	
"	7	1	2	3		21	
"	19	2	1	3			
Thornhill	1	4	1	1	13		
"	7	2	1	3		6	
"	9	2	4	11			
Heckmondwike	9	2	1	3		21, 33	
Liversedge	7	3	2	1	19	12	
Morley	1	2	2	2	8	7	
"	7	3	2	1	1	2	
"	18	3	1	2	10, 25		
Ravensthorpe	9	2	3	1	11	7	
"	10	3	2	1	14	13	
Morley	11	1	1	4		12, 13, 29	
Soothill Upper	12	2	1	3	10, 15	16	
Birstal	4	5	2			6	
"	5	1	2	4		10	
Heckmondwike	20	2	2	3		54	
"	22	1	2	4		39	
Mirfield	4	2	5			2	
"	6	2	3	2		12	
Morley	3	2	1	4		5	
Osselt	2	3	2	2		10	
"	13	2	2	3		17	

LIST of INVADED HOUSES, &c.—continued.

District.	Reference to House List.	All Inmates.			Attacked with Small-pox (Numerals refer to Case Register).		
		At Home.	At School.	At Work.	At Home.	At School.	At Work.
Ravensthorpe	14	3		4			16
Soothill Nether	5	1	1	5			8
Soothill Upper	8	3	3	1	13		
Thornhill	8	3	2	2			12
"	14	2		5			16
"	15	3	1	3	17		
Liversedge	5	5	1	1	3, 4		
Osselt	6	2	2	3		4	3
"	18	6		1	12, 13		
Soothill Upper	11	2	2	3	18		21
Heckmondwike	15	2	1	4	10, 13	12	
Morley	8	2		5			11, 14, 28
"	15	3	3	1		33, 34, 38	
"	19	4	1	2	35, 39	40	
Liversedge	2	3		5			7
"	4	1	3	4			1
Morley	21	3	3	2		32	
Soothill Nether	11	1	3	4		19	
Thornhill	13	3		5			16
Liversedge	6	4		4	10		9, 11
Morley	9	5	3			24, 26, 27	
Soothill Upper	18	2	2	4	25, 26	24	
Heckmondwike	18	3	3	2	30, 31	35	29
Mirfield	9	2		6			8
Mirfield	8	1	4	4			16
Osselt	5	8		1			1
Ravensthorpe	4	1	3	5			5
"	6	3	1	5			1
Soothill Nether	10	3	2	4			10
Soothill Upper	6	4	2	3			17
Liversedge	8	5	2	2	13, 16, 17, 18, 20.	14, 15	
Ravensthorpe	5	4	3	3			2
"	7	1	3	6			15
Soothill Nether	3	1	2	7			6
Thornhill	17	5	4	1	20		
Heckmondwike	3	3	2	5	8	9	4
Morley	17	3	3	5		15	
Ravensthorpe	11	3	4	4	8		
Soothill Upper	3	4	2	5			3
Thornhill	11	5	3	3	7		
147 houses		315	163	359	71	45	89

SUPPLEMENTARY LIST of CASES in HOUSEHOLDS of whom no further particulars were obtained.

ATTACKED WITH SMALL-POX.
(Numerals refer to Case-Registers.)

District.	At Home.	At School.	At Work.
Birstal			1
"	5		
Heckmondwike		1	
"	5-6		37
Liversedge			5
"	8		
Mirfield			5
"	6		7
Soothill Nether			11
"		14	
Thornhill		18	
12 houses	5	3	6

Dealing in like manner with the households having single and those having multiple cases in order to ascertain whether in the one group or the other there was any marked predominance of one or other class of persons in these several "occupation classes"; and analysing them according as to whether the patients remained at home or were sent to hospital, we find the following—

110 Households having Single Cases.

Occupation.	Attacked and Remained at Home.	Not Attacked.	Attacked and Removed to Hospital.	Not Attacked.
At home	3	22	21	172
At school	3	12	16	86
At work	9	29	58	182
	15	63	95	440

37 Households having Multiple Cases.

Occupation.	Attacked.		Not Attacked.	Attacked.		Not Attacked.
	Initial Case (Remained at Home).	Later Cases.		Initial Case (Removed to Hospital).	Later Cases.	
At home	9	9	15	17	12	85
At school	3	4	6	10	9	14
At work	8	4	17	7	3	33
	20	17	38	34	24	82

The "Attack-rates" that may be calculated from these data show that the relative proportions of those "at home" and "at work" are reversed in the single case households and in those of the multiple series (reckoning only the "initial" cases in the latter), showing that the larger proportion of the former group were engaged in duties away from home, whilst, where other persons in the house were attacked, the majority of those first taken ill were engaged in duties at their homes.

PROPORTIONAL ATTACK OF INITIAL CASES
(all HOUSEHOLDS).

	Single Cases in House.		Multiple in House.	
	Cases.	Per cent.	Cases.	Per cent.
At home	26	21·6	29	50·8
At school	22	18·3	13	22·8
At work	72	69·8	15	26·3
	120		57	

A different and perhaps more accurate line of comparison may be made by getting the actual "attack rate" in respect to the whole number in the house, when it will be seen that in the "single" series the greatest incidence is among those engaged at work, whether removed to hospital or not, whereas in the multiple series (exclusive of the initial cases) the rates are much lower among this class than either the other two.

SMALL-POX ATTACK RATES.

Occupation.	Cases Remaining at Home.		Initial Cases sent to Hospital.	
	"Single" Group.	"Multiple" Group (excluding Initial Cases).	"Single" Group.	"Multiple" Group (excluding Initial Cases).
At home	Per cent. 12·	Per cent. 37·5	Per cent. 19·8	Per cent. 25·5
At school	20·	40·	15·7	39·1
At work	23·7	19·	24·7	8·3

Vaccination in Relation to Small-pox.—Of the total number (219) cases of small-pox which occurred in the districts of the union—other than Dewsbury and Batley—there were :—

- Vaccinated 145, of whom two died.
- Alleged to have been vaccinated, but having no marks, six.
- Undergoing vaccination when attacked with small-pox, eight, of whom one died.
- Unvaccinated 60, of whom 11 died.

The mortality in each of the above classes was therefore :—

- Vaccinated 1·3 per cent.
- Alleged vaccination *nil*.
- "Under" vaccination 12·5 per cent.
- Unvaccinated 16·6 ..

In the accompanying table and diagram (Chart XIV.) the weekly incidence of each of the above classes is indicated.

TABLE LXXVII.

WEEKLY INCIDENCE OF SMALL-POX IN OTHER DISTRICTS OF UNION than BATLEY and DEWSBURY, according to VACCINATION. RELATION OF THOSE ATTACKED.

No. of Week of Outbreak.	Vaccinated.		"Alleged" Vaccination.		"Under" Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
iv.	1	—	—	—	—	—	—	—	1	—
v.	—	—	—	—	—	—	—	—	—	—
vi.	—	—	—	—	—	—	—	—	—	—
vii.	3	—	—	—	—	—	1	—	3	—
ix.	—	—	—	—	—	—	1	—	1	—
xxviii.	—	—	—	—	—	—	1	—	1	—
xxxiii.	1	—	—	—	—	—	1	—	2	—
xxxvi.	2	—	—	—	—	—	1	—	3	—
xxxvii.	3	—	—	—	—	—	—	—	3	—
xxxviii.	3	—	1	—	—	—	5	—	9	—
xxxix.	3	—	—	—	—	—	—	—	3	—
xl.	3	—	—	—	1	—	2	—	6	—
xli.	8	—	1	—	—	—	—	—	9	—
xlii.	4	—	—	—	—	—	1	1	5	1
xliii.	3	—	—	—	—	—	1	—	4	—
xliv.	9	1	1	—	—	—	2	1	12	2
xlv.	4	—	—	—	—	—	2	—	6	—
xlvi.	3	—	1	—	—	—	5	3	9	3
xlvii.	4	—	1	—	—	—	4	3	9	3
xlviii.	6	—	—	—	—	—	3	1	9	1
xlix.	6	—	—	—	1	1	2	—	9	1
i.	7	—	—	—	—	—	1	—	8	—
ii.	7	—	—	—	—	—	—	—	7	—
iii.	5	—	—	—	—	—	4	—	9	—
iiii.	3	—	—	—	1	—	1	1	5	1
liv.	7	—	—	—	—	—	2	1	9	1
lv.	6	—	—	—	—	—	2	—	8	—
lvi.	3	—	—	—	—	—	3	—	6	—
lvii.	5	—	—	—	—	—	—	—	5	—
lviii.	3	—	1	—	—	—	1	—	5	—
lix.	5	—	—	—	—	—	1	—	6	—
lx.	2	—	—	—	—	—	4	—	6	—
lxi.	7	—	—	—	—	—	1	—	8	—
lxii.	5	1	—	—	1	—	—	—	6	1
lxiii.	1	—	—	—	1	—	—	—	2	—
lxiv.	2	—	—	—	—	—	—	—	2	—
lxv.	2	—	—	—	1	—	3	—	6	—
lxvi.	2	—	—	—	—	—	—	—	2	—
lxvii.	3	—	—	—	—	—	1	—	4	—
lxviii.	4	—	—	—	—	—	1	—	5	—
lxix.	2	—	—	—	2	—	2	—	6	—
lxx.	1	—	—	—	—	—	1	—	2	—
	145	2	6	—	8	1	69	11	219	14

Analysed with respect to age, the cases fall into the groups given in the following table (and also in Chart X.) :—

TABLE LXXVIII.

VACCINATION and SMALL-POX.

AGES of the ATTACKED and their VACCINATION RELATIONS.

	Vaccinated.		Alleged Vaccination.		"Under" Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	—	—	—	—	2	1	2	1	4	2
1 to 5 years	9	—	—	—	4	—	9	2	22	2
5 to 10 "	13	—	—	—	2	—	17	3	32	3
10 to 15 "	13	—	2	—	—	—	9	—	24	—
15 to 20 "	14	—	2	—	—	—	9	1	25	1
20 to 30 "	46	1	1	—	—	—	11	3	58	4
30 to 40 "	27	1	—	—	—	—	1	—	28	1
40 to 50 "	15	—	—	—	—	—	—	—	15	—
50 to 60 "	2	—	1	—	—	—	1	1	4	1
60 to 70 "	3	—	—	—	—	—	—	—	3	—
70 years and over	—	—	—	—	—	—	—	—	—	—
Age not ascertained	3	—	—	—	—	—	1	—	4	—
	145	2	6	—	8	1	69	11	219	14

or grouped in age-periods :—

	Under 1 Year.	1 to 10 Years.	10 to 30 Years.	30 and over.	Age not ascertained.	Total.
Vaccinated	—	22	73	1 47	1 3	145 2
Alleged vaccination	—	—	5	1	—	6
Under vaccination.	2	1	6	—	—	8 1
Unvaccinated	2	1	26	5 29	4 2 1 1	60 11
	4	2	54	5 59	2 4	219 14

Of the relations between the type of the attack of small-pox, and the condition of the patients in respect to vaccination, the following is a summary analysis (see also Chart XI.) :—

TABLE LXXIX.
TYPE of SMALL-POX.

	Confluent.	Coherent.	Discrete.	Mild.	Type not ascertained.
Vaccinated	3	11	62	64	5
Alleged vaccination	3	2	1	—	—
"Under" vaccination	3	—	—	5	—
Unvaccinated	33	5	15	5	2

These figures are too small to permit of any satisfactory deductions to be made from them, but for the purpose of contrast with the other similar series, the following percentages may be cited :—

- (a.) Among the vaccinated about 2 per cent. had confluent small-pox, 7.5 per cent. coherent, 42 per cent. discrete, 44.1 per cent. mild attacks.
- (b.) Among the unvaccinated 55 per cent. had confluent small-pox, 4.3 per cent. coherent, 25 per cent. discrete, 4.3 per cent. mild.

And conversely :—

- (a.) Of the confluent cases, 7.1 per cent. were vaccinated, 78.5 per cent. unvaccinated.
- (b.) Of the coherent cases, 61.1 per cent. were vaccinated, 27.7 per cent. unvaccinated.

- (c.) Of the *discrete* cases, 79.5 per cent. were vaccinated, 19.2 per cent. were unvaccinated.
- (d.) Of the *mild* cases, 86.5 per cent. were vaccinated, 6.7 per cent. were unvaccinated.

Comparing the vaccination conditions of the 828 inmates of the 147 houses visited during the inquiry with that of those among them who were attacked with small-pox we find—

At all ages, of 828 inmates—
 650 were vaccinated, or 79.7 per cent.
 12 were alleged to have been vaccinated.
 17 were undergoing vaccination.
 127 were unvaccinated, or 15.3 per cent.,

and in 22 no information on the point could be obtained.

In the same households amongst the 205 cases of small-pox there were—

135 were vaccinated, or 65.8 per cent.
 6 were alleged to have been vaccinated.
 8 were undergoing vaccination.
 56 were unvaccinated, or 26.8 per cent.

(See subjoined Lists of Households and Chart XV.)

The actual numbers at each age-period were—

	Vaccinated.	Alleged Vaccination.	Under Vaccination.	Unvaccinated.	No information on Vaccination.
Under 1 year.					
Inmates	2	—	5	14	—
Cases	—	—	2	3	—
1 to 10 years.					
Inmates	107	1	8	56	3
Cases	22	—	6	25	—
10 to 30 years.					
Inmates	331	6	4	43	7
Cases	68	5	—	27	—
30 years and upwards.					
Inmates	205	5	—	14	7
Cases	45	1	—	2	—
Age not ascertained.					
Inmates	5	—	—	—	5
Cases	—	—	—	—	—

Assuming that these individuals were all equally exposed to the chances of infection, these figures show :—

- 1st. That of the *vaccinated* class, the proclivity to attack between 1 and 10 years was 1:4.6; between 10 and 30 years was 1:4.8; at 30 years and upwards was 1:4.7.
- 2nd. That of the *unvaccinated* class, the proclivity under one year of age was 1:7; between one year and 10 years, 1:2.1; from 10 to 30 years, 1:1.6; at 30 and upwards, 1:7.
- 3rd. That the general proclivity of all classes at "under" one year was - - - 1:5.2.
 One to 10 years - - - 1:3.2.
 10 to 30 years - - - 1:3.8.
 30 years and upwards - - - 1:5.
- 4th. As regards the other classes, at all ages the proclivity amongst those of "alleged" vaccination was 1:2; of those "under" vaccination was 1:2.3.

A previous attack of small-pox had been experienced by 34 of those individuals, viz., four who came into the "10 to 30 years" period and 30 into the "30 upwards" period. Again, two of the patients suffered from a second attack of the disease. Of these individuals, 20 were known to have been vaccinated (including one of the "cases"), 11 unvaccinated (including the other "case"), and in three no information as to vaccination was obtainable. If one may assume that those who have been vaccinated are on the same plane as to liability to infection as those who had previously had

small-pox then the proportions above given may be modified thus :—

Vaccinated or previous Small-pox.		Neither Vaccinated nor previously had Small-pox.	
10 to 30 years.			
Inmates	336	41	26
Cases	70		
30 years upwards.			
Inmates	214	5	2
Cases	43		

Lastly, as to the influence of vaccination in limiting the spread of small-pox in a household, the following data may be given.

GROUP A.—INITIAL CASES REMAINED AT HOME.

	Single Cases in House.		Multiple Cases in House.		
	At-tacked.	Not At-tacked.	Attacked.		Not At-tacked.
			Initial.	Later.	
Vaccinated	14	59	17	9	34
Re-vaccinated	—	31	—	—	16
Previous small-pox	—	1	—	1	1
Under vaccination	—	—	1	—	2
Alleged vaccination	—	1	1	1	—
No information as to vaccination.	—	1	—	—	—
Unvaccinated	1	2	1	7	2
Previous small-pox	—	1	—	—	—

GROUP B.—INITIAL CASES REMOVED TO HOSPITAL.

	Single Cases in House.		Multiple Cases in House.		
	At-tacked.	Not At-tacked.	Attacked.		Not At-tacked.
			Initial.	Later.	
Vaccinated	59	234	21	15	48
Re-vaccinated	—	72	—	—	27
Previous small-pox	—	15	—	—	4
Under vaccination	—	2	2	5	5
Alleged vaccination	4	5	—	—	—
No information as to vaccination.	—	20	—	—	1
Previous small-pox	—	3	—	—	—
Unvaccinated	32	59	11	4	8
Previous small-pox	1	8	—	—	1

Working out the attack rates of these various groups one finds that in group A. the attack rate amongst the *vaccinated* class in households yielding a single case is 19.1 per cent.; amongst the *unvaccinated*, it is 33.3 per cent., or deducting the one who had small-pox in childhood 50 per cent. Secondly, dealing with the houses in which multiple cases occurred, and calculating only those which occurred later than the cases regarded as "initial," the rate amongst the *vaccinated* was 20.9 per cent. amongst the *unvaccinated*, 77.7 per cent.

In Group B. the attack rate of single cases was 14.2 per cent.; of the multiple series (later cases only), 18 per cent. amongst the *vaccinated*, whilst amongst the *unvaccinated*, the attack rate of single cases was 64.8 per cent., or deducting those who had had small-pox primarily, 71 per cent.; and of the multiple (later) cases, 33.3 per cent., or deducting the one who had small-pox primarily, 36.3 per cent.

TABLE LXXX.

" OTHER DISTRICTS."

LIST OF HOUSEHOLDS in GROUPS according to the NUMBER OF MEMBERS, with VACCINATION DATES of the MEMBERS, and those ATTACKED with SMALL-POX.

Reference to House List.	All Inmates.				Attacked with Small-pox. (Nos. refer to the Case Register.)				
	Vaccinated.	No Information as to Vaccination.	" Under " Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	" Under " Vaccination.	Alleged Vaccination.	Unvaccinated.
B. 2	2				9				
O. 7	2				7				
O. 9	2				5				
O. 15	2				15				
R. 3	2				6				
T. 10	2				5				
R. 3	1	1			7	6			
H. 2					20, 33				
H. 1		2		1				18	
H. 10	1	1		1				21	
H. 11	2		1		25				
H. 12	5				19				
H. 21	2			1	35				
Mi. 5	3				11				
Mi. 7	3				9				
Mo. 2	2		1				3		
O. 14	3				19				
O. 17	3				16				
R. 13	5				17				
S.N. 1	2			1				1	
T. 4	2	1			2				
T. 5	1	1		1				9	
Mo. 6	1	1	1		10	9			
T. 6	1			2	8			3	
H. 5	3			1				20	
H. 14	3			1				3	
L. 1	4				6				
Mi. 2	4				1				
Mo. 10	4				30				
Mo. 16	4				35				
O. 3	2			2	9				
O. 4	3			1				2	
R. 1	1	3			4				
R. 12	3			1				10	
S.N. 2	4				3				
S.N. 4	4				4				
S.N. 6	1	3			7				
S.N. 7	4				9				
S.N. 9	4				2				
S.U. 5	3			1	19				
S.U. 10	2			1	1			7	
S.U. 13	2			2	11				
S.U. 14	4				2				
S.U. 17	1	1		1	1			22	
T. 2	4				15				
Mo. 14	3		1		23	37			
R. 2	2				2	3		9	
S.U. 9	2				2	8		23	
S.U. 15	2			2				4, 5	
T. 12	2		1	1	2				1

LIST OF HOUSEHOLDS, &c.—conf.

Reference to House List.	All Inmates.				Attacked with Small-pox. (Nos. refer to the Case Register.)				
	Vaccinated.	No Information as to Vaccination.	" Under " Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	" Under " Vaccination.	Alleged Vaccination.	Unvaccinated.
B. 1	1				1			2, 3	4
H. 8	4				1				22
H. 13	3	12						2	
H. 16	3		1		1				7
H. 17	1			1	3				32
H. 23	4				1				40
Mo. 4	3				2				4
Mo. 5	5							6	
Mo. 20	4				1				31
Mo. 22	3				2				41
O. 1	3				2			8	
O. 8	5							6	
O. 12	5							14	
O. 16	4				1			18	
R. 8	5							12	
S.N. 12	2	1			2				15
S.U. 1	2				3			9	
S.U. 4	4			1				6	
S.U. 16	5							7	
T. 3	3				2			14	
T. 16	1				4				19
H. 7	3				2			17	16
H. 4	2				3			11	14, 15
Mo. 12	3				2			17	18, 19
Mo. 13	4		1					20, 21	22
H. 6	6							24	
H. 19	4				2				25
L. 3	6							2	
Mi. 1	6							4	
Mi. 3	6							3	
O. 10	4	2						11	
O. 11	6							20	
S.N. 8	4				2				6
S.U. 2	6							20	
S.U. 7	6							14	
S.U. 19	5				1				27
T. 1	2	1			3				13
T. 7	3	2			1			6	
T. 9	6							11	
H. 9	5				1			27, 33	
L. 7	5				1			19	12
Mo. 1	6							7, 8	
Mo. 7	3		1		2			2	1
Mo. 18	6							16, 25	
R. 9	5				1			7, 11	
R. 10	4				2			13	14
Mo. 11	6							12, 13, 29	
S.U. 12	4				2			16	10, 15
R. 4	6			1					6
R. 5	7							10	
H. 20	5				2			34	
H. 22	4				3				39
Mi. 4	5		1		1				2
Mi. 6	6				1				12

LIST OF HOUSEHOLDS, &c.—cont.

Reference to House List.	All Inmates.				Attacked with Small-pox. (Nos. refer to the Case Register.)				
	Vaccinated.	No Information as to Vaccination.	Under " Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	Under " Vaccination.	Alleged Vaccination.	Unvaccinated.
Mo. 3	7				5				
O. 2	4		1	2			10		
O. 13	6			1	17				
R. 14	7				16				
S.N. 5	6			1					8
S.U. 9	4			3					13
T. 8	3			4					15
T. 14	5			2					16
T. 15	6			1	17				
L. 5	7				3, 4				
O. 6	7				3, 4				
O. 18	7				12, 13				
S.U. 11	7				18, 21				
H. 15	6			1	10, 12				13
Mo. 8	7				11, 14, 28				
Mo. 15	7				33, 34, 38				
Mo. 19	2	4		1		39, 40			35
L. 2	8				7				
L. 4	8				1				
Mi. 9	8				8				
Mo. 21	7			1	32				
S.N. 11	8				12				
T. 15	7			1	10				
L. 6	7	1			9, 10, 11				
Mo. 9	8				24, 26, 27				
S.U. 18	5			3	25				24, 25
H. 18	6			2	29, 31				30, 35
Mi. 8	6			3	10				
O. 5	8	1			1				
R. 4	8			1					5
R. 6	7			2					1
S.N. 10	9				10				
S.U. 6	8			1	17				

LIST OF HOUSEHOLDS, &c.—cont.

Reference to House List.	All Inmates.					Attacked with Small-pox. (Nos. refer to the Case Register.)			
	Vaccinated.	No Information as to Vaccination.	Under " Vaccination.	Alleged Vaccination.	Unvaccinated.	Vaccinated.	Under " Vaccination.	Alleged Vaccination.	Unvaccinated.
L. 8	8		1			13, 14, 15, 16, 17, 18	20		
R. 5	9				1	2			
R. 7	9			1				15	
S.N. 3	10					5			
T. 17	8				2	20			
H. 3	6		2		2	8			4, 9
Mo. 17	9				2	15			
R. 11	8			1	2	5			
S.U. 3	4				7				3
T. 11	11					7			
147 houses	610	22	17	12	127	135	8	6	66

SUPPLEMENTARY LIST OF HOUSEHOLDS.

VACCINATION DATA OF THOSE ATTACKED WITH SMALL-POX.

District.	Vaccinated.	Unvaccinated.
Birstal	1	
"	5	
Heekmondwike		1
"	5, 6	
"	37	
Liversedge	5	
"	8	
Mirfield	5	
"	6	7
Soothill Nether	11	
"		14
Thornhill		18
12 houses	10	4

PART IV.

VACCINATION IN RELATION TO SMALL-POX.

Distribution of all cases of small-pox according to age, sex, and occupation. Vaccination date of the small-pox cases. Class I. Vaccinated:—Age and sex distribution. Analysis of number, location and area of vaccination marks. Fatal cases—list of. Small-pox in re-vaccinated subjects. Class II. No information as to vaccination:—Age and sex distribution. Class III. Alleged vaccination:—Age and sex distribution. Class IV. Under vaccination:—Age and sex distribution. List of cases. Class V. Unvaccinated:—Age and sex distribution. List of cases of small-pox in unvaccinated infants. Comparison of the vaccinated with the unvaccinated classes. Analysis of invaded households as to vaccination of those attacked and those not attacked with small-pox. Influence of vaccination on the incidence of small-pox in households. Comparisons of households yielding single with those having multiple cases of small-pox. Vaccination and measures of isolation as means of protection against further attacks. Type of small-pox in relation to the vaccination condition of those attacked. Confluent type:—Age distribution. Coherent type:—Age distribution. Discrete type:—Age distribution. Fatal cases. Mild type:—Age distribution. Unvaccinated cases. Type uncertain:—Summary analysis. Type of disease amongst the vaccinated class, in reference to the quality and number of vaccination scars.

In this section I propose to collate the information respecting vaccination in relation to small-pox which has been derived from the three main sources described above, in order that as large a mass of material as possible may be available for statistical deductions. By means of diagrams (XVI. to XX.) I have endeavoured to convey these statistical details so that they become more easily grasped, the figures upon which they are based being all given in the text.

In the first place it may be useful to recapitulate the particulars of the 1,029 cases as to their incidence upon the various sexes and classes, and after that to discuss in turn each of the groups formed to describe their condition as to vaccination, and lastly to analyse these groups with reference to the type of small-pox with which they were attacked.

The total number of cases of small-pox were distributed according to sex and age as follows:—

	Male.		Female.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	14	7	15	12	29	19
1 to 5 years	40	12	44	11	84	23
5 to 10 "	48	8	63	7	111	15
10 to 15 "	53	2	50	1	103	3
15 to 20 "	88	4	92	5	180	9
20 to 30 "	132	12	140	9	272	21
30 to 40 "	55	5	55	5	110	10
40 to 50 "	34	6	25	1	59	7
50 to 60 "	11	2	15	1	26	3
60 to 70 "	5	—	4	—	9	—
70 years and over	2	—	2	—	4	—
Age not ascertained	4	—	3	—	7	—
Total	521	58	508	52	1,029	110

And grouped as to occupation:—

	At Home.		At School.		At Work.		Workhouse Inmates.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	29	19	—	—	—	—	—	—	29	19
1 to 10 years	82	22	115	16	—	—	—	—	197	38
10 to 30 "	112	8	60	—	382	22	6	3	560	33
30 years and upwards	113	10	—	—	125	10	—	—	238	20
Age not ascertained	4	—	—	—	3	—	—	—	7	—
Total	340	59	175	16	510	32	6	3	1,209	110

Of the total number—1,029—cases of small-pox, the disease occurred in—

- 627, who were vaccinated, of whom 16 died;
- 10, of whose vaccination history no information could be obtained;
- 25, who were alleged to have been vaccinated but who presented no unequivocal scars, of whom two died;
- 21, who at the time of being attacked with small-pox were undergoing primary vaccination, of whom three died;
- 346, who were unvaccinated, of whom 89 died.

The mortality on the whole number was 10·7 per cent., and for each of the above classes—

Vaccinated	2·5 per cent.
Alleged vaccination	8 "
Under vaccination	14·3 "
Unvaccinated	25·7 "

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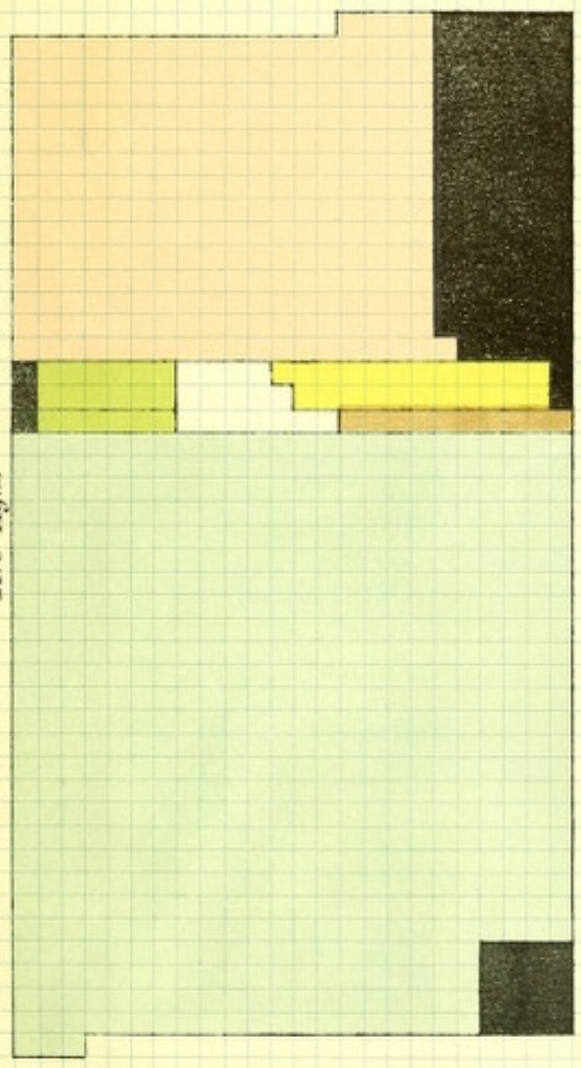
N.B.—Excluding infants under one year of age these figures would be considerably modified, namely:—

- Vaccinated—626 cases; 16 deaths; mortality, 2·5 per cent.
- Alleged vaccination—25 cases; 2 deaths; mortality, 8 per cent.
- "Under" vaccination—14 cases; 0 deaths.
- Unvaccinated—325 cases; 73 deaths; mortality, 22·4 per cent.

and the general case mortality would be reduced (1,000 cases, 91 deaths) to 9·1 per cent.

DISTRIBUTION OF ALL CASES OF SMALL POX AS REPORTED FROM

All Ages

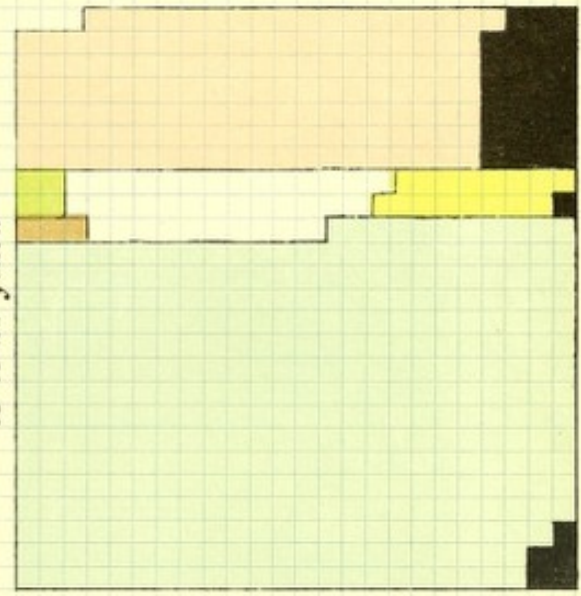


- Vaccinated.
- Under Vaccination.
- Alleged
- Unvaccinated
- No information as to Vaccination
- Fatal Cases

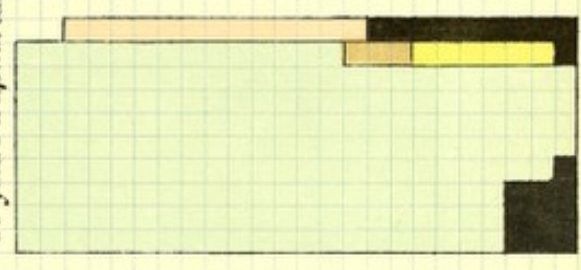
under 10 years



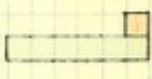
10 to 30 years

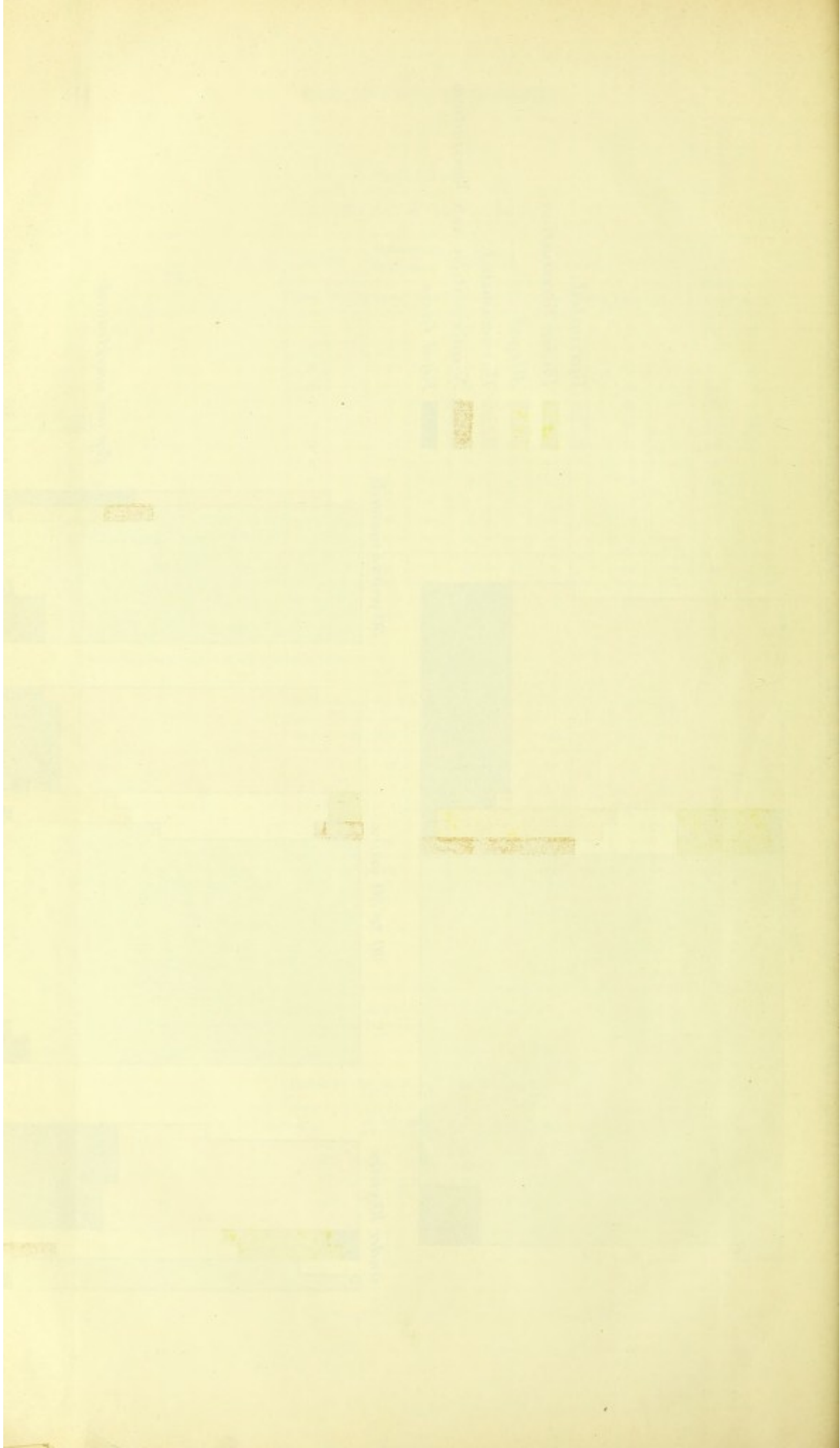


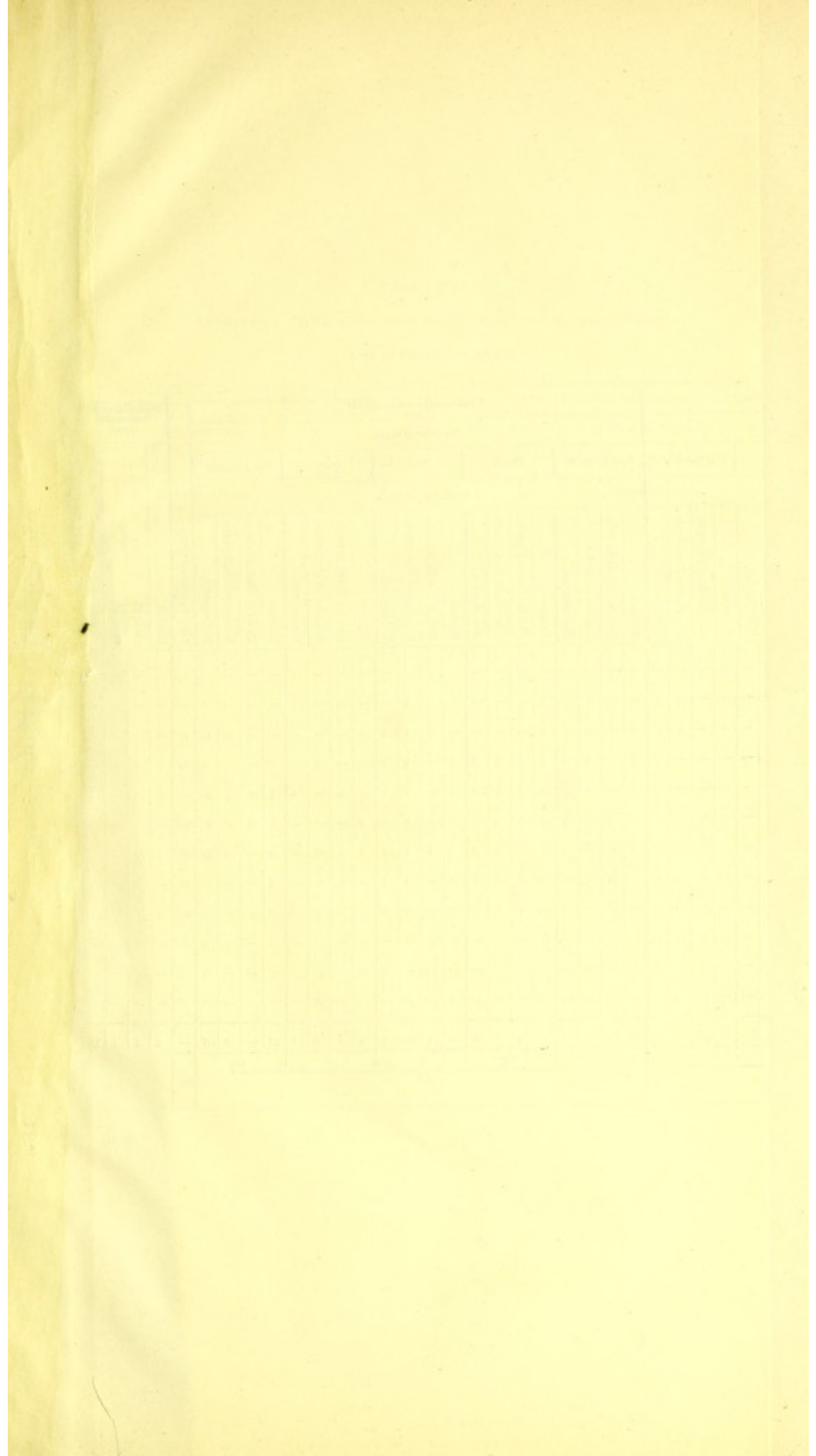
30 years & upwards



Age not ascertained







CLASS I.—VACCINATED.

In the class of the "vaccinated" are comprised 627 cases, 319 of whom were males, eight cases being fatal, 308 females, eight fatal:—

TABLE LXXXII.

	Male.		Female.		Total.		Proportion to whole number in Age Periods.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	—	—	1	—	1	—	Per cent.	Per cent.
	—	—	—	—	1	—	0·16	—
1 to 5 years	8	—	8	—	16	—	—	—
5 to 10 "	12	1	15	—	27	1	—	—
	—	—	—	—	43	1	7·01	6·25
10 to 15 years	32	—	32	—	64	—	—	—
15 to 20 "	45	—	52	2	97	2	—	—
20 to 30 "	100	1	110	2	210	3	—	—
	—	—	—	—	371	5	59·1	31·25
30 to 40 years	77	3	49	4	126	7	—	—
40 to 50 "	26	1	22	—	48	1	—	—
50 to 60 "	10	2	12	—	22	2	—	—
60 to 70 "	5	—	3	—	8	—	—	—
70 years and over	1	—	1	—	2	—	—	—
	—	—	—	—	206	10	32·7	62·5
Age not ascertained	3	—	3	—	6	—	—	—
	319	8	308	8	627	16	—	—

Number and quality of Vaccination Scars.

Particulars of the number and character of the marks produced by primary vaccination were obtained in 480 instances, amongst the 627 vaccinated persons who contracted small-pox, but these particulars did not in all instances refer to each of the several points concerned. Thus the number of scars is recorded in 461 instances, not recorded in 166; the character as to *foreation* is recorded in 416, not recorded in 211; whilst the total area of the scars is only recorded in 290, not recorded in 337. The circumstances under which the observations had to be made must account for the inability to obtain a complete record, as only a small proportion of the whole number attacked could be seen in hospital, and the absence from home on the occasion of our visits of many of those who had been attacked previous to the inquiry further explains deficiencies in the record. As regards those individuals whose homes were not visited, or who had removed from the districts, I am indebted for certain particulars *quod* vaccination to the medical officers

of health, and especially to Dr. Stewart, the acting medical officer for Batley.

The data thus obtained are presented in tabular form in Table LXXXIII. under the several age periods used in this report. I propose to offer a few remarks upon each of these heads.

Number of vaccination scars.

Of the 461 persons of whom we have records as to the total number of scars, 11 died, or 2·3 per cent.

Having 4 or more marks—42; 1 died, or 2·3 per cent.

" 3 " " 210; none died

" 2 " " 175; 10 " 5·7 "

" 1 " " 34; none "

And as regards age, the fatal case amongst those having four or more marks was aged 30 to 40; whilst the 10 having two marks were distributed thus:—5 to 10 years, one; 15 to 20, one; 20 to 30, three; 30 to 40, three; 50 to 60, two.

TABLE LXXXIV.

	Number of Marks.										Total.	
	Four or More.		Three.		Two.		One.		Not Recorded.			
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	—	—	—	—	—	—	1	—	—	—	1	—
1 to 5 years	1	—	6	—	2	—	2	—	5	—	16	—
5 to 10 "	4	—	9	—	3	1	—	—	11	—	27	1
10 to 15 "	5	—	33	—	14	—	3	—	9	—	64	—
15 to 20 "	8	—	42	—	18	1	1	—	28	1	97	2
20 to 30 "	14	—	77	—	63	3	10	—	46	—	210	3
30 to 40 "	6	1	33	—	45	3	10	—	32	3	125	7
40 to 50 "	1	—	8	—	20	—	2	—	17	1	48	1
50 to 60 "	3	—	2	—	8	2	1	—	8	—	22	2
60 to 70 "	—	—	—	—	1	—	2	—	5	—	3	—
70 and over	—	—	—	—	—	—	1	—	1	—	2	—
Age not ascertained	—	—	—	—	1	—	1	—	4	—	6	—
	42	1	210	—	175	10	34	—	160	5	627	16

It will be seen from Table LXXXIV. that the number of scars mostly varied inversely as the ages of the subjects, the per-centage being:—

Number of Marks.	Under 10 Years.	10 to 30 Years.	30 years and Under.	At all Ages.
Four or more	17.8	9.3	7.	9.1
Three	53.5	52.7	30.	45.5
Two	17.8	33.	51.7	38.
One	10.7	4.8	11.1	7.3

Foveation of Scars.—A well-defined and characteristic mark of vaccination should be regular in outline, white in colour, and stippled with minute depressions. There is

abundant scope for variation in the degree of such foveation, and for the purposes of analysis one may group the cases into series according as all the marks are (a) plain and well foveated, (b) some foveated, others not, or in which the foveation and outline of the scar are indistinct, (c) those marks which present no foveation, but either a smooth surface, and perhaps a faint appearance; or else composed of more or less radiate cicatricial tissue, causing a mark of great prominence and irregular outline. It is sometimes difficult to determine in cases of this group whether the scars have been produced by vaccination or not. When they are thick and irregular, often of large area, they indicate that the vaccination has been accompanied by extensive and perhaps deep ulceration.

Of the 416 cases, of which the records are given, one may place 294 amongst the first group, 32 in the second, and 90 in the third, but it must be remarked that the classification is an arbitrary one, and too much stress cannot be laid on the conclusions drawn from an analysis based upon it.

TABLE LXXXV.

FOVEATION OF SCARS.

	Foveate.		Part (or faint) Foveate.		Smooth and faint Scars.		Not Recorded.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	—	—	—	—	1	—	—	—	1	—
1 to 5 years	4	—	—	—	6	—	6	—	16	—
5 to 10	12	—	—	—	3	—	12	1	27	1
10 to 15	26	—	8	—	14	—	16	—	64	—
15 to 20	49	1	4	—	11	—	33	1	97	2
20 to 30	118	1	10	—	14	1	68	1	210	3
30 to 40	54	1	7	—	24	1	41	5	126	7
40 to 50	21	—	1	—	9	—	17	1	48	1
50 to 60	8	1	2	—	2	—	10	1	22	2
60 to 70	1	—	—	—	4	—	3	—	8	—
70 and over	—	—	—	—	1	—	1	—	2	—
Age not ascertained	1	—	—	—	1	—	4	—	6	—
	294	4	32	—	90	2	211	10	627	16

Having foveate marks, 294; 4 died, or 1.3 per cent.

„ partly or faintly foveate marks, 32; none died.

„ smooth, faint or thick scars, 90; 2 died; 2.2 per cent.

And as regards age, the four fatal cases amongst the foveated class occur in each of the four periods, 15 to 20, 20 to 30, 30 to 40, and 50 to 60; whilst the two fatal cases in the "scarred" class occurred amongst the ages 20 to 30, and 30 to 40.

Excluding two of whom the ages were not ascertained, the per-centage proportion of the various qualities of scars at each of those age periods is as follows (see Table LXXXV.):—

	Under 10 Years.	10 to 30 Years.	30 Years and upwards.	All ages.
	Per cent.	Per cent.	Per cent.	Per cent.
Plain foveate	61.5	75.9	62.7	70.7
Partly (or faintly) foveate.	—	8.6	7.4	7.7
Smooth, faint or thick sores.	38.5	15.3	29.9	21.5

Area of Scars.—The classification of the vaccination scars according to their areas here adopted is that employed in the statistical tables of the Metropolitan Asylums Board, upon the basis of which Table LXXXIII. has been constructed. The groups are three in number, viz., Class A¹, having marks the total area of which measures one half or more than one square inch; Class A², in which the total area of marks is one third or less than one half square inch; and Class A³, in which the total area is less than one-third square inch.

The area was obtained in 290 cases,* of which 246 fall into Class A¹ (three deaths, mortality 1 per cent.); 27 into Class A² (one death, mortality 3.7 per cent.); and 17 into Class A³ (one death, mortality 5.8 per cent.).

The three fatal cases in Class A³ fell into periods 30 to 40, two cases; and 50 to 60, one case; the one fatal case in Class A² was in period 15 to 20; and the one in Class A¹ was in period 30 to 40 years.

* It may be added that this and other details were obtained as regards the vaccination of several of the inmates of the houses visited who did not have small pox; but the facts so obtained do not seem of sufficient value to be subjected to analysis.

TABLE LXXXVI.

AREA OF SCARS.

	Class A ¹ .		Class A ² .		Class A ³ .		Class A ⁴ .		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year - - -	—	—	—	—	1	—	—	—	1	—
1 to 5 years - - -	5	—	—	—	1	—	10	—	16	—
5 to 10 " - - -	10	—	—	—	—	—	17	1	27	1
10 to 15 " - - -	32	—	7	—	—	—	25	—	64	—
15 to 20 " - - -	41	—	1	1	—	—	55	1	97	2
20 to 30 " - - -	91	—	9	—	4	—	106	3	210	3
30 to 40 " - - -	47	2	5	—	7	1	67	4	126	7
40 to 50 " - - -	13	—	3	—	2	—	30	1	48	1
50 to 60 " - - -	7	1	1	—	—	—	14	1	22	2
60 to 70 " - - -	—	—	1	—	1	—	6	—	8	—
70 and over - - -	—	—	—	—	1	—	1	—	2	—
Age not ascertained - -	—	—	—	—	—	—	6	—	6	—
	246	3	27	1	17	1	337	11	627	16

In the above Table (LXXXVI.) the figures are assigned under each age-period, and the per-centage proportions may be summarised thus:—

	Under 10 Years.	10 to 30 Years.	30 Years and over.	At all Ages.
Class A ¹ - - -	Per cent. 88·2	Per cent. 88·6	Per cent. 76·1	Per cent. 84·8
Class A ² - - -	—	9·1	11·3	9·3
Class A ³ - - -	11·8	2·1	12·5	5·8

Number, Foveation, and Area combined.—It is, however, on a combination of each of these characters that the most accurate estimate of the character of vaccination may be

held to depend; and the figures given in Table LXXXIII. supply the means for such an analysis.

It will be found on reference to this table that of the 480 cases in which one or other of these particulars were noted; in 271 the area, number, and character are given; in 139 the number and character; in 15 the area and number; in 1 the area and character; whilst in 46 the number alone; in 3 the area alone; and in 15 the character alone.

Only two fatal cases occur amongst the 271, of which all details are known; and the largest group, that of Class A¹, having 227 cases, had no fatal case; one death occurred in Class A², at age 15–20, with two foveate marks; the other, in Class A³, at age 30–40, with two "smooth" marks.

The accompanying table (Table LXXXVII.) gives an analysis of these 271 cases, extracted from the larger table already given:—

This table speaks for itself, but it may be useful to give a summary analysis of it:—

At ages under 10 years, 17 cases:—

Class A¹, 15 cases:—

Having 4 marks 5, viz., foveate 4, smooth 1.
 " 3 " 11, " " 6, " 5.
 " 2 " 1, " " 1.

Class A², 2 cases:—

Having 1 mark 2, viz., foveate 1, smooth 1.

At ages 10 to 30 years, 171 cases:—

Class A¹, 150 cases:—

Having 4 marks 15, viz., foveate 14, partly foveate 1.
 Having 3 marks 84, viz., foveate 59, partly foveate 14, smooth 11.
 Having 2 marks 47, viz., foveate 36, partly foveate 4, smooth 7.
 Having 1 mark 4, viz., foveate 4.

Class A², 17 cases:—

Having 3 marks 3, viz., foveate 2, smooth 1.
 " 2 " 10, " " 8,* " 2.
 " 1 " 4, " " 1, " 3.

Class A³, 4 cases:—

Having 2 marks 4, viz., foveate 3, smooth 1.

At ages 30 years and upwards, 83 cases:—

Class A¹, 62 cases:—

Having 4 marks 7, viz., foveate 5, partly foveate 1, smooth 1.
 Having 3 marks 18, viz., foveate 8, partly foveate 3, smooth 7.
 Having 2 marks 32, viz., foveate 22, partly foveate 4, smooth 6.
 Having 1 mark 5, viz., foveate 5.

Class A², 10 cases:—

Having 3 marks 1, viz., smooth 1.
 Having 2 marks 6, viz., foveate 4, partly foveate 1, smooth 1.
 Having 1 mark 3, viz., foveate 2, smooth 1.

Class A³, 11 cases:—

Having 3 marks 1, viz., smooth 1.
 " 2 " 4, " " 4,*
 " 1 " 6, " foveate 4, smooth 2.

* One fatal.

It will have been noticed that one infant under one year of age, said to have been vaccinated, contracted small-pox. This is the case of M. E. B., *æt.* eight months (Batley, 69). She had only a single non-foveate mark on the arm, of less than one-third of an inch in area. Her attack is described as a discrete one, but it is not known how she contracted the disease. Her father, W. B., *æt.* 25, a miner (vaccinated) was also attacked with small-pox about nine weeks afterwards. There were seven other inmates of the house, all of whom were vaccinated, except M. B., *æt.* 46, a weaver, who had suffered from small-pox when 15 years of age.

Another noteworthy case, as regards the youth of the patient, is that of E. W., an infant 19 months of age (Ba. 225), who presented three foveate vaccination scars (area unrecorded) and who had a severe (confluent) attack of small-pox. Her unvaccinated sister, C. A. W., *æt.* 8 (Ba. 304), developed a rash 14 days later, and also had a severe attack. I have no details of the other members of this family.

Fatal Cases.—There were 16 deaths amongst the vaccinated subjects, eight males, eight females. One (Batley, 544), a boy seven years of age, an epileptic, was recovering from a discrete attack of the disease when he was seized with epilepsy which proved fatal. This can hardly be considered a death from small-pox. Another (Dewsbury, 185), a young man, *æt.* 20, was under treatment at the Workhouse Infirmary for erysipelas when attacked with small-pox. A man (Dewsbury, 257), of robust appearance, had a severe attack of small-pox, and died rather suddenly from cardiac failure on the 16th day of the disease. A female, *æt.* 33 (Liversedge, 18), became comatose before the rash was fully out, uræmia? Another woman (Batley, 6), *æt.* 20, was in the third month of pregnancy. One (Dewsbury, 62), a schoolmistress, *æt.* 34, had not been in good health for some months. But of the rest there is no evidence that their health was in any way enfeebled before the attack of small-pox. A list of these cases is subjoined, together with the particulars as to their vaccination. Three fall into the Class A¹, one into Class A², one into Class A³, and 11 into Class A⁴, i.e., the group in which the area of vaccination marks is not recorded.

TABLE LXXXVIII.

FATAL CASES OF SMALL-POX IN VACCINATED SUBJECTS.

Reference.	Name.	Sex.	Age.	Type.	Vaccination.			Remarks.
					No.	Character.	Area.	
Batley, 6	J. A.	F.	20	Confluent	2	Foveate	A ⁴	Three months pregnant.
" 174	M. L.	M.	36	"	2	?	A ¹	Details furnished by Dr. Stewart.
" 208	S. A. R.	F.	17	"	?	?	A ⁴	No information obtainable.
" 391	A. A.	F.	19	"	2	Foveate	A ²	
" 420	F. S.	M.	52	"	2	?	A ¹	"Very large marks." Dr. Stewart.
" 427	G. T.	F.	32	"	2	Smooth	A ³	Details by Dr. Stewart.
" 441	W. H. B.	M.	56	"	2	Foveate	A ¹	Ditto.
" 542	P. H.	M.	38	"	?	?	A ⁴	Said to have been "twice" vaccinated.
" 544	N. H.	M.	7	Discrete	?	?	A ⁴	An epileptic; died from attack of epilepsy following small-pox.
Dewsbury, 62	H. G.	F.	34	Confluent	?	?	A ⁴	"Out of health" at time of attack.
" 185	F. J.	M.	20	"	?	?	A ⁴	Workhouse inmate. Convalescing from erysipelas when attacked.
" 195	S. S.	M.	36	"	?	?	A ¹	Previous health good.
" 201	J. A. K.	F.	35	"	4	Foveate	A ⁴	Fair health previously.
" 257	O. C.	M.	44	"	?	?	A ⁴	Syncope (? morbus cordis).
Liversedge, 18	E. H.	F.	33	Undetermined	?	?	A ⁴	Died comatose on 5th day (2nd day of rash).
Thornhill, 4	H. B.	F.	22	Confluent	2	Smooth	A ⁴	Treated by Mr. H. "hydropathically."

Re-vaccination.—The only individuals who were attacked with small-pox, and were said to have been re-vaccinated some time previously, are mentioned in the annexed table.

It is noteworthy that in five out of the 10 cases the re-vaccination was said to have been unsuccessful, nor was there any evidence of having been performed.

TABLE LXXXIX.
SMALL-POX IN RE-VACCINATED SUBJECTS.

Reference.	Name.	Sex.	Age.	Type of Attack.	Primary Scars.			Re-vaccination.		Remarks.
					No.	Character.	Area.	Date.	Result.	
Ba. 237	W.A.H.	M.	21	Discrete	3	Foveate	A ⁴	11 days before.	Nil.	Had been in army.
301	J. B.	M.	34	Mild	?	?	A ⁴	About three weeks.	3 marks.	
379	J. N.	M.	33	"	?	?	A ⁴	?	No evidence	
551	E. H.	M.	32	Discrete	2	Foveate	A ¹	On 7th day of illness.	Nil.	
D. 62	H. G.	F.	34	Confluent	?	?	A ⁴	Oct. 1891	Nil.	
104	E. B.	M.	22	Discrete	4	Foveate	A ¹	1889	?	Primary vaccination left no evidence.
112	M. S.	F.	29	Mild	3	"	A ⁴	1888	Nil.	
193	J. B.	M.	34	Confluent	?	?	A ⁴	15 years ago	?	
H. 33	J. K.	M.	42	Discrete	?	?	A ⁴	15 days before.	Nil.	
Mo. 10	S. H.	F.	31	"	2	Foveate	A ¹	8 days before.	2 large vesicles.	

In addition to these, J. R. (Ba. 309), male, 50, with two primary marks, foveation and area unrecorded, had a discrete attack. He was re-vaccinated, without success, two months later. A. B. (Mo. 28), female, æt. 18, who had just passed through an unrecognised attack of small-pox, was attempted to be re-vaccinated, together with other members of her family, on the occasion of two of the rest being attacked with small-pox. On both occasions the re-vaccination did not take.

Thus of 10 persons said to have been re-vaccinated who had small-pox, there had been no result in five, and no evidence shown in three others. There remain two cases, one of whom was re-vaccinated within eight days of being herself attacked with small-pox, and one (the only one which can be regarded as operative) re-vaccinated three weeks before the attack.

CLASS II.—NO INFORMATION AS TO VACCINATION.

In this class there occur 10 cases, none of them fatal; viz., 6 males, 4 females.

The ages of the males were:—between 1 and 5 years, one case; one between 5 and 10; 15 and 20 years, one case; 40 and 50 years, three cases.

The females fall:—one between 1 and 5 years; one between 5 and 10 years; two between 20 and 30.

TABLE XC.

	Males.		Females.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1	—	—	—	—	—	—
1-5	1	—	1	—	2	—
5-10	1	—	1	—	2	—
10-15	—	—	—	—	—	—
15-20	1	—	—	—	1	—
20-30	—	—	2	—	2	—
30-40	—	—	—	—	—	—
40-50	3	—	—	—	3	—
	6	—	4	—	10	—

CLASS III.—ALLEGED VACCINATION.

In this class there were 25 cases, 6 males and 19 females, the latter supplying the two fatal cases.

TABLE XCI.

	Male.		Female.		Total.		Proportion to whole Number in Age Periods.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	—	—	—	—	—	—	Per cent.	Per cent.
1 to 5 years	—	—	—	—	—	—	—	—
5 to 10 "	—	—	1	—	1	—	—	—
10 to 15 years	2	—	2	—	4	—	—	—
15 to 20 "	2	—	4	—	6	—	—	—
20 to 30 "	2	—	5	1	7	1	—	—
	—	—	—	—	17	1	68·0	50·0
30 to 40 years	—	—	3	—	3	—	—	—
40 to 50 "	—	—	1	1	1	1	—	—
50 to 60 "	—	—	2	—	2	—	—	—
60 to 70 "	—	—	—	—	—	—	—	—
70 years and over	—	—	1	—	1	—	—	—
	—	—	—	—	7	1	28·0	50·0
	6	—	19	2	25	2	—	—

The only comment necessary to make respecting this class is that it might have embraced a larger number had it been possible to have obtained inspection of every patient. It may be remembered that there were 147 in

the vaccinated class of whom there is no record as to the area, character, or number of marks. Some of these might, on inspection, have been found to present "no evidence of vaccination."

CLASS IV.—"UNDER" VACCINATION.

In this class there were 21 cases, 10 males, one fatal; 11 females, two fatal. All were under 30 years of age.

TABLE XCH.

	Male.		Female.		Total.		Proportion of whole Number in Age Period.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	4	1	3	2	7	3	Per cent.	Per cent.
	—	—	—	—	7	3	33·3	100·
1 to 5 years	3	—	3	—	6	—	—	—
5 to 10 "	1	—	3	—	4	—	—	—
	4	—	6	—	10	—	47·6	—
10 to 15 years	2	—	—	—	2	—	—	—
15 to 20 "	—	—	1	—	1	—	—	—
20 to 30 "	—	—	1	—	1	—	—	—
	—	—	—	—	4	—	19·0	—
	10	1	11	2	21	3	—	—

The subjoined list includes all those who fall into this class. In every case the subject was a member of a family in which, on the appearance of a case of small-pox, those not previously vaccinated were vaccinated for the first time; and in nearly every case this vaccination, running concurrently with the small-pox, was successful.

In one vaccination was performed on the second day of illness.

In one vaccination was performed one day before illness.

In three vaccination was performed two days before illness.

In three vaccination was performed three days before illness.

In one vaccination was performed four days before illness.

In one vaccination was performed five days before illness.

In four vaccination was performed seven days before illness.

In three vaccination was performed eight days before illness.

In three vaccination was performed 13 days before illness.

In one vaccination was performed 14 days before illness.

TABLE XCIII.

TABLE of CASES of SMALL-POX attacked whilst undergoing PRIMARY VACCINATION.

Ref. in Reg.	Name.	Sex.	Age.	Onset of illness.	Date of Rash.	Date of Vaccination.	Result of Vaccination.	Day of Vaccination when attacked.	Type of Attack.	Result.
1	Batley, 102	J. McQ.	M.	12	4/1/92	4/1/92	28/12/91	S.	8th	Discrete - R.
2	" 103	M. McQ.	F.	18	2/1/92	3/1/92	1/1/92	S.	2nd	Confluent R.
3	" 104	H. McQ.	M.	3mo.	4/1/92	4/1/92	28/12/91	S.	8th	Confluent R.
4	" 143	H. H.	M.	14	9/1/92	10/1/92	6/1/92	S.	4th	Coherent - R.
5	" 177	S. A. S.	F.	20	16/1/92	19/1/92	9/1/92	S.	8th	Mild - R.
6	" 234	B. G.	F.	11mo.	14/2/92	16/2/92	12/1/92	S.	3rd	Confluent D.
7	" 539	H. E.	M.	6	5/2/92	8/2/92	22/1/92	S.	15th	Mild - R.
8	" 546	A. H.	F.	10mo.	?	16/6/92	8/6/92	S.	?	Coherent - R.
9	Dewsbury, 82	H. W.	F.	5	18/2/92	21/2/92	16/2/92	S.	3rd	Confluent R.
10	" 83	W. W.	M.	3	18/2/92	21/2/92	16/2/92	S.	3rd	Coherent - R.
11	" 145	H. R.	M.	6mo.	12/4/92	13/4/92	9/4/92	S.	4th	Mild - R.
12	" 176	E. B.	F.	4	30/4/92	5/5/92	23/4/92	S.	8th	Type? - R.
13	" 264	E. M. P.	F.	12dys.	2/6/92	6/6/92	27/5/92	S.	6th	Confluent D.
14	Birstal, 8	H. D.	M.	9dys.	29/3/92	29/3/92	26/3/92	S.	4th	Confluent D.
15	Liversedge, 20	J. E. H.	M.	7mo.	4/7/92	7/7/92	2/7/92	S.	3rd	Mild - R.
16	Morley, 2	L. D.	F.	7	25/1/92	27/1/92	29/1/92	S.	—	Confluent R.
17	" 9	M. E. H.	F.	2	27/4/92	28/4/92	15/4/92	S.	14th	Confluent R.
18	" 22	W. H.	M.	1	3/7/92	3/7/92	25/6/92	S.	9th	Mild - R.
19	" 37	A. C.	F.	3	20/7/92	20/7/92	12/7/92	S.	9th	Mild - R.
20	" 39	J. K.	M.	2	20/8/92	20/8/92	7/8/92	S.	14th	Mild - R.
21	" 40	E. K.	F.	5	20/8/92	20/8/92	7/8/92	S.	14th	Mild - R.

S. = Result of vaccination successful.

Born when mother attacked with small-pox. Born when mother attacked with small-pox.

ANALYSIS OF TABLE XCIII.
CONCURRENT VACCINIA and VARIOLA.
VACCINATED.

	Days before Appearance of Rash.										Days after Rash.	
	17	13	12	10	8	7	5	4	3	2	2	—
Under 1 year				Cl.	Cl.	Cl.	M.	Cl. M.	Cl.			{ Confluent 5 (3 d.) Mild 2. Confluent 2. Mild 3. Type 1. Confluent 2. Mild 2. Discrete 1. Coherent 1. Confluent 1. Mild 1.
1 to 5 years		M. Cl.	?		M. M.		Cl.					
5 „ 10 „	M.	M.					Cl.				Cl.	
10 „ 15 „						D.		Ch.				
15 „ 20 „										Cl.		
20 „ 30 „				M.								
	1	3	1	2	3	2	3	3	1	1	1	21

It will be seen that the vaccination in these cases did not invariably have much, if any, modifying influence. In the seven children under one year of age three attacks were fatal, but two of these were newly-born infants, whose mothers were suffering from small-pox at the time of the births. These infants were vaccinated as soon as possible, one 10 days, and the other four days before the rash of small-pox appeared. The other fatal case was a child of 11 months, who was vaccinated only three days before the rash made its appearance. However, even in this series there were two infants aged four months respectively who had mild attacks, and who had been vaccinated, the one four days, the other five days before the rash appeared.

Of the five children between one and five years, two, vaccinated 13 and five days before the rash respectively, had severe attacks, and three had mild attacks, vaccinated 13 and eight days before the rash, but these all occurred at Morley where the prevalent type of small-pox at the time was singularly mild, and mostly affected children. [See Part III., Morley, p. 91.]

Of the four children between five and 10 years, mild attacks were seen in two, vaccinated one 17 days before the rash, the other 13 days (a Morley case). Severe attacks were experienced by two others, the one vaccinated four days before the rash, the other not until its admission into hospital two days after the rash had appeared. Nevertheless, in this case, four large vesicles formed at the vaccination sites.

Of those above 10 years of age, four in number, one only had a mild attack. This was the case of S. A. S., 20 years of age, who was successfully vaccinated during the incubation of small-pox, 10 days before the rash appeared.

CLASS V.—UNVACCINATED.

There were 346 unvaccinated persons amongst the total of 1,029 cases of small-pox—a proportion of 33·6 per cent.—just about one-third. Of this number, 180 were males, 49 being fatal cases; 166 were females, 40 being fatal cases.

TABLE XCIV.

	Males.		Females.		Total.		Proportion of whole number in Age Periods.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	10	6	11	10	21	16	Per cent.	Per cent.
	—	—	—	—	21	16	6·3	18·0
1 to 5 years	28	12	32	11	60	23	—	—
5 to 10 „	34	7	43	7	77	14	—	—
	—	—	—	—	137	37	39·3	41·5
10 to 15 years	22	2	16	1	38	3	—	—
15 to 20 „	40	4	35	3	75	7	—	—
20 to 30 „	30	11	22	6	52	17	—	—
	—	—	—	—	165	27	48·0	30·3
30 to 40 years	8	2	3	1	11	3	—	—
40 to 50 „	5	5	2	—	7	5	—	—
50 to 60 „	1	—	1	1	2	1	—	—
60 to 70 „	—	—	1	—	1	—	—	—
70 years and over	1	—	—	—	1	—	—	—
	—	—	—	—	22	9	6·3	10·1
Age not ascertained	1	—	—	—	1	—	—	—
	180	49	166	40	346	89	—	—

Contrasting the two sexes in this class as to mortality at various age periods, it is seen that:—

Of the whole number, <i>males</i> , mortality, 27·2 per cent., <i>females</i> , 24·1 per cent.	
At under 1 year	60·0 " " 90·9 "
1 to 10 years	30·6 " " 24·0 "
10 to 30 years	18·4 " " 13·7 "
30 years and over	46·6 " " 28·5 "

I append here a list of small-pox amongst infants. It may be recalled that there were in all 29 attacks under 1 year of age; one of these infants was vaccinated, and seven were undergoing primary vaccination.

TABLE XCV.
SMALL-POX IN UNVACCINATED INFANTS.

—	Reference to Register.	Name.	Sex.	Age.	Onset.	Rash.	Type.	Date of Death.	Duration of Illness.	—
1	Batley, 3	T. C.	M.	5 mos.	May 11	May 14	Confluent.	May 14	5 days.	
2	" 14	E. P.	F.	2 "	June 30	July 3	"	July 8	9 "	
3	" 27	S. E. B.	F.	7 "	Nov. 21	Nov. 24	"	Nov. 29	9 "	
4	" 33	C. T.	F.	3 "	Nov. 16	?	"	Dec. 1	15 "	
5	" 134	E. B.	F.	7 days	Jan. 7	Jan. 10	"	Jan. 11	5 "	
6	" 149	C. H.	M.	6 mos.	Jan. 12	Jan. 12	"	Jan. 21	10 "	
7	" 201	A. P.	F.	10 "	Jan. 18	Jan. 23	"	—	—	Recovered.
8	" 230	H. B.	F.	3 weeks	Jan. 21	?	"	Feb. 7	18 "	
9	" 267	F. W.	M.	5 mos.	Feb. 1	Feb. 2	"	Feb. 11	11 "	
10	" 332	T. L.	M.	2 weeks	Feb. 16	Feb. 18	"	Feb. 22	7 "	
11	" 374	W. McN.	M.	5 mos.	Feb. 23	Feb. 26	Discrete.	—	—	Recovered.
12	" 473	J. I.	F.	9 weeks	April 2	April 5	Confluent.	April 8	7 "	
13	" 501	E. W.	F.	3 "	April 21	April 23	"	April 29	9 "	
14	" 524	L. C.	F.	2 "	April 6	?	"	April 14	9 "	
15	" 527	E. P.	M.	7 mos.	April 29	May 1	Discrete.	—	—	Recovered.
16	Dewsbury, 23	L. D.	F.	11 "	Oct. 15	Oct. 17	Confluent.	Oct. 23	9 "	
17	" 76	R. M.	M.	5 "	Feb. 16	Feb. 20	"	Feb. 25	10 "	
18	" 190	C. A. S.	F.	8 "	April 28	May 2	"	May 9	12 "	
19	" 260	C. R.	M.	4 "	July 26	July 29	Coherent.	—	—	Recovered.
20	Morley, 19	J. E. B.	M.	7 "	June 18	June 21	Mild.	—	—	"
21	Sothill Upper, 23	F. S.	M.	12 days	Feb. 22	?	Type uncertain.	Feb. 26	5 "	

Thus there were six infants attacked under 4 weeks of age (two males, four females), all of whom died; two were between the ages of 1 and 3 months (two females) both of whom died; six were between 3 and 6 months (five males, one female)—two recovered (both males), four died; five between 6 and 9 months (three males, two females)—two recovered (both males), and three died (one male, two females); and two between 9 and 12 months (both females), of whom one died.*

In concluding this survey of the vaccination relations of those attacked with small-pox, it is instructive to contrast the two main classes, viz., those known to have been vaccinated and those known not to have been vaccinated, as regards the age incidence and proportion of fatal cases at each period:—

Thus of the vaccinated—

1·5 per cent. were under 1 year of age, yielding no fatal case.

6·8 per cent. were 1 to 10 years of age, yielding 6·2 per cent. of the total fatal cases.
59·1 " were 10 to 30 years of age, yielding 21·2 per cent. of the total fatal cases.
32·8 " were 30 years upwards, yielding 62·5 per cent. of the total fatal cases.

Of the unvaccinated—

6·0 per cent. were under 1 year of age, yielding 18·0 per cent. of the total fatal cases.
39·6 " were 1 to 10 years of age, yielding 41·5 per cent. of the total fatal cases.
47·6 " were 10 to 30 years of age, yielding 30·3 per cent. of the total fatal cases.
6·0 " were 30 years upwards, yielding 10·1 per cent. of the total fatal cases.

Taking each age period, and calculating the proportion of cases and of the deaths in each group, we have:—

—	Vaccinated.		No information on Vaccination.		Alleged Vaccination.		Under Vaccination.		Unvaccinated.		Mortality on whole Number.
	Proportion of Cases.	Deaths.	Proportion of Cases.	Deaths.	Proportion of Cases.	Deaths.	Proportion of Cases.	Deaths.	Proportion of Cases.	Deaths.	
Under 1 year	3·4	—	—	—	—	—	24·1	15·8	72·4	84·2	65·5
1 to 10 years	22·	2·6	2·	—	0·5	—	5·1	—	70·2	97·4	54·5
10 to 30 years	66·2	15·1	0·5	—	3·	3·	0·7	—	29·6	81·8	30·
30 years and over	86·5	59·	1·2	—	3·	5·	—	—	9·2	45·	18·

* The statutory age for vaccination being 3 months, and the fact that (vide *supra*) only one out of 22 infants under 1 year of age (*i.e.*, excluding seven who were "under" vaccination when attacked) attacked with small-pox was vaccinated, suggests the inference that the number of cases in this age period had all been duly vaccinated (at 3 months) might have been reduced to about 10 (or less than one-half) and the deaths to 8. This would not have reduced the proportionate mortality—since all those under 3 months died—but would have raised it from 72·7 per cent. (*i.e.*, 16 deaths out of 22 attacks) to 80 per cent. (*i.e.*, 8 deaths out of 10 attacks), but the gross mortality like the total number attacked would have been reduced one-half.

Comparison of those attacked, and those not attacked with Small-pox dwelling in invaded houses.

The vaccination condition of the 3,000 inmates of the 544 houses visited may be summarised as follows :—

- At all ages there were :—
- Vaccinated 2,271, or 75·7 per cent.
- Alleged to be vaccinated, but having no marks :—45 or 1·5 per cent.
- " Under " vaccination, 77, or 2·5 per cent.
- Unvaccinated, 527, or 17·5 per cent.

and in 80, no information on the point was available.

Similarly of the 887 cases of small-pox in these households there were :—

- Vaccinated - - 544, or 62·4 per cent.
- Alleged vaccination - 24 ,, 2·7 ,,
- " Under " vaccination - 21 ,, 2·3 ,,
- Unvaccinated - - 294 ,, 33·1 ,,
- No information - - 4.

And whereas of the whole number the per-centage of the attacked was 29·5,

- Of the vaccinated - it was 24 per cent.
- „ „ alleged vaccinated ” „ 53·3 „
- „ „ under-vaccination ” „ 37·2 „
- „ unvaccinated - „ 55·7 „

TABLE XCVI.

INVADIED HOUSEHOLDS.—Condition of Vaccination of all Inmates at various Ages.

—	I. Vaccinated.	II. No information.	III. Alleged Vaccination.	IV. "Under" Vaccination.	V. Unvaccinated.	Total.
Under 1 year	16	—	—	16	43	75
1 to 5 years	145	3	3	28	107	286
5 „ 10 „	244	4	1	13	106	368
10 „ 15 „	300	4	4	7	55	379
15 „ 20 „	314	7	6	9	88	424
20 „ 30 „	458	14	9	3	62	546
30 „ 40 „	307	7	6	2	23	347
40 „ 50 „	238	14	6	—	22	300
50 „ 60 „	136	10	6	—	13	165
60 „ 70 „	58	4	2	—	5	69
70 and over	15	3	1	—	1	20
Age not ascertained	11	10	—	—	—	21
	2,271	80	44	78	527	3,000

Explanation of Chart XVII.

Vaccination Data of 3,000 Persons exposed to Small-pox Infection.

This chart is designed to show the incidence of small-pox upon the inmates of 544 houses invaded by the disease in the Dewsbury Union; and at the same time to indicate the relative numbers of those attacked in each " vaccination-class."

Each small square in the diagram represents one person, those left unshaded represent those of the inmates who were exposed to infection, but not attacked, the shaded squares indicate those who were attacked. Fatal cases of small-pox are indicated by the sign +; and a previous attack of small-pox by the sign O.

The diagram therefore shows that :— 3,000 persons exposed to infection, 887 contracted the disease, of whom 21 died, and 6 previously had small-pox.

Of the 2,412 individuals exposed, but not infected, 180 had previously had small-pox.

Of the whole 3,000 :— 2,271 were vaccinated, of whom 544 were attacked.

In 45 vaccination was alleged, but no evidence was visible; of these 25 were attacked.

78 were " under-going " vaccination when exposed, and 21 were under-going vaccination when attacked.

In 80 no information on the point was available; of these 5 were attacked.

527 were unvaccinated, of whom 294 were attacked.

—	All Inmates.		Attacked with Small-pox.		
	—	Previous Small-pox.	—	Fatal.	Previous Attack.
Vaccinated . . .	2,271	66	544	11	(2)
Alleged Vaccination.	44	2	24	2	—
" Under " Vaccination.	78	—	21	3	—
" No information "	80	4	4	—	(1)
Unvaccinated . . .	527	50	294	67	(8)

TABLE XCVII.

INVADIED HOUSEHOLDS.—Condition of Vaccination of those attacked with Small-pox at various Ages.

—	I. Vaccinated.	II. No information.	III. Alleged Vaccination.	IV. "Under" Vaccination.	V. Unvaccinated.	Total.
Under 1 year	1	—	—	7	17	25
1 to 5 years	14	2	—	6	57	79
5 „ 10 „	26	—	1	4	68	99
10 „ 15 „	39	—	4	2	31	96
15 „ 20 „	92	1	4	1	65	163
20 „ 30 „	173	—	8	1	41	223
30 „ 40 „	112	—	3	—	8	123
40 „ 50 „	40	1	1	—	4	46
50 „ 60 „	17	—	2	—	2	21
60 „ 70 „	8	—	—	—	1	9
70 and over	2	—	1	—	—	3
Age not ascertained	—	—	—	—	—	—
	544	4	24	21	294	887

The proportion of cases of small-pox to the number of inmates of the invaded households, with reference to their vaccination condition, may be stated in different age-periods as follows :—

I.—Vaccinated.

—	Inmates.	Cases.	Proportion of attacked.
Under 1 year	16	1	1 : 16, or 6·2 per cent.
1 to 10 years	380	40	1 : 9·5 „ 10·5 „
10 „ 30 „	1,681	354	1 : 3 „ 20 „
30 years and upwards	774	179	1 : 4·3 „ 23 „
Age not ascertained	11	—	—
	2,271	544	1 : 4

Explanation of Chart XVIII.

In this chart the data given in the preceding chart (XVII.) have been divided among three age groups, viz. :—Age 0 to 10, 10 years to 30, 30 years and upwards, and those whose age was not ascertained.

Group A. (ages 0 to 10) contains 729 individuals, of whom 203 were attacked with small-pox.

Group B. (ages 10 to 30) contains 1,219 individuals, of whom 482 were attacked with small-pox.

Group C. (ages 30 years and upward) contains 908 individuals, of whom 322 were attacked with small-pox.

Group D. (age not ascertained) contains 21 individuals, of whom none were attacked with small-pox.

In A. 392 were vaccinated, of whom 41 were attacked with small-pox, and one died.

In B. 1,081 were vaccinated, of whom 321 were attacked with small-pox, and four died.

In C. 774 were vaccinated, of whom 179 were attacked with small-pox, and six died.

In D. 11 were vaccinated.

In A. 5 were " alleged " to have been vaccinated, of whom one was attacked.

In B. 19 were " alleged " to have been vaccinated, of whom 16 were attacked, and one died.

In C. 21 were " alleged " to have been vaccinated, of whom seven were attacked and one died.

In A. 57 were " under " vaccination, of whom 17 were attacked, and three died.

In B. 19 were " under " vaccination, of whom four were attacked.

In C. 3 were " under " vaccination, of whom none were attacked.

In A. 7, " no information as to vaccination " ; two attacked.

In B. 25, " no information as to vaccination " ; one attacked.

In C. 38, " no information as to vaccination " ; one attacked.

In D. 10, " no information as to vaccination " ; none attacked.

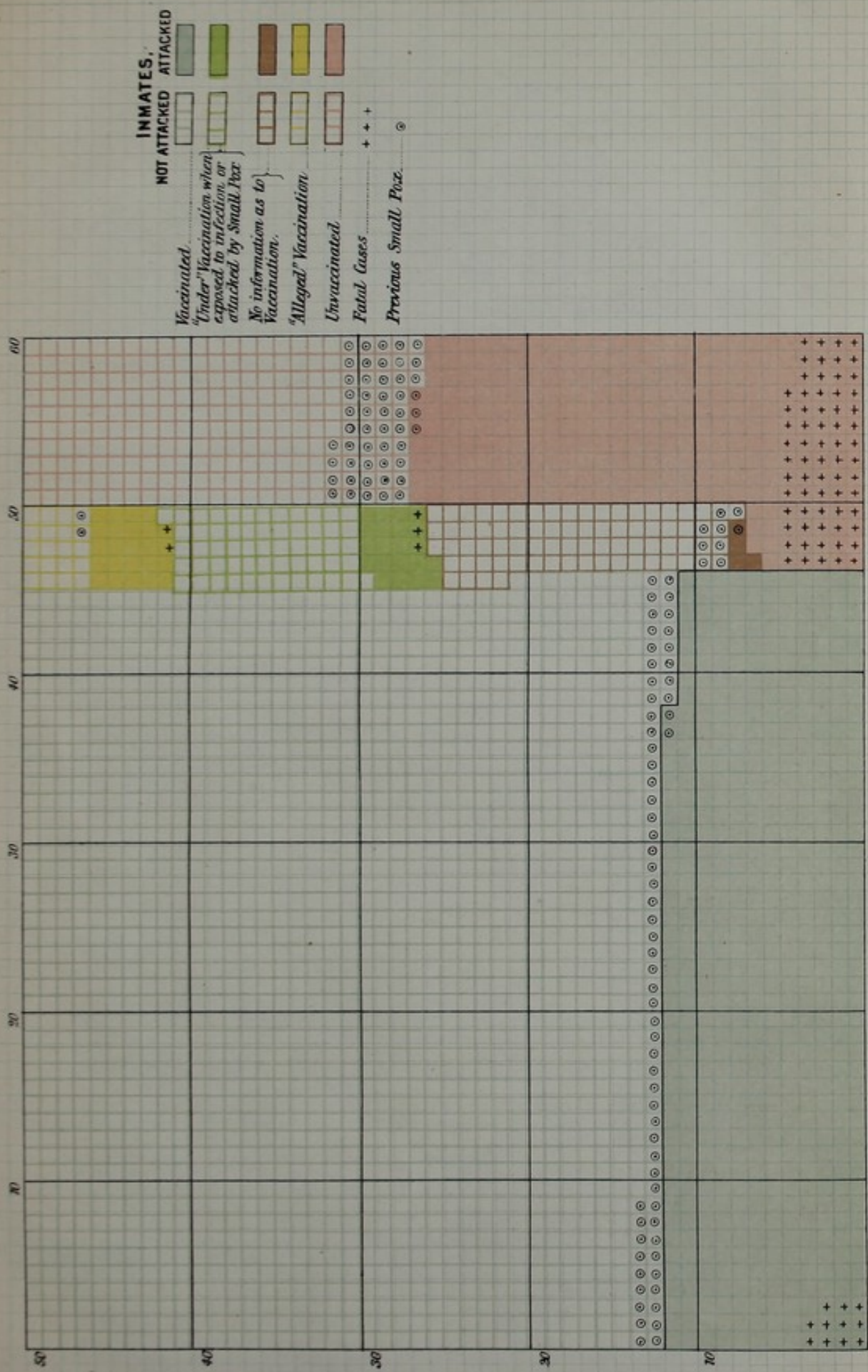
In A. 106 were unvaccinated, of whom 148 were attacked and 5 died.

In B. 203 were unvaccinated, of whom 137 were attacked and 19 died.

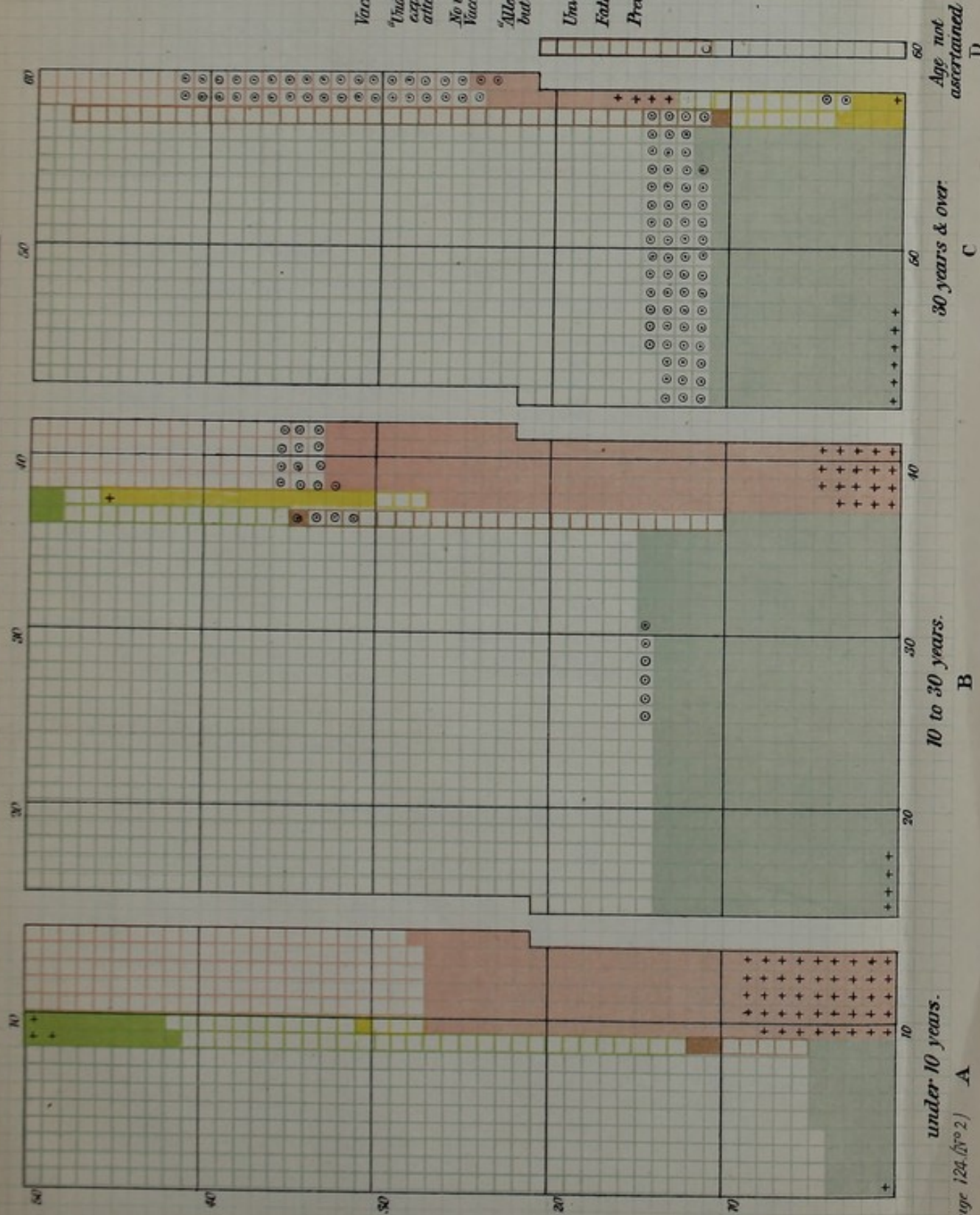
In C. 66 were unvaccinated, of whom 16 were attacked and four died.

The chart also shows that a previous attack of small-pox had occurred in 21 of those exposed and three of those attacked on this occasion in Group B.; and in 96 of the former and four of the latter in Group C. The distribution of these according to the vaccination of the subjects is shown in the chart.

VACCINATION DATA OF 3000 MEMBERS OF HOUSEHOLDS INVADED BY SMALL POX.



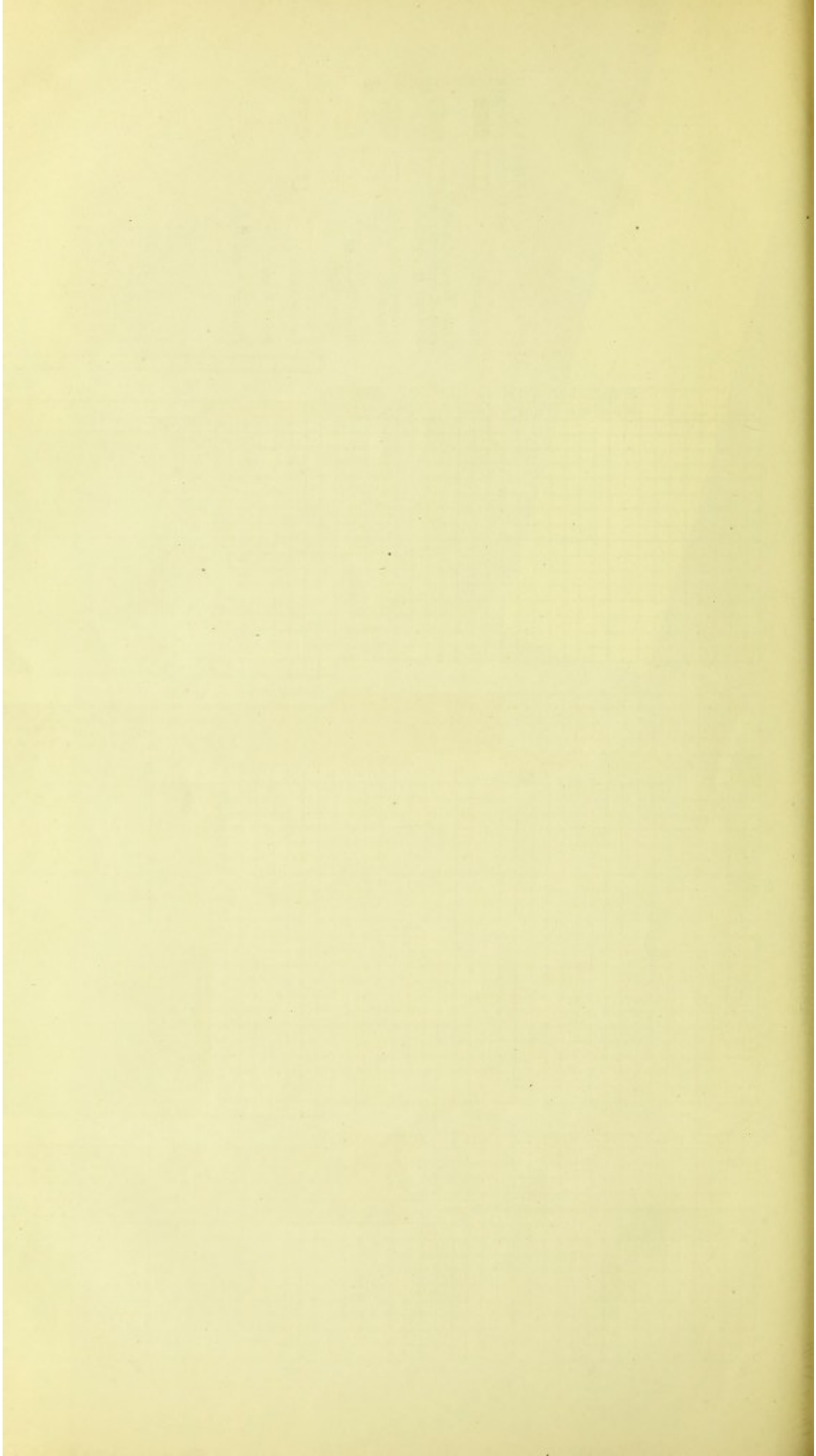
ARRANGED IN THREE AGE-PERIODS.



10 to 30 years. B

30 years & over. C

Age not ascertained D



II.—No information on Vaccination.

—	Inmates.	Cases.	Proportion of attacked.
Under 1 year - - - -	—	—	—
1 to 10 years - - - -	7	2	1 : 3·5
10 „ 30 „ - - - -	25	1	1 : 25
30 years and upwards - - - -	28	1	1 : 28
Age not ascertained - - - -	10	—	—
	80	4	1 : 20

III.—Alleged Vaccination.

—	Inmates.	Cases.	Proportion of Cases to Inmates.
Under 1 year - - - -	—	—	—
1 to 10 years - - - -	4	1	1 : 4, or 25 per cent.
10 „ 30 „ - - - -	19	16	1 : 1·2 „ 80
30 years and upwards - - - -	21	7	1 : 3 „ 33·3
	44	24	1 : 18

IV.—“ Under ” Vaccination.

—	Inmates.	Cases.	Proportion of Cases to Inmates.
Under 1 year - - - -	16	7	1 : 2, or 50 per cent.
1 to 10 years - - - -	41	10	1 : 4·2 „ 23·8
10 „ 30 „ - - - -	19	4	1 : 4·8 „ 21
30 years and upwards - - - -	2	—	—
	78	21	1 : 3·6

V.—Unvaccinated.

—	Inmates.	Cases.	Proportion of Cases to Inmates.
Under 1 year - - - -	43	17	1 : 2·6, or 37·7 per cent.
1 to 10 years - - - -	215	125	1 : 1·7 „ 59
10 „ 30 „ - - - -	205	157	1 : 1·5 „ 63·4
30 years and upwards - - - -	66	15	1 : 4·5 „ 22
	529	294	1 : 1·8

Influence of Vaccination on the Incidence of Small-pox in Households.

The question of the extent of the “ protection ” from small-pox afforded by vaccination has already been considered from the point of view of those attacked with the disease, and it remains to attempt the comparison between this class and that of those equally exposed to infection who were not attacked. The phrase “ equally exposed ” is, however, scarcely accurate, for it is obvious that in every community some members must incur more risks of contagion than others. Those in direct personal attendance upon the sick are, of course, more likely to be infected than those who are seldom, if ever, in contact with them; and in the case of families those whose duties keep them confined to the house where the patient is lying, are more likely to receive infection than those whose avocations take them for many hours daily away from home. On the other hand, the disease may be contracted by the latter class in the school or place of work by contact with sufferers, or with persons coming direct from infected houses. The relative incidence of the disease upon these various classes has been discussed in previous sections of the report, and I do not propose to refer to it again. But for my present purpose it may suffice to note the incidence of small-pox upon the members of households among whom one or more cases of small-pox occurred; in the first place without reference to the differences in liability to exposure to infection, and subsequently with reference to the occurrence of single and of multiple cases in a household, and to the fact whether the cases were removed to hospital for isolation or were kept at home during their attack.

In Part II. it has been stated that particulars were obtained of 544 households, amounting in all to 3,000 individuals, of whom 887 were attacked with small-pox, viz. :—

Batley - - - -	267 houses,	465 attacked,	991 not attacked.
Dewsbury - - - -	130 „	217 „	499 „
Other districts - - - -	147 „	205 „	623 „
	544 „	887 „	2,113 „

It should be added that six of those who were attacked with small-pox were stated to have previously suffered from it, as also were 120 who were not attacked on this occasion (see chart III. and XVI.). We have, therefore, an attack-rate amongst those stated to have previously suffered from small-pox of six out of 126, or 4·7 per cent.; and amongst those attacked for the first time of 881 out of 2,874, or 30·6 per cent. It will be seen subsequently that the liability to a second attack of the disease is about one-fifth of the liability amongst the vaccinated members of this community, and about one-twelfth of that amongst the unvaccinated class. It will also be seen that out of 257 persons known to have been re-vaccinated, 3 were attacked with small-pox in this epidemic (see page 131), or an attack rate of 1·17 per cent.

Regarding the ages of these persons we find—

—	Attacked.	Previous Small-pox.	Not attacked.	Previous Small-pox.	Incidence Rates.	
					Whole Number.	Exclusive of previous Small-pox.
					Per cent.	Per cent.
Under 1 year - - - -	25	—	50	—	33·3	—
1 to 10 years - - - -	178	—	476	—	27·2	—
10 to 30 years - - - -	482	3	867	21	35·7	36·1
30 years and over - - - -	202	3	699	99	22·4	24·9
Age not ascertained - - - -	—	—	21	—	—	—
	887	6	2,113	120	29·5	30·6

TABLE XCVIII.

	Attacked.	Previous Small-pox.	Not attacked.	Previous Small-pox.	Incidence.	
					Whole Number.	Exclusive of previous Small-pox.
Under 1 year	25	—	50	—	Per cent.	Per cent.
1-5 years	79	—	207	—	33·3	—
5-10 "	99	—	269	—	27·9	—
10-15 "	96	—	283	1	26·9	—
15-20 "	163	1	261	2	25·	25·1
20-30 "	223	2	323	18	38·4	38·4
30-40 "	123	—	224	38	40·8	42·
40-50 "	46	1	254	29	35·4	39·8
50-60 "	21	1	144	22	15·3	16·6
60-70 "	9	1	60	8	12·7	14·
70 and over	3	—	17	2	13·	13·3
Age not ascertained	—	—	21	—	15·	16·6
	887	6	2,113	120	29·5	30·6

Thus the incidence of this disease was greatest amongst persons aged 20 to 30 years, the period which yielded the largest total number of all the periods named. There is a similar concordance between the proportion attacked with small-pox and those exposed to infection in the period 15 to 20 years.

	In order of Numbers exposed.		In order of Incidence.		Exclusive of previous Small-pox.			
	Age.	Number.	Age.	Per cent.	Age.	Number.	Age.	Per cent.
1	20-30	546	20-30	40·8	20-30	526	20-30	42·0
2	15-20	424	15-20	38·4	15-20	421	30-40	39·8
3	10-15	379	30-40	35·4	10-15	378	15-20	38·4
4	5-10	368	Under 1	33·3	5-10	368	Under 1	33·3
5	30-40	347	1-5	27·9	30-40	309	1-5	27·9
6	40-50	300	5-10	26·9	1-5	286	5-10	26·9
7	1-5	286	10-15	25·	40-50	270	10-15	25·1
8	50-60	165	40-50	15·3	50-60	142	{ 40-50 70 and over }	16·6
9	Under 1	75	70 and over	15·	Under 1	75	50-60	14·0
10	60-70	69	50-60	12·7	60-70	60	60 to 70	13·3
11	70 and over	20	60-70	13·	70 and over	20	—	—

We may analyse the foregoing statistics by dividing the community into two groups, viz., those belonging to the unvaccinated classes, and those belonging to the vaccinated and other classes previously described.

In the unvaccinated class there are 527 individuals of whom 294 were attacked with small-pox, a rate of 55·7 per cent. But of this number 50 had previously suffered from the disease, three of them again being attacked.

Deducting these we have an incidence rate amongst the unvaccinated class of 61·7 per cent.

In the other classes there occurs a total of 2,473 individuals (viz.: vaccinated, 2,271, "under" vaccination 78, "alleged" vaccination 44, no information as to vaccination 80), of whom 593 were attacked with small-pox, an incidence rate of 23·9 per cent. Again deducting 76 (including three again attacked) who had previously suffered from small-pox, the rate would be 24·6 per cent.

TABLE XCIX.

	Unvaccinated.						Other Classes.					
	Attacked.		Not attacked.		Incidence.		Attacked.		Not attacked.		Incidence.	
	Total.	Previous Small-pox.	Total.	Previous Small-pox.	On Whole Number.	Exclusive of Previous Small-pox.	Total.	Previous Small-pox.	Total.	Previous Small-pox.	On Whole Number.	Exclusive of Previous Small-pox.
Under 1 year	17	—	26	—	Per cent.	—	8	—	24	—	Per cent.	—
1-5 years	67	—	50	—	39·5	—	22	—	157	—	12·3	—
5-10 "	68	—	38	—	64·1	—	31	—	231	—	11·3	—
10-15 "	31	—	24	—	66·3	—	65	—	269	1	20·	20·1
15-20 "	65	—	23	1	73·8	74·7	96	1	238	1	29·1	29·
20-30 "	41	1	21	11	66·1	80·	182	1	302	7	37·6	38·
30-40 "	8	—	17	13	32·	66·6	115	—	207	25	33·7	38·7
40-50 "	4	—	18	14	18·2	50·	42	1	236	15	15·1	15·6
50-60 "	2	1	11	6	15·4	16·6	19	—	133	16	15·5	14·
60-70 "	1	1	4	1	20·	—	8	—	66	7	12·5	14·
70 and over	—	—	1	1	—	—	3	—	16	1	15·8	16·6
Age not ascertained	—	—	—	—	—	—	—	—	21	—	—	—
Total	294	3	233	47	55·7	61·7	593	3	1,889	73	23·9	24·6

Adopting the same method for illustrating the divergence in the order of each group as to total numbers and the incidence in turn of small-pox, it is seen that the

relative positions are materially different in these groups from those taken by them as a whole.

UNVACCINATED.

—	In Order of Numbers exposed.		In Order of Incidence.		Exclusive of Previous Small-pox.			
	Age.	Number.	Age.	Per cent.	Age.	Number.	Age.	Per cent.
1	1-5	107	15-20	73·8	1-5	107	20-30	80·
2	5-10	106	20-30	66·1	5-10	106	15-20	74·7
3	15-20	88	5-10	64·1	15-20	87	30-40	66·6
4	20-30	62	10-15	56·3	10-15	55	5-10	64·1
5	10-15	55	1-5	53·2	20-30	50	10-15	56·3
6	Under 1	43	Under 1	39·5	Under 1	43	1-5	53·2
7	30-40	25	30-40	32·	30-40	12	40-50	50·
8	40-50	22	60-70	20·	40-50	8	Under 1	39·5
9	50-60	13	40-50	18·2	50-60	3	50-60	16·6
10	60-70	5	50-60	15·4	60-70	—	—	—
11	70 and over	1	—	—	—	—	—	—

which may be further contrasted with the remainder.

OTHER CLASSES.

—	In Order of Numbers exposed.		In Order of Incidence.		Exclusive of Previous Small-pox.			
	Age.	Number.	Age.	Per cent.	Age.	Number.	Age.	Per cent.
1	20-30	484	20-30	37·6	20-30	476	30-40	38·7
2	15-20	336	30-40	35·7	15-20	334	20-30	38·
3	10-15	324	15-20	29·1	10-15	323	15-20	29·
4	30-40	322	Under 1	25·	30-40	297	Under 1	25·
5	40-50	278	10-15	20·	40-50	262	10-15	20·1
6	5-10	262	70 and over	15·8	5-10	262	70 and over	16·6
7	1-5	179	40-50	15·1	1-5	179	40-50	15·6
8	50-60	152	50-60	12·5	50-60	136	50-60	14·
9	60-70	64	60-70	12·5	60-70	57	60-70	14·
10	Under 1	32	1-5	12·3	Under 1	32	1-5	12·3
11	70 and over	19	5-10	11·3	70 and over	18	5-10	11·3

It will be observed that there is a fair concordance on the whole between the relative number of those exposed to infection in each age-period, and the proportion of those who were attacked, except in certain instances where the divergence is marked. Thus in the unvaccinated series, the proportion of the attacked was high compared with the numbers exposed in the period, 15 to 20 years; and low in the period, 1 to 5 years; and if those who had previously had small-pox be eliminated, a preponderant incidence is shown in the age-periods, 20 to 30, and 30 to 40. In the series of "other classes" there is a disproportionate incidence of attacks in the period "under one year," and "at 70 and over," i.e., the two extremes of life; whilst in the age-period, 1 to 5 years, the incidence is again disproportionately low. The elimination of those who had previously suffered from small-pox makes but little change in these relations, except in the case of the age-period, 30 to 40, where the attack incidence is considerably raised thereby.

Of the whole number of 544 households, 295 contained one or more unvaccinated members, and it may be useful to contrast the incidence of small-pox in these families with that in the 249 of whom all the members were vaccinated or belonged to the other classes mentioned. Ranging these in two groups we have:—

Group A.—Households of whom no member was unvaccinated—249, comprising 1,272 individuals, of whom 355 were attacked with small-pox—a rate of 27 per cent. But 37 of these had previously suffered from small-pox (including two of those again attacked), and eliminating these the rate would be 28·5.

Group B.—Households of which one or more members were unvaccinated—295, comprising 1,728 individuals, of whom 532 were attacked with small-pox—a rate of 30·9 per cent. But 89 (including four who were again attacked) had previously suffered from small-pox, and eliminating them the rate would be 32·3 per cent.

Of the 1,728 persons, 527 were unvaccinated, and of these 294 contracted small-pox, 50 had previously suffered from it, including three again attacked.

Contrasting these groups in respect to the number of cases of small-pox occurring within them, it is found that in Group A. there were 180 households in which only one case of small-pox arose, or 72·3 per cent., and 69, or 27·7 per cent., had more than one case. In Group B. 175, or 59·2 per cent., had only one case, and 120, or 40·5 per cent., had more than one case.

Of the members of 355 households in which a single case of small-pox occurred, 1,437 were vaccinated, 35 were undergoing vaccination at time of exposure or attack, 28 were alleged to have been vaccinated but showed no evidence, 281 were unvaccinated, and in the case of 59 no information could be obtained—a total of 1,840.

Of the members of 189 households in which more than one case of small-pox occurred (amounting in all to 232), 834 were vaccinated, 43 were undergoing vaccination, 16 were alleged to have been vaccinated, 246 were unvaccinated, and of 21 no information on the point could be ascertained—a total of 1,160.

TABLE C.

—		Group A.	Group B.	Total.
Houses with single cases		180	175	355
Inmates	Attacked with small-pox	180	185	365
	Not attacked	690	795	1,485
	Total	870	970	1,840
Houses with multiple cases		69	120	189
Inmates	Attacked	175	357	532
	Not attacked	227	461	688
	Total	402	758	1,160
Total houses		249	295	544
Inmates	Attacked	355	532	887
	Not attacked	917	1,196	2,113
	Total	1,272	1,728	3,000

The above analysis shows that the incidence of small pox in households not containing unvaccinated persons (Group A.) was 27.9 per cent.; in houses yielding one case each, 20.7 per cent.; in houses yielding more than one case, 43.5 per cent. Whereas in households containing one or more unvaccinated persons (Group B.) the incidence was 30.2 per cent.; in houses yielding single cases, 18 per cent.; in houses yielding more than one case, 47 per cent. Thus the greater proportion of the attacked—Group B.—in the multiple cases is to a certain extent counter-balanced by the greater proportion in Group A. in the "single" series.

The same facts may be dealt with from another side, viz., the relative proportions of the vaccinated and unvaccinated in the houses having single and multiple cases.

Three hundred and fifty-five houses yielding single cases contained 281 unvaccinated persons and 1,559 belonging to the "other classes" (1,437 vaccinated) here indicated.

One hundred and eighty-nine houses yielding multiple cases contained 246 unvaccinated persons and 914 of the "other classes" (834 vaccinated).

Distributing the number of attacks in each of these groups we have, dealing with the vaccinated and unvaccinated:—

—	Houses with single Cases.			Houses with multiple Cases.		
	Attacked.	Not attacked.	Rate.	Attacked.	Not attacked.	Rate.
Unvaccinated	109	172	Per cent. 38.8	185	61	Per cent. 71.1
Vaccinated	232	1,205	16.1	312	522	37.4

In other words, in the houses which yielded single cases, 68 per cent. of those attacked were vaccinated subjects, and 32 per cent. unvaccinated.

In the houses yielding multiple cases 63 per cent. were vaccinated and 37 per cent. unvaccinated.

By excluding the "initial" cases in each multiple series there would be 159 vaccinated and 99 unvaccinated, or an incidence of 23.3 per cent. in the former and 61.8 per cent. in the latter, whereas the proportionate attacks were 61.6 vaccinated, and 38.4 unvaccinated.

Reverting to Groups A. and B., viz., those houses in which no persons were unvaccinated, and those in which one or more were known to be unvaccinated, one may contrast them more in detail as to the relative number of individuals in the houses in proportion to those attacked therein. No house contained more than 11 inmates, and one dwelling was inhabited by a single person only. Between these limits the households are distributed, and it will be evident from the subjoined table that in Group B. there is a greater proportion of large households and a less proportion of small households than in Group A. :—

TABLE CI.

Size of Household.	Group A.				Group B.			
	249 Houses.				294 Houses.			
	No. of Houses.	Per cent.	Inmates.		No. of Houses.	Per cent.	Inmates.	
			Attacked.	Not attacked.			Attacked.	Not attacked.
11	4	1.6	6	38	7	2.3	12	65
10	6	2.4	14	46	13	4.4	40	90
9	11	4.4	23	76	16	5.4	32	112
8	19	7.6	32	120	24	8.1	61	131
7	22	9.2	39	115	38	12.6	74	192
6	34	13.6	51	153	57	19.3	106	236
5	38	15.2	47	143	57	19.3	96	189
4	50	20.	67	133	52	17.7	73	135
3	40	16.	45	75	22	7.4	26	40
2	24	9.6	30	18	9	3.	12	6
1	1	0.4	1	—	—	—	—	—
—	249	—	355	917	295	—	532	1,196

To appreciate more fully the relative incidence of the disease upon the unvaccinated and other classes, we may further analyse Group B, i.e., those invaded households which contained one or more unvaccinated members.

1st.—In 175 households in which a single case of small-pox occurred, 281 of the 970 members were unvaccinated; whereas those attacked comprised 109 unvaccinated subjects, and 66 belonging to the "other classes" (viz.:—62 vaccinated, two "under" vaccination, and two "alleged" vaccination). Here, then, the incidence was:—

Unvaccinated, whole number, 281; attacked, 109; rate, 38.7 per cent.

Other classes, whole number, 689; attacked, 66; rate, 9.5 per cent.

But 36 of the unvaccinated class (including two again attacked) had previously suffered from small-pox, so that eliminating these we have—

Unvaccinated, whole number, 245; attacked, 107; rate, 43.6 per cent.

Turning now to the "multiple" series, we have 120 households containing 758 members, of whom 246 were unvaccinated. Those who were attacked with small-pox comprised 185 unvaccinated subjects, and 173 belonging to the other classes (viz.: 155 vaccinated, eight "under" vaccination, seven "alleged" vaccination, and three of whom no information as to vaccination could be obtained).

The "initial" cases arising in these houses must be distinguished from the "later" cases, i.e., those who were attacked first (or within a few days of one another, if more than one) and those attacked subsequently, and for the most part secondarily to the initial case. There were 161 such initial cases, and 195 later cases, the incidence being:—

Unvaccinated, whole number, 246; initial cases, 85; later cases, 100.

Other classes, whole number, 512; initial cases, 76; later cases, 96.

The rate of incidence upon the *later cases only*, was for the unvaccinated 161:100, or 62.1 per cent.

Other classes, 436:96, or 22 per cent.

Again deducting from the unvaccinated class those who had previously suffered from small-pox, viz., 12—we have an incidence rate of the later cases in those households among the unvaccinated, of 149:100, or 67.1 per cent.

This part of the subject may be completed by the following tables, showing (a) the numbers attacked and not attacked in the households containing unvaccinated inmates ranged according to the number of inmates in each house; (b) the numbers of individuals attacked and not attacked in Group A, arranged according to their ages, and (c) a similar table of those in Group B.

TABLE CII.

No. of Houses.	No. of Inmates per House.	Unvaccinated.				Other Classes.			
		Attacked.	Previous Small-pox.	Not attacked.	Previous Small-pox.	Attacked.	Previous Small-pox.	Not attacked.	Previous Small-pox.
7	11	6	—	14	3	6	—	51	—
13	10	18	—	11	1	22	—	79	2
16	9	17	—	17	2	15	—	95	—
24	8	32	—	22	5	29	—	109	7
38	7	41	—	35	7	33	—	157	5
57	6	56	—	47	10	50	1	189	13
57	5	58	—	42	8	38	—	147	8
52	4	44	1	31	5	29	—	104	1
22	3	15	1	11	2	11	—	29	4
9	2	7	—	3	3	5	—	3	2
294	—	294	2	433	46	238	1	963	42

TABLE CIII.

GROUP A.—249 households, containing 1,272 inmates, of whom none were unvaccinated:—

—	Attacked.	Previous Small-pox.	Not attacked.	Previous Small-pox.	Total.
Under 1 year	4	—	16	—	20
1-5 years	15	—	66	—	81
5-10 "	19	—	110	—	129
10-15 "	35	—	115	1	150
15-20 "	57	1	134	1	191
20-30 "	113	1	161	2	274
30-40 "	69	—	88	10	167
40-50 "	21	—	94	7	115
50-60 "	13	—	78	11	91
60-70 "	7	—	34	3	41
70 and over	2	—	6	—	8
Age not ascertained	—	—	15	—	15
	335	2	917	35	1,272

Or at age periods:—

—	Attacked.	Previous Small-pox.	Not attacked.	Previous Small-pox.	Total.
Under 1 year	4	—	16	—	20
1-10 years	34	—	176	—	210
10-30 "	205	2	410	4	615
30 and over	112	—	300	31	612
Age not ascertained	—	—	15	—	15
	335	2	917	35	1,272

TABLE CIV.

GROUP B.—295 households, containing 1,728 inmates (one or more of whom in each house were unvaccinated).

	Unvaccinated.				Other Classes.				Total.
	Attacked.	Previous Small-pox.	Not attacked.	Previous Small-pox.	Attacked.	Previous Small-pox.	Not attacked.	Previous Small-pox.	
Under 1 year	17	—	26	—	4	—	8	—	55
1-5 years	57	—	50	—	7	—	91	—	205
5-10 "	68	—	38	—	12	—	121	—	239
10-15 "	31	—	24	—	30	—	144	—	228
15-20 "	65	—	23	1	41	—	104	—	233
20-30 "	41	1	21	11	69	—	141	5	272
30-40 "	8	—	17	13	46	—	119	15	190
40-50 "	4	—	18	14	21	1	142	8	185
50-60 "	2	1	11	6	6	—	55	5	74
60-70 "	1	1	4	1	1	—	22	4	32
70 and over	—	—	1	1	1	—	10	1	12
Age not ascertained	—	—	—	—	—	—	6	—	6
	294	3	233	47	238	1	963	38	1,728

Or at age periods:—

	Unvaccinated.				Other Classes.				Total.
	Attacked.	Previous Small-pox.	Not attacked.	Previous Small-pox.	Attacked.	Previous Small-pox.	Not attacked.	Previous Small-pox.	
Under 1 year	17	—	26	—	4	—	8	—	55
1-10 years	125	—	88	—	19	—	212	—	444
10-30 "	137	1	68	12	140	—	389	5	734
30 and over	15	2	51	35	75	1	348	33	489
Age not ascertained	—	—	—	—	—	—	6	—	6
	294	3	233	47	238	1	963	38	1,728

Vaccination and Measures of Isolation.

It still remains to consider the question of the incidence of small-pox upon the vaccinated and unvaccinated respectively in regard to the greater or less liability to infection from the non-adoption or adoption of measures of isolation. This subject has been treated under each of three divisions of the district here dealt with, but it will be useful to collate the information there supplied.

We must, therefore, once more divide the various households into groups, according to the degree of isolation measures practised; and these, again, must be dealt with in relation to the number of cases arising in the households. Now, it will be obvious that to properly estimate the influence of hospital isolation in protecting the remaining members of a family from infection, it will not do merely to group together the households with single cases and then these with multiple cases, since in several of the latter the individuals attacked fell ill within a few days of one another. I have in the previous pages, therefore, distinguished between what I have termed the "initial" cases, and the "later" cases, the former including several members of the same family who could not fairly be said to have been infected by the first case. With this explanation, we may divide the 544 households into two main groups, one comprising 388 houses with 2,025 inmates, being those in which the cases were not followed by any subsequent ones; the other comprising 156 houses, with 975 inmates, containing multiple cases of which some may be regarded as initial attacks, others as "later attacks."

	Attacked.	Not Attacked.	Total.
GROUP I.			
355 houses with single cases	355	1,635	1,990
33 houses with multiple cases	85	100	185
GROUP II.			
156 houses with multiple cases.	Initial. 173	Later. 274	528
			975

Dividing each of these groups according to whether the initial case (or cases) was kept at home or removed to hospital we have:—

GROUP I. (Single and Multiple Cases).

	Initial Case Removed.	Initial Case Remained.	Total.
Number of houses	271	117	388
Attacked	315	125	440
Not attacked	1,172	413	1,585
Total	1,487	538	2,025

GROUP II. (Multiple Cases).

	Initial Case Removed.	Initial Case Remained	Total.
Number of houses	84	72	156
Attacked, initial	91	82	173
" later	147	127	274
Not attacked	292	236	528
Total	530	445	975

Group II. may be further divided according as to whether the "later" cases were kept at home or removed, in which case we have the three series A, B, C, defined in Batley Report (p. 49), viz. :—

Group II.	Series A.	Series B.	Series C.	Total.
Number of houses	84	25	47	156
Attacked, initial	91	27	55	173
" later	147	43	84	274
Not attacked	292	90	146	528
Total	530	169	285	975

The attack rates are then for :—

Group I. (all cases) 21·7 per cent.—

 Initial removed, 21·2 per cent.

 " remained, 23·2 per cent.

Group II. (later cases only, exclusive of initial cases), 34·1 per cent.

 Series A. (initial case removed), 33·5 per cent.

 Series B. (initial case remained, later cases removed), 32·3 per cent.

 Series C. (both initial and later cases remained), 36·5 per cent.

These results may be further analysed according to the vaccination relations of the individuals concerned. In order to make these returns clearly comprehensible I will once more give in the first place the analysis, as to vaccination, &c., of the whole number of households, indicating in addition to previous particulars, the numbers of the vaccinated community who were successfully re-vaccinated :—

	Attacked.	Not Attacked.	Total.
Vaccinated	544	1,727	2,271
Re-vaccinated	1	239	
Previous small-pox	2	64	
Under vaccination	21	57	78
Alleged vaccination	24	20	44
Previous small-pox	-	2	
No information as to vaccination	4	76	80
Previous small-pox	1	7	
Unvaccinated	294	233	527
Previous small-pox	3	47	
Total	887	2,113	3,000

Re-vaccinated :—

Successful - - - 240 (1 attacked).

Unsuccessful - - - 80 (3 attacked).

Previous years - - - 17 (2 attacked).

ATTACK RATES.

	All Persons.			Exclusive of those who had small-pox previously.		
	Total No.	Attacks.	Rate.	Total No.	Attacks.	Rate.
Vaccinated	2,271	544	Per cent. 23·9	2,205	542	Per cent. 24·5
Under vaccination	78	21	27	78	21	27
Alleged vaccination	44	24	54·5	42	24	57·1
No information as to vaccination.	80	4	5	72	3	4·1
Unvaccinated	527	294	55·7	477	291	61

The figures given in the foregoing table may be apportioned between the two groups above defined, viz. : Group I., 388 households, in which single cases of small-pox occurred, and multiple cases sickening within a few days of one another; and Group II., 156 households of multiple cases, some of which (in each house) were obviously infected by the first or initial cases.

	Group I.			Group II.			
	388 Households.			156 Households.			
	Attacked.	Not Attacked.	Total.	Attacked.		Not Attacked.	Total.
Initial.				Later.			
Vaccinated	288	1,296	1,584	103	153	451	687
Re-vaccinated	-	177		-	1	62	
Previous small pox	1	50		-	1	14	
Under vaccination	8	35	43	1	12	22	35
Alleged vaccination	13	18	31	4	7	2	13
Previous small-pox	-	2		-	-	-	
No information as to vaccination	1	58	59	-	3	18	21
Previous small-pox	1	5		-	-	2	
Unvaccinated	130	178	308	65	99	55	219
Previous small-pox	3	35		-	-	12	
Total	440	1,585	2,025	173	274	528	975

Re-vaccination { Successful - - - 177 - - - 63 (one attacked).
 { Unsuccessful - - - 159 (two attacked) 21 (one attacked).
 { Previous years - - - 12 - - - 5 (two attacked).

ATTACK RATES.

GROUP I.

	All Persons.			Exclusive of those who had Small-pox previously.		
	Total No.	Attacks.	Rate.	Total No.	Attacks.	Rate.
Vaccinated - - - - -	1,584	288	Per cent. 18.2	1,533	287	Per cent. 18.7
Under vaccination - - - - -	43	8	18.6	43	8	18.6
Alleged vaccination - - - - -	31	13	41.9	29	13	44.8
No information - - - - -	59	1	—	54	—	—
Unvaccinated - - - - -	308	130	42.2	270	127	47.0

GROUP II. (exclusive of Initial Cases.)

	Total No.	Attacks.	Per cent.	Total No.	Attacks.	Per cent.
Under vaccination - - - - -	34	12	35.3	34	12	35.3
Alleged vaccination - - - - -	9	7	73.3	9	7	73.3
No information - - - - -	21	3	14.3	19	3	15.8
Unvaccinated - - - - -	154	99	64.2	142	99	69.7

The initial cases of small-pox were removed to hospital (or infirmary) from 355 houses, 271 of which fall into Group I. and 84 into Group II.

In those in Group I., containing 1,487 inmates, there were 315 attacked with small-pox; 64 of those who escaped had previously suffered from the disease, as also had three of those who were again attacked. As regards their vaccination relations, 1,135 were vaccinated, of whom 194 were attacked; or, subtracting those who had previously suffered, the numbers would be 1,100 and 193 respectively. The incidence, then, on the vaccinated in this group is 16.2 per cent., or, exclusive of those who previously had small-pox, 17.5 per cent.

Nineteen were under vaccination, of whom five were attacked, an incidence rate of 26.3 per cent.

Twenty-five were said to have been vaccinated, but showed no evidence of this, and 10 of these were attacked, or 40 per cent., and, excluding one who had previously suffered, 41.6 per cent.

In the cases of 47 no information was obtainable as to vaccination; six had previously suffered from small-pox, including the one who was again attacked.

Lastly, 261 were unvaccinated, and 26 had previously had small-pox; 105 were attacked, one for the second time. The incidence rate of these was therefore 40.2 per cent., or, excluding those who had previously suffered, 44.2 per cent.

Group II. embraces 530 individuals, of whom 238 were attacked, 91 of these being considered "initial" cases, and 147 as "later" cases. 356 were vaccinated, of whom 125 were attacked (50 initial, 75 later), and nine had previously had small-pox. The incidence rates—for the later cases only—were then:—75 : 306, or 24.5 per cent., and excluding those who had previously had small-pox, 75 : 297, or 25.2 per cent.

Twenty were "under" vaccination, of whom eight were attacked (one initial, seven later), the incidence of the later cases only being 7 : 19, or 36.8 per cent.

Five were alleged to have been vaccinated, of whom four were attacked (two initial, two later); the incidence of the later cases being therefore 2 : 3, or 66.6 per cent.

None of the 11 cases, of whom no information as to vaccination was obtained, were attacked with small-pox.

Lastly, 138 were unvaccinated, of whom, 101 (38 initial, 63 later) were attacked with small-pox, and five had previously suffered from the disease. The incidence of the later cases was therefore 63 : 100, or 63 per cent., and excluding those who had previously had small-pox, 63 : 95, or 66.3 per cent.

It may be of interest to contrast the incidence of the disease in dealing with the initial cases only in each case, thus:—

Vaccinated, Group I., rate, 16.2 per cent., or excluding previous small-pox, 17.5 per cent.

Vaccinated, Group II., rate, 17.7 per cent., or excluding previous small-pox, 18.3.

Under vaccination, Group I., rate, 26.3 per cent.

" " Group II., rate, 5 per cent.

Alleged vaccination, Group I., rate, 40 per cent., or excluding previous small-pox, 41.67 per cent.

Alleged vaccination; Group II., rate, 40 per cent.

Unvaccinated, Group I., rate, 40.2 per cent., or excluding previous small-pox, 44.2 per cent.

Unvaccinated, Group II., rate, 50.6 per cent., or excluding previous small-pox, 54.3 per cent.

Thus both amongst the vaccinated and unvaccinated the incidence of small-pox was greater in the households where cases subsequently arose; the disproportion being, however, larger in the case of the unvaccinated than in that of the vaccinated.

INITIAL CASES REMOVED TO HOSPITAL.

	Group I.			Group II. (Series A.)				
	271 Households.			84 Households.				
	Attacked.	Not Attacked.	Total.	Attacked.		Not Attacked.	Total.	
Initial.				Later.				
Vaccinated - - - - -	194	941	1,135	50	75	231	356	1,491
Re-vaccinated - - - - -	—	106	—	—	—	37	—	143
Previous small-pox - - - - -	1	34	—	—	—	9	—	44
Under vaccination - - - - -	5	14	19	1	7	12	20	39
Alleged vaccination - - - - -	10	15	25	2	2	1	5	30
Previous small-pox - - - - -	—	1	—	—	—	—	—	1
No information as to vaccination - - - - -	1	46	47	—	—	11	11	58
Previous small-pox - - - - -	1	5	—	—	—	—	—	6
Unvaccinated - - - - -	105	156	261	38	63	37	138	399
Previous small-pox - - - - -	1	25	—	—	—	5	—	31
	315	1,172	1,487	91	147	292	530	2,017

ATTACK RATES.

	Group I.			Group I. (exclusive of those who had had Small-pox previously).		
	Total No.	Attacks.	Rate.	Total No.	Attacks.	Rate.
Vaccinated - - - - -	1,135	194	Per cent. 16.2	1,100	193	Per cent. 17.5
Under vaccination - - - - -	29	5	26.3	—	—	—
Alleged vaccination - - - - -	25	10	40.	24	10	41.6
No information - - - - -	47	1	2.1	41	—	—
Unvaccinated - - - - -	261	105	40.2	235	104	44.2

	Group II.				Group II. (exclusive of those who had had Small-pox previously.)					
	Total No.	Attacks.		Rates.		Total No.	Attacks.		Rates.	
		Initial.	Later.	Initial only.	Later only.		Initial.	Later.	Initial.	Later.
Vaccinated - - - - -	356	50	75	Per cent. 17.7	Per cent. 24.5	347	50	75	Per cent. 18.3	Per cent. 25.2
Under vaccination - - - - -	20	1	7	5.	36.8	—	—	—	—	—
Alleged vaccination - - - - -	5	2	2	40.	66.6	—	—	—	—	—
No information - - - - -	11	—	—	—	—	—	—	—	—	—
Unvaccinated - - - - -	138	38	63	50.6	63.	135	38	63	54.3	66.3

The foregoing figures may be contrasted with those relating to the households in which the first cases (at least) of small-pox arising therein were retained in their homes. The same separation into Groups I. and II. may here be made, but Group II. requires to be sub-divided according as to whether some or all of the latter cases were removed to hospital (i.e., Series B.), or whether they were all kept at home (i.e., Series C.).

In Group I. there are 538 individuals, of whom 125 were attacked with small-pox. Of them 29 had previously had the disease, including two who were again attacked with it. Of this number 449 were vaccinated, 16 having previously had small-pox; 94 were attacked with small-pox, a rate of 20.9 per cent., or excluding those who had previously suffered of 21.7 per cent.

There were 24 "under" vaccination, of whom three were attacked, a rate of 12.5 per cent. Six are of the "alleged" class, of whom three were attacked, i.e., 50 per cent.; but one had previously suffered, and excluding this case the rate would be 60 per cent. No attacks occurred among the 12 of whom no information as to vaccination was obtained.

Forty-seven were unvaccinated, 25 being attacked; 12 had previously had small-pox, including two who again were attacked. The incidence was, therefore, 25:47, or 53.2 per cent.; and exclusive of previous small-pox 23:35, or 65.7 per cent.

In Group II., Series B., there are 160 individuals, of whom 70 were attacked with small-pox, six had previously suffered from it. Of these 126 were vaccinated, 46 of them being attacked (18 initial, 28 later). The incidence on the initial cases only was therefore 18:98, or 18.3 per cent.; on the later cases only 28:108, or 25.9 per cent. Excluding four who had previously had

small-pox the rates are: initial, 19.1 per cent.; later, 26.9 per cent.

There are 31 unvaccinated, of whom 23 were attacked (nine initial, 14 later), and two had previously had small-pox. The incidence on the initial cases was therefore 9:17, or 53 per cent.; on the later cases, 14:22, or 63.6 per cent.; and excluding the two who had previously suffered, initial, 60 per cent.; later, 70 per cent.

In Group II., Series C., there are 285 individuals, of whom 139 were attacked with small-pox; nine had previously had it. Of these 205 were vaccinated, 85 being attacked (35 initial, 50 later). The incidence on the initial cases only was therefore 35:155, or 22.5 per cent.; and on the later cases only 50:170, or 29.4 per cent. Excluding the two cases of previous small-pox (one being again attacked) the rates are, initial, 22.8 per cent.; later, 29.1 per cent.

Thirteen were under vaccination, of whom four (all "later" cases) were attacked, a rate of 30.7 per cent.; eight were alleged, of whom seven were attacked (two initial, five later), or an incidence for initial cases of 2:3, or 66.6 per cent.; and for later cases of 5:6, or 43.3 per cent.

There are nine of whom no information as to vaccination could be obtained, and three of these (all later cases) were attacked. Two of those who escaped had previously suffered from small-pox.

Fifty were unvaccinated, of whom 40 were attacked (18 initial, 22 later), and five of the rest had previously suffered. The incidence on initial cases was, therefore, 18:28, or 64.2 per cent.; in later cases, 22:32, or 68.7 per cent. And excluding those previously attacked, it was for initial cases, 78.2 per cent.; for later cases, 81.4 per cent.

INITIAL CASES REMAINED AT HOME.

	Group I.			Group II.									
	117 Households.			(Series B.) 25 Households.				(Series C.) 47 Households.					
	At- tacked.	Not at- tacked.	Total.	Attacked.		Not at- tacked.	Total.	Attacked.		Not at- tacked.	Total.		
				Initial.	Later.			Initial.	Later.				
Vaccinated	94	335	449	13	28	80	126	35	60	120	205	780	
Re-vaccinated		71				8			1	17	13	97	
Previous small-pox		16				4			1	1	8	22	
Under vaccination	3	21	24	—	1	1	2		4	9	13	39	
Alleged vaccination	3	3	6	—	—	—	—	2	5	1	8	14	
Previous small-pox		1				—						1	
No information as to vaccination	—	12	12	—	—	1	1	—	3	6	9	22	
Previous small-pox		—				—				2		2	
Unvaccinated	25	22	47	9	14	8	31	18	22	10	50	128	
Previous small-pox	2	10				2				5	—	19	
	125	413	538	27	43	99	160	55	84	146	285	983	

Type of Small-Pox in relation to Vaccination Condition of those attacked.

The cases of small-pox may be divided into groups according to the extent of the eruption and severity of attack as follows :—

TABLE CV.

	Confluent.		Coherent.		Discrete.		Mild.		Type uncertain.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Vaccinated	44	14	59	—	260	1	256	—	8	1
No information as to vaccination	1	4	1	—	2	—	2	—	4	—
Alleged vaccination	9	2	4	—	8	—	4	—	—	—
“Under” vaccination	8	3	3	—	1	—	8	—	1	—
Unvaccinated	211	86	58	—	62	2	13	—	2	1
	273	105	125	—	333	3	283	—	15	2

Among the vaccinated :—

- 7 per cent. had confluent attacks.
- 9.4 “ “ coherent “
- 41.4 “ “ discrete “
- 40.8 “ “ mild “

Among the unvaccinated :—

- 61 per cent. had confluent attacks.
- 16.7 “ “ coherent “
- 17.9 “ “ discrete “
- 3.7 “ “ mild “

Of those “alleged to have been vaccinated” :—

- 36 per cent. had confluent attacks.
- 16 “ “ coherent “
- 32 “ “ discrete “
- 16 “ “ mild “

Of those who were “undergoing vaccination” :—

- 38.1 per cent. had confluent attacks.
- 14.3 “ “ coherent “
- 4.4 “ “ discrete “
- 28.1 “ “ mild “

And conversely—

Of the confluent cases :—

- 16.1 per cent. were vaccinated.
- 3.3 “ “ “alleged” to have been vaccinated.
- 2.9 “ “ “under vaccination.”
- 77.2 “ “ unvaccinated.

Of the coherent cases :—

- 47.2 per cent. were vaccinated.
- 3.2 “ “ “alleged to be vaccinated.”
- 2.4 “ “ “under” vaccination.
- 46.2 “ “ unvaccinated.

Of the discrete cases :—

- 78 per cent. were vaccinated.
- 2.4 “ “ “alleged to be vaccinated.”
- 0.3 “ “ “under” vaccination.
- 18.6 “ “ unvaccinated.

Of the mild cases :—

- 90.4 per cent. were vaccinated.
- 1.4 “ “ “alleged to be vaccinated.”
- 2.8 “ “ “under” vaccination.
- 4.5 “ “ unvaccinated.

CONFLUENT TYPE.

There were 273 cases of this type, including three which were also hæmorrhagic. Of this number 105 were fatal, or 38.4 per cent.; and 81.9 per cent. of the deaths were in unvaccinated subjects. The ages of these cases are given in the subjoined table :—

TABLE CVI.

	Vaccinated.		No Information on Vaccination.		Alleged Vaccination.		“Under” Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	—	—	—	—	—	—	4	3	16	16	20	18
1 to 5 years	1	—	—	—	—	—	1	—	22	23	24	21
5 to 10 “	—	—	—	—	1	—	2	—	30	14	42	14
10 to 15 “	1	—	—	—	—	—	—	—	22	3	25	3
15 to 20 “	2	2	—	—	4	—	1	—	40	7	47	9
20 to 30 “	14	3	1	—	1	1	—	—	38	17	55	21
30 to 40 “	14	6	—	—	1	—	—	—	10	3	24	9
40 to 50 “	6	1	—	—	1	1	—	—	6	5	11	7
50 to 60 “	4	2	—	—	1	—	—	—	1	1	6	3
60 to 70 “	2	—	—	—	—	—	—	—	—	—	2	—
70 and over	—	—	—	—	—	—	—	—	—	—	—	—
Age not ascertained.	—	—	—	—	—	—	—	—	1	—	1	—
	44	14	1	—	19	2	8	3	211	86	273	105

They may be summarised as follows:—

Under 1 year,	20 cases,	18 deaths,	or 90 per cent.
			mortality.
1 to 10 years,	76 "	35 "	or 46 per cent.
			mortality.
10 to 30 "	130 "	33 "	or 25·3 per cent.
			mortality.
30 and over	46 "	19 "	or 41·3 per cent.
			mortality.
Age not ascer- tained	1 "	0 "	
	<u>273</u>	<u>105</u>	

COHERENT TYPE.

There were 125 cases of this type, none of which were fatal. Their age distribution is given in the subjoined table:—

TABLE CVII.

	Vacci- nated.		No Infor- mation as to Vacci- nation.		Alleged Vacci- nation.		Under Vacci- nation.		Un- vacci- nated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	—	—	—	—	—	—	1	—	1	—	2	—
1 to 5 years	—	—	—	—	—	—	1	—	11	—	12	—
5 to 10 "	—	—	—	—	—	—	—	—	12	—	12	—
10 to 15 "	1	—	—	—	2	—	1	—	5	—	9	—
15 to 20 "	13	—	—	—	—	—	—	—	19	—	32	—
20 to 30 "	24	—	—	—	1	—	—	—	9	—	34	—
30 to 40 "	13	—	—	—	—	—	—	—	1	—	14	—
40 to 50 "	4	—	1	—	—	—	—	—	—	—	5	—
50 to 60 "	1	—	—	—	1	—	—	—	—	—	2	—
60 to 70 "	2	—	—	—	—	—	—	—	—	—	2	—
70 and under	—	—	—	—	—	—	—	—	—	—	—	—
Age not ascer- tained.	1	—	—	—	—	—	—	—	—	—	1	—
	<u>50</u>	<u>—</u>	<u>1</u>	<u>—</u>	<u>4</u>	<u>—</u>	<u>3</u>	<u>—</u>	<u>38</u>	<u>—</u>	<u>125</u>	<u>—</u>

They may be summarised as follows:—

Under 1 year of age	-	-	-	2 cases.
1 to 10 years	-	-	-	24 "
10 to 30 "	-	-	-	75 "
30 years and over	-	-	-	23 "
Age not ascertained	-	-	-	1 "
				<u>125</u>

DISCRETE TYPE.

There were 333 cases of this type, three of which were fatal. Their age distribution is given in the subjoined table:—

TABLE CVIII.

	Vacci- nated.		No Infor- mation as to Vacci- nation.		Alleged Vacci- nation.		Under Vacci- nation.		Un- vacci- nated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	1	—	—	—	—	—	—	—	2	—	3	—
1 to 5 years	3	—	1	—	—	—	—	—	13	2	17	2
5 to 10 "	5	1	—	—	—	—	—	—	21	—	26	1
10 to 15 "	28	—	—	—	2	—	1	—	11	—	42	—
15 to 20 "	38	—	—	—	1	—	—	—	9	—	48	—
20 to 30 "	90	—	—	—	3	—	—	—	4	—	105	—
30 to 40 "	54	—	—	—	2	—	—	—	—	—	56	—
40 to 50 "	21	—	1	—	—	—	—	—	—	—	22	—
50 to 60 "	11	—	—	—	—	—	—	—	1	—	12	—
60 to 70 "	2	—	—	—	—	—	—	—	—	—	2	—
70 years and over	—	—	—	—	—	—	—	—	1	—	1	—
Age not ascer- tained.	1	—	—	—	—	—	—	—	—	—	1	—
	<u>260</u>	<u>1</u>	<u>2</u>	<u>—</u>	<u>8</u>	<u>—</u>	<u>1</u>	<u>—</u>	<u>62</u>	<u>2</u>	<u>333</u>	<u>3</u>

They may be summarised as follows:—

Under 1 year	-	-	3 cases, no deaths.
1 to 10 years	-	-	43 " 3 "
10 to 30 "	-	-	193 " no "
30 years and upwards	-	-	93 " 20 "
Age not ascertained	-	-	1 " — "
			<u>333</u> <u>3</u>

The following is a list of the three fatal cases occurring amongst those who had this comparatively mild form of the disease:—

TABLE CIX.

Deaths among Subjects of Discrete Small-pox.

Reference to Register.	Name.	Sex.	Age.	Onset.	Rash.	Date of Death.	Duration.	Cause of Death.
Batley, 314 -	H. C.	M.	3	Feb. 10 -	Feb. 12 -	Feb. 26 -	17 days -	Bronchitis.
" 348 -	G. C.	M.	1	Feb. 19 -	Feb. 22 -	Feb. 28 -	20 " -	"
" 544 -	N. H.	M.	7	May 21 -	May 23 -	July 3 -	6 weeks -	Epilepsy.

These three children cannot be said to have died from small-pox primarily, although the attack may have contributed to diminish their vital resistance. Two of them were unvaccinated subjects, and succumbed to bronchitis,

after the rash had subsided, and convalescence from small-pox was established. The third was an epileptic, and died in an attack of that disease. He had long been convalescent from small-pox when the fatal seizure took place.

MILD TYPE.

This type, which includes those ordinarily described as "varioid," and many in which the diagnosis of small-pox would have been doubtful had the cases not occurred in members of households side by side with other undoubted cases, includes 283 individuals, whose ages are subjoined:—

TABLE CX.

	Vaccinated.		No Information as to Vaccination.		Alleged Vaccination.		Under Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	—	—	—	—	—	—	2	—	1	—	3	—
1 to 5 years	12	—	1	—	—	—	3	—	4	—	20	—
5 to 10 "	22	—	—	—	—	—	2	—	4	—	28	—
10 to 15 "	32	—	—	—	—	—	—	—	—	—	32	—
15 to 20 "	43	—	1	—	1	—	—	—	1	—	46	—
20 to 30 "	75	—	—	—	2	—	1	—	1	—	79	—
30 to 40 "	43	—	—	—	—	—	—	—	—	—	43	—
40 to 50 "	17	—	—	—	—	—	—	—	1	—	18	—
50 to 60 "	6	—	—	—	—	—	—	—	—	—	6	—
60 to 70 "	2	—	—	—	—	—	—	—	1	—	3	—
70 years and over	2	—	—	—	1	—	—	—	—	—	3	—
Age not ascertained.	2	—	—	—	—	—	—	—	—	—	2	—
	216	—	2	—	4	—	8	—	15	—	283	—

They may be summarised as follows:—

Under 1 year	-	-	3 cases.
1 to 10	-	-	48 "
10 to 30	-	-	157 "
30 years and over	-	-	73 "
Age not ascertained	-	-	2 "
			283 "

TYPE UNCERTAIN.

There were 15 cases of which I was unable to get sufficient details to assign them a place under each of the foregoing heads. They are given in the subjoined table, and comprise two fatal cases:—

TABLE CXII.

	Vaccinated.		No Information as to Vaccination.		Alleged Vaccination.		"Under" Vaccination.		Unvaccinated.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Under 1 year	—	—	—	—	—	—	—	—	1	1	1	1
1 to 5 years	—	—	—	—	—	—	1	—	—	—	1	—
5 to 10 "	—	—	—	—	—	—	—	—	1	—	3	—
10 to 15 "	2	—	—	—	—	—	—	—	—	—	2	—
15 to 20 "	1	—	—	—	—	—	—	—	—	—	1	—
20 to 30 "	1	—	1	—	—	—	—	—	—	—	2	—
30 to 40 "	2	1	—	—	—	—	—	—	—	—	2	1
40 to 50 "	—	—	—	—	—	—	—	—	—	—	—	—
50 to 60 "	—	—	—	—	—	—	—	—	—	—	—	—
60 to 70 "	—	—	—	—	—	—	—	—	—	—	—	—
70 and over	—	—	—	—	—	—	—	—	—	—	—	—
Age not ascertained.	2	—	—	—	—	—	—	—	—	—	2	—
	8	1	4	—	—	—	1	—	2	1	15	2

In Chart XIX. the distribution of the various classes of vaccination and non-vaccination amongst the different types of small-pox is illustrated, first, on the whole number of cases as previously given, and next at each of the four age-periods employed in this report. It may assist in the comprehension of this chart if there be given here, in tabular form the statistical data upon which it has been constructed.

The following is a list of the unvaccinated persons who had the disease in its mildest form:—

TABLE CXI.

Cases of Mild Type in Unvaccinated Subjects.

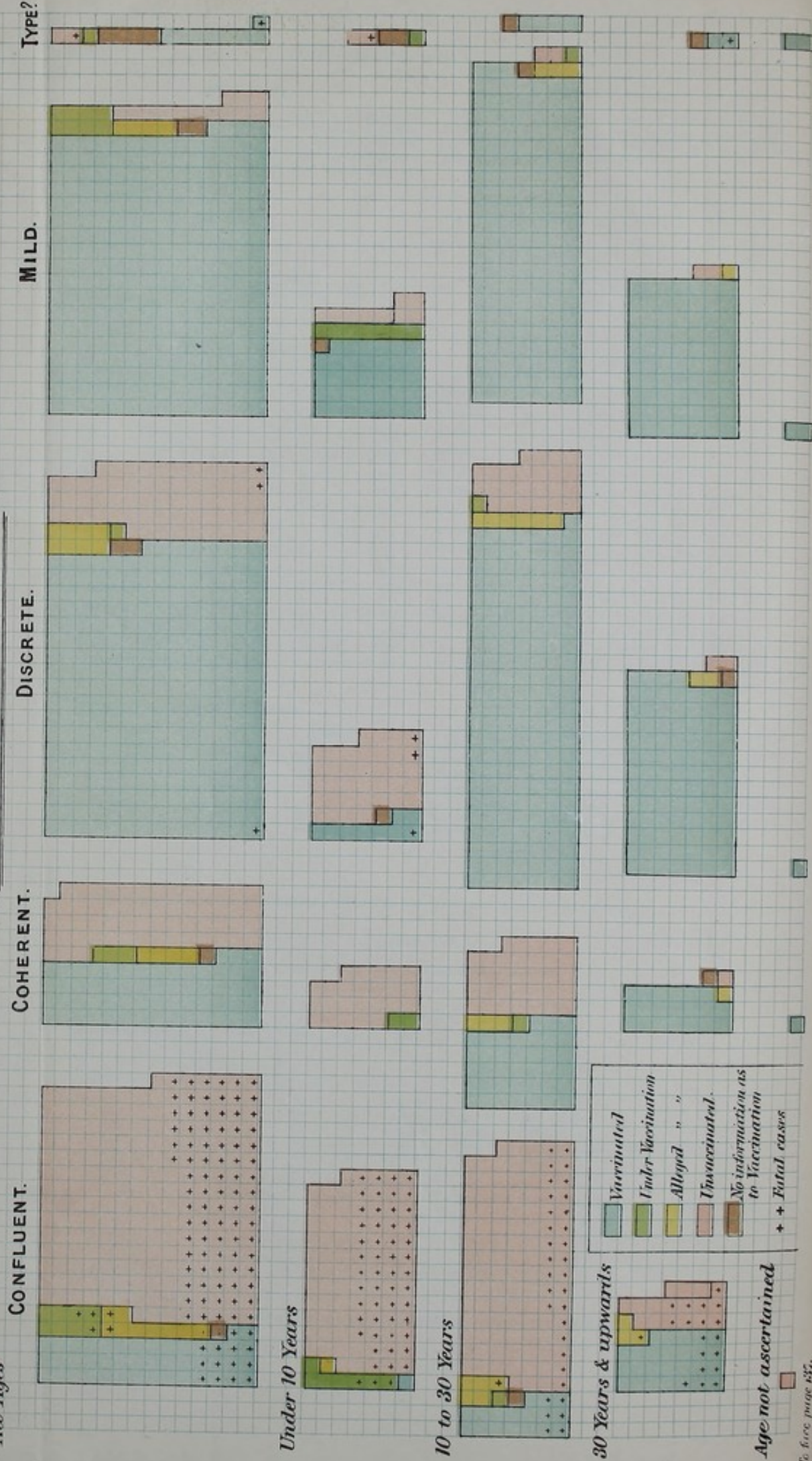
Reference to Register.	Name.	Sex.	Age.	Onset.	Rash.	Date of Discharge from Hospital as Convalescent.	Remarks.
Batley, 192	A. A. N.	F.	5	Jan. 21	Jan. 22	Jan. 31	Had small-pox in infancy.
" 280	E. A. T.	F.	16	Feb. 2	Feb. 5	Feb. 12	
" 402	L. P.	F.	7	March 3	March 6	March 19	
" 481	E. B.	F.	61	April 2	April 7	April 12	
" 528	G. W.	F.	6	April 29	May 1	May 30	
" 545	J. E. N.	M.	4	May 29	May 31	June 16	Unsuccessful attempts at vaccination two weeks before onset of small-pox.
Dewsbury, 109	T. W. C.	M.	27	March 7	March 10	March 31	
" 203	H. T.	F.	43	May 11	May 14	May 28	
Heckmondwike, 13	A. N.	M.	1	Feb. 26	Feb. 28	?	
Morley, 18	H. B.	F.	2	June 18	June 21	July 18	
" 19	J. E. B.	M.	7 mos.	June 18	June 21	?	
" 31	E. T.	F.	4	July 18	July 18	?	
Soothill Upper, 27	A. D.	F.	7	May 16	May 17	June 6	

Thus one of the three unvaccinated adults who had a mild attack had previously suffered from small-pox.

Chart XIX.

TYPE AND FATALITY OF SMALL POX IN REGARD TO AGE AND VACCINATION,
(ALL CASES IN THE DEWSBURY UNION.)

All Ages



Age not ascertained

To face page 137.

At Ages under 10 Years.

Type.	Vaccinated.		No Information on Vaccination.		Alleged Vaccination.		"Under" Vaccination.		Unvaccinated.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Confluent	1	—	—	—	1	—	7	3	87	50
Coherent	—	—	—	—	—	—	2	—	24	—
Discrete	9	1	1	—	—	—	—	—	36	2
Mild	34	—	1	—	—	—	7	—	9	—
Type not determined	—	—	2	—	—	—	1	—	2	1
Total	44	1	4	—	1	—	17	3	158	53

At Ages 10 to 30 Years.

Type.	Vaccinated.		No Information on Vaccination.		Alleged Vaccination.		"Under" Vaccination.		Unvaccinated.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Confluent	17	5	1	—	5	1	1	—	106	27
Coherent	38	—	—	—	2	—	1	—	35	—
Discrete	162	—	—	—	6	—	1	—	24	—
Mild	150	—	1	—	3	—	1	—	2	—
Type not determined	4	—	1	—	—	—	—	—	—	—
Total	371	5	3	—	17	1	4	—	165	27

At Ages 30 Years and upwards.

Type.	Vaccinated.		No Information on Vaccination.		Alleged Vaccination.		"Under" Vaccination.		Unvaccinated.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Confluent	26	9	—	—	3	1	—	—	17	9
Coherent	20	—	1	—	1	—	—	—	1	—
Discrete	88	—	1	—	2	—	—	—	2	—
Mild	70	—	—	—	1	—	—	—	2	—
Type not determined	2	1	1	—	—	—	—	—	—	—
Total	206	10	3	—	7	1	—	—	22	9

At Ages not ascertained.

Type.	Vaccinated.		No Information on Vaccination.		Alleged Vaccination.		"Under" Vaccination.		Unvaccinated.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Confluent	—	—	—	—	—	—	—	—	1	—
Coherent	1	—	—	—	—	—	—	—	—	—
Discrete	1	—	—	—	—	—	—	—	—	—
Mild	2	—	—	—	—	—	—	—	—	—
Type not determined	2	—	—	—	—	—	—	—	—	—
Total	6	—	—	—	—	—	—	—	1	—

Lastly, I append a table giving an analysis of all the vaccinated subjects at different age periods with respect to

the number and quality of the vaccination marks and the type of attack from which they suffered.

Explanation of Chart XIX.—

This chart is intended to embody all the facts gathered in the inquiry respecting the distribution of the various types of small-pox in the several classes of vaccination-relations.

The first series shows the actual numbers and the mortality of patients at all ages grouped in the series of "confluent," "coherent," "discrete," "mild," and in that where the type was "not ascertained," the condition as to vaccination being indicated as in other charts by means of different colours.

Below this series are four others, viz., at each age-period—"under 10 years," "10 to 30 years," "30 years and over," and the few cases at which the age was not ascertained.

The confluent group contains 273 cases (105 deaths) at all ages—96 (53 deaths) under 10 years, 130 (35 deaths) at 10 to 30, 46 (19 deaths) at 30 upwards, and one at doubtful age.

The coherent group contains 125 cases (no deaths) at all ages—26 under 10 years, 73 at 10 to 30, 25 at 30 upwards, and one at doubtful age.

The discrete group contains 335 cases (3 deaths) at all ages—46 (3 deaths) at under 10 years, 193 at 10 to 30, 95 at 30 upwards, and one of doubtful age.

The mild group contains 283 cases (no deaths) at all ages—51 at under 10 years, 157 at 10 to 30, 79 at 30 upwards, and 2 at doubtful age.

The uncertain group contains 15 cases (2 deaths) at all ages—3 at under 10 (1 death), 5 at 10 to 30, 3 (1 death) at 30 upwards, and 4 at doubtful age.

It may be of interest to analyse this Table (CXIII.) in the same manner as the age-incidence of the disease amongst the vaccinated has been treated, in order to ascertain whether these figures (small though they be) show any influence upon the type of small-pox examined by the area, number, or character of primary vaccination marks, i.e., whether the severity of attacks is in any way related to the evidence of good or indifferent primary vaccination but are borne by the patients.

A. Area of Vaccination Cicatrices in Relation to Type of Small-pox:—

The area of the marks of vaccination was estimated in 290 cases, of which there were—

Confluent	-	-	-	17 or 5 per cent.*
Coherent	-	-	-	26 „ 9 „
Discrete	-	-	-	120 „ 41 „
Mild	-	-	-	127 „ 44 „

and employing the classification above given there were—

—	Primary Vaccination Cicatrices.			Area not recorded, Class A ¹ .	Total.
	Four or more.	Three.	Two.		
Confluent	3 or 7 p.c.	7 or 4 p.c.	19 or 11 p.c.	1	44
Coherent	5 „ 12 „	23 „ 11 „	15 „ 9 „	33	59
Discrete	104 „ 42 „	12 „ 44 „	4 „ 24 „	149	260
Mild	109 „ 44 „	10 „ 37 „	8 „ 47 „	129	256
	246	27	17	329	619
Type?	—	—	—	8	8
				337	627

The only notable feature of these statistics being the rise in the proportion of confluent cases with the diminution in area of marks.

Distributing the cases in age-periods there were:—

At ages under 10 years (17 cases).

—	Class A ¹ .	Class A ² .	Class A ³ .
Confluent	—	—	—
Coherent	—	—	—
Discrete	1 or 7 per cent.	—	1 or 50 per cent.
Mild	14 „ 93 „	—	1 „ 50 „
Total	15	—	2

At ages 10 to 30 years (185 cases).

—	Class A ¹ .	Class A ² .	Class A ³ .
Confluent	4 or 3 p.c.	1 or 6 p.c.	1 or 25 p.c.
Coherent	16 „ 10 „	1 „ 6 „	—
Discrete	73 „ 44 „	8 „ 47 „	1 or 25 p.c.
Mild	71 „ 43 „	7 „ 41 „	2 „ 50 „
Total	164	17	4

At ages 30 years and over (88 cases).

—	Class A ¹ .	Class A ² .	Class A ³ .
Confluent	7 or 10 p.c.	1 or 10 p.c.	3 or 27 p.c.
Coherent	6 „ 9 „	2 „ 20 „	1 „ 9 „
Discrete	30 „ 45 „	4 „ 40 „	2 „ 18 „
Mild	24 „ 36 „	3 „ 30 „	5 „ 46 „
Total	67	10	11

* In all these calculations the per-centage is stated in whole numbers.

Again, the only striking fact is that at each age-period the most severe cases were more numerous in those classes in which the area of the vaccination marks was smallest.

B. Number of Vaccination Cicatrices in Relation to Type of Small-pox:—

Excluding from the whole number of the vaccinated those cases of which there is no record as to the number of marks, and also those of which the type of attack was not recorded, there remain 457 cases, of which there were—

Confluent	-	-	30 or 6.5 per cent.
Coherent	-	-	48 „ 10.5 „
Discrete	-	-	207 „ 45 „
Mild	-	-	172 „ 38 „

and distributed according to the number of primary cicatrices—

—	Primary Vaccination Cicatrices.				No. of Marks not recorded.	Total.
	Four or more.	Three.	Two.	One.		
Confluent	3 or 7 p.c.	7 or 4 p.c.	19 or 11 p.c.	1 or 3 p.c.	14	44
Coherent	5 „ 12 „	23 „ 11 „	15 „ 9 „	5 „ 15 „	11	59
Discrete	18 „ 43 „	95 „ 45 „	79 „ 46 „	15 „ 44 „	53	260
Mild	16 „ 38 „	84 „ 49 „	59 „ 34 „	13 „ 38 „	84	256
	42	309	172	34	162	619
Type?	—	1	1	6	8	38
						627

It will be seen from these figures that as regards confluent attacks those having one mark only suffered the least, those having three marks had the next largest proportion of such attacks, those having four marks the next, and those having two marks yielded the greatest proportion of such cases. In the coherent series those having two marks yielded the lowest proportion, and those having one mark the highest, whilst the discrete and mild cases were fairly equally distributed throughout the classes.

As regards age-distribution there were:—

At ages under 10 years (44 cases).

—	Primary Vaccination Cicatrices.				All Classes, including not recorded Marks.
	Four or more.	Three.	Two.	One.	
Confluent	—	1 or 7 p.c.	—	—	1 or 2 p.c.
Coherent	—	—	—	—	—
Discrete	1 or 20 p.c.	4 or 27 p.c.	2 or 40 p.c.	1 or 33 p.c.	9 or 20 p.c.
Mild	4 „ 80 „	10 „ 66 „	3 „ 69 „	2 „ 67 „	34 „ 78 „
Total	5	15	6	3	44

There were no confluent or coherent attacks with one exception—a child who had three marks—and of the rest it will be seen that the proportion of mild to discrete attacks was mostly higher in those having the larger number of cicatrices.

At ages 10 years and under 30 (367 cases).

—	Primary Vaccination Cicatrices.				All Classes, including those in which Number of Marks not recorded.
	Four or more.	Three.	Two.	One.	
Confluent	—	3 or 2 p.c.	8 or 9 p.c.	1 or 7 p.c.	17 or 4 p.c.
Coherent	3 or 11 p.c.	18 „ 12 „	8 „ 9 „	1 „ 7 „	38 „ 10 „
Discrete	16 „ 59 „	65 „ 43 „	43 „ 46 „	10 „ 36 „	162 „ 45 „
Mild	8 „ 39 „	65 „ 43 „	35 „ 36 „	3 „ 30 „	150 „ 41 „
Total	27	151	94	15	367

Thus there were no confluent attacks amongst those having four or more marks, and a much smaller proportion of such attacks amongst those with three marks than those with two or one, although the latter group had fewer than the former. Coherent attacks were more numerous in those with three or four marks than in those with one or two. There were fewest mild attacks in those who only had one mark, and most mild attacks in those with three marks.

At ages 30 years and upwards (204 cases). Marks recorded in 142:—

	Primary Vaccination Cicatrices.				All Classes, inclusive of "non-recorded" marks.
	Four or more.	Three.	Two.	One.	
Confluent	3 or 30 p.c.	3 or 7 p.c.	11 or 15 p.c.	—	25 or 13 p.c.
Coherent	2 or 20 "	5 or 12 "	7 or 10 "	4 or 25 p.c.	29 or 10 "
Discrete	1 or 10 "	25 or 61 "	34 or 46 "	4 or 25 "	88 or 43 "
Mild	4 or 40 "	9 or 20 "	51 or 20 "	9 or 50 "	70 or 34 "
Total	10	43	73	15	204

The most striking fact at this age-period is the relatively large proportion of severe attacks amongst those having the largest number of vaccination marks. (See Chart XX.)

C.—Foveation of Marks in Relation to Type of Small-pox.

Of the 627 vaccinated subjects the character of marks as to foveation was noted in 417 cases, in one of which the type of disease was not recorded. The remainder comprise:—

Confluent	—	—	26 or 6 per cent.
Coherent	—	—	41 or 10 "
Discrete	—	—	183 or 44 "
Mild	—	—	166 or 40 "

and distributed according as to whether the marks were (a) wholly foveated, (b) partly foveated, and (c) smooth or scarred. They were:—

	Foveation of Primary Cicatrices.		
	Foveate.	Partly Foveate.	Smooth or Scarred.
Confluent	13 or 5 p.c.	3 or 10 p.c.	19 or 11 p.c.
Coherent	31 or 11 "	4 or 13 "	6 or 7 "
Discrete	125 or 42 "	12 or 8 "	43 or 47 "
Mild	125 or 42 "	9 or 29 "	32 or 35 "
Total	204	31	91

Some slight concordance is thus seen to obtain amongst the confluent and mild series in respect to the degree of foveation and type of attack.

	Under 10 Years.		10 to 30 Years.		30 Years and upwards.		All Ages.	
	Vaccinated.	Unvaccinated.	Vaccinated.	Unvaccinated.	Vaccinated.	Unvaccinated.	Vaccinated.	Unvaccinated.
Confluent	1 or 2 p.c.	87 or 50 p.c.	17 or 4 p.c.	106 or 64 p.c.	25 or 13 p.c.	17 or 77 p.c.	44 or 7 p.c.	210 or 61 p.c.
Coherent	—	74 or 15 "	38 or 10 "	33 or 20 "	29 or 10 "	1 or 5 "	58 or 9 "	58 or 17 "
Discrete	9 or 30 p.c.	36 or 53 "	162 or 45 "	24 or 15 "	88 or 43 "	2 or 9 "	259 or 42 "	62 or 18 "
Mild	34 or 78 "	9 or 6 "	159 or 41 "	2 or 1 "	79 or 34 "	2 or 9 "	254 or 42 "	13 or 4 "
Total	44	156	367	163	204	22	615	343

Again, subdividing these cases into age-periods there were—

At ages under 10 years (26 cases).

	Vaccination Cicatrices.		
	Foveate.	Partly Foveate.	Smooth or Scarred.
Confluent	1 or 6 p.c.	—	—
Coherent	—	—	—
Discrete	4 or 25 p.c.	—	3 or 30 p.c.
Mild	11 or 69 "	—	7 or 70 "
Total	16	—	10

Here, again, the exceptional occurrence of one confluent case gives a slight advantage to those with smooth marks over the foveate class; but it is noticeable (although the paucity of numbers does not warrant any sure conclusion) that there is otherwise no difference as to relative numbers of discrete and mild cases in each group.

At ages 10 and under 30 years (253 cases).

	Primary Vaccination Cicatrices.		
	Foveate.	Partly Foveate.	Smooth or Scarred.
Confluent	6 or 3 p.c.	1 or 5 p.c.	3 or 7 p.c.
Coherent	21 or 11 "	2 or 9 "	2 or 5 "
Discrete	88 or 45 "	10 or 48 "	17 or 44 "
Mild	78 or 41 "	8 or 38 "	17 or 44 "
Total	194	21	39

Again, there is a slight increase in severity of attack amongst those with least foveated marks, a proportion reversed in the coherent series, and not evident in the other series.

At ages 30 years and upwards (135 cases).

	Primary Vaccination Cicatrices.		
	Foveate.	Partly Foveate.	Smooth or Scarred.
Confluent	6 or 7 p.c.	2 or 20 p.c.	7 or 17 p.c.
Coherent	9 or 11 "	2 or 20 "	4 or 10 "
Discrete	33 or 20 "	5 or 50 "	22 or 54 "
Mild	36 or 45 "	1 or 10 "	8 or 19 "
Total	84	10	41

There were fewest confluent cases in those with foveate marks and most mild cases.

I must refer to the table for the figures in which the area, number, and character of marks are associated, but in conclusion may contrast the whole series of the vaccinated and unvaccinated (the type of whose attacks are known) in each of those age-periods:—

The total number (627) of the vaccinated is made up by the addition of six whose ages were not ascertained, and six of which the type of attack is not recorded. These figures are given diagrammatically in Chart XX. (above).

Utilising the above figures, it may be calculated that if (at all ages) the proportionate distribution between the 958 attacks were on the rate of the "vaccinated" (at all ages) and "unvaccinated" (at all ages) series respectively, the numbers would be—

		At Vaccinated Rate (for all ages).	At Unvaccinated Rate (for all ages).	Actual Rate.
Confluent	- - - -	67	584	254
Coherent	- - - -	86	163	116
Discrete	- - - -	403	173	321
Mild	- - - -	402	38	267
Total	- - - -	958	958	958

A similar, and in some instances even more striking, variation from the actual numbers would appear in each of the respective age-periods.

Thus at ages "under 10 years" :—

		At Vaccinated Rate (for ages 0-10 years).	At Unvaccinated Rate (for ages 0-10 years).	Actual Rate.
Confluent	- - - -	4	112	88
Coherent	- - - -	0	30	24
Discrete	- - - -	40	46	45
Mild	- - - -	156	12	43
Total	- - - -	200	200	200

At ages "10 to 30 years" :—

		At Vaccinated Rate (for ages 10-30 years).	At Unvaccinated Rate (for ages 10-30 years).	Actual Rate.
Confluent	- - - -	21	340	123
Coherent	- - - -	53	106	71
Discrete	- - - -	240	80	186
Mild	- - - -	218	6	152
Total	- - - -	532	532	532

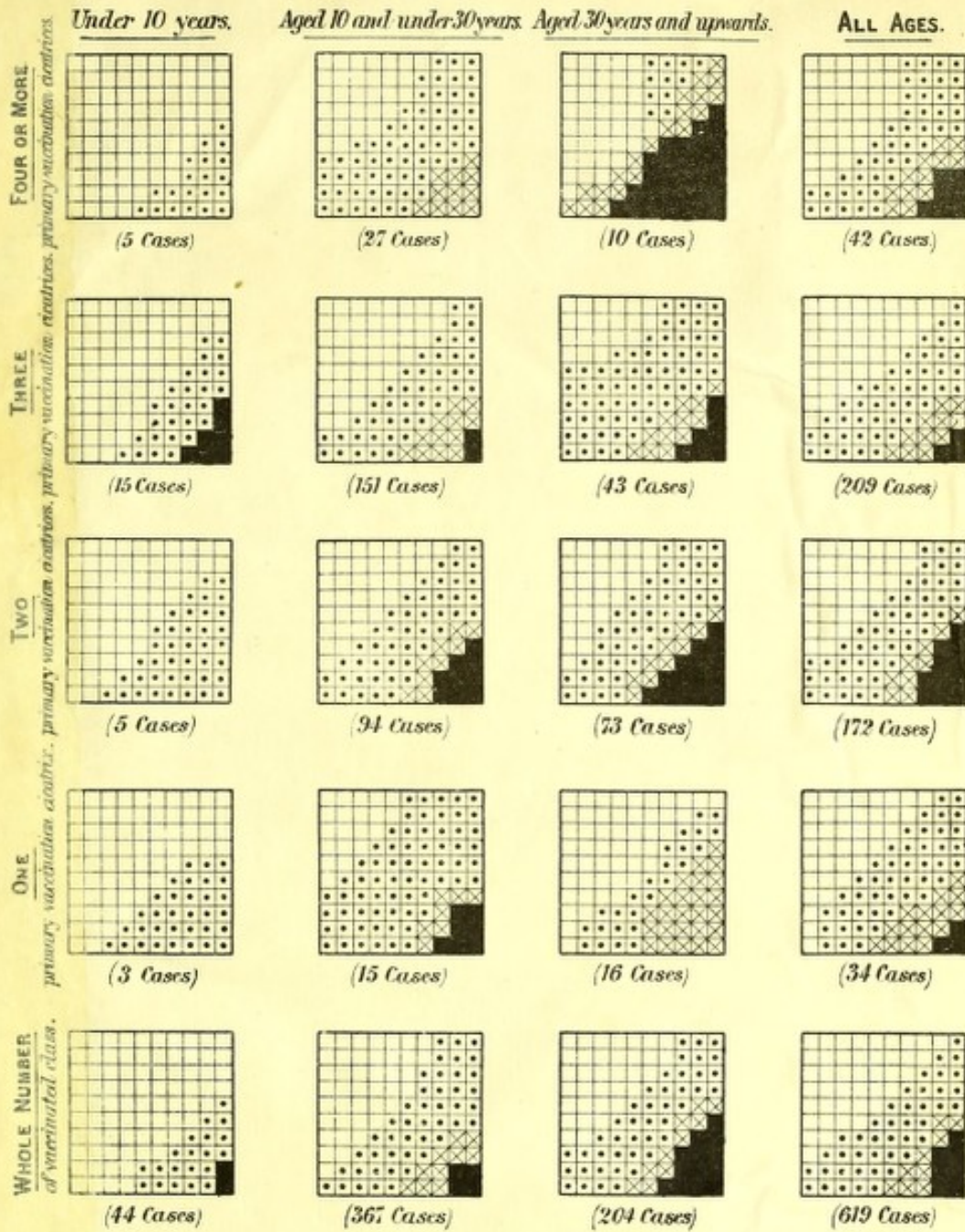
At ages "30 years and upwards" :—

		At Vaccinated Rate (for ages 30 years and over).	At Unvaccinated Rate (for ages 30 years and over).	Actual Rate.
Confluent	- - - -	29	174	43
Coherent	- - - -	23	12	21
Discrete	- - - -	97	20	90
Mild	- - - -	77	20	72
Total	- - - -	226	226	226

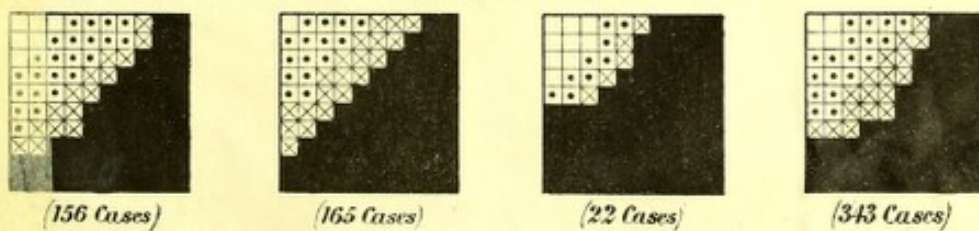
SIDNEY COUPLAND, M.D.

CHART XX — DIAGRAM SHOWING THE PROPORTION OF CASES OF SMALL-POX OF DIFFERENT TYPES WHICH OCCURRED IN VACCINATED AND UNVACCINATED PERSONS AT ALL AND CERTAIN SPECIFIED AGES.

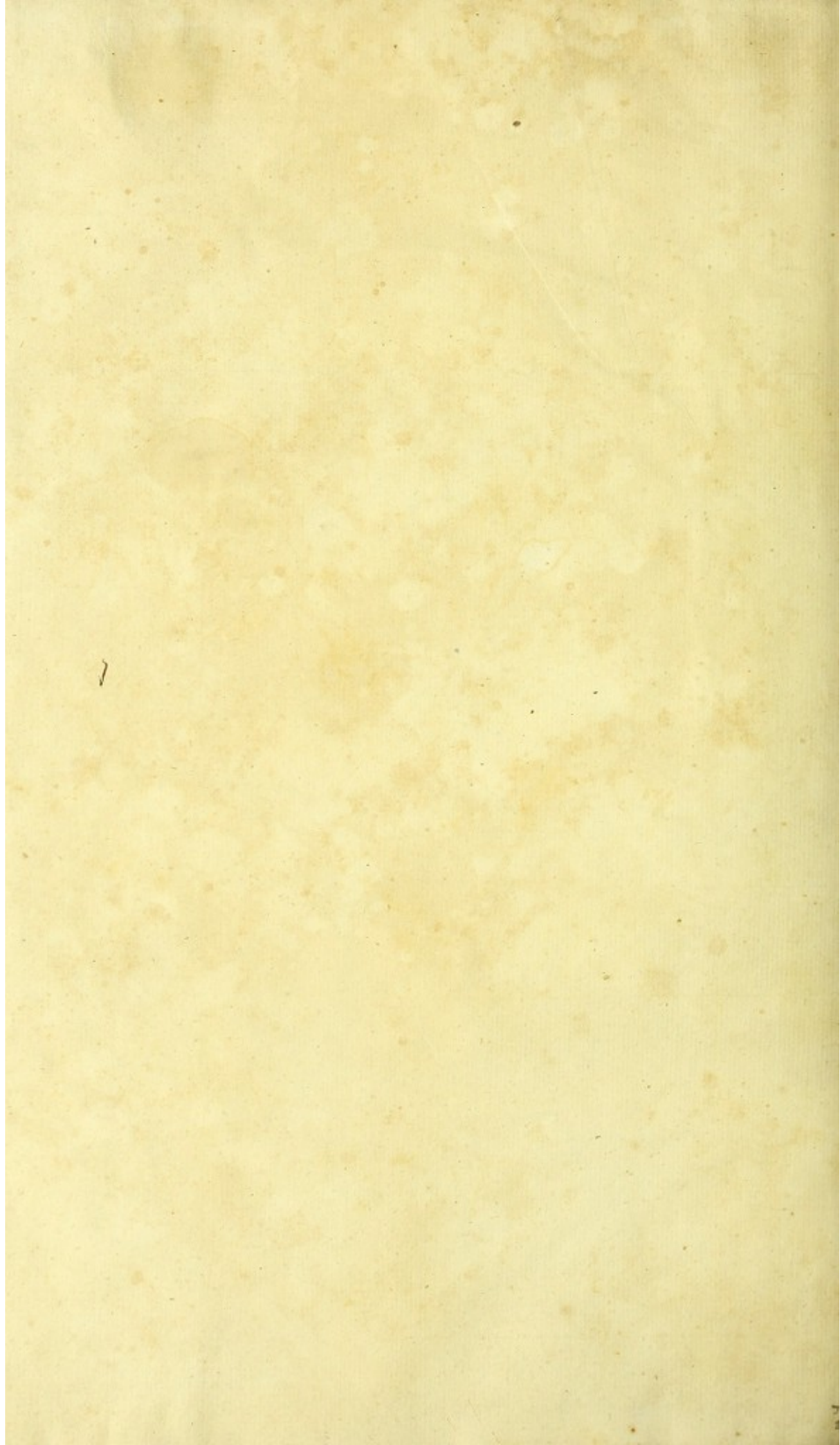
VACCINATED.

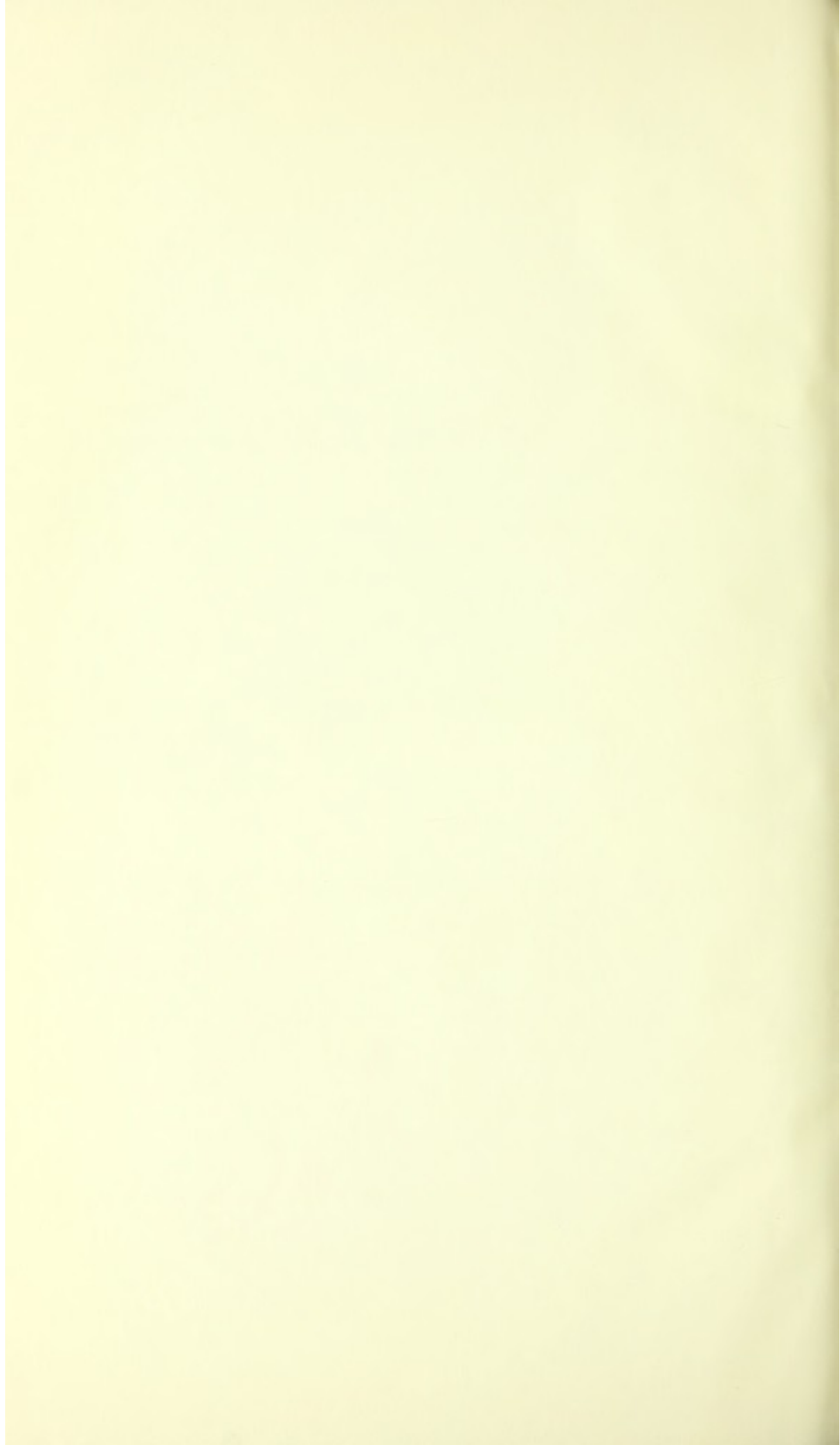


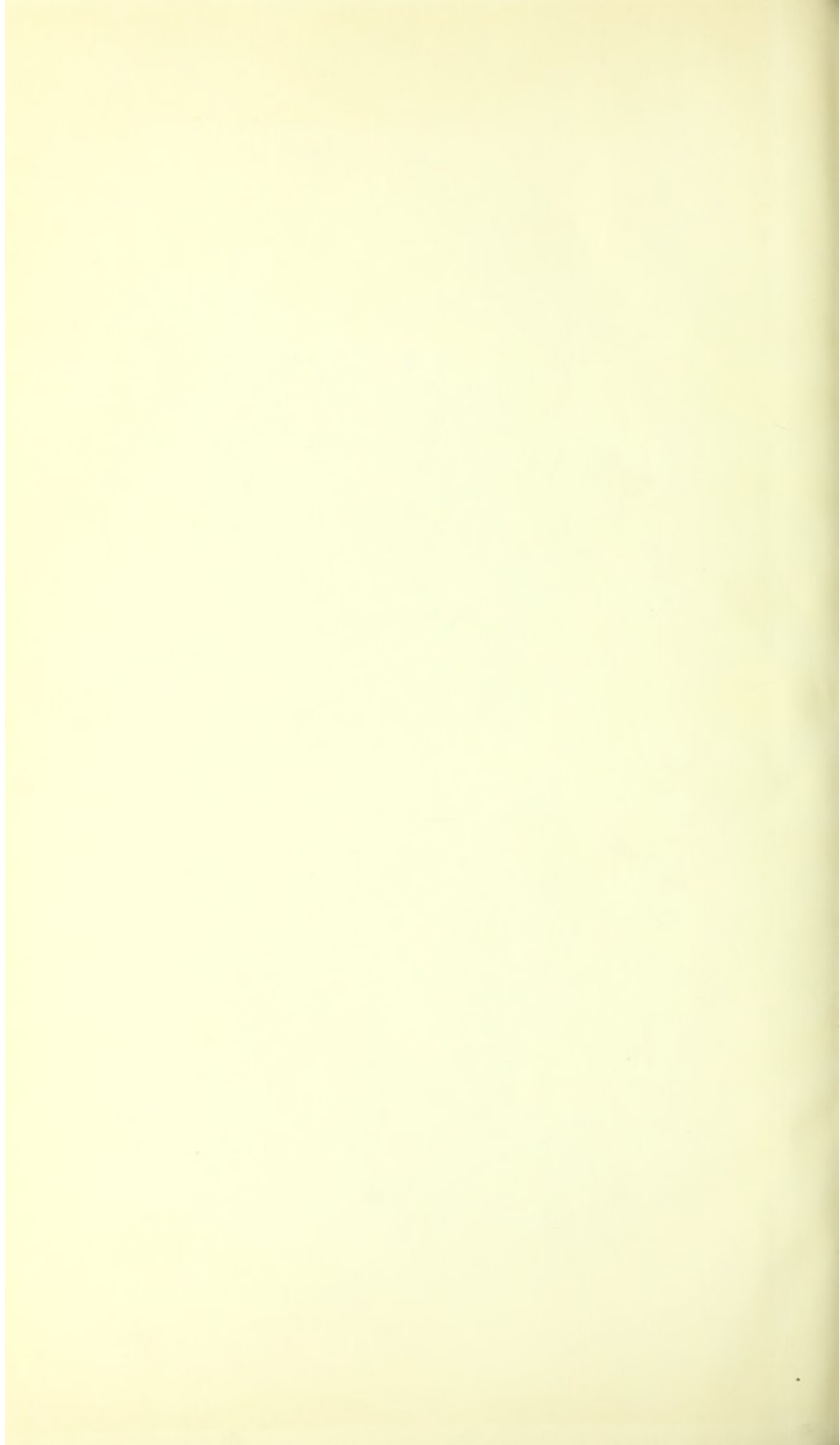
UNVACCINATED.



Confluent type of Small-Pox.
 Discrete type of Small-Pox.
 Coherent type of Small-Pox.
 Mild type of Small-Pox.







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