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- 1) Report on certain cases of Plague occurring in Glasgow in 1900 - By the M.O.H.
- 2) Census 1900 - Report on Glasgow - Its Sanitary Districts and Municipal Wards
- 3) Report by the M.O.H. on Small-pox in Glasgow - 1900-1905
- 4) Sanitary Inspector's (Peter Fyfe's) Annual Report for the Year 1905. - Glasgow City.





CORPORATION OF GLASGOW.

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REPORT  
ON CERTAIN  
CASES OF PLAGUE

OCCURRING IN GLASGOW,

IN 1900,

BY THE MEDICAL OFFICER OF HEALTH.



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## P R E F A C E .

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THE issue of this Report has been delayed for the purpose of affording time for the completion of some enquiry which was instituted with the view of acquiring a more intimate knowledge of the pathology of plague, and of the changes which take place in the blood serum of the patient. With this object the Report includes a description of the Symptomatology and Sero-therapeutics by Dr. Brownlee, Physician-Superintendent, Belvidere Hospital; Dr. Campbell M'Clure, lately Senior Resident Assistant Physician, contributes a section dealing with the Clinical Bacteriology; Dr. D. Louis Cairns, who has succeeded him, undertook an investigation into the agglutinating properties of the blood serum, and Dr. R. M. Buchanan, Bacteriologist to the Corporation, has reviewed the morbid anatomy and bacteriology.

It is hoped that in this way a more complete picture of the outbreak will be presented, and something of permanent value added to the technique of the resources available for the recognition of the disease.

A. K. CHALMERS, M.D.,  
*Medical Officer of Health.*

SANITARY CHAMBERS,  
GLASGOW, *August*, 1901.



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## INTRODUCTION.

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The reappearance of a disease which had long ceased to have any save an historical interest to the population of Glasgow is of more than passing importance.

When Plague appeared in our midst, in the autumn of 1900, it abruptly reopened a record in which the last entry was contemporaneous with the period of the Restoration, and of which the pages of Defoe and Boghurst may be said to have been regarded by generations as the closing chapters.<sup>1</sup>

To some extent the awakening was a rude one. In an interval of two centuries and a half there is room for much to happen in the history of a population; but its reappearance has shown that we have acquired no racial immunity to plague, and that some of the physical conditions necessary for its development are still present with us. Nor has the disease changed. Its type may be modified by circumstances, but it is still capable with us of manifesting a considerable degree of malignity. In our recent experience, in one household of two persons both died, as did a neighbour; in another of six persons, all were attacked, and only two recovered.

Of the cases recognisable as plague during their currency 28·5 per cent. proved fatal, but there were eight other deaths inferentially attributable to the disease, because of their association with subsequent and definitely recognisable cases, which bring up the number of deaths to sixteen, and the attacks to thirty-six.

There is much to be learned regarding the methods by which plague spreads.

There are many who question whether it is infectious, or communicable from man to man, in the sense in which measles is communicable; whether, in fact, risk of contracting the disease arises from association with the plague-stricken patient or with an infected place. So far as the disease is an affection of mankind, it would seem as if infectivity depended on the type which it assumes in the individual patient. In the limited experience which our cases afforded, secondary cases in inmates of the same house, or in visitors, followed only when the original attack was pneumonic or diarrhoeal, or septicæmic in type. There was no evidence that the simple bubonic form, even when severe and treated for a lengthened period at home, transmitted the disease.<sup>2</sup>

The explanation would appear to be that in these latter forms the *bacillus pestis* is usually confined to the affected glands, and has no means of escape therefrom until in time it becomes degenerate and loses its virulence, or secondary suppurative changes occur, which are generally hostile to it.<sup>3</sup> In the pneumonic type, on the other hand, the atmosphere surrounding the patient may contain suspended particles of expectoration, and a true infectivity of the immediate neighbourhood of the patient become established.

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<sup>1</sup> Much interesting information regarding the action of the Town Council in plague years, especially during the 17th century, is contained in the Charters and Documents relating to the City of Glasgow, 1175-1649, Part I., published by Sir James Marwick, and I have to express my indebtedness to Dr. William H. Hill, of Ingram Street, for an opportunity of perusing many valuable MS. notes on the condition of the city and of the customs of the citizens during that period. A very concise description of the ravages of plague in Glasgow at that time, and of the action of the Town Council, appears in the Memorials of the Faculty of Physicians and Surgeons of Glasgow, by Alexander Duncan, Esq., LL.D., secretary of the Faculty, and extracts therefrom will be found on p. 37.

<sup>2</sup> There were two apparent exceptions to this—the secondary case at Oxford Lane and the tertiary attacks in Dale Street. In the former, association with the wakes cannot be excluded; in the latter there was present in the house in which they contracted their infection the bed on which a pneumonic patient had died.

<sup>3</sup> In one case, however, the *bacillus pestis* was recovered in a virulent form from a bubo rupturing spontaneously; in another it co-existed with putrefactive bacilli found *post-mortem* in a bubo, although it was absent from the discharge therefrom during life.

But there is another form of plague prevalence of which we had no experience. The disease affects both man and some animals, and in this resembles anthrax, glanders, and tuberculosis. In our recent experience it was confined to man.

The susceptibility of rats to plague, and the part played by these animals, when infected, in spreading the disease, is now well recognised. In the Formosa outbreak of 1896, plague was known as rat sickness, and the dissemination of the disease as an affection of mankind in Sydney, in 1900, was preceded by a rat infection. The distribution of infection over wide areas is thus easily accomplished, although the operation of still another factor seems to be required to transmit the disease to man. It is a laboratory fact of no mean significance that cultures of the plague bacillus are notoriously prone to lose their virulence. In the body of a rat dead of plague the bacillus must find an equal difficulty in maintaining it. But the sick rat becomes an attractive host for fleas, which rapidly leave it when death occurs. These insects, together with flies, lice and ants, are capable of conveying the infection, and indirect contact may thus be established. There is much evidence to show that plague infection more commonly gains access to the system through some injury—it may be a trifling one—to the skin or mucous membrane; there is little in favour of it ever being acquired through food. If the bite of an insect, acting as the temporary host of the bacillus of plague, inoculates the disease through the puncture, after the manner in which the malarial parasite is transmitted through the bite of certain mosquitoes, the locality of infection and contact therewith both acquire an elastic meaning. It has been shown that from the rat-infected flea the bacillus may be recovered; although experiments are awaiting to show how long it may remain virulent in the insect.<sup>1</sup>

In the cases which came under observation there was a definite grouping of those directly associated with the neighbourhood of “wakes,” and there were certain others which had no such association. Taken by themselves, these latter were but broken links in a chain, having in common only the fact that they were plague-stricken. But in two instances antecedent deaths had occurred, one, at least, of these being a visitor to a tenement in which it is now reasonably certain that the septicæmic form of the disease had caused one death, and in which one if not two others were, at the time, sick of attacks that were to prove fatal subsequently. In two more, contact with the wakes, in the intermediate sense already alluded to, could be established; and in the remaining case, the wife of an employé of the department had the infection conveyed to her in her husband's clothing, though their home was far removed from the area of infection.

By placing the unrecognised deaths at home in the series of attacks, the continuity of the series becomes established, and the agency by which the disease was transmitted to the clothes collector's wife suggests the medium by which “contact” for the apparently disconnected cases may have been established.

#### PLAGUE PANDEMIC FROM 13TH TO 17TH CENTURIES—ITS FORMER PREVALENCE IN BRITAIN.

It may be of some general interest here rapidly to outline the scope of the former prevalences of plague in this country.

To many the Great Plague of London stands as an incident by itself, quite unassociated historically with any other event save the Great Fire which followed it; and when plague ceased after the fire had occurred, the theory that there was no more plague because the fire had destroyed the places where plague had found a home was too obviously a deduction from the facts to be doubted—for a time, at least.

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<sup>1</sup> The part played by the flea in the propagation of the disease among rats is so important that I have introduced, on p. 30, an extract from a report by Dr. Tidswell, which accompanies that of the Chief Medical Officer (Dr. Ashburton Thompson) on the recent outbreak at Sydney.



But in Marseilles, about sixty years afterwards, and in Moscow, in 1770, outbreaks of the disease occurred with a virulence almost equal to that which made the Great Plague historical, and with it they form the major incidents in the recession of a pandemic which lasted for more than four centuries and had included the whole of Europe in its ravages.

It is necessary to recall this in order to appreciate what underlies the phrase, again so common in recent years, in describing the present diffusion of plague, for there is a suggestiveness in the widely extended cyclical movements of this disease which raises it above the category of those which are wholly dependent on local causes. On two former occasions, at least, plague extended to Britain. The Justinian outbreak, which devastated Europe in the sixth century, appeared in Britain in that which followed, and the Black Death, of the fourteenth century, were both examples of a Western diffusion of plague, which reached Europe in the former instance through Egypt, and in the latter came overland from China. But while the Justinian Plague appears to have exhausted its malignancy in Britain in twenty years (664-685), the Black Death left its impression on our epidemic history for three centuries, until, indeed, its final extinction some fourteen years after the occurrence of the Great Plague in London in 1665.<sup>1</sup>

During the centuries which lay between the appearance of the Black Death and the occurrence of the Great Plague, the disease was endemic in Britain—tending latterly to linger among the population of towns, having a certain periodicity in the times of its maximum prevalences, and almost capriciously capable, as in the great outbreaks in London, Marseilles, and Moscow, of displaying the malignity which three centuries earlier had earned for it the name of the Black Death.

Following its extinction in this country, it was wholly absent from Western Europe during the greater part of the eighteenth century, and its further recession may be told in a quotation from Mr. Netten Radcliffe:—"At the close of the first third of the nineteenth century the area of the prevalence of the disease had shrunk to the easternmost parts of the Turkish Empire in Europe, and in the year 1841 plague ceased on the Continent altogether."

Almost simultaneously it had been receding along the Southern shores of the Mediterranean, and its disappearance from Syria, Asia Minor, and Egypt, in 1844, encouraged the hope that a disease which had left its impress on the epidemiology of five centuries had been extinguished in the struggle which mankind is ever waging with the uncontrolled forces of nature.

It is from this point that the increasing prevalence of plague in recent years must be measured, for although the Hong Kong outbreak of six years ago stands almost at the beginning of a new era of wide distribution, the importance of this, as a factor in its distribution, is limited to the facilities for transit which the commerce of Hong Kong placed at its disposal. Indeed, the distribution of plague and its diffusion may convey quite distinct conceptions, for at the present moment plague is more widely distributed than ever, whilst we are still slowly accumulating evidences of its diffusion. For this, modern methods of commerce and travel are responsible. In transit by land, epidemics diffused themselves along a caravan route. The furthest point reached was but a step beyond the previous resting place, and lateral diffusion along the route was possible. The Black Death reached Europe in less than half a century after its probable origin in China, but the way

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<sup>1</sup> When the Black Death appeared in Britain, Europe had barely awakened from the sleep of the Middle Ages. It began in Dorsetshire about August, 1348, reached London in the end of that year, and in January, 1349, Parliament was prorogued "owing to the increasing severity, day by day, at Westminster and places adjoining." Spreading northward it entered Scotland in the autumn of 1349, appearing first among "the Scots assembled in the Forest of Selkirk for an invasion, at the time when the mortality was greatest in the Northern Counties of England, but was held in check there during the winter months following. Its former prevalence in Glasgow came to an end about the year 1648.<sup>1</sup>

<sup>1</sup> See "History of Epidemics in Britain," by C. Creighton, M.D. University Press, Cambridge, 1891.

thither was marked by its ravages. Now, in less than six years, both hemispheres have been invaded, although this alone is an illustration of the method of distribution rather than evidence of pandemic intensity. For this latter we must look to the Eastern haunts of plague, and there the evidences are sufficiently disturbing. For while there is now some reason to doubt the reality of its disappearance in the middle of the nineteenth century, its movement in the latter half has been towards an ever-widening area of prevalence, and the century closes while the avenues of commerce are being watched for its appearance with a minuteness probably quite unparalleled. For plague is an international question, and commerce vibrates with every evidence of its progress.

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#### ASSOCIATION AND TOPOGRAPHICAL DISTRIBUTION OF CASES.

Written after the events described have terminated, it has been possible here to deal with the outbreak as a continuous narrative, and to discuss many of the questions which the association of cases suggested, but it has been deemed advisable also to append the Interim Reports presented to the Health Committee during the successive fortnights in which plague was present, as these best convey the impression created by the events while still in their development.

When plague was recognised to exist, it had already invaded several families, and had been present for at least a fortnight, almost certainly for three weeks. It was suspected to exist on 25th August. On the 27th, a man was found who had sickened on the 12th, while his wife was already dead on the 9th, and a grandchild, a baby of two months, living with them, on the 7th of that month.

The circumstances attending the recognition of the disease, as related in my Report to the Health Committee on 10th September, 1900, are as follows:—

A child and its grandmother (Mrs. B.), living in the same house at 71 Rose Street, South-Side, Glasgow, sickened suddenly on the evening of 3rd August—the child dying on the 7th and the grandmother on the 9th—the cause of death of the child being certified as “zymotic enteritis,” and of the grandmother “acute gastro-enteritis.” In both cases a wake was held, and the grandmother was buried on the 11th. Although the husband of this latter patient sickened on the 12th, he was only admitted to hospital on Monday, 27th August, certified “enteric fever,” when he was recognised to be suffering from plague.

Concurrently with the later developments in this household, the following illnesses were appearing in the members of a family (M.), 57 Thistle Street, some of whom had either attended Mrs. B.’s wake, or were present during the illnesses in her house.

On the evening of Sunday, 19th August, a child, Christina M., 10 years, sickened with acute symptoms, which ended fatally at mid-day on the 21st. She was only medically visited, however, within ten minutes of her death. The symptoms were those of pneumonia, and the cause of death was certified as “acute pneumonia.”

Before the child died the mother had already sickened (20th); a son (since dead) sickened on the 22nd, and a half-brother, a young child of three years, sickened on Thursday, 23rd.<sup>1</sup> These three were first seen by Dr. C. E. Robertson, who had also seen the child Christina, and later by Dr. Colvin, who, on discovering that Dr. Robertson had already visited, went to confer with him regarding the symptoms. The action in which this conversation ended is thus described by Dr. Robertson:—

“We were satisfied that they were cases demanding the attention of the Sanitary Authorities, and I agreed with Dr. Colvin that, having both seen them independently, we should both notify them as cases of enteric fever, with a mark of interrogation after it, to imply that the diagnosis was not definite, but that they were evidently of an infectious nature, and should be removed at once.”

They were accordingly notified on 25th August, and removed to hospital same day.

On admission, Dr. Brownlee, the Physician-Superintendent, made a careful examination of the cases, which resulted in his coming to the conclusion that the patients were suffering from bubonic plague, although they were inhabitants of Glasgow, and there was no known case of bubonic plague in Britain. Dr. Weir, Senior Assistant Physician at the Hospital, and Dr. Knight, my

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<sup>1</sup> On subsequent enquiry it was found that this patient sickened on 22nd.



assistant, concurred in the diagnosis. Dr. M'Clure, Acting Superintendent of the Smallpox Hospital, immediately examined blood-films obtained by hypodermic puncture of the buboes, with the result that typical forms of the bacillus pestis were observed. Immediately on this conclusion being arrived at, Dr. Knight visited the patient's house, verified the story of the illness and death, and arranged for the removal of the other members of the family to the reception-house for observation. Cultures taken on glycerine agar showed, by the evening of August 26th and the morning of August 27th, the typical appearance, both macroscopical and microscopical, of the *bacillus pestis*. Later in the week they were fully confirmed by animal experiments by Dr. Muir, Professor of Pathology in the University of Glasgow, in the absence of our own Bacteriologist, Dr. R. M. Buchanan. (Professor Muir's Report will be found at p. 28.)

On the same day that these three cases were admitted (25th August), another woman (Mrs. T., 23 Oxford Lane), had been admitted certified typhus fever. This disease was excluded on examination, and owing to the presence of an inflammatory condition in the left groin, and a history of recent confinement, the provisional diagnosis of pelvic cellulitis was entertained. Later, her association with the B. family was discovered, and the diagnosis revised in the light of the symptoms presented by these others.

The house occupied by the B. family was a single apartment on the ground floor. It is distant at least a quarter of a mile from the river<sup>1</sup>—considerably further from the docks. The father, although a dock labourer, was employed exclusively in vessels engaged in the coasting trade, and no evidence of other association with shipping could be found. The mother was a fish hawker, and took special charge of her grandchild. This is important, because the grandmother took the child with her wherever she went, and they sickened simultaneously. It suggests that they found their infection beyond the limits of their dwelling. On the other hand, the child's grandfather, the dock worker, sickened on the day following his wife's burial. The only other inmate of this house was a daughter—mother of the baby referred to—and employed, until the date of her mother's sickening, in a rag store. She was not affected.

In tracing the spread of the infection from this focus, a passing reference is necessary to the social customs of the class to which these persons belonged when death occurs, because here, as on a subsequent occasion of a similar character in Thistle Street, they played an important part not only in the spread of the disease, but in rendering its recognition easier.

Waking, or watching with the dead, is primarily an act of reverence and of sympathy. But "wakes," as we now mostly know them, are an abuse of this custom. They are lacking absolutely in reverence, and only a distorted conception of friendship could construe them into expressions of sympathy. Hospitality is, perhaps, natural in the circumstances, but its excess becomes debauchery, and when, to this, indulgence in games is added, the last remnant of reasonableness in the custom has gone. This digression is necessary for the purpose of explaining how gross but temporary overcrowding occurred in the infected houses, and became a powerful factor in the spreading of the disease. Considerably over one hundred persons were present on one or other of the evenings on which these ceremonies were held, and, as the families were related, many attended the "wakes" in both households. On the first occasion, the "wakes" were held during the evenings from 7th to 10th August, and among those present were several members of a family, M., residing at 57 Thistle Street. Four of these latter ultimately were affected, but two only, I think, need be regarded as contracting their infection at 71 Rose Street. The first victim in this second family, a child (T. M.), sickened on 19th August, nine days after the last evening of the first "wake." Her mother sickened on the following day, and two brothers on the 22nd. This child died on the 21st, and here, again, on that evening, and on the 22nd, there occurred a repetition of the ceremonies which had taken place from the 7th to the 10th in the Rose Street house. The first illness in the Thistle Street house was pneumonic in type, and the two members of this household, sickening on the 22nd,

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<sup>1</sup> A reference to the accompanying map will help the reader unacquainted with the locality to follow the distribution of the cases.



most probably obtained their infection from her. Subsequently to these "wakes," the following attacks occurred:—

(1) *Attacks in Persons visiting Rose Street House.*

Three households were primarily infected, and five persons sickened secondarily to them.

	Primary.	Secondary.
(1) 23 Oxford Lane, - - T.,	Sickened, 12th Aug.	21st Aug.
(2) 57 Thistle Street, - M.,	{ 19th "	21st "
	{ 20th "	22nd "
(3) 248 Mathieson Street, - G.,	{ Sickened (?) 21st Aug.	D., (?)
	{ Discovered 1st Sept.	H., 7th Sept.

The date here assigned to the primary attack at Mathieson Street is subject to an explanation. This patient was a daily visitor to a non-infected house at 71 Rose Street, for the purpose of tending a child during the mother's absence at work, and is known to have been present in the infected house during the funeral service on 11th August, and may have visited later during the husband's illness, but of this we have no reliable information. Her visits ended on 21st August, and on the 24th she was seriously ill, according to the mother of the child she nursed. At this time her daughter, who is indicated on the list of secondary cases by D. (?), was well. It is only on 1st September that the mother's illness was known to us, and her daughter was at the same time found dead, and decomposition was too far advanced to admit of a *post-mortem* examination being made.

The other secondary case at Mathieson Street was a neighbour and visitor of the family G.

(2) *Attacks in Persons visiting Thistle Street House.*

Six persons were infected, and there were no secondary cases.

(1) 6 South Coburg Street, - T.H.,	Sickened, 23rd Aug.	
(2) 57 Thistle Street, - - M'K.,	" 28th "	
(3) 110 South Wellington Street, M.,	" 28th "	} Sickened in Reception- House.
(4) 28 Cook Street, - - - D.,	" 29th "	
(5) 57 Thistle Street, - - - M'G.,	" 30th "	
(6) " - - - R.,	" 31st "	

The first patient on this list probably owes his infection to visits to the Thistle Street household during the currency of the child's illness, rather than to attendance at her "wake," because he sickened on the day following her death. This Thistle Street house consisted of two apartments on the first floor (1 up, that is), "ticketed"<sup>1</sup> for four, but occupied at the time by eight adults and one child.

Leaving aside these groups for the moment, there are others which require consideration, because their association with the "wake" households was in no case direct, in some it was hypothetical, and in others there was no evidence that it existed.

(3) *Attacks in other Persons associated with Rose Street.*

	Sickened.	Removed to Hospital.
77 Rose Street, - - - P. F.,	13th August.	29th August.
1 Well Street, - - - J. C.,	17th "	30th "

P. F., a jobbing shoemaker, lived next land but one to the family first attacked, but was not a visitor, nor with any knowledge of having repaired boots for the affected household at the time.

J. C. was a frequent visitor to the house next door to the infected one, and occasionally stayed over night there, but denied having been present in this latter. His house was on the other side of the river.

<sup>1</sup> By Section 378 of the Glasgow Police Act, 1866, any house of not more than three apartments, whose cubic contents do not exceed 2,000 feet, may be examined and ticketed to indicate the number of persons it may legally accommodate. The standard of accommodation was raised to 400 cubic feet for adults by the Amending Act of 1890.







(4) *Attacks in Persons indirectly or doubtfully associated with "Wake" Households.*

(A) *154 Crookston Street—*

M. M'L., a child of 18 months, sickened on 20th August, but suspicion regarding the nature of the illness was only aroused when the cases at Thistle Street were recognised. Consequently, she was nursed at home till 6th September. A girl who had been present at the Rose Street "wake," and was employed along with the patient R. M. (10), in a hair factory, but was herself unaffected, lived next door to this child, and occasionally nursed her.

(B) *57 South Coburg Street—*

Four cases sickened here between 13th and 14th September. A fatal illness of six days' duration had commenced on 22nd August in this house, which was regarded at the time as pneumonia, but had been accompanied, according to information obtained subsequently from the friends, by painful swellings in the neck and axilla. This earlier illness should, I think, be regarded as plague, and the subsequent illnesses occurring in this household as due to the continuance therein of infection.

(C) *23 Florence Street—*

R. M. sickened here on 23rd August, but the nature of her illness was not suspected till 10th September, when she was removed to hospital. She had no direct association with either of the plague households, but several fellow-workers had been at one or other "wake."

(D) *52 Dale Street—*

At this address a man (M'L.), employed as a furnaceman, sickened on 25th August with symptoms which were attributed to a simple pneumonia, and died on the 29th. He was buried on 1st September, his bed being gifted to a neighbour, who had rendered him some service. The recipient, with his wife and child, slept thereon, and on 8th September the husband sickened, and was the first case of plague recognised at this address. On the following day he was removed to hospital. On the 18th a relation (Mrs. G.), living on the floor below, and who had visited and assisted in nursing him before his removal to hospital, sickened, as did also one of her children (M. G.). The man who died here of the pneumonia in the end of August had friends resident at 248 Mathieson Street, where, as we know, an illness, ultimately fatal, had begun about 21st August. He was said to have visited that address about this time, but this could not be verified.

In none of these cases could direct association with the "wake" households be discovered. In the Florence Street and Crookston Street cases there was association with persons not themselves affected, but who had been present at the Rose Street "wake," and the time incidence of their attacks suggests some manner of indirect transmission of the infection, which a subsequent illustration (7) may be regarded as supporting. The cases at 57 South Coburg Street, on the other hand, are not known to have been directly associated with any "wake" contact, although a neighbour and frequent visitor of the Oxford Lane cases, the first of which sickened on 12th August, was also a visitor at the South Coburg Street tenement.<sup>1</sup> The first attack here was separated from the others by an interval of a fortnight, which may, I think, suggest that she found her infection outside her home, although, when the subsequent cases occurred, no record of her movements could be obtained.

(5) *Govan Cases.*

Meanwhile a case of the disease had occurred in the Burgh of Govan, fatal towards the end of August, but having no traceable association with the Glasgow cases.

<sup>1</sup> On an earlier statement, that she visited the house of the M. family, some doubt was afterwards thrown.

*(6) Cases occurring in Hospital.*

A baby born in hospital, on 16th September, of a plague mother, developed cervical buboes 8 days after birth, and died of recognisable plague on 27th September. Delivery was by forceps, and the buboes developed in the lymphatics arising in the area subjected to the pressure of the instruments.

A cleaner in the plague ward in hospital sickened of the disease on 13th September, nineteen days after her first exposure, and on the 9th day after she had received an immunising dose of 10 c.c. Yersin's serum injected subcutaneously. Her attack was of the mildest character, but the bacillus was recovered from an affected gland.

*(7) Transmission of Infection by a Person not suffering from the Disease, but definitely exposed to Infection.*

Special interest attaches to the following case, because it affords an illustration of the transmission of infection on the person or clothing of one not suffering from the disease, although definitely exposed to infection. The importance of this incident was recognised at the time, and made the subject of a special enquiry. (See Report in Minutes of Corporation, p. 1452.) It was our custom on removing the inmates from an infected house to leave everything *in situ*, and fumigate with liquified sulphur dioxide for at least twelve hours, and thereafter to spray surfaces, &c., with formalin or chlorine. Clothing which was to be removed for further treatment by steam or otherwise was thereafter wrapped in sheets damped also with formalin. One of our clothes collectors was so employed on 3rd, 6th, and 10th September. Whether he carefully followed instructions regarding the removal of infected articles may be doubted, as on the 13th September his wife sickened of plague, an inguinal bubo developing. Their house was far removed from the other infected houses, and there was no other discoverable or probable source of infection. I believe the husband carried it on his clothing or person, although it may be open to question whether the medium was infecting dust or fleas. The part played by fleas in the transmission of infection is referred to elsewhere. The collector, it should be stated, had received an immunising dose of Yersin's serum.

This, then, represents the distribution of the houses invaded, and it may make the development of the outbreak clearer if we arrange the cases in groups according to the order of sickening.

## TIME DISTRIBUTION OF CASES.

*(1) 3rd August.*

Household at 71 Rose Street is invaded. Two out of four inmates sicken, and "wakes" are held from 7th to 10th. On 12th a third inmate is attacked, and a visitor (Mrs. T.), residing at 23 Oxford Lane. The occupant of a neighbouring house (P. F.) sickens on the 13th, and an occasional visitor to an adjoining house (J. C.) on the 17th.

*(2) 19th August.*

Two cases begin at 57 Thistle Street, and attacks follow in two members of the same family, and in six other persons who attended the "wake" here on 21st and 22nd August. The last of these sickened on 31st August.

*(3) 20th and 23rd August.*

(a) Members of three households, in Florence Street, Crookston Street, and 57 South Coburg Street, sicken. These have had no direct connection with either "wake," but one (R. M.) was associated in her employment with several who had attended that at Rose Street. A second (L. M'L.) was nursed occasionally

by another contact, while no very definite information can be obtained regarding the movements of a third (South Coburg Street family) before her fatal illness developed. It is regarded as plague because of four subsequent cases in the family.

(b) A contact (Mrs. G.) with Rose Street sickens at 248 Mathieson Street on the 21st, and before her illness is discovered two others—her daughter and a neighbour (G. H.)—have been attacked.

(4) 29th August.

(a) A man (M'I.), having relations living in Mathieson Street, sickens at Dale Street on 25th August, and dies on 29th of a pneumonia. On 8th September a neighbour (M'M.), who had slept in his bed, sickens, and from this two secondary cases (Mrs. G., who nursed M'M., and her daughter) sicken on 18th September.

(b) About this date a fatal illness occurred in Govan. (Case H.)

It was acute in character, fatal on the second or third day, and the nature of the disease verified by *post-mortem* examination. This patient had no traceable connection with the Glasgow cases, and may thus prevent us from holding as proved the direct line of descent from the Rose Street "wakes" of some, at least, of our own cases, especially those where the association is of an intangible character.

(5) 13th September.

Clothes collector's wife (Mrs. B.) sickens.

In the following Table all the deaths occurring at home which preceded recognisable cases are included, but distinguished by letters instead of consecutive numbering. Case H, however, was, as has been stated, demonstrably plague on *post-mortem* examination. In case D, also, the death, although occurring in hospital, was not at the time regarded as plague. (See Dr. Buchanan's observations.)



TABLE SHEWING CASES RECOGNISED AS PLAGUE, AND INCLUDING CERTAIN

No.	NAME.	Age. Years.	SEX.		ADDRESS.	OCCUPATION.	DATE OF		Recovery.
			M.	F.			Sickening.	Removal to Hospital.	
A	Mrs. B., -	57	...	1	71 Rose Street, - - -	Fish hawk, - -	August 3, -	... ..	...
B	Baby B., -	$\frac{2}{12}$	...	1	71 do., - - -	... ..	„ 3, -	... ..	...
1	J. B., -	60	1	...	71 do., - - -	Dock worker, -	„ 12, -	August 27, -	...
2	Mrs. T., -	40	...	1	23 Oxford Lane, - - -	Domestic, - -	„ 12, -	„ 27, -	1
3	P. F., -	56	1	...	77 Rose Street, - - -	Shoemaker, - -	„ 13, -	„ 29, -	1
4	J. C., -	24	1	...	1 Well Street, Calton, - -	Slater's labourer, -	„ 17, -	„ 30, -	1
C	C. M., -	9	...	1	57 Thistle Street, - - -	At school, - -	„ 19, -	... ..	...
5	Mrs. M., -	40	...	1	57 do., - - -	Domestic, - -	„ 20, -	August 25, -	1
D	Mrs. G., -	55	...	1	248 Mathieson Street, - - -	Domestic, - -	„ 21, -	September 1, -	...
E	M. G., - (Daughter of Case D).	24	...	1	248 do., - - -	Charwoman, - -	?	... ..	...
6	D. T., -	7	1	...	23 Oxford Lane, - - -	At school, - -	August 21, -	August 29, -	1
F	C. M., -	14	...	1	57 South Coburg Street, - -	Cigarette packer, -	„ 22, -	... ..	...
7	P. M., -	20	...	1	57 Thistle Street, - - -	Slipper maker, -	„ 22, -	August 25, -	...
8	W. M., -	3	...	1	57 do., - - -	.. ..	„ 23, -	„ 25, -	1
9	T. H., -	15	1	...	6 South Coburg Street, - -	Nil, - - -	„ 23, -	„ 29, -	1
10	R. M., -	28	...	1	23 Florence Street, - - -	Hair worker, - -	„ 23, -	September 10, -	1
11	W. W., -	48	...	...	21 Robert Street, Govan, - -	Painter, - - -	About 4 weeks previous to admission, -	„ 20, -	...
G	G. M'L., -	52	1	...	52 Dale Street, - - -	Labourer, - -	August 25, -	... ..	...
12	E. M'L., -	$1\frac{1}{2}$	...	1	154 Crookston Street, - - -	... ..	„ 26, -	September 6, -	1
13	A. M'K., -	12	...	1	57 Thistle Street, - - -	At school, - -	„ 28, -	August 29, -	1
14	A. D., -	18	1	...	Removed from Reception House,	Rivettmaker, - -	„ 28, -	„ 29, -	1
15	J. M., -	14	...	1	Do.,	Millworker, - -	„ 28, -	„ 29, -	1
16	P. M'G., -	18	1	...	Do.,	Labourer, - -	„ 30, -	„ 31, -	1
17	Ag. R., -	$3\frac{1}{2}$	...	1	Do.,	Nil, - - -	„ 31, -	September 3, -	1
H	Govan Boy,	...	1	...	... ..	... ..	?	... ..	...
18	G. H., -	46	1	...	248 Mathieson Street, - - -	Boot-top fitter, -	September 7, -	September 12, -	...
19	C. M'M., -	27	1	...	52 Dale Street, - - -	Labourer, - -	„ 8, -	„ 9, -	1
20	Mrs. B., -	29	...	1	81 Cubie Street, - - -	Domestic, - -	„ 13, -	„ 14, -	1
21	E. R., -	21	...	1	Belvidere Hospital, - - -	Ward maid, - -	„ 13, -	„ 14, -	1
22	Mrs. M., -	20	...	1	57 South Coburg Street, - -	Domestic, - -	„ 13, -	„ 15, -	...
23	Mrs. M., -	41	...	1	57 do., - - -	Domestic, - -	„ 14, -	„ 16, -	1
24	Mary M., -	14	...	1	57 do., - - -	Nil, - - -	„ 14, -	„ 15, -	1
25	R. M., -	12	1	...	57 do., - - -	At school, - -	„ 14, -	„ 16, -	...
26	Mrs. G., -	24	...	1	52 Dale Street, - - -	Domestic, - -	„ 18, -	„ 19, -	1
27	M. G., -	6	...	1	52 do., - - -	At school, - -	„ 18, -	„ 19, -	...
28	Baby M., -	8 days	...	...	Belvidere Hospital, - - -	... ..	„ 24, -	... ..	...
X	A. A., -	18	1	...	3 Moss Road, South Govan, - (Removed from Western Infirmary).	Boilermaker, - -	September 5, -	September 6, -	1

DEATHS OCCURRING AT HOME. THESE LATTER ARE DISTINGUISHED BY LETTERS.

DEATHS IN		Nature of association with earlier cases.	Approximate duration of Incubation.	Nature of attack and site of External Bubo.
Hospital.	Home.			
... ..	August 7, -	} 1st Case of which there is any record,	... ..	Death ascribed to Acute Gastro Enteritis.
... ..	Do. 9, -		... ..	Death ascribed to Zymotic Enteritis.
September 24, -	... ..	Husband of A,	Maximum, 9 days,	Right inguinal. Ultimately Septicæmic.
... ..	... ..	Relative, and helped to nurse A,	Do.,	Left inguinal, complicated with Abortion. Severe.
... ..	... ..	Lived in neighbouring tenement to A,	Maximum, 10 days,	Left inguinal. Severe.
... ..	... ..	Slept in house next door to A on 13th August,	4 days,	Double inguinal. Mild.
... ..	August 21, -	At wakes in A's house,	8 days,	Death ascribed to Pneumonia.
... ..	... ..	Do.,	Uncertain whether she sickened simultaneously with her child, Case C,	Right inguinal. Severe.
September 4, -	... ..	At funeral service in A's house,	10 days,	Death assumed at time to be due to Typhus Fever.
... ..	Found dead September 1, -	... ..	... ..	P. M. impossible owing to advanced decomposition.
... ..	... ..	Child of No. 2,	A possible illustration of infection from bubonic attack in a parturient woman, but associated with the wakes,	Right inguinal. Mild.
... ..	August 23, -	None known,	... ..	Death ascribed to Pneumonia.
August 27, -	... ..	Brother of Case C,	4 days,	Neck, axilla, groin, and abdomen. Septicæmic.
... ..	... ..	Do.,	2-3 days,	Cervical. Mild.
... ..	... ..	In C's house during her illness and wake,	Maximum, 4 days,	Cervical, right inguinal and right femoral. Severe.
... ..	... ..	Associated with visitors at C's house,	... ..	Double inguinal. Mild.
October 6, -	... ..	... ..	... ..	Ultimately Septicæmic.
... ..	August 29, -	History of visits to 248 Mathieson Street at time of D's illness,	... ..	Death ascribed to Pneumonia.
... ..	... ..	Nursed by associate of visitors at C's wake,	Maximum, 5 days,	Right axilla. Mild.
... ..	... ..	At C's wake,	6-7 days,	Cervical. Pestis ambulans.
... ..	... ..	Do.,	Do.,	Do. do.
... ..	... ..	Do.,	Do.,	Right axillary. Pestis ambulans.
... ..	... ..	Do.,	8-9 days,	Cervical. Pestis ambulans.
... ..	... ..	Do.,	9-10 days,	Right axillary. Pestis ambulans.
... ..	August -	... ..	... ..	... ..
September 13, -	... ..	A visitor at D's house,	Maximum, 7 days,	Right inguinal. Ultimately Septicæmic.
... ..	... ..	Slept in G's bed,	... ..	Left axilla. Cerebral. Severe.
... ..	... ..	Wife of employee of Sanitary Department,	... ..	Right inguinal. Mild.
... ..	... ..	... ..	... ..	Posterior cervical. Pestis ambulans. Had Serum previously
September 16, -	... ..	} Household in which Case F. had died.	16 days' interval elapsed between the first of these cases and Case F,	Left inguinal, with general septic infection. Premature labour.
... ..	... ..		... ..	Right inguinal. Severe.
... ..	... ..		... ..	Right axilla. Pustular plague. Mild.
September 28, -	... ..	... ..	... ..	Left axilla. Ultimately Septicæmic.
... ..	... ..	Nursed Case 19,	9-10 days,	Right inguinal. Mild. Had Serum previously.
September 25, -	... ..	Daughter of 26,	Do.,	Right inguinal. Probably ultimately Septicæmic.
Do. 27, -	... ..	... ..	7-8 days,	Cervical. Septicæmic.
... ..	... ..	... ..	... ..	See pp. 16, 55, and 70.

Arranged in weekly periods, the impetus which the infection acquired from the "wakes" becomes more evident, and I have placed the whole series in this chronological order with the view of asking whether it affords any information regarding the conditions which determine the infectivity of plague.

NUMBER SICKENING IN WEEKLY PERIODS, WITH NUMBER OF FATAL ATTACKS BEGINNING IN EACH.

Week Ending, - - -	August.				September.				Total.
	4	11	18	25	1	8	15	22	
Number Sickenings, - - -	2	...	4	11	8	2	6 <sup>1</sup>	3 <sup>1</sup>	36
Number of Fatal Attacks beginning in each week, - -	2 <sup>a</sup>	...	1	6 <sup>b</sup>	2 <sup>c</sup>	1	2	2	16

<sup>1</sup> These figures include one in each week occurring in hospital.

<sup>a</sup> Cases A and B.

<sup>b</sup> Includes cases C, D, E, F, and G.

<sup>c</sup> Includes case H.

#### TYPES OF THE DISEASE.

Professor Zabolotny, of St. Petersburg, who spent a considerable time with us during the outbreak in a study of the serum-therapy of the disease, has placed on record his opinion that the outbreak was mild in its character when compared with those of India, China, and the East generally, and also as compared with the more recent European outbreaks at Kolobowka and Oporto. Particularly he lays stress on the picture of protracted illness which the *post-mortem* appearances presented.

In J.B. death followed only after forty-three days' illness; in G.H. it occurred on the tenth day; in the six other deaths occurring in hospital after intervals of from two to seven days from the onset.

Two of these fatal cases (P.M. and Baby M.) were septicæmic in type, probably from the onset; in the others the septicæmia was secondary, and associated with the invasion of other organisms.

In all the cases external buboes were present, which varied in situation and size, and in the degree of involvement of surrounding tissues; in those designated *pestis ambulans* the affected glands were small, and sometimes so deeply seated that puncture was attended with considerable difficulty.

In one case only were the affected glands not tender to pressure after patient came under observation (Case D). This patient was, however, comatose on admission. In another patient, marked X on table, enlarged glands were felt, but pressure elicited no evidence of tenderness. This case is not included in the list; but a special note by Dr. Cairns is appended.<sup>1</sup> Clinically it did not differ from a severe pneumonia; but doubt existed as to presence of *b. pestis* in the sputum, and patient's recovery seemed to discredit the assumption that it was a plague pneumonia. The probability was only revived when the agglutinative reaction was obtained, and serum experiments had demonstrated a limited protection in animals, from inoculation with plague virus.

With regard to the degree of severity of attack, the following classification of the hospital cases can be made:—*Eight* were fatal, *six* were severe, *seven* were mild, and *seven* were so slight as to warrant them being regarded as *pestis ambulans*. In these latter the symptoms belonged to the same category as in the more severe cases; but they were slightly marked, vanishing, in their mildness,

<sup>1</sup> See p. 55, and Table III., p. 70.



almost beyond recognition. Save for their association, plague as an explanation would have been purely conjectural, except by the recovery of the bacillus from the affected glands. Most of these developed their attacks while under observation in the reception-house. By contrast, all the deaths occurring at home, and which are now to be regarded as plague, followed short-lived illnesses. Four had a definite history of pneumonia. Two had diarrhoeal symptoms. All were probably septicæmic from the outset. One, when found, had extensive deep-seated glandular enlargements in the inguinal regions, presented a definite petechial staining of the skin, and was regarded, provisionally, as typhus fever. This case was admitted to hospital before death occurred.

The symptomatology as presented by the patients in hospital is discussed by Dr Brownlee in a subsequent section.

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### THE CONDITIONS OF SPREAD.

In describing the topographical distribution of the cases we have seen that, by including unrecognised deaths at home, a more or less tangible thread of association can be established between all of them, which the time incidence of the attacks strengthens.

We have now to consider the manner in which this association became established; and on this the after history of the wake contacts has some bearing.

The first cases which occurred (A and B) had marked intestinal symptoms; and the fatal termination in less than a week suggests that a condition of septicæmia preceded death. In these cases the *p. bacillus* is present in the blood.

Linen soiled with the discharges from the patients would retain the infection; and it is a fair surmise that the suctorial parasites of mankind are equally capable with those of the rat of abstracting the *p. bacillus* from the blood of a human patient where a plague septicæmia exists. Of the persons present at the wakes here, four afterwards sickened. Among those attending the Thistle Street wake, six primary attacks resulted. The first illness in the Thistle Street household was pneumonic in type; and during the wakes three others of the family were sick, one of them of plague septicæmia. Seven families altogether were resident at 57 Thistle Street; but attacks occurred only among those who had been present at the wakes, although the importance of this may be to some extent discounted by the recognition of the nature of the disease five days after the death in this household occurred, and the consequent removal of all the known contacts to the reception-house.

Some importance also attaches to the new centres of infection created by the cases who obtained their infection while attending the wakes. The secondary case which occurred at Oxford Lane had other associations with the wake families, being a relative; and the two cases marked secondary at Thistle Street were within the time limit of infection from their sister, who died of pneumonia.

But the patient G.H. (Case 18), whose sickness was definitely secondary to that of the visitor from Mathieson Street, had no relation with Rose Street, and owes his attack entirely to the new focus established in the Mathieson Street household, as, indeed, also does this visitor's daughter, if we assume that her death was due to plague.

Again, of the primary attacks which followed from the first wake, two out of four died—three out of five if we include the grandfather's illness—and one who recovered had a protracted and severe illness; and of the secondary attacks developing in the new centres of infection thus formed, three deaths again occurred out of five attacks. In this connection it is to be observed that severity of attack in those called primary infections was supplemented by prolonged exposure at home on the part of those who sickened secondary thereto.

In contrast with this is the record of attacks which followed the second wake. Here only one was severe in character, and there were no secondary attacks. But it is to be remembered that by this time we had become alive to the fact that we were dealing with plague, and an active search for the discovery and segregation of contacts had begun; and so it happened that four of these primary attacks developed under observation in the reception-house. A fifth was under observation at home, and was removed to hospital on the day following sickening; while the sixth, the only severe one, had sickened on August 23rd, but remained at home till the 29th, when the nature of his illness and his association with the Thistle Street cases were first known.

It may be that there is an important lesson in this, could we read it aright. The first wake was held in a dirtily-kept one-apartment house, in which a child was dead after four days' illness, and a woman after seven. The second wake followed an illness of two days' duration; but the type was pneumonic, and three others of the family were already sick or sickening, one of them of an attack which was to prove fatal in a few days. Save in the existence of a second apartment, this latter house was like the other. Either would have offered an excellent breeding ground for typhus fever. But all the first wake contacts sickened in their own houses, and for days remained there undiscovered. Thus not only was their infection contracted, but the whole of their incubation period was passed in the foetid atmosphere of ill-kept dwellings. On the other hand, before the incubation period had passed for those attacks which resulted from the second wake, four of them had been removed from the squalor of their homes to the cleaner conditions of a reception-house; and these attacks were so mild that, save for the circumstances under which they occurred, they would never have come under medical observation at all. Indeed, the analogy of smallpox, modified and defaced, as it were, by almost protective vaccination, was forcibly suggested by these mild attacks of plague.

I am disposed to connect the mildness of these latter attacks with the healthier conditions under which part of their incubation period was passed, although the numbers are too small to encourage any attempt to overweight their importance. But as the clinical histories of the patients in hospital developed, and it was possible to learn something from *post-mortem* examinations of the causes which were at work in producing the fatal issue, it began to be recognised that plague not only powerfully predisposes to septic complications, but that some form of double-infection might, indeed, possibly be present almost from the beginning. Whatever be the significance of this, it remains as an observation that none of the attacks which developed at home were so mild as those occurring among contacts in the reception-house. So mild, indeed, were these latter that it was difficult to regard them as constituting elements of danger at all to persons in healthy surroundings.

In the whole range of plague literature, no feature in the spread of the disease is more uniformly insisted upon than its association with local conditions of grossly defective hygiene. Indeed, it is from this circumstance that the belief in an autochthonous origin of plague arose; and, without subscribing to the theory, we may accept the facts on which it is based as of the first importance. But there is something more to be considered. By what means do locally defective conditions become operative in the spread of plague? In other words, is the potency of plague infection determined by the conditions of exposure to it?

At first it would seem as if this implied the need to distinguish between susceptibility on the part of the individual and the conditions under which exposure to infection takes place; but many things point to this latter as forming the dominant factor in determining an attack. The inmates of an infected dwelling, under certain conditions, also contract the disease; the occasional visitor rarely, if at all. Of the gang of dustmen engaged in carrying out disinfection in Bombay, only those contracted the disease who lived in houses of bad sanitary condition.



Here susceptibility to the disease would seem to have been induced by conditions *ejusdem generis* with those which favour its spread. An opposite, and quite the most interesting, illustration of its kind which I have found, is that described by Dr. Cantlie.<sup>1</sup> Eight Chinese students of the College of Medicine in Hong Kong were engaged, during the outbreak there, as ward attendants and clerks in the plague wards for a period of six weeks, and they shared the immunity enjoyed by Europeans at a time when their relations, living at home, were being attacked. They lived, however, and worked under conditions which afforded little opportunity for the plague virus becoming concentrated, and to this their protection may be attributed.

With this illustration we may, I think, dismiss from consideration any argument based on immunity from infection enjoyed under corresponding conditions of exposure. It is true that one of our ward cleaners contracted the disease in a mild form—cultivation and inoculation experiments with the dust of the ward were at the time, unfortunately, impossible—yet the statement, I believe, holds good that plague, even more than typhus fever, may be handled with comparative immunity under the conditions obtainable in hospital wards; but that it may be conveyed on the person or clothing of one who has been definitely exposed to infection, but is not ill of the disease, the attack on the wife of our clothes collector also demonstrates. And here there was neither the individual susceptibility which unhygienic conditions of living creates, nor the simultaneous exposure to infection, and the conditions favourable to its spread at a point where both existed. This attack also was mild in type. There was no superficial abrasion of the cuticle to indicate the point of entrance of the infection, so that inoculation by infectious dust may presumably be excluded. But the houses of the majority of the cases were hotbeds of vermin, and the clothes collector, like all those who had to deal with the infected houses, frequently complained of the annoyance these insects caused him. He had received an immunising dose of 10 c.c. of Yersin's serum before beginning plague work.

It may be that some of the cases which we have regarded as arising from indirect contact owed their infection to quite a different source—to a strain of infection kept alive through a series of cases of *pestis ambulans*, which the most diligent search failed to discover. The attack of the clothes collector's wife, however, introduces a new aspect into our conception of what contact implies. It is not necessarily contact with infectious sick, or with their exhalations or discharges, but with infection retained in the secretions of an insect, which has obtained it from one or other of these.

In two of those which have been called indirect (P.F. and J.C.), the association was not with persons at all, but with locality; and these are the only two which suggest radiation of the infection beyond the invaded households by means other than personal intercourse. One, we have seen, slept next door to the house at 71 Rose Street four days before sickening, and the other lived near by and worked as a jobbing shoemaker, with his workshop attached to his house.

The death from pneumonia, which preceded the recognised illness at Dale Street, occurred in a man who had been visiting 248 Mathieson Street, where the attacks were septicaemic; but in the following instance there is a suggestion that the plague organism passed into a state of saprophytic existence, and thereafter acquired renewed virulence, or maintained it in some way not presently demonstrable. In the cases to which I have already referred as occurring at 57 Coburg Street the attacks developed, one on the 13th and three on 14th September, the earlier and one of the latter being fatal, one being a parturient woman, and the other a mixed infection. We have seen that a death occurred here on 28th August, from an illness which began on the 22nd, and which was probably plague pneumonia. An interval of sixteen<sup>2</sup> days thus elapsed before the next sickening

<sup>1</sup> See Transactions Epidemiological Society, vol. xvi., p. 24.

<sup>2</sup> An incubation period of fifteen days was observed during the Hong Kong outbreak.



occurred, and this is rapidly followed by attacks in all the remaining members. What was happening in the interval between the first death and the next sickening? So far as we could learn, these last four had been exposed to no new source of infection outside their dwelling. The house was on the third floor of a four-storeyed tenement, housing sixteen families. The focus of infection must have been strictly localised, as no other household in the tenement was affected. Apart from a knowledge otherwise obtained, one might infer from this alone that the rats here were not infected. It may be that the virus remained in the bed or body clothing, which had been soiled during the first fatal illness, or in the dirt which prevailed everywhere; but laboratory experiment would seem to show that after fourteen days artificially infected material loses its virulence if kept at air temperature. (See earlier reference to question of transmission by fleas).

It may have been a coincidence; but one of these cases was the sole example of pustular (cutaneous) plague which occurred, the first vesicles appearing under the right shoulder blade. (Case 24.)

The small number of plague contacts who develop the disease while under observation has frequently attracted notice. In the segregation camps of India, in Sydney, and elsewhere, the experience has been the same; and the inference usually drawn is that the direct source of infection is in the surroundings rather than in the patient. This, I think, is partly true, although we have seen that the Bombay dustmen required more than exposure to the infected house to produce the disease in them. Those who were attacked had been rendered susceptible by residence in unhealthy surroundings.

But there is a sense in which the type of attack in the individual may be said to determine the infectivity of his neighbourhood. Variation in type, indeed, appears to be more important than variation in severity of attack. The pneumonic patient may eject the bacilli into the air, and the septicæmic afford facilities for the transmission of the disease by insects. Wherever this form was present during treatment at home, secondary cases followed. This was seen in the deaths which, at the time of their occurrence, were unrecognised, and from 71 Rose Street, 57 Thistle Street, 57 South Coburg Street, and 52 Dale Street, dissemination of the disease also took place.

But in Well Street, 77 Rose Street, Florence Street, Crookston Street, 6 South Coburg Street, Cubie Street, and in the Govan patient (H.), no secondary infection followed, although intervals varying from one to nineteen days elapsed between sickening and removal of the patients to hospital. These, save the Govan case, might be called bubonic in type. Forty-five persons were known to have visited the six Glasgow patients just noted. All of them escaped infection, and the opinion expressed by Montanus, and quoted by Boghurst, that a slight plague infects not "unlesse a body bee extremely fitted to receive it," has quite a modern illustration.

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## ADMINISTRATIVE MEASURES.

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The recognition of the disease created a new problem for the sanitary administration, and made it necessary to recast several of the executive methods.

The outbreak at Oporto in the previous year had led to increased activity on the part of port sanitary authorities, with the view of arresting the introduction of the disease through shipping. The geographical position of Glasgow, however, places it at a disadvantage in this respect. Within its own municipal area it is unable to protect itself against sea-borne infection; and the occurrence of indigenous plague in the only considerable port of the country which has no constituted port authority is suggestive. Such limited examination of ships and crews from infected ports as, in the circumstances, was possible, had been conducted during the year; and a record was kept of foreign-coming passengers who had entered the country in infected ships through other ports in the kingdom. In no case was any illness discovered suggestive of plague; and none of the passengers who had come off infected ships resided within the infected area.

The occurrence of the cases without any traceable connection with the source of infection made domiciliary visits, with a view to the discovery of others, a first necessity; whilst the facilities which bad hygienic conditions were known to afford for the spread of the disease made the introduction of a higher standard of domestic cleanliness in the neighbourhood of the infected houses second only in importance to this. Fortunately, the means by which the latter could be enforced, and the former object accomplished, lay to hand in Section 254 of the local Police Act of 1866, which owes its origin to the typhus fever prevalences in the middle of the century.<sup>1</sup> It supplied a lever by which practically anything which could be regarded as affording a suitable nidus for the saprophytic existence of the plague organism might be speedily exorcised; and I am inclined to regard it as one of the most valuable statutory powers we possess. It brought the limewasher and scavenger into active co-operation with the housewife, and established for dirty areas "spring cleaning" on a fairly extensive scale.

In view of the possibility of a rat infection, the condition of disused basement-flats, cellars, and the like became important; and this clause was extensively applied in procuring the cleansing of such places.

An emergency meeting of the Magistrates Committee and of the Committee on Health was held on 31st August, and the following extracts will indicate the line of action recommended and approved thereat:—

The Medical Officer of Health reported that in the district of the city bounded by Cumberland Street on the south, South Wellington Street on the east, Adelphi Street and Carlton Place on the north, and Bridge Street and Eglinton Street on the west, plague or similar epidemic disease exists in such district, and that it would be desirable to use special sanitary measures in order to prevent the spread of such disease; and the Magistrates Committee, having considered said report, approved thereof, and remitted to the Medical Officer of Health to forthwith enforce the provisions of Section 254 of the Glasgow Police Act, 1866, within the said district.

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<sup>1</sup> "On a report by the Medical Officer that in any district, street, or court it would be desirable to use special sanitary measures in order to mitigate the severity, or prevent the spread of epidemic, endemic, contagious, or other disease, or that any such disease prevails, or exists, and threatens to prevail, in such part of the city, the Magistrates Committee may approve thereof; and on such an approval it shall be lawful for the Medical Officer to give notice, in manner hereinafter provided, to the proprietor or occupier of any dwelling-house situated in the part of the city in which the Medical Officer has reported that it appears to him desirable to use special sanitary measures, requiring such proprietor to cleanse and limewash the outside thereof, and the common stair and lobbies and staircases, and requiring such occupier to cleanse and whitewash the interior thereof, and to purify, ventilate, and disinfect the said dwelling-house, or any apartment or apartments, or bedding or clothes therein."—Glasgow Police Act, 1866, Sec. 254.



The Medical Officer of Health explained to the Joint-Committee that he proposed that the following line of action be immediately adopted in dealing with the existing state of matters, viz. :—

- (1) (a) That in each land from which a case is removed the lobbies, staircases, common passages, and each house be disinfected and cleansed by the Sanitary Department—the Cleansing Department making special arrangements for emptying and cleansing ashpits and hosing out courts ;
- (b) That tenements from which “contacts” are removed be dealt with similarly to the foregoing ;
- (2) That the district above defined be constituted a special cleansing area, the provisions to include a thrice-weekly emptying of ashpits, limewashing thereof, hosing of courts, special removal of rubbish, &c. ;
- (3) That medical inspection of the district be organised and carried out by the medical staff of the Sanitary Department, with the addition of two duly qualified and suitably experienced medical practitioners, and that inoculation with anti-plague serum be offered, free of charge, where deemed advisable ;
- (4) That a special sanitary inspection for dirty stairs and houses, and for overcrowding of houses, be instituted ;
- (5) That ratcatchers be employed for service, where deemed necessary, within the said district ; and
- (6) That a handbill be posted within the district directing the attention of the public to the fact that immediate medical attention may be had from the Sanitary Department on communicating therewith through the nearest police office or station.

The Joint Special Committee approved of the foregoing operations proposed by the Medical Officer of Health, and directed the Sanitary Inspector, the Superintendent of Cleansing, and the Chief Constable, and all other officials interested, to act in constant co-operation with the Medical Officer of Health in fully and effectually carrying out the said proposals, and safeguarding the public health.

The Joint-Committee agreed to recommend that it be remitted to the Medical Officer of Health, the City Engineer, the Sanitary Inspector, and the Clerk, to enquire as to obtaining further suitable and adequate reception-house accommodation, and to report on the result of their enquiries to the Lord Provost and Councillor James Dick, with power to the latter members of Committee to authorise the acquisition of such additional reception-house accommodation.

The Joint-Committee resolved to propose, at a special meeting of the Corporation as the Local Authority under the Infectious Disease (Notification) Act, 1889, which special meeting the Lord Provost had directed to be convened for Tuesday, 4th proximo, at 1.30 o'clock, the following resolution, viz. :—“The Corporation, as Local Authority for the City and Royal Burgh of Glasgow under the Infectious Disease (Notification) Act, 1889, declare, in terms of Section 7, Sub-section 6, of said Act, that emergency arises in consequence of the existence within the city of certain cases of plague, and therefore order that said Act shall, in the district of the said Local Authority, apply to ‘Plague,’ and that for the period from the expiration of one week from the date of the advertisement to be made in terms of said Act till the 31st day of December, 1900.”

The scheme of action thus outlined was carried into effect in the manner described in the following extract from the Report of the Medical Officer to the Health Committee on 10th September following :—

The scheme of action approved of at the special meeting of the Magistrates Committee and the Committee on Health, held on 31st August, is being carried out in the following detail in the defined area, and, as then authorised, Dr. Frederick Dittmar and Dr. Alfred Webster have been added to the staff :—

- (1) Within this district special cleansing operations are being conducted in the following detail :—
  - (a) Ashpits are being
    - (1) emptied three times a week, and
    - (2) washed once weekly with “chloride of lime whitewash” (1 lb. “chloride of lime” added to 12 gallons of freshly-slaked lime solution of the consistency of milk).<sup>1</sup>
  - (b) Back courts in dirty condition are hosed every night with “chloride of lime” solution, 1 in 100 (1 lb. “chloride of lime” to 10 gallons water). [For this solution “chloros” was afterwards substituted, owing to a mechanical difficulty in the distribution of the “chloride of lime” mixture.]
- (2) A special inspection of the district is taking place for the detection of dirty houses, closes, &c., and for overcrowding of houses.
- (3) Infected tenements, and, if necessary, those where “contacts” reside, are being dealt with as in (8).

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<sup>1</sup> To secure uniformity in the strength of the caustic lime solution, the proportions specified in the Venice Convention were subsequently substituted, viz., 10 lbs. of dry lime to 3½ gallons of water.



- (4) Medical inspection of the district is being carried out; the occupants of the infected tenements, and all "contacts," are offered inoculation with Yersin's serum, and others in neighbourhood with Haffkine's prophylactic. Suspected cases are being seen with the medical attendants.
- (5) Plague has been added to the Infectious Disease (Notification) Act, 1889.
- (6) Handbills are being distributed offering the services of the medical staff at any time, on application to the nearest Police Office.
- (7) Efforts are being made, through co-operation with the surgeons of the shipping companies, to arrange for medical inspection of Lascars and other crews of ships from infected countries.
- (8) The detailed arrangements for the removal of cases and disinfection of infected tenements are under the personal supervision of one of the medical staff, and may be detailed as follows:—
  - (a) Removal of patient to hospital.
  - (b) Removal of "contacts" to reception house.
  - (c) Fumigation of infected house by liquified sulphur dioxide from 12 to 24 hours, the disinfectant being used in proportion to the cubic space dealt with.
  - (d) After the fumigation the house is entered; all articles of clothing, &c., to be removed, are first of all thoroughly wetted with 2 per cent. solution of formalin (1 gallon 40 per cent. solution formaldehyde to 50 gallons water), then wrapped up in sheets soaked in the same fluid and removed to the Sanitary Wash-house. There all articles which cannot be boiled or steamed, or treated with formaldehyde, are burned.
  - (e) The walls, ceiling, flooring, wood work, &c., of the infected house are also sprayed with the formalin solution (1 gallon to 50 gallons water).
  - (f) All houses in the infected tenement are cleansed by the Department; the lobbies, stairs, and closes being dealt with by formaldehyde or "chloride of lime" solution.
  - (g) Courts of such tenements are watered with "chloride of lime" solution.
  - (h) Ash-pits have contents watered with same and then removed and burned.
- (9) Clinical demonstration of cases in hospital is given daily.
- (10) A pamphlet descriptive of the varieties of the disease has been prepared for circulation among practitioners.
- (11) The co-operation of hospital and other dispensaries for the detection of doubtful glandular affections has been invited.
- (12) *Rats*.—Ratcatchers have been employed, and the existence of disease in rats is being enquired into.

A circular has been issued to hospitals and dispensaries intimating the presence of plague, and directing the attention of the medical staff to the need for carefully scrutinising all suspected persons; and one also to shipowners impressing upon them the desirability of having the crews of ships arriving from suspected ports abroad kept under medical observation while in port.

\* \* \* \* \*

#### DETAIL OF DISINFECTION.

In some of the houses which have had to be dealt with there were some few fabrics which could only be disinfected by some germicide in gaseous form; and for this purpose formic aldehyde is being added to the details formerly stated. An epidemic inspector has also been set apart to supervise, under the directions of the medical staff and of the district inspector, the carrying out of the details of cleansing which in those cases is a necessary complement of the process of disinfection.

#### QUESTION OF GLANDULAR AFFECTIONS.

We knew from our death registers that acute lung diseases were not unusually prevalent—that, indeed, no class of disease existed causing death in such numbers as to suggest the prevalence of unrecognised plague; and the services of the various hospital and dispensary staffs were enlisted with the view of discovering whether ill-defined forms of glandular affection, with fever, were present in unusual number among the persons attending for treatment. The result of this also was negative.

## CIRCULAR LETTER TO DISPENSARY PHYSICIANS.

Sanitary Department,  
23 Montrose Street,  
Glasgow, 8th September, 1900.

DEAR SIR,

## PLAGUE.

Will you allow me to bring under your consideration the advantage which will result at the present juncture to the sanitary administration of having the active co-operation of all hospital and other dispensaries in the following direction.

Those who are familiar with the recent literature of plague will have prominently before them the almost uniform record of glandular enlargements of an indefinite character which have preceded outbreaks of the recognised disease. Sir Richard Thorne, for example, in his last report remarks:—"Fever with glandular swellings prevailed in Bombay before it was recognised that plague had reached that city; and it is impossible to read the medical history of this disease in almost every part of the world without being impressed with the frequency with which recognised plague has been preceded by ailments of such slight severity, involving some bubonic enlargement of glands, and some rise in body temperature, as to mask the real nature of the malady."

With this experience elsewhere, and the presence of recognised cases of plague in hospital, there will, I think, be a distinct public advantage if the attending physicians of dispensaries will carefully scrutinise all glandular affections of doubtful origin, with the possibility of their association with plague in view.

I need hardly add that every assistance which can be rendered by the medical staff here will be at your disposal.

Yours truly,

A. K. CHALMERS.

In carrying out the house-to-house visitation, the medical inspectors made a wide circle of inspection of persons residing round infected and contact tenements; and practitioners generally rendered valuable service by bringing doubtful illnesses under scrutiny. In addition, the inspectors for the discovery of dirty houses reported any illness not medically attended, with a view to these being visited by the medical staff.

Many of the cases which were thus brought under scrutiny could be definitely excluded on an examination of the symptoms and history of illness; but several were removed to hospital for observation, and the most interesting are detailed in the third interim report.<sup>1</sup> Our experience was that septic conditions of glands were those which most closely simulated plague. In all *recent*<sup>2</sup> cases the absence of the *bacillus pestis* from fluid obtained by puncturing the affected gland set the question at rest. The serum-reaction with a fresh culture of the bacillus has in this respect also a definite value after the first week of illness.<sup>3</sup>

Reference is elsewhere made to late information which was obtained of the arrival in Glasgow, early in the summer, of a vessel trading with plague-infected ports in India, among whose crew there appeared, during the passage from London to Glasgow, a glandular affection accompanied by fever; and the following circular resulted in a voluntary arrangement by which the crews of all such vessels were kept under medical supervision while in port:—

## CIRCULAR LETTER TO SHIPPING AGENTS.

Sanitary Department,  
23 Montrose Street,  
Glasgow, 8th September, 1900.

DEAR SIR,

## PLAGUE.

Circumstances which have come to my knowledge render it extremely desirable, in the interests both of the shipping of the port and of the community generally, that the crews of ships from plague-infected ports should, under present circumstances, be placed under a system of medical surveillance while in port here. This, I believe, may best be accomplished at present by the custom being generally adopted which obtains in certain firms of arranging with individual surgeons who might act in co-operation with this department.

I shall be glad to hear from you on this suggestion at your earliest convenience.

Yours truly,

A. K. CHALMERS.

<sup>1</sup> Page 36.<sup>2</sup> See Dr. McClure, p. 57.<sup>3</sup> See Dr. Cairns, p. 67.



## PUBLIC NOTICE.

## WAKES.

The Lord Provost and Magistrates have had under consideration the prominent part which has been played by the holding of wakes over the dead in the recent visit of plague, and would strongly urge upon the public the necessity and the duty of discontinuing the custom. These ceremonies, while meant to be acts of friendly remembrance, are fraught with danger to the health of all who take part in them, and thus to the well-being of the community at large.

They would also remind the public that it is illegal to hold a wake over the body of a person who has died of any infectious disease.

By Order.

J. LINDSAY, *Int. Clerk,*  
*Corporation Police Department.*

City Chambers, 12th September, 1900.

Sanitary Chambers,  
23 Montrose Street,  
Glasgow, 22nd October, 1900.

CIRCULAR LETTER TO THE KEEPERS OF SEAMEN'S AND EMIGRANTS'  
LODGING OR BOARDING HOUSES.

SIR,

The recent occurrence of several cases of plague in the city possesses a special interest to all connected with shipping, and particularly to those who are in daily association with emigrants or seamen.

Plague can be introduced by persons who, although suffering from the disease, can undertake journeys of a considerable distance, and it may be so mild that, unless the symptoms are specially examined by a doctor, its presence may readily be overlooked.

As long as plague is present in foreign countries, there will exist a pressing necessity for carefully examining every illness in persons coming therefrom, and the possibility of its occurrence among persons of this class should be constantly before you.

The Public Health (Scotland) Act, 1897, imposes on common lodging-house keepers the duty of informing the Sanitary Authority of the occurrence of infectious disease in any of the inmates of these houses. It is also provided in Bye-law 25 of those applicable to common lodging-houses that "If any person or persons in a common lodging-house shall become ill, the lodging-house keeper shall at once ascertain from a legally qualified medical practitioner whether the said person or persons are affected with fever or other infectious disease." Should the illness be of this character, the lodging-house keeper is bound to inform the Officers of the Sanitary Department thereof. Neglect either to obtain medical advice in these circumstances, or to inform the Sanitary Department of the existence of infectious disease, renders the keeper liable in a penalty of five pounds (£5).

Plague is now added to the list of infectious diseases under the Notification Act, which also places on the householder the duty of intimating the occurrence of any infectious disease to the Medical Officer of Health.

Communication with the Sanitary Chambers and with the Medical Officer of Health may at any time be obtained through the nearest Police Station.

Yours truly,

A. K. CHALMERS, M.D.,  
*Medical Officer of Health.*

DISINFECTION AND EVACUATION OF INFECTED HOUSES.

On the recognition of each case the unattacked members of the family were removed to a reception-house, together with every visitor who could be traced. Disinfection of the infected house was thereafter carried out in the manner already detailed; and every house in the tenement was similarly treated—papered walls, surfaces of furniture, &c., being sprayed with formalin, while to unpapered walls, lobbies, staircases, &c., the chlorinated lime solution was applied. The houses of contacts were dealt with in a similar manner; and the application extended to the whole tenement in this case also, where the character of the tenants rendered this desirable. On the completion of these processes of chemical disinfection, the evacuated houses were unoccupied until the dismissal of the inmates from the reception-house, and the windows left open, in order that complete aeration of the interior might be accomplished.



Disinfection in practice, however, has many meanings and many requirements. A room with well-plastered walls, solid, and with no crevices into which dust might drift and insects find a hiding-place, with the flooring good, and the seams between the boards not gaping, is easily disposed of; but where the plaster is old, blistered, and broken, the laths uncovered in places, and the flooring irregular and with gaping seams, the possibility that disinfectants will reach the crevices in which dust gathers and infection may lodge is a remote one, and it must be remembered that the possibility of a saprophytic existence of the bacillus of pest has been entertained. Standing in the middle of such a room from which a plague pneumonia had been removed, the question which pressed for answer was, can any form of liquid or gaseous disinfection accomplish its object, the method of applying it, and the place, being taken into account? To get at the crevices you must remove the plaster, and broken flooring can only be dealt with by getting it up and turning out the deafening, and the process of disinfection is finished only when complete renovation of the interior is accomplished. The problem in this form was placed before the owners of all the invaded houses; and, without exception, they willingly acquiesced in completing the work which chemical disinfection may be said only to have begun.

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#### SUPERVISION OF CONTACTS.

The segregation in the reception-houses of persons who had been in association with the infected houses was accomplished without having recourse to the statutory powers existing both in the Public Health (Scotland) Act, 1897, and in the local Police Act, for removing them under warrant. During the period in which they were under observation there, but especially when they were dismissed and had returned to their homes, some apprehension existed, and was occasionally expressed, that the freedom of intercourse with the general public permitted to them was attended with risk of spreading the disease. This in the circumstances was natural; but these persons were not sick, and consequently were not infectious. In cholera an attack may be ushered in with uncontrollable vomiting and diarrhoea, which would establish a focus of infection at the point of seizure. There was nothing in plague, as we saw it, similar to this, so that, after washing their clothing and the use of a bath, our reception-house inmates were allowed to attend their work in the usual way; but living in a reception-house instead of in their homes, and under daily medical examination. There was no evidence that the freedom allowed them was prejudicial, although, with a different type of disease predominating, the practice might require to be revised.

Rats were numerous in many of the infected tenements, and in those in which the type of the disease was pneumonic or intestinal, opportunities of infection, in all likelihood, occurred. On the recognition of the cases, inquiry failed to discover any evidence that rat-mortality prevailed to an unusual extent; and when a definite system of examination was begun, nearly three hundred, killed by trapping, or found dead in ashpits or elsewhere, chiefly within the area of infection, were bacteriologically examined without evidence of pest being discovered in any of them. Various efforts were made to accomplish their destruction by some means more expeditious than trapping. Rats can be driven from their haunts most readily by the fumes of sulphur dioxide; and when escape is impossible, as in the hold of a ship, they readily succumb to its action. In a simple system of sewerage it is possible, as was done at Belvidere Hospital, to rid the drains absolutely by such means; with a more complex system, the difficulties might well tax the resources of ingenuity, as when means of escape exist, the rats are only dispersed. Indeed, one of the chief difficulties in dealing with rats arises from the intelligent apprehension displayed by them of efforts to accomplish their destruction. A few may be killed by poison or by trapping, but the majority migrate. Sick rats, indeed, are deserted by their fellows. If they are already plague-infected, their dispersal would seem

doubtful policy; and their destruction can at best only be partial. With the view of procuring their extinction in one of the hospitals, Danzy's serum was experimentally fed to them, in the hope that the results might lead to its more extensive use; but it quite disappointed expectation. None of the rats to whom it was fed died; and of two which were inoculated with it, only one succumbed to the infection.

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### VENICE CONVENTION.

The present Convention is in force for five years from the date of its ratification, which, for the majority of the signatory governments, was 1898. It is renewable quinquennially "*on the same conditions*;" and this suggests consideration of some of its requirements, because non-compliance with them by the government of an infected country cancels the obligation of the other governments to restrict the precautions against infection, stipulated in the Convention, to the shipping coming from *that part of a country* which is declared to be infected. In the following letter these difficulties are explained at length, and it was made the basis of a representation to the Local Government Board:—

[Copy.]

Sanitary Chambers,  
Glasgow, 17th October 1900.

JOHN LINDSAY, Esq.,  
Interim Clerk of Police.

DEAR SIR,

### PLAGUE.

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#### CIRCULAR LETTER FROM LOCAL GOVERNMENT BOARD, 4TH OCTOBER, 1900,

#### ENCLOSING COPIES OF CHAPTERS 2, 3, AND 4 OF THE VENICE CONVENTION.

Will you allow me to return to the subject of our conversation some days ago concerning the phrasing of Section 3, page 6, of the above quotations from the Venice Convention. The terms used suggest the conditions of a contract, the object of the contract being to prevent the introduction of plague, while securing a minimum interruption to commerce. Certain minimum restrictions, it is agreed, shall be imposed by the governments of non infected countries in the event of plague appearing in any of the other countries represented at the Convention. But the obligation to restrict interference to this minimum standard is dependent on the government of the infected country taking measures to prevent the exportation from its infected area of articles declared susceptible. These articles are described in Section 4, Chapter II., of the Convention. The inference seems to be that, if this condition is not complied with, the non-infected countries may impose restrictions on persons and goods coming from *any port of the infected country*, and not only on those from the area which may be infected. We were agreed that the "government" referred to in Section 3 is, in present circumstances, the Imperial Government, but if you refer to page 2 of the Local Government Board circular, accompanying these extracts, you will find it stated that on Local Authorities rests the burden of giving practical effect to the conditions under discussion. Section III. (Chapter II. of the Convention) appears to base the restricted enforcements of these precautions by non-infected governments on the stipulation that exportation of susceptible articles from the infected area shall be prevented, but it is also stated that the information which the governments of infected countries must communicate to the others shall include a description of the measures taken regarding the departure of ships as well.

Dealing first with the question of susceptible articles, I beg to enclose you copy of a letter which I forwarded to the Local Government Board on 28th September, in which the possible application for this purpose of Sections 16 (6) and 56 (1) (c) of the Public Health Act is discussed, and its practicability set aside.

If my reading of these sections is correct, we are unable to give effect to one condition of the Venice Convention—that is, we have no power to prevent the exportation of articles which cannot be defined as a "nuisance" or certified as "infected."



The question regarding the examination of persons leaving port in an infected area may be considered on a somewhat different footing. It is referred to in Chapter II., Section I, as one of the items of information to be communicated to other governments, but the "measures to be taken in Europe" do not, as I read them, include medical examination of passengers and crews and disinfection of non-infected out-going ships by a sanitary authority situated as we are at the present moment. This opinion I have already stated to you in my letter of 10th inst., but the question is of considerable importance to commerce, and the absence of any system of inspecting the passengers and crews of all out-going ships may be interpreted abroad as a violation by us of the terms of the Convention. As you are aware, the Health Committee lately approved of a voluntary agreement by which I undertook to examine the crews of certain ships, but this is only possible through the courtesy of the shipowners and the acquiescence of the crew, and its scope is very limited. If either must be done to fulfil the terms of the Convention, do statutory powers exist enabling us to do so? Section 45 of the Public Health Act is quite specific *where there is reason to believe that infectious disease exists*, but can reasonable grounds for entry and inspection be alleged in the case of every ship leaving an infected port?

If my observations on the legal aspects of these questions commend themselves to you, may I suggest that the matter be brought under the consideration of the Health Committee, with the view of their presenting to the Local Government Board a statement of the difficulties which exist in Local Authorities giving effect to two conditions of the Venice Convention.

Yours truly,

(Signed) A. K. CHALMERS.

# BACTERIOLOGICAL AND PATHOLOGICAL REPORT ON THE CASES OF PLAGUE IN BELVIDERE HOSPITAL IN AUGUST, 1900, BY ROBERT MUIR, M.D., PROFESSOR OF PATHOLOGY, UNIVERSITY OF GLASGOW.

In accordance with the request of the Public Health Committee, conveyed to me by Dr. Chalmers on Monday, August 27th, I have investigated the bacteriology and pathology of the cases of suspected plague in Belvidere Hospital, and beg to report as follows. (A Preliminary Report was communicated to Dr. Chalmers on Thursday, August 30th.)

In making these investigations my endeavours were directed, in the first place, to the separation and cultivation of the special bacillus from the cases, and, in the second place, to the determination, by scientific methods, of its identity with the bacillus of bubonic plague. In addition, I performed the *post-mortem* examination in the case of P. M. on Tuesday, August 28th, and have to state in brief the results of that examination.

In summarising the results it will be convenient to place them under the following three heads:—

- (I.) The characters of the bacillus isolated in pure culture—is it the bacillus of bubonic plague?
- (II.) The presence or absence of that bacillus in the various cases examined.
- (III.) The pathological changes in the body of P. M.

I. The bacillus, cultivated, in the first instance, from P. M. during life, was examined as regards the following characters:—

## (a) Structural Characters and Staining Reactions.

Under this heading may be mentioned size and shape, grouping in various cultures and in the tissues of the body, absence of motility, presence of polar staining, decolorisation by Gram's method, production of involution forms under various conditions, absence of spores, &c.

## (b) Cultural Characters.

These were studied in various media, including agar, Haffkine's salt-agar, blood serum, peptone-gelatine, and bouillon.



(c) *Pathogenic Effects in various Lower Animals.*

As regards the various points enumerated under the above headings, the organism was found to correspond in every particular with the bacillus of bubonic plague; and I may especially state that the pathogenic results of the plague bacillus were reproduced in animals by inoculation with the pure cultures obtained from the human subject.

The result of these investigations is to demonstrate that the organism in question is without doubt the bacillus of bubonic plague.

II. I have examined nine cases bacteriologically. For this purpose I have punctured the affected glands, and have examined the fluid obtained both microscopically and by means of cultures.

The following are the results:—

In the cases of P. M. (No. 7), P. F. (No. 3), T. H. (No. 9), and J. B. (No. 1), the bacillus of plague was found on microscopic examination, and also cultivated in a pure condition. In the case of (Mrs. M., No. 5), a few degenerated plague bacilli were found on microscopic examination, but I did not obtain cultures. Two days previous to my examination, however, Dr. M'Clure obtained pure cultures of the plague bacillus; and the negative results obtained by me were in all probability due to the fact that the disease was in process of cure, and that the bacilli were dying out. The five patients mentioned have thus been demonstrated to have suffered from bubonic plague; and it is of interest to note that in none of them was any other organism than the plague bacillus obtained from the glands.

The following were examined with negative results, viz.:—D. T. (No. 6), Mrs. T. (No. 2), A. D. (No. 14), and J. C. (No. 4). [This does not prove, however, that these patients had not plague. In fact, the three last-mentioned were recovering at the time of examination; and, if they had plague, the bacilli would be few, if not entirely gone.]

III. On Tuesday, August 28th, I made a *post-mortem* examination on the body of P. M. I found an almost general bubonic affection of the lymphatic glands, those especially involved being in the right armpit and in the neck. The glands were greatly swollen and inflamed, partly hæmorrhagic, and partly softened, while the surrounding tissues were the seat of inflammatory œdema and hæmorrhages. On microscopic examination, these glands were found to contain enormous numbers of plague bacilli. The spleen was swollen to twice its normal size. [It is unnecessary to give greater details—a full report has been entered in the Pathological Records in Belvidere Hospital.] The sum total of the changes found are met with in no other disease than bubonic plague.

As a summary of the facts above stated, I have to report that, up to the present date, five patients have been proved by bacteriological methods to have suffered from bubonic plague, and that one of those (P. M.) died from that disease.

In conclusion, I have much pleasure in acknowledging the valuable collaboration of Dr. M'Clure in the bacteriological work, and the kind assistance which I have had from Dr. Brownlee and other members of the staff of Belvidere Hospital.

ROBERT MUIR.

Pathological Laboratory,  
University of Glasgow,  
September 2nd, 1900.

## THE SIGNIFICANCE OF PHLYCTENULES.

EXTRACT FROM REPORT BY FRANK TIDSWELL, M.B., D.P.H.(CAMP.), APPENDED TO REPORT ON THE OUTBREAK OF PLAGUE AT SYDNEY IN 1900, BY THE CHIEF MEDICAL OFFICER OF THE GOVERNMENT OF NEW SOUTH WALES.

As the outcome of close inquiry into the circumstances attendant upon the well-known liability to plague infection as a consequence of handling rats dead of the disease, Simond states that a plague rat is dangerous or not in accordance with the time that has elapsed since it died. If handled soon after death, plague may follow; but if not touched for some hours it may then be handled without risk. It was, says Simond, just as if the infection completely evaporated within a few hours after death. He also states that perfectly healthy rats harbour very few fleas, and are very expert in removing them; but as they become sick they neglect their toilet, and fleas become more and more abundant upon them, so that they sometimes swarm upon moribund rats. After death, on cessation of the circulation, and as the body becomes cold, the fleas leave it and seek another host.

By associating the "evaporation" of the infection with the departure of the fleas, Simond inferred that these parasites were implicated in the transport of the infection. This inference was further supported by clinical observations of two kinds, viz.—the site of the bubo and the existence of a phlyctenule. Simond noticed that persons becoming plague-stricken after handling a dead rat did not necessarily develop their bubo in the axilla. As often as not in such cases the bubo was femoral. Hence the infection was not due to direct contact with the rat, but to some associated circumstance, such as invasion by fleas from the rat. It is obvious that such fleas might inflict a bite and inoculate the bacilli, not on the hand or the arm, but on the leg or trunk, and thus produce a bubo elsewhere than in the axilla.

\* \* \* \* \*

Examinations were made of fleas from healthy human beings, from a plague patient, from mice, from rats, and from cats. The microscopical examinations all proved negative except in the case of fleas obtained from a rat actually sick with plague. This rat was taken in a house from which a case of plague had been removed five days previously, and in the vicinity of which many persons were attacked. The animal was killed with chloroform, and about a dozen apparently stupefied fleas were obtained from its body. The fleas were crushed up in a few drops of sterilised distilled water, and as preparations from the emulsion so obtained showed micro-organisms resembling plague bacilli, the remainder of it was inoculated into a guinea-pig. The animal became sick, and died on the seventh day. The *post-mortem* appearances were those of plague, and micro-organisms resembling bacilli *pestis* were found in the bubo, in the blood of the heart, in the spleen, and in the liver.

In the experiments performed with living fleas the conditions described by Simond were slightly modified. A rat, selected because of its having many fleas upon it, was inoculated with plague bacilli from a culture and placed in a small wire cage. A second healthy rat was placed in a similar wire cage. The two cages containing the rats were both placed in the same (sheet-iron) larger cage, the interval between them being about two inches. The inoculated rat died in three days, and its dead body was allowed to remain in the cage for twenty-four hours. It was then removed, and on examination was found to be generally infected with plague. The other rat remained perfectly well for a period of four weeks. The experiment was repeated under exactly the same conditions, except that numerous fleas, obtained by the chance discovery of a mouse's nest, were thrown into the cage, and upon the inoculated rat. This animal also died in three days, its body left twenty-four hours in the cage, and when examined found to be generally infected with plague. A third rat was placed in the uncleaned cage. Neither the first nor the third rat became infected.

It will be seen that the observations we had the opportunity of making in this laboratory gave support to Simond's assertions as regards the presence of plague bacilli in phlyctenules and in fleas from plague rats, and, whilst the results in the experiments with living fleas were negative, it has to be noted that such tests are obviously liable to miscarry owing to the several uncontrollable factors involved in their performance.

## PROTECTIVE INOCULATION.

On 1st September a supply of Yersin's serum was obtained, and protective inoculation of the hospital, reception-house, and sanitary staffs engaged in plague work was begun. It was also offered to the friends of patients who had been in contact with them, and to the tenants and others in the neighbourhood of infected houses. Without exception these latter declined the offer, and only five contacts, other than those engaged in dealing with the cases, accepted it. Of these five two developed the disease in an exceedingly mild form (Cases 21 and 26); but it should be observed that the attacks developing in the four reception-house inmates (who had no serum) were also of this character. In all, seventy persons received injections, the quantity used varying in amount from 10 to 20 c.c. In addition to this, nine of the patients in hospital were treated with the serum for



curative purposes, the dose varying from 40 to 100 c.c.s. During the observations on these latter cases it became apparent that the intravenous use of the serum was attended with better results where the symptoms could be regarded as due to plague only, uncomplicated with any other form of coccal infection, than when injected subcutaneously, but the more careful technique required in this form of injection is almost unattainable in persons not in hospital. The details of this work were carried out by Dr. Alfred Webster, and the Table on the following page prepared by him is of interest because of the careful record it presents of the constitutional and local symptoms which followed the injections. It was decided to use the serum in preference to the other prophylactic available, because of the impression that this latter, in persons already exposed to infection and probably incubating the disease, might be attended with risk, but there is reason now for thinking that this impression is erroneous. One of the medical staff was inoculated with Haffkine's prophylactic.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS TAKEN AT  
GLASGOW OBSERVATORY, 1900.

MONTHS.	TEMPERATURE.				RAIN.		
	Highest Temperature in Shade.	Lowest Temperature in Shade.	Mean Temperature for Month.	Departure from average of 32 Years.	No. of Days it fell.	Amount Collected.	Departure, 32 Years.
January, ...	51.1°	30.2°	39.6°	+ 1.2	25	4.56	+ 0.88
February, ...	50.0°	14.8°	34.0°	- 5.2	14	2.86	- 0.20
March, ...	52.7°	26.2°	37.8°	- 2.4	8	0.43	- 2.06
April, ...	66.9°	32.7°	45.6°	+ 0.9	18	2.04	+ 0.06
May, ...	69.5°	35.7°	49.9°	+ 0.5	17	2.16	- 0.32
June, ...	74.0°	43.9°	56.3°	+ 1.1	17	4.34	+ 1.59
July, ...	73.9°	46.3°	58.7°	+ 1.2	23	3.54	+ 0.41
August, ...	77.7°	45.8°	56.0°	- 0.8	17	4.91	+ 1.08
September, ...	68.2°	39.2°	53.5°	+ 0.6	17	3.38	- 0.30
October, ...	60.1°	31.3°	46.3°	- 0.4	20	5.44	+ 1.78
November, ...	57.8°	27.0°	43.2°	+ 1.2	21	5.86	+ 2.11
December, ...	55.0°	34.3°	44.2°	+ 5.7	29	7.34	+ 3.38



## PHROPHYLATIC USE OF YERSIN'S SERUM—DOSAGE AND RESULTS.

1900.	Name and Status.	Quantity.	Length of Exposure.	Constitutional and Local Symptoms.
September 1,	Dr., - - - - -	10 c.c.	Days. 9	Erythema and urticaria, 7th day.
" 1,	Dr., - - - - -	"	9	Urticaria, 7th ; acute arthritis, 11th.
" 2,	Dr., - - - - -	"	9	Urticaria, 10th to 12th ; marked fascial and articular pain, 2nd to 3rd week ; general malaise.
" 2,	Dr., - - - - -	"	8	Erythema, 5th day ; urticaria, 7th day.
" 3,	Dr., - - - - -	"	8	Erythema urticaria, 8th day.
" 3,	Dr., - - - - -	"	3	Erythema urticaria, 7th day.
" 3,	Dr., - - - - -	"	9	Urticaria, 8th day.
" 2,	Nurse, - - - - -	"	3	Erythema urticaria, 1st week ; joint pains, 2nd week.
" 2,	Nurse, - - - - -	"	8	Erythema, 3rd day ; urticaria, 4th day.
" 2,	Nurse, - - - - -	"	1	...
" 2,	Nurse, - - - - -	"	6	...
" 3,	Nurse, - - - - -	"	4	Erythema, 5th day ; urticaria, 8th day ; joint pains, 8th day.
" 3,	Ward Maid, - - - - -	"	9	Sickened on Sept. 13 with symptoms of plague, enlargement of cervical glands.
" 3,	Van Driver, - - - - -	"	9	Erythema urticaria, 1st week.
" 3,	" - - - - -	"	9	" " 5th day.
" 3,	Nurse, - - - - -	"	8	" " 10th day ; joint pains, 11th to 15th day.
" 3,	Nurse, - - - - -	"	4	Erythema urticaria, joint pains, 4th day.
" 3,	Nurse, - - - - -	"	4	Erythema.
" 3,	Nurse, - - - - -	"	9	Erythema urticaria, 1st week.
" 3,	Nurse, - - - - -	"	9	Erythema, 9th ; urticaria and joint pains, 10th.
" 5,	Dr., - - - - -	"	No contact.	Erythema urticaria, 8th day.
" 5,	Dr., - - - - -	"	7	" " 7th day.
" 5,	Bact. Laby. Assistant, - - - - -	"	No contact.	...
" 5,	Inspector, - - - - -	"	" 7	...
" 5,	" - - - - -	"	" 7	...
" 7,	Dr., - - - - -	"	...	Erythema urticaria, 8 to 10 days.
" 7,	Dr., - - - - -	"	...	" " 7 to 9 days.
" 7,	Dr., - - - - -	"	No contact.	...
" 7,	Washing-house Staff, - - - - -	"	8	...
" 7,	" - - - - -	"	8	Malaise at end of 1st week.
" 7,	" - - - - -	"	8	...
" 7,	" - - - - -	"	8	...
" 7,	" - - - - -	"	8	...
" 7,	" - - - - -	"	8	...
" 9,	Mrs., 27 Warwick Street, - - - - -	"	2	...
" 9,	Dr., - - - - -	"	15	Enlargement of axillary gland.
" 10,	Van Driver, - - - - -	"	14	...
" 10,	Collector, - - - - -	"	14	...
" 10,	Washing-house Staff, - - - - -	"	14	...
" 10,	" - - - - -	"	14	...
" 10,	" - - - - -	"	14	...
" 10,	" - - - - -	"	14	...
" 4,	J. T., - - - - -	"	15	...
" 10,	Mrs., 52 Dale Street, - - - - -	"	2	...
" 10,	J., - - - - -	"	2	Erythema and urticaria, 8th day.
" 10,	Mrs., - - - - -	"	2	Developed plague on September 18.
" 10,	M'L., - - - - -	"	2	Erythema on 6th day.
" 10,	Mrs., - - - - -	"	2	...
" 10,	Mrs., 23 Florence Street, - - - - -	"	21	...
" 14,	Reception-house Staff, - - - - -	"	No contact.	Erythema, 2nd day ; joint pains, 10th day.
" 14,	" - - - - -	"	"	...
" 14,	" - - - - -	"	"	Erythema and urticaria, 7th day ; acute joint pains, 14th day,
" 14,	Ward Maid, - - - - -	"	"	...
" 14,	" - - - - -	"	"	...
" 15,	Nurse, - - - - -	"	"	Acute general joint pains, 10th day,
" 15,	Nurse, - - - - -	"	"	Local erythema and urticaria.
" 15,	Dr., - - - - -	20 c.c.	22	Urticaria, 8th day ; joint pains, 4th day.
" 16,	W., 57 S. Coburg Street, - - - - -	10 c.c.	September 14.	...
" 16,	C., - - - - -	"	No contact.	...
" 20,	J., 52 Dale Street, - - - - -	" *	8	...
" 20,	G., - - - - -	" *	8	Erythema and oedema of the arm around puncture on 2nd day.
" 21,	Dr., - - - - -	20 c.c.	13	...
" 25,	Dr., - - - - -	15 c.c.*	30	...
" 25,	Dr., - - - - -	15 c.c.*	30	...
" 25,	Dr., - - - - -	20 c.c.	No contact.	Erythema and urticaria on 11th day ; oedema of legs and ankle, 12th day ; acute joint pains in hip, knee, and ankles, with general malaise.
October 29,	Dr., - - - - -	10 c.c.	"	Contacts in the ward, Belvidere.
" 1,	D., Belvidere, - - - - -	20 c.c.	27	
" 1,	D., " - - - - -	"	27	
" 1,	M'M., " - - - - -	"	24	
" 1,	M., " - - - - -	"	12 (?)	
" 1,	M'C., " - - - - -	"	11	
" 1,	K., " - - - - -	"	16 (?)	
" 1,	S., " - - - - -	"	22 (?)	

\* Second injection.

## APPENDIX.

INTERIM REPORT BY MEDICAL OFFICER OF HEALTH, SUBMITTED  
TO HEALTH COMMITTEE ON 10TH SEPTEMBER, 1900.

At last fortnightly meeting of the Committee I reported that a careful study of the symptoms presented by three patients then in hospital gave rise to the conviction that they were suffering from plague. This conviction was ultimately established beyond doubt, and the following narrative describes the circumstances of the outbreak so far as at present known.

\* \* \* \* \*

(See page 22.)

Immediately the suspicion of plague was created, a medical examination was made of all persons who could be discovered as having attended either the B. wake or the wake of the child M., with the following results:—

1. Discovered ill in their own houses—

(1) Two children (T.), sons of Mrs. T. already referred to. One of these, on closer observation, proved not to be plague.

(2) A girl (M'K.), residing at 57 Thistle Street.

2. Removed to reception-house.

In all, over 100 persons, who were not obviously ill, but had visited one or other of the houses named, were removed to the reception-houses for observation, and four of them have since sickened (M., M'G., D., and R.) (For dates see Table which follows.)

Two additional cases, F., 77 Rose Street (admitted 29th August), and C., 1 Well Street, Calton (admitted 30th August), were afterwards brought under notice by medical practitioners, suffering from the disease, and, after examination, removed to hospital. C. has an indirect connection, in respect of having slept in a house next door to that of the B. family on 15th August, and F. is a jobbing shoemaker living in the adjoining tenement.

On 6th September, one of the "contacts" under observation displayed symptoms of tenderness in the groin, and was removed to hospital for observation. Phlebitis of the femoral vein there developed and cleared up the suspicion. On the following day a child was removed from Crookston Street with symptoms suggestive of pestis minor, and a history of indirect association with one of the wake-contacts. In 8 of these cases the diagnosis of plague has been microscopically verified. From the following Table, a family (D.), from 57 Thistle Street, is presently omitted, because of some uncertainty regarding the clinical importance to be attached to their symptoms:—

GLASGOW.—PLAGUE CASES, WITH DATES OF SICKENING AND EXPOSURE AS  
PRESENTLY KNOWN.DEATHS AT HOME (*assumed to be due to Plague*).

Name.	Address.	Sickened.	Died.	Wake held.
(1) Baby in B. Family,	71 Rose Street,	Aug. 3rd,	Aug. 7th,	—
(2) Mrs. B.,	" "	" 3rd,	" 9th,	Aug. 9th and 10th.
(3) Tina M., <sup>1</sup>	57 Thistle Street,	" 19th,	" 21st,	" 21st and 22nd.

<sup>1</sup> Attended the B. wake.

## CASES REMOVED FROM THEIR HOMES.

Name.	Age.	Address.	Sickened.	Removed to Hospital.	Where Exposed, &c.
B. (1) James B.,	60	71 Rose Street,	Aug. 12th,	Aug. 27th,	Wife died 9th August. A jobbing shoemaker near B.'s, but definite contact not traced.
B. (2) Pat. F.,	56	77 " "	" 13th,	" 29th,	
B. (3) John C.,	24	1 Well St., Calton,	" 17th,	" 30th,	Slept in house adjoining B.'s on 13th August.
B. (4) Mrs. T.,	—	23 Oxford Lane,	" 12th,	" 25th,	Relations and visitors at B.'s.
(5) James T., <sup>2</sup>	9	" "	" 21st,	" 29th,	
(6) Dennis T.,	6	" "	" 21st,	" 29th,	
B. (7) Mrs. M.,	—	57 Thistle Street,	" 20th,	" 25th,	{ Attended B.'s wake, child died at home on 21st August (see above). Pat. M. died in hospital.
B. (8) Pat. M.,	—	" "	" 22nd,	" 25th,	
(9) Wm. M.,	3	" "	" 23rd,	" 25th,	
(10) Annie M'K.,	12	" "	" 28th,	" 29th,	At B.'s wake, and afterwards in house.
B. (11) Thomas H.,	12	6 So. Coburg St.,	" 23rd,	" 29th,	At M.'s on 20th August.

B. = Bacillus obtained.

<sup>2</sup> James has not plague, but a gluteal abscess.



## CASES AMONG "CONTACTS" AND SICKENING IN RECEPTION-HOUSE.

Name.	Age.	Address.	Sickened.	Removed to Hospital.	Where Exposed, &c.
(12) Jane M.,	14	—	Aug. 29th,	—	At M.'s wake.
(13) Arch. D.,	—	—	" 29th,	—	"
(14) Patrick M'G.,	18	—	" 31st,	—	"
(15) Agnes R.,	—	—	" 31st,	—	"

## INDIRECT CONTACT.

(16) May M'L.,	18 months.	154 Crookston Street,	Aug. 26th,	Sept. 6th,	Indirect contact (?)
----------------	------------	-----------------------	------------	------------	----------------------

NOTE.—This Table does not include a family (D.) removed from 57 Thistle Street on August

At the present moment it is impossible to make any definite statement as to the source of the infection of the first two cases in the B. family. The husband of the elder patient was in the service of a local shipping company as a dock labourer, and employed by them at their wharves on the south side of the river. He was engaged exclusively on vessels trading between home ports. His illness only developed after his wife died, and may be regarded as resulting from this or from his grandchild's illness. His daughter, the mother of the child who first died, is said by her father to have been ill for two days shortly before her child sickened. She now displays, one month afterwards, very slight enlargement of the cervical and axillary glands on both sides, which, compared with the glands of a normal girl—definitely non-infected—of corresponding age, indicate some irritative process recently active. This girl, meanwhile, stoutly denies any illness, and it must be remembered that she had nursed her baby for some time. The father of the child is an iron-worker in constant employment. He has had no illness, and presents no evidence of glandular enlargement.

[NOTE.—Since the above was written one case, clinically recognisable as plague, and verified by bacteriological examination, was admitted to hospital on Sunday, 9th current, and a girl, whose illness goes back to the 23rd of August, was removed the following day. These are not traceably connected with each other, or with any of the earlier wakes, and, taken in connection with the death in Govan during the last week of August, must be regarded as indicating that a strain of infection has obtained admission to the population from which each of these four groupings directly arise.

The means by which this strain of infection has gained access is presently conjectural only; but it is to be remembered that pestis minor, or the ambulant form of plague, is a disease characterised by few symptoms, and must frequently escape detection. In this connection the occurrence of several cases of sickness, with glandular affection, among the crew of a ship while in port here in May last, is being inquired into. Any opinion as to the character of an illness described after such an interval can only be formed after very careful scrutiny of the facts; but it is obviously most desirable, in the interests both of the shipping and the community, that all such sicknesses, when they occur, should be promptly brought to the notice of the Local Authority.]

\* \* \* \* \*

(See p. 22.)

SECOND INTERIM REPORT BY MEDICAL OFFICER OF HEALTH,  
SUBMITTED TO THE HEALTH COMMITTEE ON 24TH SEPTEMBER, 1900.

Since 19th September no case of plague is known to have occurred among our own population, the admission to hospital on the 20th being that of a male patient from Govan, who had been sent to one of the general hospitals for treatment for what was regarded as a surgical affection, and was from thence transferred to Belvidere.

The following table continues the record of admissions since those contained in the report for last fortnight :—

Name.	Address.	Date of Sickening.	Removed to Hospital.	Where Exposed.
(1) Chas M'M.,	52 Dale Street,	Sept. 8th,	Sept. 9th,	Slept on a bed on which a neighbour had died from "pneumonia" on 28th August, and was buried 1st September.
(2) Rosina M.,	23 Florence Street,	Aug. 23rd,	" 10th,	Worker in a hair factory, but with no known association with other cases.
(3) Mrs. B.,	81 Cubie Street,	Sept. 13th,	" 14th,	Wife of a clothes collector in Sanitary Wash-house.
(4) Ellen R.,	Belvidere Hospital,	" 13th,	" 14th,	Cleaner in Plague-ward.
(5) George H.,	248 Mathieson Street,	" 7th,	" 14th,	See Note in text.
(6) Mrs. M.,	57 South Coburg Street,	" 14th,	" 15th,	A married daughter of the other Mrs. M. admitted 16th September.
(7) Mary M.,	"	" 14th,	" 15th,	See details in text.
(8) Robert M.,	"	" 14th,	" 16th,	
(9) Mrs. M.,	"	" 13th,	" 16th,	
(10) Mrs. G.,	52 Dale Street,	" 18th,	" 19th,	Sister and niece of C. M'M. above. See note below.
(11) Mary G.,	"	" 18th,	" 19th,	
(12) Wm. W., <sup>1</sup>	21 Robert Street, Govan,	" 1st,	" 20th,	

<sup>1</sup> Admitted through one of General Hospitals.



In addition to the above, five persons were removed to hospital during the fortnight presenting symptoms which at the time gave rise to a suggestion of plague. In four of these the further development of symptoms enabled them to be set aside definitely as not plague, while one case still remains under observation.

#### RELATIONSHIP OF CASES.

(1) C. M'M. has no relation which can be traced with earlier known cases. A neighbour had died on 28th August of "pneumonia," and was buried on 1st September. After the death the bed on which he had lain was transferred to M'M.'s house, and was used by M'M. and his wife.

(10) Mrs. G. is a sister of this patient, and sickened under observation on 18th September. On 10th September she had been given subcutaneously 10 c.c. Yersin's serum. A mild attack.

(10) Mary G., aged six years, a daughter of last patient, also sickened on 18th September. Because of her age and some passing indisposition an injection of Yersin's serum was not given. Her attack has proved fatal.

(2) Rosina M. sickened 23rd August, a swelling in the groin being observed by herself on 26th. She had no regular medical attendance, and the nature of her illness was not recognised till 10th September.

(3) Mrs. B., the wife of an employee of the department engaged in the work of collecting infected clothing. He must therefore be regarded as the transmitter of the infection to his wife, and for this reason the occurrence will require the most rigid investigation. For several years it has been understood that the collectors were provided with overalls to protect their clothing, and to be worn only when at work. It now appears that what they wear is not an overall suit, but simply clothing of a white material. His wife now makes the definite statement in hospital that he regularly came home in this suit, and occasionally wore a coat to render it less conspicuous. For the present I have recommended that after each removal of plague clothing the collector must bathe and change his entire clothing before leaving the wash-house.

(4) Ellen R., a ward cleaner, employed in the plague-ward, and, like all the others whose work brings them into contact with these cases, she received an injection of 10 c.c. Yersin's serum. This was on 3rd September, and she sickened on 12th, her illness being of the mildest possible description. The micro-organism has, however, been recovered from an affected gland.

(5) George H., 46 years, boot-top fitter, residing at 248 Mathieson Street, was admitted to hospital on 12th instant, and died on the following day. Examined *post mortem*, this was found to have resulted from plague. He sickened on 8th September. His illness was associated with earlier illnesses in a family (G.) living at the same address. Mrs. G. was removed to hospital on 1st instant, and died on the 4th of suspected typhus, whilst her daughter, at the time of her removal, was discovered dead in their house. In Mrs. G.'s case the question of plague was considered, because she was known to have been a visitor at the family B. when the earlier cases occurred; but the diagnosis held in suspense. On *post-mortem* examination the evidence was still held as inconclusive.

(6-9) M. Family.—A mother and three children, one of whom was married, formed one household, in which, we were informed by neighbours, cases of illness were occurring. They have an indirect association, through a "contact," who visited them frequently, with the family T., of 23 Oxford Lane, and on 22nd August a daughter of the family, named Kate, aged 14 years, sickened, and died on the 28th August, the cause of death being certified as "pneumonia." The friends now describe her illness as having been accompanied by painful swellings about the neck and arms.

Putting together the admissions since the disease was recognised, we have now had a total of 27 admissions from definitely recognisable plague, and of these, up to the present (26th September), 5 have died and 22 remain under treatment, 1 of these being a patient from the adjoining burgh.

#### MILD NATURE OF ATTACK IN MANY CASES.

Eight only of the cases coming under treatment in hospital can be classed as severe attacks, and of these 5 have died. Seven, on the other hand, are of extreme mildness, so that, save for their association with recognisable cases, a suggestion of plague would never have been raised.

Twelve fall into a middle class, the severity in individual cases ranging between the severe and mild type just alluded to, but with a tendency to mildness rather than otherwise. Indeed, with regard to many of the milder forms, the question of diagnosis is no easy one. We are familiar in smallpox outbreaks with the extremely modified form which the disease may present in persons fairly well protected by vaccination, and where a definite history of exposure alone affords a means of interpreting aright symptoms which would, indeed, rarely be critically surveyed were the persons not under observation at the time.

We are now learning practically that in a corresponding way plague can become so defaced by mildness in its form of attack that an administrative difficulty of no inconsiderable magnitude is created. Consequently, I believe safety lies in disregarding the query which constantly haunts those milder forms, and dealing with the surroundings and associates of the suspect as if no doubt as to its nature existed.

#### YERSIN'S SERUM.

Over 60 persons known to have been in association with plague patients have been immunised by subcutaneous injection of Yersin's serum in 10 c.c. doses. Of these, 2 have sickened of a very modified form of the disease.

Questions of dosage and the method of administration will require consideration in the light of the partial failures. The serum is much more powerful as a curative agent when injected into the veins than when given subcutaneously, and it may be that the full protective value for "contacts" is only to be obtained by a similar selection of site.

#### RETURN OF CONTACTS TO THE GENERAL POPULATION.

A not unnatural degree of apprehensiveness exists regarding these people on their discharge from the reception-houses. It may serve to allay this if it is explained that when they are passed out of observation by the department they are themselves free from any risk of developing the disease to which their contact with plague patients had exposed them, their clothing has been disinfected, and there remains nothing about them save the memory of their association.

\* \* \* \* \*

(See page 23.)

#### NOTICES UNDER GLASGOW POLICE ACT, 1866, SECTION 254.

The following Notices under this section have been issued :—

<i>Week ending 8th September.</i>		
Dirty Houses.	Dirty Stairs, Lobbies, and Passages.	Total.
35	42	77
<i>Week ending 15th September.</i>		
Dirty Houses.	Dirty Stairs, Lobbies, and Passages.	Total.
176	79	255
<i>Week ending 22nd September.</i>		
Dirty Houses.	Dirty Stairs, Lobbies, and Passages.	Total.
244	14	258

The number of cases of overcrowding discovered in the defined area is as follows :—

Week ending 8th September,	...	...	...	38 cases.
Week ending 15th September,	...	...	...	27 cases.
Week ending 22nd September,	...	...	...	29 cases.

A. K. CHALMERS.

Sanitary Chambers,  
Glasgow, 24th September, 1900.

#### THIRD INTERIM REPORT BY MEDICAL OFFICER OF HEALTH, SUBMITTED TO THE HEALTH COMMITTEE ON 8TH OCTOBER.

During the fortnight the following deaths from plague occurred in hospital :—

Name.	Date of Death.	Date of Admission.	Reference No.
James B., ...	September 24th, ...	August 27th, ...	No. 1 of 1st Interim Report.
Mary G., ...	September 25th, ...	September 19th, ...	No. 11 of 2nd Interim Report.
<sup>1</sup> Baby M., ...	September 27th, ...		
Robert M., ...	September 28th, ...	September 16th, ...	No. 8 of 2nd Interim Report.
William W., ...	October 6th, ...	September 20th, ...	No. 12 of 2nd Interim Report.

<sup>1</sup> This child was born in hospital of Mrs. M. (No. 6 of 2nd Interim Report) on 16th September, and died on 27th, having been ill for three days. From birth it was a delicate child.

No case is known to have occurred among the population during the fortnight, but among persons brought under examination the following may be selected as illustrations of illnesses which at one part of their course at least present symptoms suggestive of plague, and require careful scrutiny before exclusion :—

(1) J. M'C. (male adult), sickened on 27th September with shivering and headache, which were followed on the 28th by pain in the right axilla. On examination on October 2nd and 3rd, there was a general thickening in this situation, which was tender on pressure, although definite glandular enlargement in the axilla could not be discovered. In the left axilla, however, several glands were palpable, but were not tender on pressure. He was removed to hospital for observation, and in the course of the following day an abscess of a distinctly septic character appeared in the right axilla.

(2) Mary M'F., aged 13, was admitted to hospital on Saturday, 6th October, with the following history :—

"About twelve days previously a swelling appeared in the right groin, which, on examination, was not painful to pressure, and had not given rise to constitutional disturbance." Further examination of this gland has quite definitely excluded plague.



(3) On 6th October, a boy, M<sup>E</sup>., was notified as suffering from "fever, probably typhus," and on the house being visited it was learned that he had died on the previous evening. A history of illness beginning suddenly in the midst of apparently perfect health, and accompanied by vomiting and high fever, with rapidly increasing prostration, followed by death within twenty-four hours, aroused suspicion, which was strengthened by an external examination of the body and the discovery of a chain of enlarged cervical glands on both sides of the neck and in the left axilla. The body was, in consequence, removed to the mortuary at Belvidere, and, with the father's consent, a *post-mortem* examination was there made by Dr. Buchanan. This revealed a tonsillar abscess, with a widely distributed glandular enlargement, all pointing to an extreme degree of susceptibility to septic poisoning, to which the death can be attributed. Evidence of plague was entirely absent.<sup>1</sup>

Professor Zabolotny, of the Imperial Institute of Experimental Medicine, St. Petersburg, who in recent years was a member of the Russian Expedition for the Study of Plague in India, Arabia, and Eastern Mongolia, and who spent several weeks here on behalf of his Government, left Glasgow on Saturday last, and was good enough to convey to me his conclusions regarding the outbreak here. As these will be of interest to the Committee, I reproduce them:—

(1) The epidemic in Glasgow, when compared with that of India, China, and Africa, and with those in Europe of recent years (Oporto, Kolobowka), is of the most mild description.

(2) The extension of the epidemic is not great, and the mortality quite insignificant, which may be attributed to the medical and sanitary measures which have been here practised with so great energy.

(3) For the most part one meets with bubonic cases which are less dangerous from the point of view of epidemiology than the pneumonic forms. These latter are excessively contagious, because the sputum of the sick person teems with plague bacilli.

(4) As in the bubonic form, the sickness does not spread except by contact with the skin, the measures of isolation and cleansing of linen and clothing play a most important role in prevention.

(5) For persons in contact with the sick the best method of protecting them is by preventive injection with serum (10 to 20 c.c.), as is here practised.

(6) Treatment of the patients is most effective when the serum is injected in large doses (60 to 120 c.c.) intravenously.

(7) The *post-mortem* examinations of fatal cases have presented a picture of protracted illness (suppuration, *nodules pesteuse*, mixed infection), and not that of an acute malady terminating fatally in from two to three days.

#### NOTICES UNDER GLASGOW POLICE ACT, 1866, SECTION 254.

The following notices under this section have been issued:—

Week ending 29th September.					Week ending 6th October.					GRAND TOTALS.				
Apartments.					Apartments.					Apartments.				
2.	3.	4.	Total.		1.	2.	3.	4.	Total.	1.	2.	3.	4.	Total.
37	106	18	1	162	35	75	25	4	139	72	181	43	5	301

The number of cases of overcrowding discovered in the defined area is as follows:—

Division.	Overcrowded.	Fined.	Admonished.
19	54	3	19
20	25	...	7
21	28	10	14
22	6	4	3
	113	17	43

#### PLAGUE IN GLASGOW IN THE 17TH CENTURY.

AN EXTRACT FROM MEMORIALS OF THE FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW, BY ALEXANDER DUNCAN, M.A., LL.D., SECRETARY AND LIBRARIAN OF THE FACULTY.

But the most memorable epidemic of the plague was that which visited Glasgow in 1645-46, and during that, and perhaps the next two or three years, made terrible havoc amongst the townsmen. Almost from the first the most determined efforts were made to stamp out the disease. Daily house-to-house visitation was eventually adopted, and daily reports sent to the magistrates of the sick.<sup>2</sup> When the measure to arrest its progress failed, it was resolved to have recourse to the old expedient of transporting the infected out of the town to the muir. This muir is believed to have comprised the waste-lands of Sighthill, Seggieholm, and others in the district to the north of the burgh. Intimation was to be made "be touk of drum that na manner of persone goe out to the muir quher the foull persones are without leave of the magistratis, and to certify that those who on the contraire schall be put out to the muir with the hail families they are in."

<sup>1</sup> See Dr. Buchanan, p. 85.

<sup>2</sup> Minute of Council, 5th November, 1646.



The prevailing terror invaded the academic precincts in High Street, the University authorities migrating in a body to Irvine, where the principal, the regents, and the bursars of the College were boarded in 1645 and part of 1646. Local trade was almost at a standstill. Nearly all who could leave the town appear to have done so. The burgh tollmen and tacksmen had to beg off from the payments of their rents. "Comperit the haille takismen of the mylne, Laidells, tron, and brig, and intimat to the Councell that in respect of the seikness and visitatioun they could get naething of ther deutes." The burial of the dead was unaccompanied by the usual rites. On 12th December, 1646, it was ordained "that ther be na meiting at lykwakes nor efter burrialls, and that this be intimat by touk of drume."

If such was the state of things in the burgh, who can imagine the horrors of the plague-stricken banished to the bleak muir? The time was the depth of winter, their only shelter was "ludges made of dailis and spairs," with straw for their bedding. By 20th February, 1647, the visitation of this miserable colony had assumed a systematic form. "James Robiesoune, baxter, is maid choyce of to be visitour of the muire quhair the oncleane fokes ar, and to set doune in a register all occurantes daylie anent the infectioun, . . . and to tak notice of the graves." Frequent entries also appear in the treasurer's accounts at this time<sup>1</sup> of disbursements for supply of the poor on the muir, and for "coals, peitts, and strae" furnished to them. On 17th July the Councillors are appointed by turns for a week to visit the muir, each selecting "an other honest man," to receive a list of all in the muir, and to "disburse to James Robiesoune such money as he sall requyre to sustean the puire on the muir, and to viseit the muir tweiss or thryiss in the week," with other necessary duties of a similar kind. Doctor Rae, possibly a physician reputed to have skill in the treatment of the plague, is written for, but apparently does not come, and Dr. M'Chuir is engaged, and on 26th July got ten dollars "for bygane service to incouradge him." From a subsequent minute it appears that John Hall, the principal surgeon in Glasgow at that period, by arrangement with the magistrates, gave his services to all and sundry gratuitously, being subsequently paid by them as well for inspecting the bodies of the dead as for his care of the living.<sup>2</sup>

Within the burgh it would appear that sanitary measures were prosecuted with energy. There is a curious minute of 10th March, 1647, in which the bailies, with the aid of a hired man, are charged with the duty of removing "suspect fulyie." In these days the honourable office of the magistracy was clearly very far from a sinecure. One noteworthy result of the compulsory removal of such large numbers of the citizens to the muir was that the magistrates found that they were obliged *pro tempore* to make payment of their plague patient's debts.<sup>3</sup> From some subsequent minutes we infer that some amount of imposition had been practised by the "unclean" or their friends. Thus, on 13th March, we find two men appointed to revise "the compts debursit for honest men the tyme they closit up for fear of infectioun." Through the whole of the summer and autumn of 1647 the plague appears to have been raging with virulence. As the College session drew near, it was necessary to make some arrangement in regard to a temporary local habitation till the plague abated. Irvine had probably been found inconvenient on account of its distance from the city. Paisley was now selected for the purpose, being clear of the pest, though its past reputation as a plague-haunt was not good, and there the College authorities spent part of the winter.<sup>4</sup>

On 22nd July, 1648, the pestilence was still on the increase; a daily inspection of everybody in town was again arranged for, and a proclamation made by tack of drum prohibiting the frequenting of taverns, or even idle wandering through the streets. From the Town Council Records (for 12th August, 1648) we learn that Glasgow was now in sore straits for money for the maintenance of such numbers of the stricken poor. Accordingly they agreed to call in a sum of two thousand marks, collected, but not expended, some years before for a similar purpose, and now on loan to the Earl of Wigtown. It was not till the following year that this terrible visitation of plague appears to have come to an end in Glasgow.

In 1665, when the dreadful scourge made its memorable inroad on London, and more than decimated the population, the Town Council Records (3rd September) show that the people of Glasgow were alarmed and on the watch. In the previous year even they were evidently on the alert, the Master of Works having been ordered to repair the ports. This was always done when they had reason to fear an outbreak, as if the magistrates hoped to repel the impalpable infection of what, with emphatic tautology, they call "the plague of pestilence" from their gates by the same measures as they would the attack of an armed foe. The dreaded visitor, however, did not make its appearance in Glasgow then or subsequently. Its sudden disappearance not long after, not only from this country, but from Western Europe generally, has often been made the subject of remark, though scarcely explained.<sup>5</sup>

<sup>1</sup> Minute, 29th May, 1647, &c.

<sup>2</sup> Minutes of 18th September, 1647, and 26th August and 2nd October, 1648.

<sup>3</sup> Minute, 20th February, 1647.

<sup>4</sup> Mackie's History of Paisley, p. 143. See also *Munimenta Universitatis Glasguensis*, III., p. 537.

<sup>5</sup> The cause of its sudden decline and extinction are discussed by Creighton (*History of Epidemics in Britain*, II., 34 *et. seq.*)

## NOTES REGARDING SYMPTOMATOLOGY.

BY JOHN BROWNLEE, M.A., M.D.(GLAS.), D.P.H.(CAMB.), PHYSICIAN-SUPERINTENDENT, BELVIDERE FEVER HOSPITAL.

THE following remarks summarise briefly the chief symptoms which were observed in the cases of plague seen in Belvidere. No attempt has been made to dissert on the symptoms of plague in general, but only to give, as far as possible, an accurate summary of what was actually observed.

*Onset of the Disease.*—The onset of the disease was, in general, severe, but did not differ markedly in any respect from that of other specific infectious disease. In only one case were there any prodromal symptoms. In this case slight headache and malaise seem to have been present for three days prior to the true onset of illness. The onset was, in general, associated with severe headache, and often with rigor. Severe prostration, and pain in the back and limbs, were also marked features. Vomiting, though not frequent, was sometimes a very urgent symptom, and in one case lasted through the whole of the first week of illness. Although constipation was more often observed than diarrhœa, yet the latter was present with sufficient frequency to negative the diagnostic value of either symptom.

*Facies.*—Even at an early stage of the disease the *facies* was very characteristic. The face assumed an earthy pallor, which was more marked round the lips. The expression was dull and heavy, resembling that seen in typhus, to which was superadded a look of anxiety, which was most noticeable and striking. If the patient was handled, even with the greatest care, the brows contracted, and the face assumed a more marked appearance of apprehension, which was further exaggerated if the area surrounding the bubo was touched. This was very noticeable even in patients who were on admission quite unconscious to all outside impressions. The characteristic *facies* was also observed, though to a less extent, in nearly all the cases of *pestis ambulans*.

*Course of the Temperature.*—With the onset of the disease the temperature seems at once to have risen. In the cases which came under observation on the second day of illness, with one exception, the height of the fever had by that time been reached. In severe cases a high and somewhat irregular pyrexia, ranging from 102° F. to 105° F., was present, usually remittent, the morning temperature being from one to two degrees lower than that of the preceding evening. In general, the pyrexial period ended by crisis or rapid lysis. This occurred even in cases which ultimately terminated fatally from secondary sepsis. The crisis took place between five and eighteen days from the beginning of the illness in the untreated cases. In the milder cases an early fall to nearly normal, with a secondary recrudescence, was not unusual. In those in which secondary infection was present from the beginning, the temperature resembled that of an ordinary septicæmia. In the very severe cases, with rapid death, it remained continuously high until the fatal issue.

In the cases treated with serum, the course was often apparently modified, as will be found specially recorded in another section.

*Buboes.*—The chief sign of plague, as seen, was the bubo. All the cases treated in hospital, with one exception, which will be discussed separately, were of the bubonic type. The character of the bubo varied, of course, with the severity of the case. In its simplest form it consisted of an enlarged lymphatic gland, with some infiltration surrounding it. The skin above it might be freely moveable. Even in this, the simplest form, the tenderness of the swelling was a feature which was so marked as to attract immediate attention to its presence. The limitation of the bubonic infection to one gland was, however, very unusual. In most cases the groups of lymph glands which fill the axilla or the groin were concurrently affected. In severe cases the implication extended further, and the involvement of adjacent groups of lymphatic glands took place.



In these instances, though the surrounding connective tissue was markedly infiltrated, yet the separate glands could, in general, be felt on palpation, if a little care were exercised. This was, of course, much more noticeable in the groin than in the axilla. Over the affected glands the skin was usually reddened. The colour at first was rose, turning afterwards to a deeper red, and finally to a dusky purple colour.

As the bubo advanced there was frequently an exudation of serum into the neighbouring connective tissue. This was often slight, but in some cases there was a widespread œdema into the area of which the bubo was the central point. In one case this œdema extended from the middle of the abdomen to the foot. In one other case, with bubo in the groin, although the œdema surrounding the bubo was slight, yet marked swelling of the foot on the affected side was observed.

The life-history of the bubo was various. In the slighter cases resolution took place without breach of the skin-surface, but in the majority of cases the bubo ruptured spontaneously, and discharged for a time before healing. The discharge was sero-purulent, flakes of pus appearing suspended in a slightly-turbid serous fluid. Microscopical examination of this fluid showed degenerate bacilli, both free and included in the leucocytes. Cultures made from the discharge were generally sterile, if due precautions in cleansing the skin were observed; at most, a few colonies of skin-cocci were obtained. In only one instance was the *B. pestis* in a virulent condition recovered from a bubo which had spontaneously ruptured. In the severe cases extensive necrosis of the glands occurred, involving, also, large areas of skin, and in such cases it was impossible to prevent secondary infection. If this occurred, two results were noticed. If the area of necrosis were small, the process remained localised; while if the area of necrosis were extensive—as in the case of J. B.—a widespread extension of the secondary infection occurred, and death resulted from septicæmia. It is worthy of note that the discharge from the ruptured buboes was always sero-purulent. Even in slight illnesses it was moderately abundant, and only slightly mixed with pus cells. It seemed, in fact, to consist largely of the normal lymphatic drain into the affected glands. It was, in the case last referred to, very abundant indeed, the dressings being very frequently soaked, and requiring to be renewed. In a number of the cured cases the discharge continued for some weeks, and in one case there remained for a longer time a small lymphatic fistula discharging clear fluid.

The tenderness of the buboes was a feature of great interest. In only one case was this symptom absent. In some patients the pain on touching was so great that even the movement of the bedclothes produced considerable distress. It is also worthy of note that this tenderness disappeared almost completely with the fall of temperature, and although the swelling was some time longer in showing any signs of subsiding.

*Skin.*—The skin in all cases of plague observed was dry and hot. Sweating, even during a crisis, was not a constant symptom—in fact, the only two cases in which it was noted were those in which doses of Yersin's curative serum were administered. (Cases Nos. 9 and 19.) Otherwise it was only noted in those patients who suffered from secondary septic infections.

There was no specific rash observed, but over the trunk and thighs, in a certain number of the severer cases, a mottling of a pronounced character was noted. This mottling was more marked than the subcuticular mottling of typhus, but not so noticeable as the commencing mulberry eruption. This mottling disappeared as the disease progressed, and gave place to a general dusky hue of the whole cuticle. Petechiæ, or hæmorrhage, were not observed in any of the cases which were admitted to hospital.

Desquamation of the cuticle was not infrequent. It began towards the end of the second week in a punctiform manner over the trunk and limbs, and in some cases on the palms and soles the separation of the cuticle was complete, as in scarlet fever,



the patches separating being tough and not friable, differing in this respect from the desquamation which often accompanies continued fevers, such as enteric.

*Alimentary Tract.*—The lips in the severe cases were dry and cracked, and occasionally covered with sordes; in the milder cases they presented nothing noteworthy.

The tongue was covered with a white fur, and was usually clean round the edges. Even in severe cases it was often not dry. In the worst cases, however, as the disease progressed, it became dry over the dorsum, and covered with a brown fur. Even in these cases, however, the edges usually remained moist.

The fauces were, as in most fevers, somewhat congested, but presented nothing noteworthy.

Vomiting was not a common but sometimes an urgent symptom at the onset.

The bowels were in general constipated, but sometimes the attack was ushered in by severe diarrhoea.

The plague patients, as a rule, fed well during the attack.

*Heart and Circulatory Organs.*—In the acute cases the heart sounds were soft, but murmurs were absent. The pulse was at the onset full and bounding, but rapidly became soft and easily compressible. The rate varied very much, but in general it was lower than that usually seen in other fevers with a corresponding temperature. In the severest type of case, however, the rate frequently evidenced a very profound degree of cardiac poisoning (*e.g.*, a temperature of  $105.8^{\circ}$ , with a pulse of 134, in an adult, and a temperature of  $103.4^{\circ}$ , with a pulse rate of 152, in a child of six years.)

In general the fatal issue was accompanied by the usual quickening of the pulse, which is the symptom of cardiac failure.

*Respiratory Organs.*—The respiration rate in plague cases was, as a rule, strikingly increased, as compared with that usually observed in other cases of fever, apart from any increase in pulse rate. The normal pulse-respiration ratio of 1 to 4 was almost invariably often much disturbed without any lesion being discoverable in the lungs. Sometimes a few subcrepitant rales were present at the base of the lungs.

Pneumonia was present in a number of cases as a complication, and in these the signs present were those indicating that the lesion was patchy and not lobar. Hypostatic pneumonia was present in a certain number of the fatal cases much as it is in any other continued fever. As a sequel of the disease, pleurisy, without effusion, was observed in one case.

*Spleen.*—The spleen was in some cases enlarged, but not markedly so even in those cases in which a blood infection was proved *post mortem*. In no case could the lower border of the spleen be palpated below the costal margin.

*Urine.*—The urine showed nothing remarkable. At the onset it exhibited the usual febrile characteristics, and during the height of the fever a trace of albumen was sometimes observed, but this was considerably less frequent than is the case with such diseases as typhus and pneumonia, where the symptoms are of like severity.

*Nervous System.*—The most marked nervous symptoms were delirium and coma. Even in the protracted cases the delirium was slight, and of a mildly delusional character—the patient was, in general, unaware of his surroundings, and often thought that he was engaged in his ordinary avocations. Muttering was almost always present. When coma occurred, it was either at the beginning or the end of the illness. If the former, it was deep, to the point of complete unconsciousness; but it was noted in the two cases in which this was observed that the patient resisted attempts to touch the region in which the bubo was situated. A curious feature of this resistance was that it was apparently purposive. The patient made the same movements of resistance which a perfectly conscious person would make, showing that, although the higher centres were completely out of gear yet that the brain-poisoning was not so complete as is commonly seen in the coma of other

specific fevers. When the coma supervened at the close of the diseases, it differed in no wise from that which is commonly seen ushering in the lethal exitus.

Muscular tremor was rare, and resembled that of enteric rather than that of typhus. Severe hiccough was present in one instance.

*Organs of Special Sense.—Eye.*—The eyes were, in general, suffused, but photophobia was not observed. The pupil was slightly dilated in most cases, but reacted well to light. Conjunctivitis was occasionally present, and in three cases there occurred, in the third week of the diseases, a unilateral severe injection of the eye, which was very painful. This resisted treatment, and subsided only on the patient's return to health. From such inflammations the plague bacillus was not recovered.

*Ear.*—Deafness was not observed as a symptom, as in some other acute fevers—*e.g.*, typhus and enteric. Otitis media occurred once, and on that occasion the only organisms found were the bacillus pyocyaneus and a diplococcus.

*Pestis Ambulans.*—From the reception-houses four persons who seemed to be suffering from very slight attacks of plague were admitted, so slight that had they come under observation without a definite history of contact they would, apart from a bacteriological examination, be quite unrecognisable. The importance of the matter is further enhanced when it is considered that in these cases the buboes were so small that to put a needle into the substance of the gland was a most difficult matter. The general symptoms which these persons exhibited have been as follows:—In the onset there was headache and malaise, associated with sickness, while vomiting was only occasional. The temperature was only slightly raised—rarely above 100° F., and sometimes not above 99·6°; the pulse was only slightly quickened, and the rapidity of the respirations was not markedly altered. The face was heavy and drowsy-looking, the eyes injected, and the tongue furred.

In general, in addition, the patient looked much more ill than the severity of the symptoms warranted. This look of illness usually persisted for several days after the symptoms subsided. The seat of the buboes in the seven cases has been twice in the left axilla, three times in the sub-maxillary glands, once in the anterior cervical chain, and once in the sub-occipital glands. The glands have been enlarged, with some peri-glandular infiltration, and in one case reddening of the skin. Tenderness has always been present, though not so markedly as in the more severe cases of typical plague, and this tenderness has usually appeared on the second day of illness; it subsided after two or three days, though the swelling of the glands might not be wholly absent even after a fortnight. The clinical picture is fairly constant, though, as before remarked, the illness is not of a severity to be readily diagnosed unless with a definite history of plague contact.

One of these cases occurred in hospital (E. R., case No. 21), in a wardmaid who was in attendance in the pavilions. As they were for plague, she had received a protective inoculation of 10 cubic centimetres of Yersin's serum exactly 10 days previously to her developing an illness in all points exactly resembling that described above. In this case the buboes were in the sub-occipital region, so that their puncture was rendered more easy on account of the firm tissue which lay sub-jacent, and did not involve the same risk as in other cases where the glands affected lay over the main blood-vessels. Typical cultures of the plague bacillus were obtained.

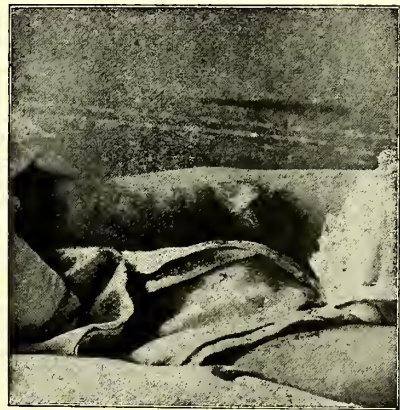




**Case No. 9.—T. H. M., æt. 15.**  
To shew facies of the plague patients.



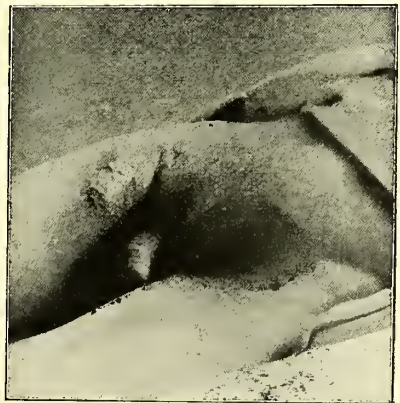
**Case No. 24.—M. M. F., æt. 14.**  
Case of pustular plague, shewing site of pustule and mid axillary  
bubo.



**Case No. 3.—P. F. M., æt. 56.**  
Left inguinal bubo, with necrosis involving the skin.



**Case No. 6.—D. T. M., æt. 6.**  
Right inguinal bubo, forming abscess and about to burst.



**Case No. 1.—J. B. M., æt. 60.**  
Right inguinal bubo, with much surrounding infiltration and cedema.





## CLINICAL HISTORIES, WITH THE POST-MORTEM REPORTS\* IN FATAL CASES.

\* Case No. 1.—J. B., aged 60 years, was admitted to hospital on August 28th, his case being certified as enteric fever. The patient sickened on August 15th, on which date he was suddenly seized with sniveling, nausea, and vomiting, associated with severe headache and slight abdominal pain. The symptoms from their onset were so severe as to make him take to bed, where he remained till his removal to hospital. From August 25th he suffered from diarrhoea, and for the 24 hours preceding admission he was delirious.

*On admission* the patient's face was seen to have the same dull, heavy, and yet anxious look as described in detailing the case of Patrick Malloy. The pupils were moderately dilated and the conjunctivæ were slightly injected. The tongue was coated with a thick greyish fur in the centre, while the edges were moist and clean. There was no congestion of the fauces. The skin presented the same mottling noted before in Patrick M., with the difference that over the abdomen it was much more profuse. In the right groin was a very large tense red and œdematous swelling occupying the situation of the verticle group of glands. This swelling was exquisitely tender and the tissues surrounding it were so infiltrated as to make the appreciation of individual glands by palpation impossible. The lymphatic glands above Poupart's ligament were also palpable and slightly tender, while the skin over the right iliac region, though not reddened, was distinctly œdematous. Elsewhere the lymphatic glands were not palpable. The temperature was 102·8° F., the pulse was soft and weak and numbered 72, while the respirations were at the rate of 24 per minute. The abdomen was slightly distended and rather tense. Nothing noteworthy was detected in the heart and lungs, and the spleen and liver were not enlarged.

*Course of Disease.*—The patient's condition was all along precarious, delirium was almost continuous, although slight, and at no time violent. The pulse was feeble, and at no time during the first 10 days of the disease. Hiccough was present from August 30th till September 8th, though not in a distressing degree. Until the morning of September 2nd the temperature ran a febrile course varying between 100·6° and 103°. On that morning the patient had a distinct crisis and the temperature fell to 97·6°, and there was improved tension in the patient's pulse and he expressed himself as feeling better. After admission the redness and œdema surrounding the swelling in the groin slowly spread until it extended downwards almost to the mid-thigh and backwards over the buttock. At the same time œdema without redness spread from the right iliac region until nearly the whole abdominal wall pitted readily on pressure. This was associated with a distinct increase in the abdominal distension. The inflammatory process reached its height on September 1st, and after that date there was a slow but distinct subsidence of the redness and œdema around the bubo. The œdema of the abdominal wall disappeared, but there appeared coincident with this considerable œdema of the left foot, with tendency to the formation of pressure sores. On September 6th a secondary fever, due to the suppurating bubo, commenced, and the temperature ranged continuously from 100° to 102°. The discharge from the bubo was copious and serous, and there was never any attempt at separation of the sloughs. Patient gradually became more feeble, remained constantly delirious, and died on September 24th (Photograph of bubo, Plate A).

*Post-mortem Examination, 25th September, 1900, by Dr. R. M. Buchanan.*

*External Appearances.*—The body is considerably emaciated. On the trunks, arms, and thighs there is an unusually profuse freckling of the skin. Over Scarpa's triangle on the right side there is a large ulcer measuring 2½ inches by 1½ inches. Its margin is sharply defined, and its floor is a smooth yellowish-white slough. The margin at the inner side is undermined extensively, and a small sinus opening is discharging pus from the upper end of the ulcer.

*Chest.*—Both *lungs* are firmly adherent posteriorly, the right especially. Both are hyperæmic and œdematous posteriorly—the right more than the left. A considerable amount of purulent secretion is present in the bronchial tubes of the right lung.

*Heart.*—The myocardium is pale, and presents on section the characters of cloudy swelling. There are no hæmorrhages in the muscle or pericardium. The curtains of the mitral and aortic valves present much fibrous thickening.

*Liver.*—The liver is of a normal size. It shows slight hyperæmia.

The *spleen* is slightly enlarged, and its tissue firm.

*Kidneys.*—The capsule of each kidney is removed with difficulty, exposing a granular surface with a number of cysts. Numerous small yellow foci are widely distributed over the surface of both kidneys. They have the appearance of small abscesses, but are firm and not surrounded by a zone of hyperæmia.

*Stomach.*—A small ulcer is found near the pylorus on the posterior wall.

The *intestines, pancreas, and bladder* present nothing remarkable.

The right iliac fossa and the right side of the pelvis are occupied by a large partitioned abscess, a large portion of which impinges on and involves the wall of the bladder. From this abscess a sinus runs upwards along the surface of the psoas muscle to the right side of the lumbar vertebrae, and another leads from its lower limits downwards to discharge from the ulcer on the thigh. The abscess cavities contain creamy pus and masses of necrotic tissue. A purulent infiltration of the subcutaneous tissues is traced nearly half-way down the thigh.

The *left inguinal glands* show some enlargement, but no evidence of inflammatory action.

A pure culture of bacillus pestis was obtained from puncture of the bubo on the night of admission.

\* The Temperature Charts of those cases marked with an asterisk are given on the lithographed plates at the end of this Section.

\* Case No. 2.—Mrs. T., æt. 40, admitted August 25th, 1900.—Certified “Typhus Fever.” Patient took ill *ten* days prior to admission, the onset of the illness being severe. Headache, sickness, and vomiting were the most marked symptoms. Patient was three months pregnant, and aborted four days before admission. It seems to be quite certain that at this time she made complaint of pain in the left groin, but when this first appeared could not be definitely ascertained, as patient was very ill, and her mental condition much obscured. On admission the temperature was 103.2°; pulse, 128; respiration, 44. The face was flushed and heavy, the eyes suffused, and the tongue dry. The pulse was very soft and feeble, resembling that of typhus. Nothing worthy of record was discovered in the lungs. The discharge from the vagina was scanty and sanguinolent, with no bad odour. In the left groin, above Poupart’s ligament, there was a large swelling of about 4 inches in length and 2 inches in breadth, which was very tender. The skin over this swelling was markedly inflamed. Patient’s temperature came down after admission by rapid lysis, reaching the normal on the morning the crisis, felt fairly well, but the bubo became secondarily infected, and she had a continued of August 28th. From cultivations made after puncture of the bubo on August 29th, a pure culture of *B. pestis* was recovered, after an unsuccessful attempt to recover the bacillus on the previous day.

. . . The patient, after the crisis, felt fairly well. The bubo ruptured spontaneously on September 5th, and discharged a sero-purulent fluid. Secondary infection of the bubo occurred, and patient had a remittent pyrexia until 16th September, when she had a rather severe rigor, and examination of the chest showed the presence of a left-sided pleurisy. Thereafter the temperature remained highly febrile for two days, after which it resumed its previously remittent type, the pleurisy at the same time disappearing. On 22nd September a similar dry pleurisy on the right side was ushered in by rigor and rise of temperature, which lasted for three days. On 25th September pain in the left ear was complained of, and next day a free discharge of pus through the external auditory meatus occurred, after which the temperature fell to normal, and remained steadily so until dismissal. By October 2nd the ear was completely healed. Cultivation made from the discharge from the ear showed marked growth of *B. pyocyaneus* and small colonies of *adiplococcus*, but no *B. pestis*. Convalescence was good.

\* Case No. 3.—P. F., admitted to Hospital, 29th August, 1900. Patient took ill on 14th August with headache, sickness, and vomiting, diarrhœa, and extreme malaise. Two days later he complained of pain in the left groin, and, examining the region for himself, he discovered a swelling, of which he was unable to state the exact size. The diarrhœa quickly subsided, whilst the symptoms, especially the vomiting, persisted for more than a week. The swelling in his left groin steadily increased and remained intensely tender till admission.

On admission, temperature was 103°; pulse, 86; respiration, 36. The patient was evidently acutely ill, the face drawn and anxious-looking. The eyes were suffused and the pupils slightly dilated. The skin was dry and hot, and the lips tended to crack. The tongue was very dry, except at the edges, and there was a brownish fur on the dorsum. The pulse was very small and feeble. The heart’s sounds were muffled. Nothing noteworthy was discovered in the lungs. In the left inguinal region was a large swelling over which the skin was reddened and inflamed. It filled up the whole groin, and on palpation was found to be very hard and tender. This swelling was evidently glandular in origin, and the tissues in its neighbourhood were markedly œdematous. There appeared to be little or no involvement of the glands above Poupart’s ligament.

During the first few nights after admission patient was delirious, and remained so until the temperature fell to normal, which occurred in the morning of 3rd September. On 6th September, slight ichorous discharge made its appearance at the site of a puncture made in the bubo on the night of admission. The skin at this point began to necrose, and on 9th September the sloughing skin was cut away to admit of free drainage. During this time, and up till 7th September, a hectic temperature was maintained, but on that date a large mass of necrosed tissue was removed from the groin, after which the temperature became normal, and the wound granulated until, by 6th October, it was completely healed.

On 6th September the suffusion of the right eye had passed away, but there was present a most intense conjunctivitis of the left eye. This condition was very troublesome, and did not disappear until convalescence became fully established.

The patient was left greatly enfeebled by his illness, and convalescence was very slow (Photograph of bubo, Plate A).

Case No. 4.—J. C., reported page 65.

\* Case No. 5.—Mrs. M., aged 40 years. Admitted to hospital August 25th. Case certified as “enteric (?)”

*History.*—The patient on the night of August 10th was at the wake of a Mrs. B. On admission the patient stated that she was first seized on August 20th with shivering, vomiting, severe headache, diarrhœa, and slight pain in the abdomen. Next day she felt uneasiness in the right groin, and on examination she found a small swelling which was very tender. The general symptoms became more urgent and the swelling in the right groin increased rapidly in size and in tenderness. During the whole of her illness she was confined to her bed.

*Condition on Admission.*—The patient was quite intelligent, but looked very ill. The face was slightly flushed and wore a rather anxious expression. The pupils were moderately dilated, but there was no injection of the conjunctivæ. The tongue was moist and only slightly coated in the centre with a whitish fur. The skin was hot and dry, and no eruption was noticed on any part of its surface. In the right groin there was a mass evidently composed of enlarged lymphatic glands surrounded by



inflammatory tissue to the extent of obliterating the fold of the groin. The skin over the mass and for a considerable area around about, particularly laterally, was deeply reddened and oedematous. Over this area the tenderness was extreme, much exceeding that usually elicited in ordinary infective buboes. At the upper border of the swelling deep palpation showed that numerous glands in the deep group of lymphatics were also enlarged and tender, but there was practically no infiltration of the cellular tissue of this region. The skin over the right iliac region was normal in appearance. The glands in the left groin and in the axillary and cervical regions were not palpable. Nothing noteworthy was discovered in the heart or in the lungs. There was no enlargement of the liver or of the spleen. The temperature was 102° F. The pulse was soft and full, numbering 92 per minute. The respirations were easy and numbered 28. In the evening the patient complained of very severe headache confined to the frontal region. The temperature was 103·4° and the pulse was 112, while the respirations had increased in rapidity to 30 per minute. On August 26th there was practically no change in the patient's condition. The morning and evening temperatures were respectively 102° and 101·8°, and the corresponding pulse-rates were 72 and 80. On August 27th the morning and evening temperatures were 102° and 100·4°, and the pulse-rates were 76 and 80. Though the respiration-rates corresponding to these were respectively 30 and 26 there was no evidence of any pulmonary lesion. August 28th was the day of the crisis, the temperature falling during the day from 101·4° to 98·6°, the pulse showing a corresponding drop from 78 to 64. At the same time the headache, which had been a clamant symptom up till that date, disappeared, and although no obvious change had occurred in the bubo in the right groin the tenderness was distinctly less. The patient also expressed herself as feeling much better. After the crisis patient's recovery was continuously good. The bubo gradually subsided and spontaneously ruptured. For a considerable time healing was slow and a thin serous discharge continued for some weeks; from this the bacillus of plague was not recovered. She left well on October 6th.

*Bacteriological Examination.*—Four hours after admission a puncture was made into the glandular mass in the right groin and some blood was withdrawn. From this cover-glass films were made and glycerine agar tubes were inoculated. Immediate examination of the films after staining with gentian violet showed the presence of considerable numbers of short bacilli morphologically identical with the bacillus pestis. The inoculated tubes were incubated at 37° C., and 24 hours later a faint white surface-growth had appeared composed of small translucent colonies. Microscopical examination of cover-glass preparations made from these colonies stained with gentian violet showed, as in the previous case, that they were composed of short, thick bacilli with rounded ends, showing for the most part well-marked bipolar staining and occurring frequently as diplobacilli. When treated by Gram's method the bacillus was decolourised. The appearance of the cultures and stained films placed the diagnosis of the organism as bacillus pestis practically beyond a doubt (Photograph of bubo, Plate A).

Case No. 6.—D. T., reported page 65.

Case No. 7.—P. M., aged 21 years, admitted August 25th, 1900, his case being certified as "enteric (?)."

*History.*—Patient was living in the same room as his sister, who sickened on August 19th, and died on the 21st. As the patient was not in a condition to give an account of himself, the information was obtained from his mother, who volunteered the following history:—Until three days prior to admission the patient appeared in his normal state of health. On that date (August 22nd) he suddenly experienced a shivering, associated with sickness, vomiting, diarrhoea, and pain in the abdomen. During the night the patient was evidently delirious, and delirium was a notable feature of his illness until the time of admission. With the exception of measles and whooping-cough patient had suffered from no other infectious disease.

*Condition on Admission.*—On admission the patient looked extremely ill. He was nearly in a state of coma. The face generally was of a greyish colour with a more marked circum-oral pallor. In spite of the stupor in which the patient lay the expression of the face was distinctly anxious; there was marked knitting of the eyebrows, the eyes were widely open, and the conjunctivæ were slightly congested. The respirations were slow, numbering 18 per minute, and sighing. The skin generally was hot and dry. It was covered with a faint purplish mottling most marked across the lower part of the abdomen, the arms, and the buttocks. The characters of this eruption somewhat resembled the sub-cuticular mottling of typhus fever. The tongue was moist, and covered in the centre with a thick greyish fur, while the edges were clean and red. There was no congestion of the fauces. There was in the upper part of the deep cervical chain a swelling composed of one moderately enlarged and several slightly enlarged lymphatic glands. The tissues surrounding these were markedly infiltrated and the skin was reddened and oedematous. Manipulation of this swelling was evidently very painful. There was no enlargement of glands in the right cervical region or of the superficial chain on the left side. The right axilla was filled with a large mass evidently composed of lymphatic glands embedded in oedematous cellular tissue. Here, again, the skin was red and oedematous and movement of the arm or even the lightest palpation gave rise to exquisite pain, evidenced by the wincing of the patient even in his comatose condition. In the left axilla a few glands were slightly enlarged, but not tender. No enlargement of glands was apparent in either groin. The temperature was 103·6, the pulse was very soft and easily compressible, and numbered 128 per minute. The lungs revealed nothing noteworthy on physical examination. The cardiac sounds were pure; the first sound was rather weak. The abdomen was not distended and was neither painful nor tender. There was no apparent enlargement of either liver or spleen. Exploratory puncture of the glands of the axilla was

performed, and an immediate examination of films prepared from the blood withdrawn revealed the presence of a considerable number of bacilli morphologically identical with the bacillus pestis of Kitasato.

On August 26th the general condition of the patient remained much the same, though the respirations were more rapid, numbering 28 per minute, but the local conditions had undergone marked alteration. In particular the lymphatic glands on the left side of the neck before mentioned were much more enlarged and the superficial glands on that side were now considerably involved. Late in the afternoon the glands in the left groin were easily palpable and slightly tender. The oedema in the right axilla was more extensive, involving the anterior border. The spleen was found to be enlarged to percussion, though not palpable below the costal margin. The temperature at 6 A.M. was  $102.4^{\circ}$  and at 6 P.M.  $104.4^{\circ}$ . The pulse in the morning was 112 and in the evening 132, and even softer than on the previous day. On this evening the glycerine-agar cultures made after puncture of the glands on the 25th and incubated for 24 hours at  $37^{\circ}$  C were examined. There was a faint surface growth composed of minute whitish translucent colonies. Cover-glass preparations were made from this growth and stained with an aqueous solution of gentian violet. These showed the presence in pure culture of a short bacillus with rounded ends, tending to run in pairs and showing well-marked bipolar staining. The bacillus was decolourised by Gram's method. The character of the culture and the morphological appearances of the bacillus and its staining reactions confirmed the diagnosis made from the examination of the films on the 25th that the organism under consideration was the bacillus pestis.

On August 27th the local conditions had if anything advanced, but the general condition of the patient was rather better. There was a little less mental obtuseness, though it was still with great difficulty that he could be got to show his tongue. This improvement, however, was not maintained. By mid-day the patient was cyanosed and the pulse was notably weaker. He sank rapidly and died at 3.35 P.M.

*Post-mortem Examination, 28th August, 1900, by Professor Muir.*

The body of the deceased is that of a fairly well nourished though rather slightly built man. There is a distinct swelling in the right axilla and also a well marked swelling in the left side of the neck. In the left groin there is a fairly distinct swelling and also a very slight one in the right groin. Well marked hypostasis and diffuse congestion exist in the region of the neck.

*Thorax.*—The pericardium contains about half an ounce of blood stained serum. The right side of the heart is greatly distended with dark coloured partially clotted blood, while the left side is rather contracted and empty. The cavities are of normal size and the valves appear healthy. The heart muscle is rather paler than normal, but not specially soft. Over the apex of the left lung are a few old adhesions. There is no fluid in the pleural cavities. The lungs show marked hypostatic congestion and also some collapse but no pneumonia. The glands at the root are not visibly affected. The bronchi contain some purulent mucus. The right lung is adherent all over, especially over the lower lobe. There is an old cicatrix on the chest wall over this part (resection of rib?) This lung is otherwise in a practically similar condition to the other.

*Abdomen.*—The peritoneum is normal. The spleen is enlarged, weighing  $12\frac{1}{2}$  ounces, the increase being chiefly in breadth. The consistence is softer than normal, but by no means diffident. The pulp presents a pale and mottled appearance and the Malpighian bodies are small and distinct. The liver is somewhat swollen, pale, and soft, and evidently the seat of cloudy swelling in a marked degree. Both kidneys are somewhat swollen and soft, owing to cloudy swelling of the cortex. No hæmorrhages exist. The pancreas is slightly swollen and softer than the normal. The suprarenal bodies also are rather swollen and softened.

*Lymphatic Glands.*—The glands in both groins show enlargement especially in the vertical group along the vessels. They are somewhat irregular on the surface, extremely tense, much congested, and show small hæmorrhagic points. The substance is rather softer than normal, and there is no evidence of suppuration. The enlargement also affects the glands along the inguinal vessels and some of them are distinctly hæmorrhagic. The retro-peritoneal glands along the aorta show great swelling, but none of them reach a great size. In the right axilla there is a large swelling almost as large as a closed fist, composed of a mass of enlarged glands bound together by infiltrated tissue. The largest single glands are about the size of a small plum. They are of a dark red colour, owing to the diffuse hæmorrhages into their substance, and here and there show partial softening. The periglandular tissue is the seat of a gelatinous oedema with diffuse hæmorrhages. The involvement of the glands extends upwards behind the clavicle. On the left side there is great enlargement of the cervical glands below the sterno-mastoid muscle, where there is a large irregular mass; the axillary glands are also affected, though to a much less degree than on the right side. The amount of hæmorrhage is extreme, some of the glands presenting a deep crimson colour and being also much softened. Here, also, there is much inflammatory infiltration. The glands in the upper mediastinum are also enlarged and surrounded by inflammatory oedema. A scraping from one of the inguinal glands shows enormous quantities of the bacillus pestis.

Case No. 8.—W. M., aged three years, 57 Thistle Street, Glasgow, was admitted to the Belvidere Hospital on August 25th. This child is the son of Mrs. M., and is stated by his mother to have become ill on August 21st. His symptoms appear to have been very slight. They consisted solely of slight pain in the abdomen and general malaise. On admission the temperature was  $99.6^{\circ}$  F., the pulse was 106, and the respirations were 22. The child's expression was dull and the face was very pale. There was a markedly enlarged gland in the submental region of about the size of a large marble. This gland seemed to be hard and adherent, and the skin above it was



slightly red. This gland, the mother distinctly stated, was not present prior to this illness. The glands in the axillæ, neck, and groins were palpable, but were not markedly enlarged. Those in the right groin were the most obvious. Nothing noteworthy was detected in either lungs, heart, liver, or spleen. On August 26th the temperature reached  $100.6^{\circ}$  but without any aggravation of the symptoms; since then the temperature had been normal and the child fairly well. The submental gland above noted decreased steadily in size till at the end of 10 days it was barely perceptible. No bacteriological examination was made in this case.

\*Case No. 9.—T. H., aged 14 years, was admitted to hospital on August 29th, his case being certified as "enteric fever (?)." He sickened on the 23rd. On the 23rd the patient was seized with headache, retching, and pain in the back and right axilla. He was fevered, restless, and delirious at nights after the onset of illness. The pain in the right axilla rapidly became worse, and was followed by pain in the left side of the neck and in the right groin.

On admission the patient's face was flushed and the expression was dull and heavy. He had the same apprehensive expression described in previous reports. The pupils were dilated and the conjunctivæ were fairly clear. The lips were dry and there was well-defined circum-oral pallor. The tongue was coated in the centre with a greyish white fur, but was clean and moist at the tip and edges. The skin was hot and dry; it presented a faint mottling which was most marked on the back, flanks, and buttocks. As the patient lay in the dorsal decubitus the right thigh was slightly abducted and the leg was semi-flexed. There was a general enlargement of the glands in the groins, the axillæ, and the neck. The glands in the right axilla and the right groin were distinctly the largest and exceedingly tender. No complaint of pain was made on palpation of the glands of the left groin, the left axilla, or the neck. The skin over the right axilla and the right groin was slightly reddened, but was not œdematous. The temperature was  $104.6^{\circ}$  F., the pulse was 140, and the respirations were 26. The pulse was easily compressible, but quite regular. The respirations were easy. Examination of the lungs revealed nothing except a few sub-crepitant râles in the left baso-lateral region. On auscultation over the cardiac area a faint systolic murmur was heard both at the apex and in the pulmonic region. The abdomen was slightly tympanitic to percussion, especially in the right iliac region. The spleen was enlarged both in its longitudinal and transverse diameters.

*Course of Disease.*—Until September 2nd the general condition remained the same. There was no visible increase in the size of the enlarged glands. He was very restless at nights, having delirium with delusions. Fever was high, the temperature ranging from  $103^{\circ}$  to  $105^{\circ}$ . The pulse was rapid and feeble. Considering the stress and duration of the fever there was a notable absence of some of the commoner symptoms of high fever—viz., subsultus tendinum and dryness of the mouth and tongue. Headache was constantly present. On August 31st a marked injection of the right eye was observed, with slight prominence of the eyeball. On September 2nd a consignment of Yersin's anti-plague serum was received. It was decided, after consultation, that this patient was a suitable subject for serum treatment. Accordingly, at 12 midnight, an intravenous injection of 15 cubic centimetres, and at the same time a subcutaneous injection of 25 cubic centimetres of the serum, were made. The patient slept well after the injections, and perspired freely for the first time since admission. Next day brought no remission of the temperature, but the buboes in the right groin, which had been extremely tender on the previous day, could now be touched without the patient experiencing more than a slight sense of pain. A like lessening in the tenderness of the axillary bubo was also quite manifest. A fall of temperature amounting to  $4^{\circ}$  occurred on the night of September 3rd, and since then the improvement has been maintained. On September 9th there was an recurrence of pain in the right groin, associated with a temperature oscillating between  $98^{\circ}$  and  $101^{\circ}$ . After this the convalescence was uninterrupted and good.

A pure culture of the bacillus pestis was obtained after puncture of the axillary bubo on the day after admission (Photograph to illustrate plague facies, Plate A).

Case No. 10.—R. M., reported page 65.

Case No. 11.—W. W., æt. 42, admitted 20th September, 1900. Patient was working on a ship laid up for repairs on return from India, and four weeks prior to admission he became ill. His general symptoms were very indefinite. A large and tender bubo on the left groin, which apparently made its appearance with the onset of the general symptoms, was the chief cause of complaint. This was incised by his own medical attendant a week after its appearance without any pus being found. A fortnight later it was again incised, but again no pus was found. The next week a profuse discharge of pus from the incision commenced, and patient was sent to the Western Infirmary, and thence to Belvidere on the suspicion of his having plague. On admission he was evidently very ill. The temperature was  $100^{\circ}$ ; pulse, 88; respiration, 50. His intelligence was clouded, and he was unable to give any satisfactory account of his illness. The face was livid and congested, and the eyes suffused and wandering. The tongue was dry, and coated with a yellowish-white fur. Nothing abnormal was discovered in the lungs. In the left groin there was a large swelling, over which the skin was very livid, and which was bisected by a large vertical incision, from which a large quantity of ichorous fluid was exuding. In this fluid, on direct microscopical examination, numerous degenerated bacillary forms were observed free in the fluid, and also contained in the leucocytes. No definitely typical forms of *B. pestis*, however, were seen, and none could be isolated by culture. The bowels were constipated, and the urine contained a trace of albumen.



During the time this patient was in hospital his temperature ran a continuous hectic course. He was delirious, tending occasionally to become violent. The discharge from the bubo became very profuse and ichorous. On 2nd and 3rd October, 55 cubic centimetres of Yersin's serum were administered without any effect. He gradually sank, and died on 6th October. It is to be noted, however, that the bacillus pestis was recovered post-mortem.

\*Case No. 14.—A. D., aged 18 years. On the evening of August 28th he was seen on account of his having been taken ill. The patient was very drowsy, so much so that he manifested no reflex on touching the conjunctiva with the finger. There seemed to be no suspicion that this was due to alcohol. Headache, sickness, and vomiting had been marked and severe just before arrival, but had temporarily subsided. The temperature was normal, and the pulse was 70. All the glands of his body which were accessible to palpation were examined without anything abnormal being discovered. Next morning the patient was somewhat better, but he was kept in bed. In the afternoon a recurrence of the headache and vomiting took place. The sub-maxillary glands in the left side were complained of and found to be enlarged. The temperature was 99.6° F. He was straightway sent to hospital.

On admission the patient had that heavy and obfuscated look which has been already described in such cases, with injection of the conjunctivæ and slight dilatation of the pupils. The sub-maxillary glands were considerably enlarged and painful on palpation. Next morning the temperature was 99°, at which elevation it remained all day, but a consistent normal temperature was not maintained till the seventh day of the illness. The pulse, on admission, was 72, and had, on the latter date, declined in rate to 50, while the respiration rates were respectively 24 and 20.

The tenderness of the glands persisted for about three days, when it gradually subsided, but the swelling has not, even at the date of writing (September 18th), completely disappeared. The aspect of illness was more marked and lasted longer than would have been expected from the local conditions had the latter been due to ordinary causes. As possible causes of the condition which were definitely excluded may be mentioned caries of the teeth, faucial catarrh, and nose or ear mischief. Puncture of the gland was attempted only once, as it immediately overlay the deep vessels of the neck, and the culture proved sterile. It is, however, open to doubt whether the needle actually penetrated the substance of the gland.

\*Case No. 17.—A. R., reported page 67.

Case No. 18.—G. H., æt. 46, admitted September 12th.—Patient was admitted about midnight. He was evidently ill. His intellect was clear but his expression anxious. He made no complaint of pain, but in the right groin a marked swelling was noticed about the size of a hen's egg. The tissues round about were infiltrated and the skin reddened. It resembled the plague bubo, as we had already seen it, but there was a complete absence of that tenderness which had been present in all the other cases.

As patient came in very late, and was much exhausted by the ambulance drive, he was not subjected to any physical examination. He collapsed early in the morning, and died of acute heart failure.

Temp. on admission, 103°.

*Post-mortem Examination, 13th September, 1900, by Dr. R. M. Buchanan.*

*External Appearances.*—A well nourished, well developed body, showing a small number of petechiæ scattered over chest, abdomen, and thighs. Over the upper part of the right thigh there is some fulness, in the form of an indefinite diffused slightly œdematous swelling, over the centre of which the skin has a yellowish tint.

*Chest.*—The *pericardium* contains about 1 ounce of clear fluid. The *heart* presents subpericardial hæmorrhage over the base of the left ventricle, and its muscular tissue shows parenchymatous degeneration. The valvular structures are normal.

In the right pleural cavity there are about 20 ounces fluid, and about 10 in the left. The *lungs* are free from adhesion, œdematous and hyperæmic. The *bronchial glands* are deeply pigmented, enlarged, and very hyperæmic, and the cut surfaces reveal some hæmorrhage.

The tissues of the *posterior mediastinum* are infiltrated with blood. The *neck* is the seat of an extensive extravasation of blood. The hæmorrhage, which is more widespread on the right side than on the left, is mainly in the loose intermuscular connective tissue, but is also evident in the substance of the muscles, especially in the sterno-mastoid.

The *cervical lymphatic glands* are hyperæmic, and considerably enlarged.

*Abdomen.*—The *spleen* is of normal size, but the cut surface shows the pulp slightly soft and hyperæmic.

The *liver* is of normal size. On section the tissues present the homogeneous glancing appearance of cloudy swelling in a marked degree. The gall bladder is adherent to the duodenum.

The *kidneys* are large and very hyperæmic. In the loose adipose tissue of the hilus of each kidney there is considerable extravasation of blood.

In the mucous membrane of the *stomach and intestines* numerous small punctiform hæmorrhages are found.

*Glands.*—The vertical set of the *right inguinal glands* has undergone enlargement, and the connective tissue for some distance around is œdematous, the fluid near the glands being of an amber colour. The glands are firmly matted together, forming a diffuse swelling. On median section of this swelling it is seen that one of the glands has attained the size of a walnut, while the others are much smaller. They are all intensely hyperæmic, with numerous hæmorrhages, giving the cut surface a brownish red mottled appearance. The large gland is also somewhat friable. The tissues immediately around the glandular mass are occupied by extravasated blood in large amount.

The *iliac and pervertebral glands* of the same side are hyperæmic and slightly enlarged, and the same is to be said of the inguinal glands of the left side.

\* Case No. 19.—C. M'M., aged 30 years, admitted to the Belvidere Hospital on September 9th. The history of the illness obtained from his friends, and afterwards verified by himself, was to the effect that for about a week before his admission to the hospital he had suffered from moderately severe headache and slight malaise, but he continued at his work until the morning of September 8th, when he had a rigor, with increased severity of the headache and sickness, although vomiting was absent. By noon he was unconscious, and he was delirious all night, and very violent.

On admission the patient was evidently extremely ill. His face was of an ashy colour, with a more marked ring of pallor round the mouth. The conjunctivæ were slightly injected and the pupils were contracted, in contrast to the more common dilatation observed in the other cases. The tongue was moist, with a white fur on the dorsum, but not markedly injected. The temperature was 105·8° F., the pulse was 134, and the respirations were 40. The pulse was soft and compressible, but full. There was no evidence that the patient was in the least conscious of his surroundings. When left alone he tossed restlessly in bed, but betrayed considerable anxiety in his face. On being handled he resisted so strongly that it was impossible for the nurses to wash him. This resistance was extremely marked if the palpation of his left axilla was attempted. In this situation a group of glands was found which were enlarged and acutely painful. (It is to be noted here that the movements of resistance made in opposition to the examination of this bubo resembled those of a person conscious of his actions, and not the purposeless movements usually made in the delirium of typhus or enteric fever.) The only bubo found was in the left axilla; elsewhere, though the glands were slightly enlarged, the enlargement was no more than is often met with in healthy persons. The other organs, on examination, showed nothing worthy of note. At 12 midnight 20 cubic centimetres of serum (Yersin's) were injected into one of the brachial veins, and a like quantity into the subcutaneous tissue of the abdomen. This was done with considerable difficulty owing to the struggles of the patient. At the end of six hours it was seen that the patient had had a light sweat, and that the temperature had fallen four degrees. The pulse-rate was reduced to 108, and the respirations had fallen to 34. The pain in the axilla was markedly lessened, and the surrounding œdema was much less. By the evening the glands could be palpated without undue resistance. A puncture, for the purpose of completing the diagnosis, was made, with the result that the clinical diagnosis was confirmed microscopically. By next day the cultures made at the same time showed typical growths of the bacillus pestis. On this day the temperature was throughout 100°, and the pulse ranged from 64 to 76. The patient felt quite well, and desired to get up. On questioning him it was found that he remembered nothing from mid-day on Saturday (September 8th) till the evening of Monday (the 10th), when he found himself in the hospital. Since the latter date the improvement has been constant, with the exception of a rise of temperature to 101° on the evening of the 14th, associated with a slight recrudescence in tenderness of the glands in the left axilla, which subsided on the next day. The pulse, however, was still weak, and the heart-sounds somewhat toneless. On the 19th and 20th there was a rise of temperature, associated with pain and discomfort in the knee-joint and in the left thigh, as well as in the arms, due in all probability to the serum injected on the 9th. From this point convalescence was interrupted.

\* Case No. 20.—Mrs. B., æt. 29, admitted 14th September. The illness began on the day prior to admission with severe frontal headache and rigor, pains in limbs, and severe pain in the back. There was no sickness, vomiting, or diarrhœa. On the morning of the day of admission pain was felt in the right groin, and on examining this region she perceived a small lump, which was very tender to the touch. Temperature on admission was 100·8°, the pulse was 96, and the respirations were 32.

On admission patient did not look very ill, but the face was somewhat flushed and anxious. The eyes were slightly injected, and the pupils normal. The tongue was moist and slightly furred. The heart and lungs, on physical examination, showed nothing noteworthy, with the exception of a few wheezing râles.

A bubo was present in the right groin, chiefly involving the horizontal chain of lymphatic glands below Poupart's ligament. The vertical chain was only slightly involved, and there was some œdema in the surrounding connective tissue. The skin in Scarpa's triangle was reddened. This bubo was exceedingly tender.

Next day the patient was somewhat better, and as the temperature had fallen no serum was given. On the 16th the temperature was still normal, but the symptoms advanced during the day, and in the evening the temperature rose to 101·2. The bubo was now considerably larger, the connective tissue more œdematous, and the skin more inflamed. 20 cubic centimetres of serum were therefore injected into the skin of the abdomen. Next day the temperature had fallen and the pain



in the bubo considerably abated. On the morning of the 18th, however, the local conditions had again advanced, with extension to the deep inguinal glands above Poupart's ligament. The œdema was much increased, and the redness had extended down the side of the thigh. Consequently 20 cubic centimetres of serum were injected into a vein of the right arm. Towards evening a great improvement in the patient's condition had taken place, and she both looked and felt very much better. Next day the temperature was normal, and, falling to slightly sub-normal in the evening, remained so. Improvement was rapid; the bubo softened and ruptured spontaneously on September 23rd. Convalescence was good.

A pure culture of the plague bacillus was obtained on admission from the bubo. On rupture the discharge proved sterile, but contained many degenerate forms of bacilli, some being free and others contained in the leucocytes.

Case No. 21.—E. R., aged 21 years, was a wardmaid in the wards at the Belvidere Hospital reserved for plague. On September 3rd, as a prophylactic measure, 10 cubic centimetres of Yersin's serum were injected subcutaneously. This produced none of the effects often resulting from it, such as urticaria or articular pains. On the 13th headache and pain in the back were complained of, and nausea was also present, but there was no vomiting. The patient, however, felt very unwell. On the 14th the headache and malaise still continued, and, in addition, tenderness and stiffness in the back of the neck were complained of. The eyes were slightly injected, and the face was flushed and its expression heavy. The tongue was slightly furred, but was otherwise normal. Neither diarrhoea nor constipation were present. The temperature was normal and the pulse showed nothing noteworthy. Behind the ears, in the posterior triangle of the neck, there was on each side a markedly enlarged lymphatic gland—that on the left side being of about the size of an almond, and that on the right side of the size of a bean. Puncture was made into the gland of the left side, and cover-glass films and cultures were made. These showed a bacillus morphologically indistinguishable from the bacillus pestis. By the 15th the tenderness of the glands had subsided, and since that date they have been decreasing in size. The patient was discharged well.

\* Case No. 22.—Mrs. M., 20, admitted September 15th. The duration of the illness was a little doubtful, owing to the difficulty of obtaining an accurate history of the patient from her friends. It was, however, certainly under 48 hours. The onset had apparently been very severe headache, pain in the back, diarrhoea, and great prostration being the most marked symptoms. The patient was very much emaciated, and had undergone great privation for some time prior to admission. The face was pallid, the lips dry and covered with sordes, and the tongue likewise dry, with a brown fur. The temperature was 102·6; the pulse, which was soft and rapid, numbered 140, and the respirations 40. The patient was 8½ months pregnant, and on admission labour was already in progress. The only physical signs observed in the lungs were some subcrepitant râles at both bases. There was a large, indurated, and very tender bubo in the left inguinal region. No rash was observed. On the evening of admission, 20 cubic centimetres of serum were injected intravenously, and 20 cubic centimetres into the area immediately below the left groin, so that it might drain directly into the bubo. At the time of the injection the temperature had fallen to 99·6, and the patient was much collapsed. At 4 a.m. the os was found to be fully dilated, and as by this time the patient's general condition was one of extreme gravity, instrumental delivery was at once effected. The child was born asphyxiated, and after much trouble was resuscitated. No gross lesion of the placenta could be observed. After the birth of the child the patient rallied a little. The temperature rose to 103·8; the tongue and lips became cleaner and moister, and the patient expressed herself as feeling a little better. On September 16th, 20 additional cubic centimetres of serum were injected subcutaneously into the abdominal wall. During the day the patient's state became more and more grave, and she died at 11.50 p.m. A pure culture of the plague bacillus was obtained from the bubo on admission, and also from the blood. On examining the bubo after death no plague bacillary forms which did not bear evidence of the most profound degeneration could be discovered, though in the spleen and other organs of the body typical uncultured forms were easily seen.

*Post-mortem Examination, 18th September, 1900, by Dr. R. M. Buchanan.*

*External Appearances.*—The body is very well developed and well nourished. The abdomen is much distended, and presents the greenish discolouration of commencing putrefaction. With this exception, the general surface of the body is pale. There is a slight fulness observed over the area of Scarpa's triangle on the right side.

*Chest.*—The heart is of firm consistence. Over a small area at the apex of the left ventricle there is a group of small hæmorrhages under the pericardium, extending into the muscle superficially. The muscle is slightly paler than normal, and a slight degree of cloudy swelling is evident. The valvular structures are normal.

The lungs are hyperæmic posteriorly and œdematous.

*Abdomen.*—The liver, spleen, and kidneys are hyperæmic.

The uterus in its form, size, and position, is characteristic of recent delivery. It is firmly contracted, and the internal surface is lined by a filmy coating of blood clot.

*Glands.*—The right inguinal glands are considerably enlarged. The vertically disposed glands together with a retroperitoneal (lower iliac) gland form a chain in which each gland is very similar in

size and appearance. On section they are found to be fully half-an-inch in diameter, while the cut surfaces are of firm consistence, intensely hyperæmic, and darkly mottled. The surrounding tissues are œdematous but free from hæmorrhage. The retroperitoneal gland is the largest of the group in virtue of its elongated shape. The *prevertebral glands* on the same side are also notably affected. The glands generally, including those of the mesentery, are slightly enlarged and hyperæmic.

\* Case No. 23.—Mrs. M., æt. 41, admitted 16th September. The history of the illness was a little difficult to obtain accurately, as the patient was considerably out of sorts for some weeks, but it probably began two days prior to admission. The chief symptoms were severe headache and general malaise; on the day prior to admission she noticed a small tender swelling in the right groin.

On admission, temperature was 102·4, the pulse was 104, and the respirations were 24. Patient complained of very severe headache. The tongue was dry, and the face very anxious looking. In the right groin there was a small bubo about the size of a pigeon's egg which was exceedingly tender. There was also some induration in the tissues round the gland, but the skin was not adherent. The bowels were constipated. Patient was evidently ill. On the evening of admission 20 cubic centimetres of serum were injected into the abdominal wall. Next day there was no change in the patient's condition, with the exception of the fact that the bubo was, if anything, less tender, and, as on the 18th, no further improvement had taken place, 20 cubic centimetres of the serum were injected into a vein of the right arm. In the evening great improvement had taken place in the patient's sense of well-being, and she expressed herself as feeling very much better. The tongue was more moist, the headache had gone, and the pain in the bubo was much less. From this point convalescence was good, no rise of temperature occurring subsequently.

\* Case No. 24.—Mary M., 14, admitted September 15th. Patient on night prior to admission became gradually very ill with severe frontal headache. On day of admission, sickness and vomiting were the most prominent symptoms, but she also complained of a tender swelling in her left axilla. On admission, the temperature was 99·8, the pulse was 120, and the respirations were 28. The face was of an earthy colour, with an anxious look; the lips were dry and the skin was hot to the touch. The tongue was dry over the dorsum, but the edges were red and moist. There was no rash. Four inches from the base of the axilla there was a single small, hard, tender gland, which was freely moveable; at the border of the latissimus dorsi behind there was another gland rather more obvious, but not so tender. No other complaints were made at the time of admission. No serum was given, as the patient did not appear particularly ill. Next evening, the temperature had risen to 101·4. It was then noticed, for the first time, that the patient had on the back, about the level of the spine of the eighth dorsal vertebra, a small pustule. This pustule showed certain distinctive features. It was about a quarter of an inch in diameter, the centre being depressed and covered by a scab, while the edge was raised, and formed of a ring of minute pustules. An inflammatory zone of about 2½ inches surrounded this pustule. Direct microscopical examination of the material obtained from the pustule showed the presence of numerous quite characteristic plague bacilli, whilst in many of the leucocytes degenerating forms of the same organism were apparent. Cultures were made, and a characteristic growth of the organism obtained. 20 cubic centimetres of serum was injected subcutaneously. Next day, 17th September, the temperature had fallen to normal, and the patient was somewhat better; but, although the gland in the axilla was a little less tender, the pustule showed no signs of diminishing. In the evening another area of congestion appeared on the left flank. The following morning the patient's temperature was 102°, and she was apparently considerably worse. The second area of inflamed skin had now a yellowish centre, as if of commencing pustulation. At mid-day, 20 cubic centimetres of serum were injected into the right median basilic. In the evening the patient spontaneously expressed herself very much better, and her temperature was normal. Next day, 19th September, the patient felt very well. The slough in the centre of the pustule had separated, leaving a healthy granulating surface, and the second erythematous area in the flank had almost completely disappeared. From this point convalescence was uninterrupted. (Photograph to illustrate site of pustule and bubo, Plate VI.).

\* Case No. 25.—R. M., æt. 12, admitted 16th September, 1900.—Patient became ill on the evening of 14th September with slight headache. Next morning he was much prostrated, and the headache had become very severe. He also made complaint of acute pain in the left axilla, and this seems to have been from that time up to his admission to hospital his most clamant symptom. No history of rigor, sickness, or vomiting could be obtained. On admission his temperature was 102·4°, the pulse numbered 130, and the respirations 36. The patient looked very ill. The face had the characteristic ashy pallor, with drawn brows. The lips were dry and fissured; the tongue dry and brown on the dorsum, but moist and red at the edges. The eyes were clear, and the conjunctivæ not injected. There was some mental obscuration, dependent partly on the grave prostration, but partly also on his continual dread of the pain consequent on his being even carefully handled. The slightest movement caused the most acute pain, referred chiefly to the left axilla. Palpation in this region revealed the presence of a small indurated gland, which was very tender. Unlike, however, what had been observed in other cases, the tenderness was not limited to the immediate neighbourhood of this bubo, but extended to the outer portion of the pectoral region.

Physical examination of the lungs revealed nothing noteworthy beyond a few localised patches of crepitant râle. There was no dyspnoea, and no evidence of pulmonary engorgement. The heart's



action was very feeble, and the apex impulse widely diffused. The pulse was full and bounding, but of very poor tension. The spleen was not enlarged. The urine contained no albumen. The bowels were constipated.

Twenty cubic centimetres of serum were injected subcutaneously, and also 20 cubic centimetres into the right median cephalic vein on the evening of admission.

On 17th September patient's general condition seemed rather better, the tongue being moister, and the expression of the face less anxious. There was also less tenderness in the left axilla. On the 18th his condition was worse, and an additional dose of 20 cubic centimetres of serum was injected subcutaneously in the afternoon. On the 19th, 20 cubic centimetres were injected intravenously. Next day there was no apparent improvement, the respirations were more frequent, and an increased amount of crepitant râle was audible over both lungs. There was, however, no cough, and no sputum could be obtained. At the outer part of the left pectoral region was an indefinite swelling, feeling, on palpation, as if situated under the pectoral muscle, suggestive of deep abscess formation. The axillary bubo was no longer tender. As the temperature since admission seemed to indicate a pyogenic infection, and as the serum had no effect on its course, no more serum was given, on the assumption that the patient was now suffering from the effects of a double infection rather than from plague alone. This supposition was borne out by the alleviation of the pain, and tenderness at the site of the bubo, and the recent swelling under the pectoral muscle. By the 25th this swelling gave definite signs of deep fluctuation, and was incised after freezing the skin, giving exit to a sero-purulent fluid, which, on cultivation, gave a pure culture of the staphylococcus aureus, but no *B. pestis* was isolated. The abscess was found to be situated under the pectoralis minor. From this time patient's condition became rapidly worse, and he died on September 28th. The respiration was very rapid, but patient was so ill that he was not disturbed by physical examination.

Throughout the urine remained free from albumen, except on the 22nd and 23rd September, when the specimens obtained showed a faint trace.

#### *Post-mortem Examination, 29th September, 1900, by Professor Pertik, Buda-Pesth.*

*External Appearances.*—The body is that of an ill nourished child. The bones are poorly developed and there is great emaciation. The skin is shrivelled; on the back are numerous medium-sized livid *post-mortem* stains. In the left mammillary line in the second intercostal space is a drain opening of about 6 mm. in diameter. A probe can be easily introduced towards the axilla through this opening, which traverses both the pectoralis major and minor. The opposed surfaces of both muscles are brawny and infiltrated with pus. Under the pectoralis minor is a mass, 5 cm. long, 10 cm. broad, and 2 cm. thick, which reaches into the left axilla, and consists of lymphatic glands and connective tissue, semi-fluid, and infiltrated with pus. The former (lymph glands) are partly softened, and of a yellowish-grey colour, and partly of a firmer consistence, showing within smooth, slightly granular cut surfaces, dull areas of coagulation necrosis. The latter (connective tissue) is of the consistence of thick cream, infiltrated with pus, mixed with detritus, fat globules, and puriform masses. In parts of the muscles—the pectoralis minor and the serratus anticus major—there are purulent areas running parallel with the muscular fibres.

*Position of Organs.*—The *diaphragm* reaches on the right side to the inner border of the fifth, and on the left to the upper border of the sixth rib. The *liver* in the middle line reaches 10 cm. under the xyphoid process, and in the right mammillary line reaches 5 cm. below the costal margin. The *intestines* are moderately distended with gas. The lower end of the *ileum* is contracted. In the abdominal cavity, in Douglas' pouch, there is about 60 cc. of clear wine-red fluid.

*Examination of Organs.*—On removing the sternum there escapes about 30 cc. of thin yellow pus from the upper end of the anterior mediastinum. This pus evidently comes from the thymus gland, which has been cut into, and evidently consists of an abscess with a thin wall. The gland itself is about 7 cm. long, and about 2.8 cm. in thickness at the base.

*Lungs.*—The anterior edges of the lungs are considerably congested, and adherent to the chest wall, especially on the right side. The right lung is very large, as in the state of deep inspiration. On superficial examination there are seen several sub-pleural nodules, free from air, and of a pale yellowish-red colour, about the size of hazel nuts. These appear above the level of the crepitant depressed lung substance. The middle lobe is enlarged and non-crepitant, of liver-like consistence. The cut surface shows many areas of a reddish-grey colour, tough, non-crepitant, and exuding fluid. After scraping with a knife the surface appears finely granular, and allows the lobular structure of the middle lobe to be clearly recognised. At the cut surface of the upper and lower lobes the hyperæmic lung tissue, which here exudes much frothy fluid, and is also in parts atelectatic, appears depressed, and within that tissue are prominent areas about the size of a hazel nut, which show the characteristics of disseminated lobular pneumonia. In the lower lobe some of these areas reach the size of a walnut. In the *left lung* are about twenty similar nodules of lobular infiltration, which in the lower lobe, and more especially at the hinder and lower edge, are wedge shaped. The *bronchial glands* are greatly enlarged; they are pale, and at the cut surfaces show a few opaque spots.

The *thyroid gland* is small, and of a pale reddish-brown colour, with a finely granular surface.

The *larynx* and *trachea* have the mucous membrane congested, and covered with a reddish-yellow frothy secretion.

The *Heart*.—In the pericardium are about 20 cc. of a finely flocculent clear serum. The right heart is in complete diastole, the left in moderate systole. The apex of the heart is formed by the left ventricle—the size about that of a child's fist. In the heart there is soft dark-red clot and fluid blood. The myocardium is very friable and opaque looking, "cloudy swelling." The substance

is pale yellowish-brown in colour. These characters are especially well marked in the papillary muscles. The valves are patent.

*The spleen* is enlarged 8 cm. long, 3·5 broad, and 2·5 thick. The capsule is thin and stretched. The cut surface is smooth. The pulp is not easily removed from the stroma. The malpighian bodies are enlarged and hyperæmic, of a dark-brown colour, perhaps also hæmorrhagic.

*The suprarenals* are of medium size; the substance is somewhat injected.

*The kidneys* are of medium size. The cortical substance is friable, opaque, and without obvious fatty change. The cut surface projects a little beyond the medulla. It is of a pale reddish-yellow colour. The medulla is congested, and its cut surface is slightly depressed. The bladder is distended and filled with flocculent yellow urine.

*The stomach*.—The mucous membrane is injected. In the neighbourhood of the pylorus are a few small punctiform hæmorrhages.

*The liver* is of medium size. The capsule is thin and stretched and smooth. The tissue generally is friable, and is in a state of "cloudy swelling." Its colour is a pale yellowish-brown.

*The intestines* have mucous contents. At the lower end of the ileum are three circumscribed injected areas. The solitary follicles and mesenteric glands are not enlarged.

The inguinal glands on both sides, and the right axillary glands, are about the size of beans, of a greyish-yellow colour, with a smooth cut surface and ordinary consistence.

*Diagnosis*.—Purulent, left-sided, sub-clavicular, and axillary bubo. Polyadenitis. Abscess in the thymus gland. Lobular pneumonia of both lungs, here and there necrotic. Hyperplasia of the spleen. Parenchymatous degeneration of the myocardium, liver, and kidneys. (Bubonic Plague with secondary lobular pneumonia.) Proximate cause of death—parenchymatous degeneration of the heart muscle, and resulting cardiac failure, with hyperæmia and œdema of the lungs.

\*Case No. 26.—Mrs. G., age 24, admitted 19th September. Patient became ill on the day prior to admission. The initial symptoms were not of great severity, slight headache and a feeling of general malaise only being complained of. Coincident with these symptoms a tender swelling was discovered by patient herself in the right groin. It is to be noted, however, as accounting, perhaps, for the comparative mildness of the onset, that seven days prior to the commencement of illness she had received a prophylactic injection of 10 c.c. of Yersin's curative serum. On admission patient did not look as if she were very ill. Frontal headache of moderate severity was complained of, and in the right groin, involving the vertical chain of glands, the above-mentioned swelling, which was about the size of a walnut, was observed. The glands were more or less adherent to one another, and also to the subjacent tissues, but the overlying skin was freely moveable and not inflamed. The tongue was moist and clean; the bowels were constipated. The illness had interrupted the suckling of a three-months'-old child, and on this account the breasts were enlarged and tender. The course of the illness, however, was short, lasting in all about five days, and the only clamant symptom complained of was the frontal headache. The fever was maintained at a high level for two or three days, ranging between 100° F. and 104° F., but other symptoms were not present in like severity. The pyrexia might be regarded as due to three factors—1st, the attack of plague, probably the most important; 2nd, the condition of the breasts, which became very large and tender; 3rd, serum fever. The maximum temperature occurred on the ninth and tenth days after the prophylactic injection of serum—i.e., at the period when the pyrexia due to serum usually made its appearance. On October 4th spontaneous rupture of the bubo took place, and from the discharges obtained on that day virulent plague bacilli were recovered. From this point onwards convalescence was rapid and complete.

\* Case No. 27.—Mary G., æt. 6, admitted September 19th. This patient, who is the daughter of Mrs. G., and niece of Charles M.M. (Cases No. 17 and No. 13), became ill on the day prior to admission with severe prostration and headache.

On admission patient's temperature was 101·2° F., the pulse was 146, and the respirations were 44. The aspect was that of a person acutely ill. The face was pale and somewhat cyanotic, the lips dry and blue. The tongue was dry over the dorsum, but the edges were moist and clean. The child lay in a semi-comatose state, and did not even recognise her mother, who lay in the next bed. The right inguinal region was the seat of a swelling about the size of a hen's egg, and on examination this was seen to consist of a mass of enlarged and tender lymphatic glands. There was also some periglandular infiltration, but no reddening of the skin. Examination of the lungs failed to detect anything noteworthy.

On the evening of admission intra-venous injection of the curative serum was attempted, but without success, as the veins were very thin-walled and deeply embedded in a thick layer of adipose tissue. 20 c.c. of serum were therefore given subcutaneously into the wall of the abdomen.

Next evening the child was rather worse, the temperature somewhat higher, and the pulse softer and more compressible. A second attempt to inject serum into a vein failed, and accordingly 40 c.c. of serum were again injected into the wall of the abdomen. The following morning the patient's condition was, if anything, slightly better, though she was still more or less unconscious. The pulse, however, was firmer, and the respirations somewhat slower. A third attempt at intra-venous injection having failed, 40 c.c. of serum were injected for the third time into the abdominal wall. In the evening a very marked improvement was observed, the child having regained its natural colour, and being now quite conscious for the first time. She smilingly recognised her mother. The improvement, however, was not maintained beyond the following morning. On the evening of the



22nd the temperature again rose, and the pulse became very feeble. From this point onwards patient sank steadily. Death was associated with marked hypostatic congestion of the lungs, and was directly due to heart failure. No additional serum was given on account perhaps of undue timidity, for, as by this time, moderately severe constitutional disturbance following on small doses of the serum had been frequently observed in healthy persons, it was not deemed advisable to persevere with the treatment.

Case No. 28.—Baby M., born in Hospital, 16th September, at 4.30 a.m.—Though the mother had a blood infection of *B. pestis* (v.s.), the placenta showed no macroscopic lesion. At birth the child was completely asphyxiated, and no spontaneous attempt at respiration was made for almost three-quarters of an hour.

For eight days the child seemed to be quite well, but on the ninth day it was observed that the neck seemed rigid, and on examination some induration was discovered on the left side of the neck, high up, at the posterior border of the sterno-mastoid. Next day a few isolated glands could be felt, about the size of a pea, in the above-mentioned situation, and the group of glands lying in the anterior triangle of the neck were by this time also affected. On the right side there were also some enlarged lymphatic glands, but not so large as those on the left side. The temperature, which had previously not risen above  $99.6^{\circ}$ , rose on this evening to  $101^{\circ}$ . Next day the child refused its food, and vomited frequently. The child rapidly sank, and *died* on the following afternoon.

*Post-mortem Examination, 27th September, 1900, by Dr. R. M. Buchanan.*

*External Appearances.*—The body is that of a well-formed infant of recent birth. There is lividity of the whole surface. The circumference of the neck is greatly increased by an ill defined elongated swelling along the line of the hinder border of the sterno-mastoid muscle on each side, and diffuse swelling of the front and back of the neck.

*Chest.*—The heart shows very marked parenchymatous degeneration, the muscle having a pale, granular, parboiled appearance. Its cavities are all occupied by soft very dark coloured blood clots.

The *pleural cavities* contain opaque yellow fluid. The pleural surface of both lungs, in the lateral aspect, shows a thin film of fibrinous exudation.

The *left lung* appears intensely hyperæmic and partly consolidated. It floats in water. The pleural surface presents a considerable number of minute hæmorrhagic points, several of which have a yellowish centre. On section similar hæmorrhagic areas are disposed throughout the substance of both lobes in the manner of a broncho-pneumonia.

The *right lung* is rather more consolidated and more hyperæmic than the left, and the pleural surface shows a larger number of minute yellow points with a marginal zone of intense congestion or hæmorrhage. In the lung substance hæmorrhagic lobular consolidations are also more numerous and more extensive.

*Abdomen.*—The *spleen* is much enlarged and of a firm consistence, resembling that of the liver. Section of the organ displays intense hyperæmia, the cut surfaces being very dark in colour, and having a homogeneous, glossy appearance.

The *liver* is enlarged and extremely hyperæmic, very dark blood flowing freely from the vessels on incision. Its substance shows very marked cloudy swelling, and parts of the cut surface are very pale. A small number of minute yellowish foci, from 1 to 2 mm. in diameter, are distributed throughout the organ. Those at the surface are not raised, and they are all of firm consistence. The capsule of Glisson is œdematous.

The *kidneys* are hyperæmic, and the cut surfaces are studded with minute hæmorrhagic foci, disposed chiefly in the pyramids. The cortical tissue is dull, opaque, and of a brownish-yellow colour.

The *right supra-renal gland* is considerably swollen, and median section displays the whole organ transformed into a dense yellow cheesy looking mass by coagulation necrosis. The *left supra-renal gland* is very hyperæmic. Its medullary tissue is notably œdematous, the fluid being sanious.

*Glands.*—There is a general enlargement, with hyperæmia of the lymphatic glands. The *mesenteric*, *inguinal*, *prevertebral* and *bronchial* glands are all hyperæmic and increased in size, while the *axillary* and *cervical* glands have undergone great enlargement.

The *axillary glands* are in the form of a flattened mass rather larger than an almond, with œdema and hyperæmia of surrounding tissues. On section these glands appear intensely congested, but no hæmorrhage or necrosis is detected.

On dissecting the tissues of the neck to expose *cervical glands* a hæmorrhagic œdema of the subcutaneous tissue is displayed. The glands behind the sterno-mastoid muscles form a dense elongated mass on both sides. The glands comprising each mass are seen on section (Fig. 2) to have attained a size varying from an eighth to half-an-inch in diameter. All are intensely engorged and some are necrosed. The latter are opaque, finely granular, and greyish, or finely mottled, brownish-red, and grey.

A similar mass of enlarged glands is found on each side of the larynx and trachea, most of the glands in which present this hæmorrhagic granular opaque appearance of necrosis.

The occipital tissues are œdematous, and the occipital glands partake in the general enlargement, without necrosis.

The *Thymus gland*, the larynx, and the trachea are hyperæmic.

The *stomach* presents a few small slightly hyperæmic patches. The intestines are normal.

Case D.—Mrs. G., æt. 55, admitted September 1st.—Patient was admitted in a comatose condition from which she could not be roused. No definite history could be obtained, but the illness probably dated from August 21. On admission the temperature was 102°2, the pulse 104, and the respiration 36. The tongue was dry and brown and the gums covered with scales. The expression was that of stupor. The eyes were injected and the pupils contracted. The skin was covered with a mottling resembling that of typhus. The heart's sounds were very weak and the lungs showed signs of marked hypostatic congestion. In the left groin, above Poupart's ligament, was a sausage-shaped swelling, evidently consisting of enlarged lymphatic glands, not, however, tender. She remained comatose, sank gradually, and died on September 4th.

*Post-mortem Examination, 4th September, 1900, by Dr. R. M. Buchanan.*

*External appearance.*—The skin generally is dusky, and the surface of the abdomen is marked by a faint typhus-like mottling; numerous petechiæ are visible over the abdomen and thighs.

*Chest.*—The heart is soft and flabby, the muscular tissue appearing pale brown on section. The cusps of the aortic and pulmonary valves are slightly thickened and fenestrated.

The right lung is firmly adherent all over. It is hyperæmic and œdematous posteriorly, and the lower lobe shows some condensation in indefinite areas.

The left lung is hyperæmic and œdematous.

*Abdomen.*—The spleen is soft and diffuent. The liver shows some cloudy swelling. The kidneys are also marked by cloudy swelling, and present a granular surface on removal of the capsule.

*Glands.*—The glands in the left groin are much enlarged, and surrounded by œdematous tissue. The glands involved in the enlargement lie along Poupart's ligament. On section they all have the appearance of well-defined abscesses, containing shreds of necrosed tissue and brownish viscid pus, and delimited by a thin rind of residual gland tissue infiltrated with blood. They have all attained a fairly uniform diameter of about three quarters of an inch.

The same set of glands in the right inguinal region is also enlarged, but to a lesser extent. The largest of the group being less than half-an-inch in diameter, and being the only one which displays suppuration.

The prevertebral glands, especially on the left side, are hyperæmic and slightly swollen.

The glands in the other parts appear normal.

CLINICAL HISTORY OF A PNEUMONIA (? PLAGUE).

\* Case X.—A. A., æt. 18, admitted 6th September, 1900.—Patient was apparently in full health on the morning of 1st September, but during the course of the evening he complained of slight headache. From this point onwards he evidently felt somewhat out of sorts, but was able to continue at work till 4th September, and was even present at a dance the same evening. Early on the morning of the 5th, however, he became acutely ill with pain in the right side. The symptoms of illness appeared to have developed with great rapidity, and on the evening of the 6th he was admitted to the Western Infirmary. His appearance there being regarded with suspicion, the physician in charge deemed it advisable to have him transferred to Belvidere the same evening. On admission patient was evidently acutely ill. The admission temperature was 99.8 F., but this was evidently due to collapse, as the record prior to removal from the Western Infirmary was 104 F.). The pulse numbered 124 per minute and was soft and full. The respirations were 42, but there was no evidence of any respiratory distress. The face generally was of an ashy-grey colour, with a dusky flush in the malar regions. The eyes were held widely open, the conjunctivæ injected, and the pupils dilated. The tongue was moist and covered with a white fur. The skin showed, especially on the trunk, a general erythematous mottling, resembling that already noted in plague. This was also present on the extensor surfaces of the forearms, though to a less extent. Examination of the lymphatic glandular system revealed slight enlargement of the glands in the right axilla and also of those in the left groin. No special tenderness, however, was complained of on manipulation. Physical examination of the lungs revealed slight relative dulness to percussion over the left back from the spine of the scapula downwards. The breath sounds over this area were distinctly tubular, and the vocal resonance and vocal fremitus were both exaggerated. Next day patient's condition was much the same, the evening temperature being 105 F. He was drowsy, however, and had some slight muttering delirium, but made no complaint of pain. The expectoration, which was very scanty and viscous, was slightly tinged with blood. On direct microscopical examination of the sputum, large numbers of diplococci were seen, and there was also present in very considerable numbers a bi-polar staining bacillus, which was decolourised by Gram's method, and morphologically was indistinguishable from that of plague. In many parts of the slide this bacillus appeared to be present in almost pure culture.

Examination of the chest on 8th September showed, in addition to the signs already enumerated, a certain amount of fine subcrepitant rale accompanying the inspiratory murmur in the consolidated area. Over the lower lobe of the right lung also a variable amount of rather fine bronchial rale was heard. The upper part of both lungs yielded a perfectly clear percussion note whilst the respiratory murmur in this situation was entirely devoid of rale. The temperature did not reach normal till 12th September, and terminated, not by a true crisis, but by a somewhat rapid lysis extending over 48 hours. This lysis resembled the lysis of plague rather than that of pneumonia, and was unaccompanied by sweating, the skin remaining dry to the touch. Convalescence was rapid and uninterrupted.



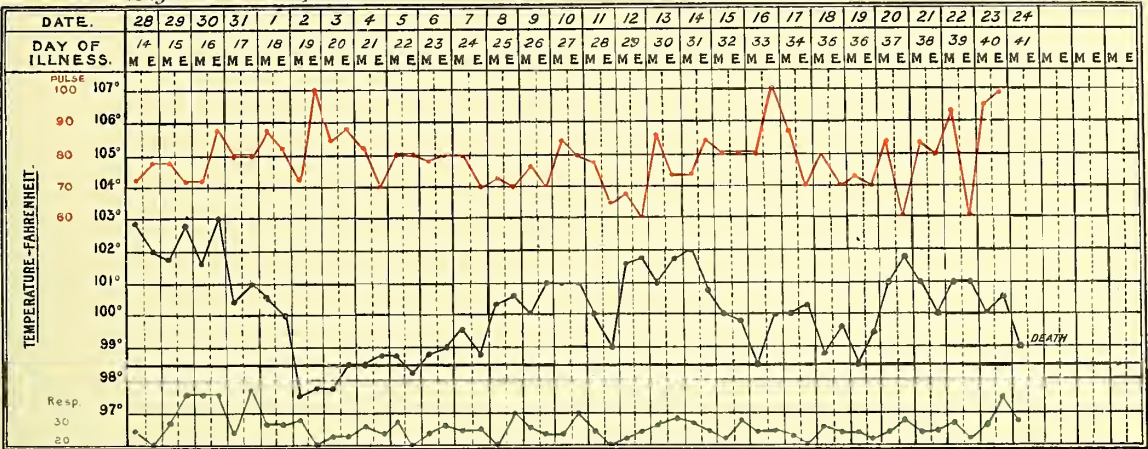
Unfortunately the sputum was not inoculated directly into an animal, and on account of an accident to the regulator of the incubator, the only culture of the above-mentioned plague-resembling bacillus was destroyed at a time when it was no longer possible to obtain another. The definite diagnosis of this case therefore remained to a certain extent doubtful. During convalescence, however, a very pronounced agglutinative reaction was obtained from the blood in a dilution of 1-25.

It may here be remarked that, as making for the diagnosis of plague pneumonia, the serum of this patient taken during late convalescence exhibited decided prophylactic qualities. This was demonstrated by the following experiment performed by Dr. Cairns. Two white mice, A and B, of approximately equal weight, were each inoculated with a lethal dose of an active and virulent culture of plague bacilli. In the case of B, however,  $\frac{3}{4}$  c.c. of blood serum, taken from the patient during the ninth week of illness was injected into the subcutaneous tissues of the back twenty-four hours before performing the inoculation. The following results were observed :—Control animal A became obviously very ill 12 hours after inoculation, and died at the end of twenty-four hours. *Post-mortem* examination showed the spleen to be slightly enlarged and engorged with free plague bacilli, none of which were enclosed by the splenic cells. The organisms were also present in the blood in very large numbers. Animal B never appeared to be particularly ill at any time, but died suddenly on the twelfth day after injection. *Post-mortem* examination showed the spleen to be slightly enlarged, and on examining smear preparations of splenic juice only a few free bacilli could be found after a prolonged search. The splenic cells, however, contained plague bacilli in all stages of digestion.

CHARTS, SHOWING TEMPERATURE, WITH PULSE AND RESPIRATION RATES,  
OF THE MORE INTERESTING CASES (WITH REFERENCES).

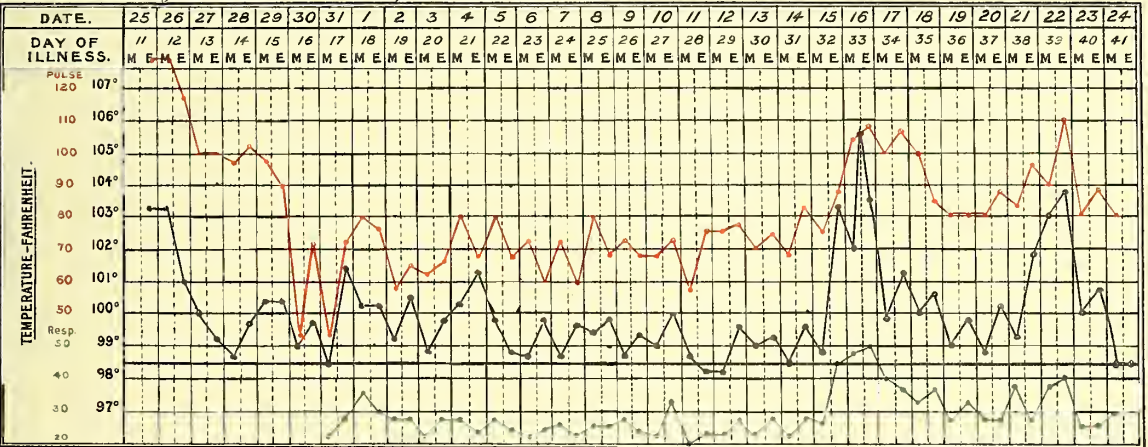
August 1900 September

CASE  
No 1  
J. B.  
M. AET 60

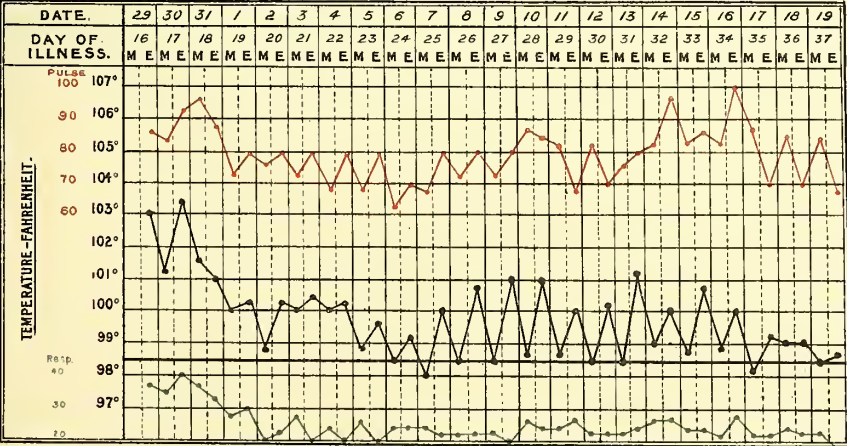


August 1900 September

CASE  
No 2  
M<sup>RS</sup> T.  
F. AET 40

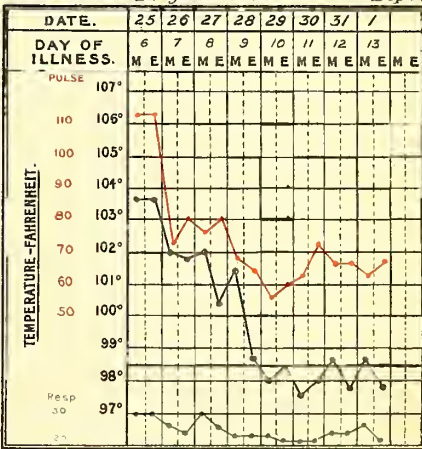


August, 1900 September



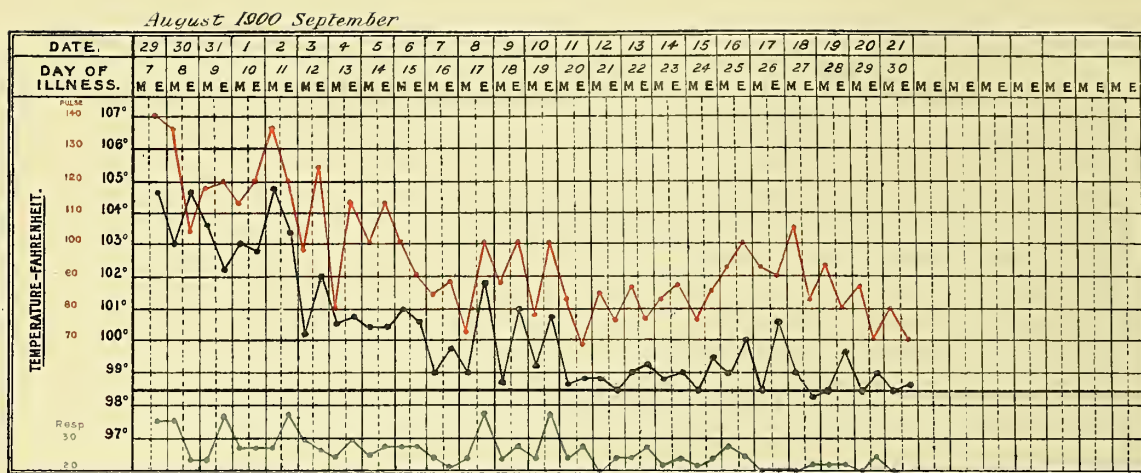
CASE  
No 5  
MRS M  
AET 40

August, 1900 Sept.

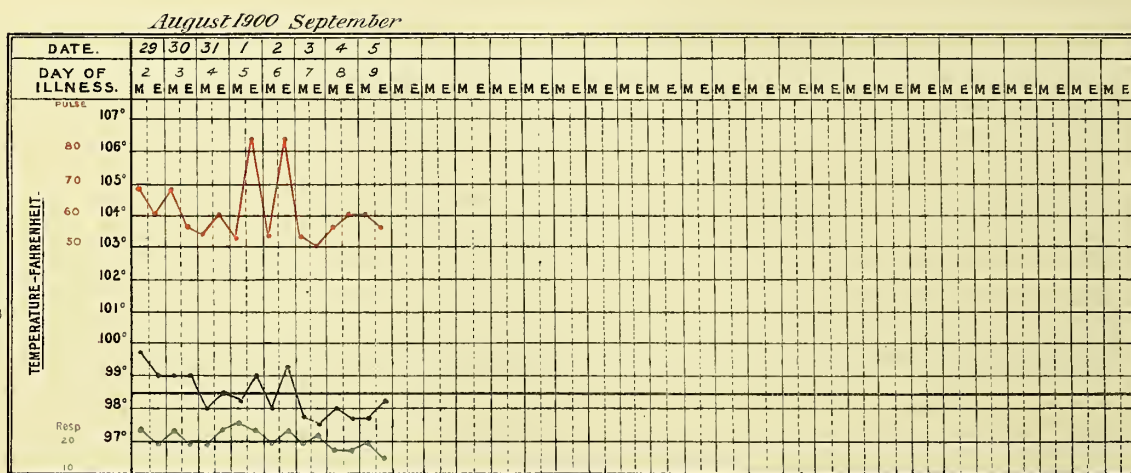




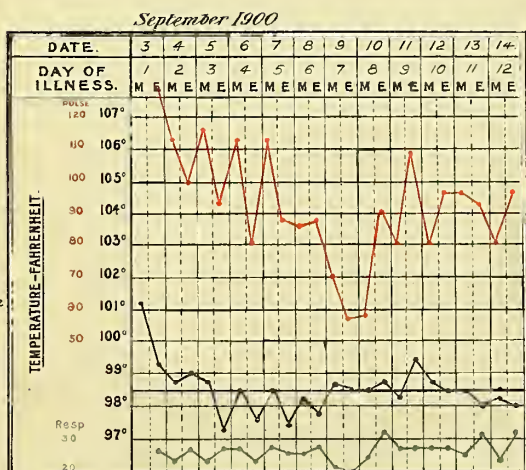
CASE  
No 9  
T.H.  
M.AET.15



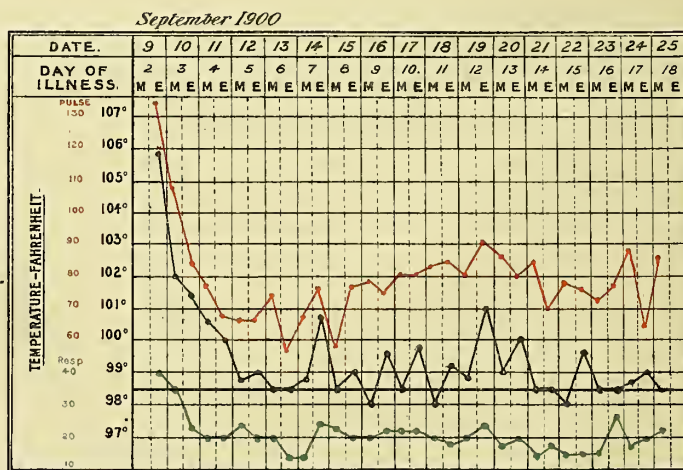
CASE  
No 14  
A.D.  
M. AET.18



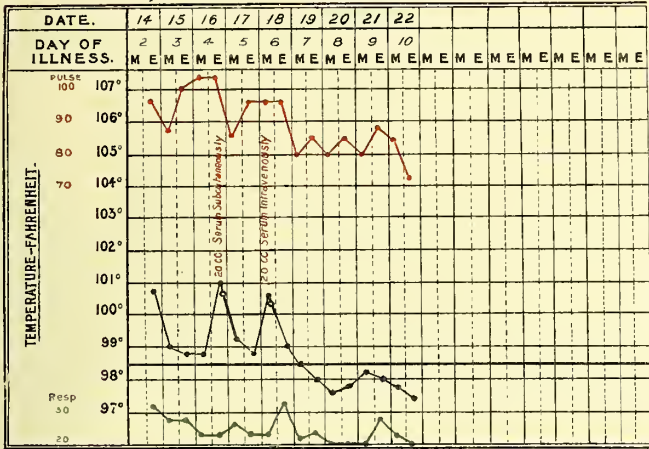
CASE  
No 17  
A.R.  
F.AET.3 1/2



CASE  
No 19  
C.M.M.  
M. AET.27

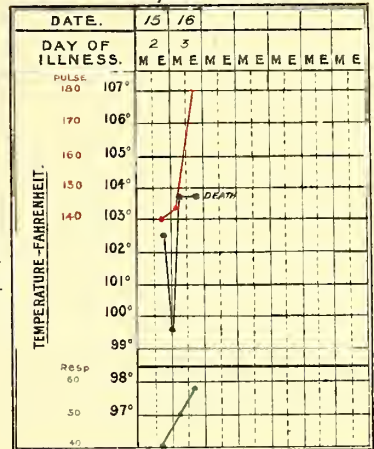


September 1900



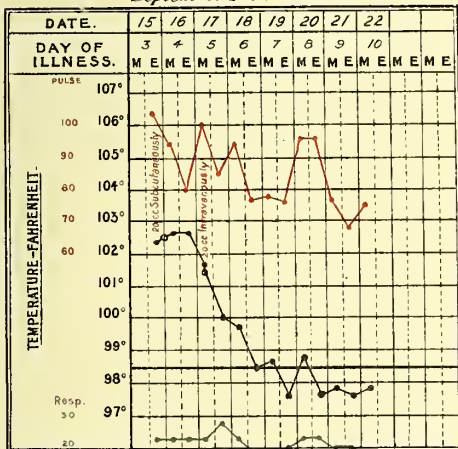
CASE  
No 20  
Mr. B  
AET. 29

September 1900



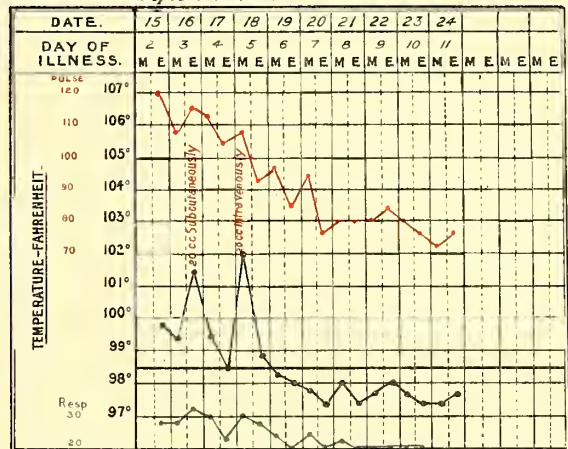
CASE  
No 22  
Mrs. M.  
AET. 20.

September 1900



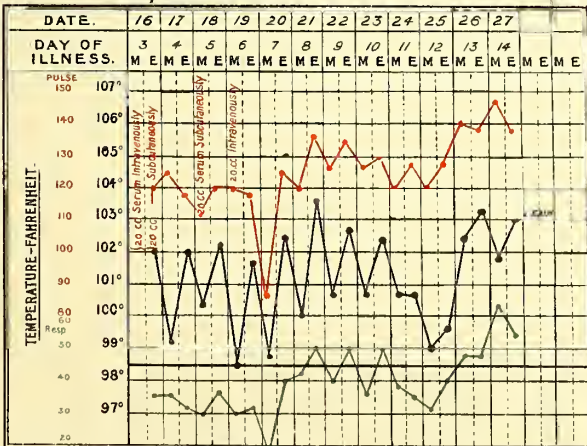
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No 23  
Mrs. M.  
AET. 41.

September 1900



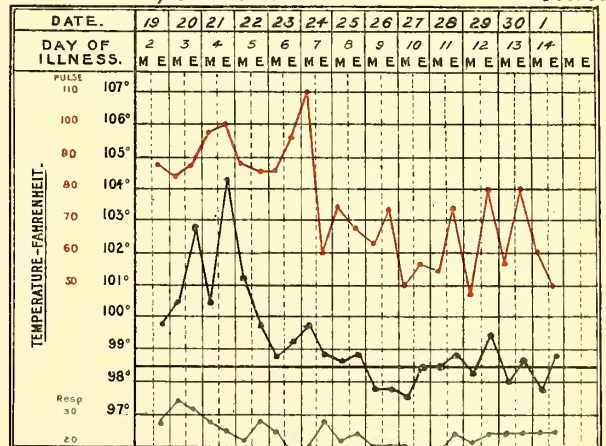
CASE  
No 24.  
M. M.  
F. AET. 14.

September 1900



CASE  
No 25  
R. M.  
M. AET. 12

September 1900

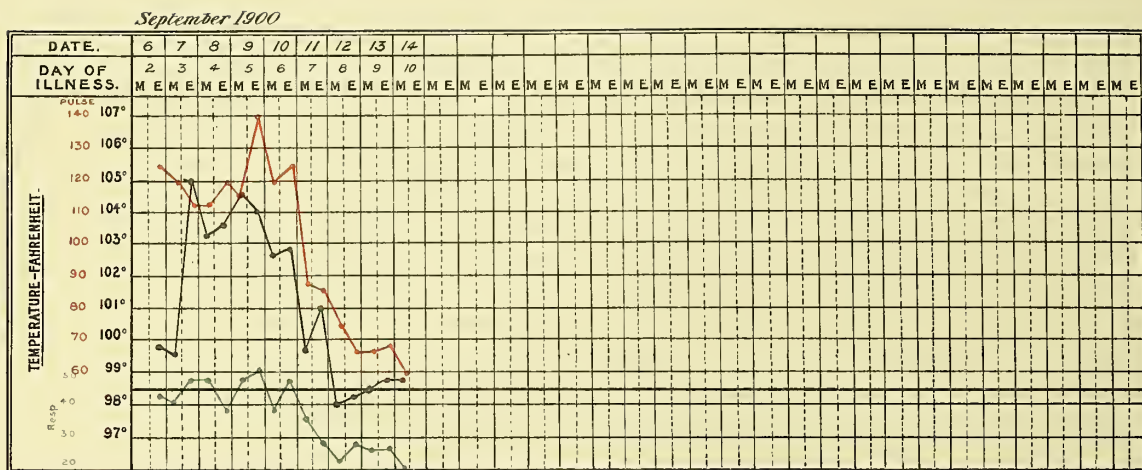


CASE  
No 26  
Mrs. G.  
AET. 24

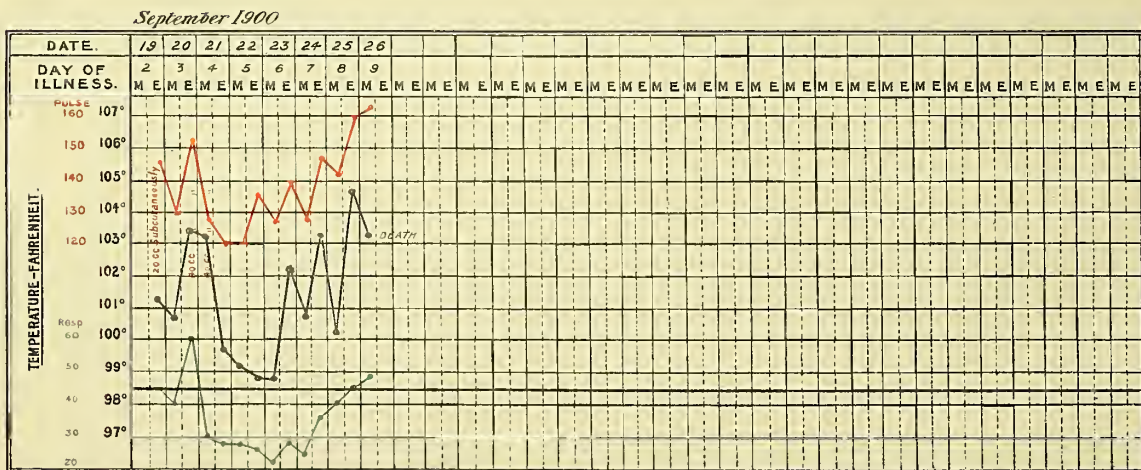
October



CASE  
No. X.  
A. A.  
M. AET. 18



CASE  
Nº 27  
—  
M. G.  
F. AET. 6.



## CLINICAL BACTERIOLOGY.

By J. CAMPBELL McCLURE, M.B.(Glas.),  
Senior Res. Assist. Physician, Belvidere Hospital.

In almost all the cases admitted to Belvidere a bacteriological examination of the bubo was attempted on admission, with varying result, according to the length of time the patient had been suffering from plague and the situation of the bubo, it being sometimes impossible in the mild cases to puncture a small deeply-situated gland.

The method of examination was as follows:—The skin over the bubo was rendered sterile; the bubo was punctured with a sterilised hypodermic needle, some fluid drawn off by the syringe, and cover-glass preparations and inoculations on agar and glycerine-agar made from the contents.

In all cases of true plague, where the bubo was examined during the first week of illness, the *B. pestis* was easily recovered. Direct microscopical examination of the fluid withdrawn usually showed the characteristic bi-polar staining bacillus, but often only in very small numbers, even in the most malignant cases. With one exception (case of P.M., No. 7) the cultures made on agar from the same fluid yielded on incubation pure cultures of the *B. pestis*. In the exception referred to a large diplococcus was also present in considerable numbers. The bacteriological examination of the bubo was usually negative at the end of the second week; in some of the milder cases, indeed, the bacillus had disappeared by the seventh day; but in two cases (P.F. and J. B., Nos. 3 and 1) the *B. pestis* was recovered from the bubo eighteen days after the commencement of the illness. This was the latest date in the illness at which the bacillus was recovered from the bubo. While cultures made from the bubo after the second week, as mentioned above, were almost invariably sterile direct microscopical examination showed with great constancy for some days after it was impossible to cultivate the bacillus the presence of certain degenerate bacillary forms, such as our experience had taught us to associate with degenerating plague bacilli. These degenerate forms were found both free in the fluid, and also contained in cells.

In only one instance was the bacillus recovered from an external lesion, and on that occasion (case of M.M., No. 24) it was easily recovered from a small pustule in the back. This appears to have been the original point of inoculation.

After the spontaneous rupture of a bubo the chances of recovering the bacillus are apparently very remote; in only one case (Mrs. G., No. 26) was the examination positive. Here typical forms of the *B. pestis* were seen on direct microscopical examination, and proved to be actively virulent when inoculated directly into animals.

In several instances inflammatory conditions occurred during convalescence, which, from analogy with other infectious fevers, might reasonably have been supposed to be due to metastatic infection by the *B. pestis*, but repeated examination failed to reveal the presence of the specific organism. Of these instances may be mentioned the case of Mrs. T. (No. 2), who developed an acute otitis media, and that of P.F., who developed an acute conjunctivitis. In the former of these cases only the *B. pyocyaneus* and a diplococcus were found in the aural discharge, and in the latter the conjunctival sac yielded only the *staphylococcus pyogenes aureus* and *albus*, a large diplococcus, and the so-called pseudo-diphtheria bacillus of the eye.

On account of the importance, from a public health point of view, of the investigation of possible sources of infection, the urine was systematically examined, both during the acute stages of the disease and also during convalescence, although much more thoroughly in the latter. In no instance was the *B. pestis* recovered, the urine even of R.M. (No. 25), an example of the septicæmic type of the disease, from whom characteristic organisms were found widespread after death, proving sterile, both by culture and by the direct inoculation into mice and guinea-pigs of the sediment obtained by centrifugalisation.



In one case *post-mortem* examination showed that although the *B. pestis* had apparently disappeared from the bubo, it still maintained its existence in the body in a virulent condition. In this case (J.B. No. 1) the bacillus was recovered after death from the spleen and liver, although the date of death was in both cases some six weeks after the onset of the illness, and although the bubo yielded no culture-growths of the specific organism.

The preceding remarks apply to all cases of plague observed here without distinction, but some special remarks fall to be made with regard to double infections and the fatal cases.

The result of bacteriological examination in the latter group of cases is given in the accompanying table.

The cases where double infection was observed fall naturally into two classes—(1) where the double infection seemed to be primary, *i.e.*, where there was no visible external lesion; and (2) where a pyogenic infection seemed to follow the rupture of a bubo.

*Class I.*—All the cases in this class were fatal—

(a) "P.M." (No. 7).—This patient died of the septicæmic variety of plague. The only organism present beside the *B. pestis* was a diplococcus discovered in the bubo.

(b) "G.H." (No. 18).—This patient lived only a few hours after coming to hospital, and in all his organs after death were found both the *B. pestis* and the streptococcus pyogenes, the latter far exceeding the former in numbers. A diplococcus was also present in the bubo.

(c) "R.M." (No. 25).—This patient's bubo was not examined on admission, as he was very ill, and there was no doubt of the diagnosis either clinically or from association. On the ninth day of illness, as it was evident that an abscess had formed in connection with the axillary bubo, incision was made and agar tubes inoculated from the pus. The cultures yielded only colonies of the staphylococcus pyogenes aureus. Cultures made from the blood during life were invariably sterile. On *post-mortem* examination, however, the *B. pestis* and the staphylococcus pyogenes aureus were recovered not only from the bubo, but also from the heart's blood and the principal viscera. The urine and peritoneal fluid were sterile.

(d) "Mrs. M." (No. 22).—In this patient puncture of the bubo and examination of the blood during life, and cultures made *post mortem* from bubo, heart's blood, spleen, lungs, liver, and retro-peritoneal glands, showed the presence of *B. pestis*, contaminated only by *B. coli communis* in the abdominal organs and by diplococci in the lungs. The presence of a diplococcus in the retro-peritoneal glands was, however, demonstrated in section after staining by Gram's method. This patient must, therefore, be included in the group of primary double infections in plague.

*Class II.*—To this class belong four cases, in all of which secondary infection seemed to be associated with sloughing of the buboes, as the latter all gave only pure cultures of the *B. pestis* prior to the beginning of necrosis.

(a) "Mrs. T." (No. 2).—After rupture of the bubo the staphylococcus pyogenes aureus was found in the discharges during the secondary fever, and in an acute otitis media occurring during convalescence the *B. pyocyaneus* and a diplococcus were obtained in culture from the aural discharge. This patient recovered.

(b) "P.F." (No. 3).—Admitted on the fifteenth day of illness. Crisis on the eighteenth day was followed by sixteen days of intermittent pyrexia. Examination of the bubo on admission showed the presence of the *B. pestis* and no other organism, both on direct examination and from culture. Sloughing of the bubo took place on the twenty-third day of illness, and from the discharge the staphylococcus aureus and albus with a small putrefactive bacillus were obtained, but no *B. pestis*, even on direct microscopical examination.

(c) "J.B." (No. 1).—In this case a prolonged secondary fever preceded death, and after death cultures made from the bubo yielded luxuriant growths of a small putrefactive bacillus, from the midst of which the *B. pestis* was recovered with great difficulty. In the spleen the *B. pestis* was likewise scanty, and was associated with large numbers of the staphylococcus pyogenes albus.

Two cases (B.M., No. 28, and M.G., No. 27) terminated fatally, in which death seemed to occur from a pure infection of the *B. pestis*. In the latter case a *post-mortem* examination was refused, while in the former no other organism was recovered after death save only the *B. coli communis*, which can scarcely be regarded as a double infection, seeing that it is almost constantly met with in cultivations made from the cadaver.

As mentioned above, it was almost impossible in the extremely mild cases of plague to puncture the affected glands, on account of their small size and frequently deep situation. In one case, that of the wardmaid (E.R., No. 21), where the glands affected were, although small, in the occipital region, and therefore easily accessible, puncture showed the presence of the *B. pestis* in pure culture.

## THE SEROTHERAPEUTICS OF PLAGUE.

By JOHN BROWNLEE, M.A., M.D.(Glasg.), D.P.H.(Camb.).

In giving an account of my experience of the treatment of patients suffering from plague with Yersin's serum, as received from the Pasteur Institute of Paris, it may be well to point out that the disease, as it occurred in Glasgow, was apparently of a much milder type than that usually seen in the East. The number of cases was too small to admit of statistical comparison between those treated with the serum and those not so treated, and, on account of the mild character of the epidemic, comparison with the statistics of other epidemics in other countries is not possible. Consequently the value of the treatment can only be gauged by a careful consideration of each case in detail.

The first two cases in which the serum was given were those of T. H. and C. M. (Cases No. 9 and 19). In both these cases the only organism obtained in puncturing the buboes was the bacillus pestis. The first of these cases belonged to the septicæmic variety of plague, with multiple bubo. The prognosis was bad. Within 36 hours of the administration of the serum the temperature nearly fell to normal, and the patient was apparently out of danger. In the second case, which appeared to be an example of the fulminant type of plague, an injection of 20 c.c. of the serum intravenously, and of a like amount sub-cutaneously, was followed within 24 hours by a complete cessation of symptoms. Both patients were excessively ill, and in both the subsidence of the symptoms was marked and immediate. There were, it is true, some cases of plague untreated by the serum in which there was a critical fall in the temperature; but in these the disappearance of the mental obscurance which accompanied the fever was much more gradual, and the convalescence more tedious. In both the cases under consideration, a symptom was present not observed in any of the other cases which terminated by crisis, viz., a few hours after the injection a copious sweating occurred over the whole body.

The next three persons treated by serum suffered from a milder type of the disease; in only one was the prognosis doubtful. The first, Mrs. B., No. 20, was a case with right inguinal bubo, from which, on puncture, a pure culture of bacillus pestis was obtained. The patient on admission did not seem sufficiently ill to require an injection of the serum, but two days later, as the symptoms had considerably advanced, 20 c.c. of the serum were injected subcutaneously into the abdominal wall. The next day the symptoms had somewhat abated. The pain in the bubo was less, and the reddening of the skin over the swelling was not so marked. In the evening, however, the patient's condition was again not so good, and by the following morning the temperature had again risen. The local condition had advanced, and the infectious process had extended so as to involve the lymphatic glands above Poupart's ligament, and also the deep inguinal glands. A further injection of 20 c.c. of the serum was then given, this time into one of the veins of the right arm. An immediate improvement was noted. Six hours after the administration of the serum the temperature had become normal, and on this occasion no subsequent rise took place such as had occurred after the former dose administered subcutaneously. In a second instance the result was equally interesting. The case was that of M. M., No. 24. This patient, a girl of 14 years of age, suffered from a bubo in the left axilla. The point of entry of the infection was evidently located in the back, where, as described in the full report, a small pustule was situated, which was proved bacteriologically to contain the plague bacillus. The external local condition afforded a visible index by which the therapeutic effect of the remedy could be gauged. Here again a subcutaneous injection of the serum was followed by a temporary improvement as regards the bubo, the pain being con-



siderably less on the next day, but no improvement could be seen in the pustule above-mentioned. A recrudescence of the disease occurred likewise in this case, with a rise of temperature to 102° F. A second pustule began to form on the back, while the erythematous zone surrounding the first-occurring pustule became rather larger. Here again the intravenous injection of the serum in a dose of 20 c.c. was followed by an immediate improvement. Within 24 hours a slough in the centre of the original pustule had separated, and the inflammatory zone had almost disappeared, while the second commencing pustule had completely aborted. The patient six hours after the administration of the last dose of serum spontaneously expressed herself as feeling very much better. The temperature by the same time had fallen to normal, and, as in the other case just mentioned, it remained so without subsequent rise. Convalescence from this point was rapid and uninterrupted. The third case belonging to this group was that of Mrs. M., No. 23. This patient, the mother of the preceding, was aged 41. She had a right inguinal bubo. On admission the temperature was 102°·4 F., the pulse was 104, and the respirations were 24. The patient was evidently ill, though a fatal issue was not expected. A subcutaneous injection of 20c.c. of the serum produced almost no effect, but there was, if anything, next day a lessening of the pain in the bubo. Thirty-six hours later a second injection of 20c.c. was given intra-venously. As in the other two cases just noted, there was observed an almost immediate improvement, the patient expressing herself as being much better six hours after the remedy had been administered. The temperature fell to normal within 24 hours, and remained there.

The points to be noted with regard to all these are, that the subcutaneous injection of the remedy produced little effect, and that of a temporary nature, while the administration of the serum intravenously was followed in each case by an improvement which was easily seen in the subsidence of the signs of illness, and which, besides, was spontaneously borne witness to by the patients themselves.

The serum was also administered to four persons in whom the disease progressed to a fatal issue. One of these needs no mention, as he did not come under treatment till the fourth week of the illness, at which period an extensive secondary pyogenic infection of the sloughing bubo had occurred. Each of the other three require special note. The first of these in point of time was Mrs. M., case No. 22). She had for some time prior to the onset of illness experienced considerable privation. On admission she was extremely ill, and premature labour was in progress. No apparent benefit resulted from the administration of the remedy, the patient dying within about three days from the commencement of the illness. In this case serum was administered on the evening of admission—20 c.c. into a vein of the right arm and 20 c.c. into the subcutaneous tissue of the flexure surface of the left thigh, so that it might drain directly into the bubo, which was situated in the left groin. Next day 20 c.c. additional was administered into the subcutaneous tissues of the abdomen. Though only the plague bacillus was obtained on culture from the bubo in this case both before and after death, yet in the retroperitoneal glands it was demonstrated that the infection was a mixed one, as considerable numbers of colonies of a diplococcus, staining by Gram's method, were seen on section of these. This patient was so enfeebled by the privation which she had undergone that she would in all probability not have survived her confinement, apart from the attack of plague. So that, both because the case was not uncomplicated, and because of the patient's weakness, the result cannot be said to weigh one way or the other in appraising the value of the serum treatment. But it must be noted, as indicating that the serum had some considerable influence on the organism, that the bubo revealed, on examination after death, no plague bacillary forms which did not bear evidence of the most profound degeneration, while those obtained from the other organs of the body, showed no evidence of being in any way altered. On the same day the brother of this patient was admitted (R.M., Case No. 25). Here also the infection was from the first of a mixed nature. When in the course of the

second week of illness one of the buboes had proceeded to abscess, the only organism recovered from the discharge after incision was the staph. pyog. aureus, and that in great numbers. As there were no means of infection of this bubo prior to its incision, it is highly probable, considering the septic course of the temperature, that the double infection was primary. Of all the cases treated with the serum at the beginning of the illness this is the only one in which no effect of any kind was noted.

The only other case in which the serum was administered was that of M. G. (Case No. 27). This was, though fatal, one of the most interesting in some of its features. The patient was a child six years old. Puncture of the bubo in the right groin on admission resulted in the discovery of the plague bacillus in its typical forms. On admission she was profoundly ill, and in a state of almost complete unconsciousness. When disturbed she cried out harshly and struggled to be let alone, but otherwise took no notice of her environment. As recorded in the report, intravenous injection was attempted without success, but in the first 48 hours after admission she received 100 c.c. of the serum into the subcutaneous tissues, chiefly of the lower part of the abdomen. On the morning of the fourth day after admission a marked improvement was noted, in so much that the child for the first time recognised her mother, and smiled to her. From this point, however, there was a rapid advance in the gravity of the case, and death supervened, with the usual symptoms of heart failure, on the eighth day of illness. The same appearance was noted in this case as in that of Mrs. M. (Case No. 22) above referred to, namely, that the bacilli found in the bubo which received the strain of a large part of the serum administered, was marked by degeneration, while those in the deeper organs of the body were unaffected and very virulent.

A general review of the action of Yersin's serum falls to be considered under two heads—First, by the prophylactic action; and second, by the curative action.

*1. The Protective Action of the Anti-plague Serum.*—Of the healthy persons who had been in contact with plague, and who received a prophylactic injection of the anti-plague serum, two developed the disease. One of these was a maid attached to the service of the plague wards. From her buboes the specific bacillus of plague was recovered, and at the appropriate time after the disease was over, her blood gave the typical agglutinative reaction in a marked degree. The other was the mother of one of the fatal cases noted above (Mrs. G., Case No. 26). The latter during the course of the disease ran a fairly high pyrexia, but she never gave the impression that she was dangerously ill. The three factors which might have contributed to produce this high temperature are noted in the full report. These two cases prove that a dose of 10 c.c. of Yersin's serum administered subcutaneously does not afford complete protection, yet it is a fair presumption that a certain degree of immunity is afforded, as the symptoms in both cases were of great mildness. This corresponds with what has been frequently observed with regard to the action of diphtheria anti-toxin when used as a prophylactic. Immunity is not a certainty, but if the disease becomes established the attack is almost certain to be slight.

*No. 2. Curative Action.*—A general review of the facts given above, and a consideration of the reports of the individual cases, will, I think, justify the following conclusions:—*Firstly*, that subcutaneous injection is not of any great curative value. This is probably not due to the blocking of the lymphatics during an attack of plague, as has been suggested by some, in view of the fact that absorption of the serum by healthy persons is no more rapid than that seen in the plague patients. The failure in action is therefore much more likely the result of the lymphatic system exercising a distinct action as a biological filter on the serum, such as exists in the organs. In this way the antitoxic substances of the serum are retained largely in the glands which drain the area into which the injection is given, so that only the more inert portions of the serum reach the general circulation. It was noticed that the lymphatic glands connected with the



area into which the injection was made in healthy persons enlarged for some days thereafter. This is not a proof that such a filtering action as above indicated takes place, yet it shows that some constituent of the serum having an irritant action is retained, and, if the glands possess the power of filtering out certain ingredients of the serum, there is no reason to doubt, in the light of what has gone before, that this may include the active anti-toxin. The case of Mrs. M. (Case No. 22) lends some clinical support to this view. The inguinal bubo, into the drainage area of which the serum had been injected, showed *post-mortem* evidence of a potent local effect in the marked degeneration of the bacilli, while the organisms found in other parts of the body were quite normal. It is therefore evident that subcutaneous injection of the serum can be efficient only in cases where the infection is localised to a bubo and has not become general. *Secondly*, the intravenous injection of the serum seems, in most cases, to produce a most marked therapeutic effect, even when given late in the disease. This is exemplified in the case of T. H. (Case No. 9), where it was administered on the eleventh day of illness. In those cases, however, where double infection has existed from the beginning its action is greatly lessened.

In conclusion, it is probable that the doses given were, in general, too small; and should an opportunity again arise of using this remedy, large initial doses of 60 c.c. and upwards would be given intravenously. Probably it would be advisable, if using the serum subcutaneously at all, to inject it only into the area drained by the lymphatic system which leads directly to the bubo.

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#### ON THE AGGLUTINATING PROPERTY OF BLOOD SERUM IN CASES OF PLAGUE.

By D. LOUIS CAIRNS, M.B.(Glasg.),  
Resident Assistant Physician, City of Glasgow Fever Hospital, Belvidere.

The number of observations which have been made up to this time on the agglutinative power of serum from patients in the course of, or during convalescence from, an attack of bubonic plague is comparatively limited. This is all the more remarkable when one considers the numerous opportunities which have occurred during the last five or six years for such observations. The literature also bearing on the subject is not at present of such extent or completeness as to furnish a basis for inferences of practical value. The earliest reference to this part of the subject which I have been able to find is contained in the report of the German Commission sent to Bombay for the investigation of plague. In their abstracted report, published in the *Deutsche Medicinische Wochenschrift* for 1897, the existence is announced of a definite reaction between the serum of man and animals infected with plague and an emulsion of the specific bacillus. The reaction consists in the precipitation of the bacilli in the form of small distinct floccules when such serum is added to a test tube containing an emulsion of plague bacilli. The report also states that no such precipitation of other organisms by plague serum occurs, the emulsion of these remaining uniformly turbid. The report of the Commission, however, makes no mention of the value of the reaction either as a diagnostic or prognostic agent in this disease, and suggests merely that the specificity of the reaction may constitute a reliable method for the identification of the plague bacillus and its differentiation from other organisms closely resembling it. About the same time Paltauf<sup>1</sup> established the existence of the reaction in the blood of animals (guinea pigs and horses) which had succumbed to inoculations of dead plague cultures. A very slight degree of dilution of the blood, however (from 1 to 5 or even 1 to 1), was employed—a fact which tends to diminish the value of the observations. Considerably greater practical importance attaches to the results obtained by Wyssokowitz and Zabolotny.<sup>2</sup> These authors state that the agglutinative power is not manifest during the earliest and most acute stage of the disease. It first appears in the blood about the seventh day of illness, gradually increases up till the fourth week, and declines after this period. In cases fatal during the first week of illness they found it absent.

A short *résumé* of the results obtained independently by Professor Zabolotny during the epidemic at Bombay in 1897 appeared in the *Deutsche Medicinische Wochenschrift* for the same year,<sup>3</sup> and though

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<sup>1</sup> Wiener Klinische Wochenschrift, 1897, p. 537; also La Semaine Médicale, June 2nd, 1897.

<sup>2</sup> Archives Russes de Pathologie, May, 1897. Recherches sur la Peste Bubonique, Annales de l'Institut Pasteur, No. 8, p. 663, 1897.

<sup>3</sup> Über agglutinierende Eigenschaften des Menschenblutserums bei der Pest, Deutsche Medicinische Wochenschrift, 1897, No. 24, p. 392.

no details are given the conclusions to which he has been led substantially agree with those of the last-mentioned observers. In a subsequent paper<sup>1</sup> the method employed for demonstrating the reaction is stated, and from a comparatively large number of single observations the probable curve of the agglutination wave is constructed. I desire here to acknowledge my indebtedness to Professor Zabolotny, to whom, during his stay in Glasgow, I owed several valuable suggestions in the carrying out of my work on this subject. Dr. Leumann, of the Bombay Plague Laboratory, has also made a considerable number of single observations on the bactericidal and agglutinative properties of plague serum, and while the technique adopted was sufficient for the demonstration of the former property and for rough estimations of the latter, it was evidently quite impossible to obtain reliable comparative data by this method. One or two loopfuls of an agar culture were simply suspended in sterile water and serum was added drop by drop till precipitation of the microbes occurred. No attempt was made to estimate the relative proportions of serum and emulsion, and, as will be shown later, the *sine quâ non* of all agglutinative experiments—viz., a perfectly homogeneous emulsion—cannot be obtained by this method. A short paper by Dr. E. Klein<sup>2</sup> completes the list of those which I have hitherto been able to consult. In it he mentions the difficulty and emphasises the importance of obtaining a perfectly homogeneous distribution of the bacilli in the emulsion to be used. (This is referred to in a later part of the present paper.) The extensive report of the Austrian Commission contains, so far as I am aware, no reference to this aspect of the subject, and the comparatively short paragraph devoted to it in the exhaustive work of the late Dr. Müller, of Vienna,<sup>3</sup> is indicative of the necessity for extending our observations on the subject.

The recent outbreak of bubonic plague in Glasgow provided an opportunity of furnishing an additional contribution on the character and significance of the agglutinative phenomenon in this disease. It has been my desire to gauge as accurately as possible the degree of completeness of the reaction at several stages of the disease in the same individual, so that a basis for the estimation of its value at any particular period may be established. The following record contains particulars of 24 cases examined with this specially in view, and considerably over 300 agglutination tests have been performed to furnish the strictly comparable data. The fact that the entire series of observations was made by myself is mentioned only to indicate that the standard of comparison by naked-eye examination of all the reactions has been practically uniform throughout.

Unfortunately, many of the earlier agglutinative experiments performed with plague serum in this research were rendered of comparatively little value, owing to the fact that a mode of procedure was adopted similar in all respects to that now in common use for obtaining the agglutinative reaction in enteric fever. The method adopted for the latter purpose becomes inapplicable to plague because the specific bacillus, unlike that of enteric fever, does not produce in peptone bouillon a homogeneous turbidity during growth, but tends to cohere either in the form of strands of varying lengths ("stalactites") or as minute floccules which are aggregated mainly on the sides and bottom of the tube, and to a lesser extent occur throughout the fluid medium. It was found impossible by means of prolonged agitation of such a culture to produce a homogeneous suspension of the bacilli. After such treatment the micro-organisms were found to settle at the bottom of the tube in the form of a loose powdery deposit, and on microscopical examination clumps of minute size were found throughout the supernatant fluid. The most important condition for the performance of a trustworthy series of experiments in agglutination or sedimentation—viz., an absolutely homogeneous emulsion of the young organism—is therefore, in the case of bacillus pestis, unobtainable with peptone bouillon. The cohesion of the bacilli during growth in bouillon (possibly related to the development of an adhesive agent connected with the capsules of the organisms by which zoogloea-like masses are formed) is also exhibited during growth on the surface of agar-agar. If the surface of such a culture of 24 hours' incubator growth be touched with a platinum loop its slimy consistence becomes at once apparent, and while the needle is being removed a fine gelatinous thread is drawn out from the growth on the tip of the wire. This becomes a more marked feature in slightly older cultures. The difficulty in obtaining such an emulsion of plague bacilli was one which entailed a considerable amount of experimental work. It was ultimately found that a homogeneous emulsion could be obtained in sterile 0.75 per cent. salt solution. It is noteworthy that Dr. Klein, whose paper on the subject has recently appeared, has solved the same difficulty after trial of various expedients in an almost precisely similar manner. This method yields a perfectly homogeneous and workable emulsion which remains practically unchanged for 24 hours showing no signs of clarification in the upper portion of the fluid and no great tendency to the deposition of micro-organisms at the foot of the tube. A drop of this fluid examined under the microscope shows the bacilli perfectly free and isolated from each other, and, if carefully prepared, ought to be entirely free from any clump-formations.

The following was found the most suitable method of preparing the emulsion, which, in view of the necessity of obtaining reliable comparative results in each case, was required in considerable quantities. Several sloped agar tubes, which had been inoculated from a 24 hours' culture of bacillus pestis, were incubated for from 24 to 36 hours. Cultures which showed the presence of involution forms in considerable numbers, or which had been incubated for longer periods than 48 hours, were not (and should not be) used for this purpose. The tubes were then filled with sufficient 0.75 per cent. sterilised salt solution to cover the solid medium. The growth was then as far as possible transferred to the salt solution. This was carried out most efficiently and without tearing the surface of the agar in the process by rubbing the growth with the rounded extremity of a sterile Pasteur pipette, the end of which had been previously curved in the form of a shepherd's crook. The various emulsions so pre-

<sup>1</sup> Recherches sur la Peste, Zabolotny, Archives des Sciences Biologiques, April, 1900, T. viii., No. 1.

<sup>2</sup> The Lancet, Feb. 16th, 1901, p. 456.

<sup>3</sup> Die Pest von Müller und Pösch, 1901.



pared were then decanted into a large sterilised test tube, which was set aside for a short time to allow any cohering masses which might be present to settle. If the growth had been very luxuriant a more sensitive emulsion was usually obtained by diluting still further with salt solution. The exact degree of dilution with salt solution is undoubtedly a matter of some importance and can only be determined after considerable experience in agglutinative work. As a matter of frequent observation it may be stated that too concentrated emulsions are agglutinated very slowly and often very imperfectly. In the following series of observations the emulsions were all prepared from the same stock cultures, incubated for approximately the same length of time, and, as far as possible, grown under exactly similar conditions. It need hardly be added that the cultures used responded to all the recognised tests for the complete identification of the bacillus *pestis*. Inoculation of animals with these cultures reproduced the disease with its characteristic lesions, and after death the specific bacillus was recovered from the blood or organs.

In performing experiments on agglutination two chief methods are recognised: (1) the microscopical and (2) the macroscopical or sedimentation method. The result of a considerable number of comparative trials of both methods indicated that, on the whole, the latter yielded more reliable data. By means of the microscopical method, however, pronounced and in every way characteristic reactions can be demonstrated in much higher dilutions than by the latter technique, but data so obtained are frequently vitiated by the occurrence at times of puzzling and apparently unaccountable pseudo-reactions. Consequently, though the potency of a given serum was estimated in most instances by both methods, only the sedimentation test was adopted throughout this series of observations as the standard for performing comparative quantitative estimations, and no serum was regarded as yielding a positive result which failed to give a satisfactory reaction by this method. The reactions were carried out with serum separated directly from blood collected in sterilised Pasteur pipettes, care being taken in every possible way to avoid its contamination. By so doing the possible introduction of a fallacious factor in the means used for obtaining serum by a blister was avoided. The amount of time absorbed in the careful separation of serum directly from blood necessarily limited the number of observations made. It may be stated, however, that no visible difference either in the degree of the reaction or in the time within which it made its appearance could be detected in several instances where serum separated from blood and that obtained from a blister were used from the same case and at the same date for purposes of comparison.

Before undertaking a consecutive series of observations it is well to prepare beforehand all necessary apparatus, so that no delay may take place at any stage which might interfere with or vitiate the comparative value of individual reactions. Accordingly it was found advisable to have in readiness a supply of ordinary Pasteur pipettes about 30 centimetres in length and an equal number of a slightly modified pattern. The latter were provided with a capillary portion of a length equal to the distance between the open extremity of the ordinary Pasteur pipette and the commencement of its capillary portion; in addition, a constriction or neck was fashioned on the upper end of the tube about three-quarters of an inch below the level of the cotton plug. Blood is most conveniently obtained from puncture of a finger, the skin being first rendered sterile according to recognised methods. All traces of antiseptics having been removed by a final washing with spirit, the finger is carefully dried with aseptic gauze, and the pulp punctured with a sterilised bayonet-pointed needle. The drop of blood which exudes is immediately aspirated into a sterilised Pasteur pipette, the sealed extremity being first passed through a flame and then snapped across at a suitable level by means of sterilised forceps. By "massaging" the finger from above downwards and aspirating each drop as soon as it appears, a quantity, sufficient not only for the immediate performance of the reaction, but also for purposes of comparison subsequently, can usually be obtained. In this way from half to one cubic centimetre of blood may be furnished by a single successful puncture. During aspiration care should be taken to avoid the introduction of any air-bubbles, as these interfere to some extent with the formation of a firm coagulum and a resulting clear serum. The fine extremity of the tube is then sealed by drawing it out in a spirit flame, unnecessary heating of the contents being carefully avoided. The pipette is kept in an upright position, and set aside in a cool place for several hours pending the separation of the serum. If no air has been introduced a firm coagulum usually forms at once and may be seen floating in the centre of the tube surrounded by a perfectly clear serum. If, however, during the process of aspiration the blood has been more or less churned up with air, then it is better to set the tube aside for from 12 to 18 hours. The resulting serum in this case is apt to contain a considerable number of red corpuscles, and, though these in no way interfere with the satisfactory performance of the reaction, a clearer serum is obtained if time be allowed for the sedimentation of the red corpuscles. The separation of the serum from the coagulum is effected by means of the modified pipettes. The cotton-wool plug being removed from the tube containing the blood, the sealed extremity of a modified pipette is first snapped across with sterilised forceps, the capillary portion introduced into the former and carried down to the conical narrowing of the tube. The clear serum is then aspirated into the second tube, and the capillary portion sealed at a suitable level by drawing out in a flame. Before doing so, however, the precaution should be observed of aspirating all the fluid into the body of the tube so as to avoid any undue heating of the serum. If the preservation of the serum for any length of time is desired the pipette may easily be converted into a hermetically-sealed capsule by drawing out the constricted portion in a Bunsen flame. On account of the difficulty of preparing two emulsions of exactly the same density it is always better to subject at one time as large a number of sera as possible to the influence of a single emulsion. For the same reason when performing quantitative estimations it is absolutely necessary to compare the agglutinating power of the serum under observation with that obtained at a previous date, the potency of which has already been ascertained by repeated experiment. Only by so doing is it possible to establish an arbitrary

standard and so gain an accurate conception as to the quantitative value of individual reactions. When results materially disagreed with previous observations the data so obtained were disregarded, and the series of reactions again observed with a fresh emulsion.

The reaction is conveniently performed in test tubes about 9 centimetres in length, prepared from ordinary soft-glass tubing of about 0·7 centimetre internal diameter. These are thoroughly cleansed and dried, the open extremity being closed with a plug of cotton-wool. After sterilisation at a temperature of 160° C. for an hour they are ready for use. In all cases the reaction was carried out in at least three dilutions, and in many instances with sera possessing a high degree of potency in five dilutions. The proportions adopted throughout have been 1 in 10, 1 in 25, 1 in 50, 1 in 75, and 1 in 100. In no case has an undoubted reaction been obtained in a dilution higher than 1 in 75, and reactions lower than 1 in 10 have not been recorded, as the necessarily large relative dilution of serum with the emulsion in such preparations yields a practically clear fluid in which the determination by the naked eye of any agglutination becomes a matter of extreme difficulty.

The reaction is conveniently performed as follows. A long Pasteur pipette is taken and its capillary portion snapped across at a level corresponding in diameter with that of the capillary portion of the pipette containing the serum under examination. It is thus ensured that drops issuing from the orifices of these two pipettes will have as nearly as possible the same volume, and in this way any required dilution of serum with emulsion can be readily performed. The Pasteur pipette, the wider portion of which is guarded by two cotton-wool stoppers to prevent possible accidents during inspiration, is filled with the bacillary emulsion. A drop of serum having been introduced into each of a series of sedimentation tubes the emulsion of bacilli is added to each, drop by drop, to produce the requisite degree of dilution. The serum and emulsion are thoroughly mixed, and the cotton-wool stopper is replaced in the sedimentation tube. It is convenient to place vertically in a small deep box the requisite number (from three to five) of sedimentation tubes for each serum under investigation. This obviates the necessity of labelling each tube, and at the same time prevents confusion. The degree of dilution can then be readily inferred from the volume of fluid in each tube. When completed the whole series is set aside in a cool chamber for from 18 to 24 hours. As control experiments in each series two or more tubes containing (1) a quantity of the bacillary emulsion, and (2) emulsion + normal serum in corresponding dilutions were employed. If at the end of 24 hours any degree of sedimentation had taken place in these latter the data obtained from this series were not recorded. Under ordinary circumstances, however, no changes were observed in the control tubes, whilst in the case of those containing serum from a convalescent plague patient a remarkable alteration became apparent after a variable interval of time and according to the potency of the serum. The emulsion was seen to clarify from above downwards till practically the entire column of fluid became absolutely clear. This change was due to the precipitation of bacilli to the lower part of the tube, where they form a loose flocculent deposit. On examining this bacillary deposit under the microscope it was observed that the capsules of the organisms had become indistinct. In the case of powerfully agglutinative sera the process may be observed to commence after one or two hours, but as a rule the reaction is rarely completed till 24 hours have elapsed. Consequently the latter has been adopted as the uniform time limit throughout this series of investigations. In high dilutions or when dealing with sera of feeble agglutinative power the reaction, as might be expected, is less complete. Comparison with the control tubes, however, show that, while a certain degree of clarification and precipitation has occurred at the end of 24 hours, the process has stopped short of completion, leaving a slightly opalescent appearance in the tube. In the following tables such reactions are indicated by the sign + f (feeble), as the precipitated microbes showed the same microscopical changes as in complete reactions. A complete reaction is indicated by the positive sign + whilst the negative sign — indicates that no reaction has taken place. In the case of powerfully agglutinative sera, when clarification of the emulsion occurs soon after performing the dilution (from one to two hours), the double sign ++ has been used.

The following tables represent in a condensed form the result of over 300 separate agglutination tests of the serum taken at different stages of the illness from 27 plague patients. Detailed clinical histories have been purposely omitted in this paper, but it has been deemed advisable to add short clinical *résumés* of those mild cases in which bacteriological confirmation of the diagnosis was not available. The cases examined, with one exception, which will be referred to later, were all of the bubonic type, and, of these, nine received at one time or other varying doses, either subcutaneously or intravenously, of Yersin's anti-plague serum. The agglutinative reactions in these cases, however, were probably not modified to any considerable extent by the previous administration of the serum for curative purposes. In support of this it may be here remarked that the blood serum of individuals who had received one or more prophylactic doses of this serum showed no evidence whatever of agglutinating power. It is, therefore, highly improbable that the data so obtained have been vitiated in the slightest degree, as even the remedy itself when mixed with a highly sensitive emulsion fails to produce any visible change after the lapse of 24 hours. With the view of ascertaining the possible effect of a mixed infection on the agglutinative reaction I undertook a complete bacteriological examination of most of the organs in fatal cases of plague. These results are appended in Table I. Reference to the cases in Table II. shows that the presence of micro-organisms other than the bacillus pestis in the blood or organs of a patient dead from bubonic plague does not prevent the development of the specific reaction.

For purposes of classification the cases have been arranged in the following groups.

Table II. shows the results obtained from six fatal cases, in all of which the presence of the bacillus pestis was verified by reproducing the disease with its characteristic lesions in animals. Cultures of the specific bacillus were obtained during life, either from the bubo or blood of the patient, or *post*



*mortem* from the various organs. These were either injected subcutaneously or a small quantity of an agar growth placed in the nasal cavity of an animal and the bacillus again recovered from the tissues after its death. In this group of cases the reaction was also demonstrated with other body fluids—viz., pleural effusion, pericardial effusion, peritoneal fluid, and bile. With respect to the first three of these it will be observed that, in comparison with blood serum, a relatively high degree of agglutination has been noted in the only three cases in which it was possible to perform the test with these morbid exudations.

Table III. comprises those severe cases terminating in recovery, from all of which, with one exception (Mrs. M.), the bacillus *pestis* was obtained by puncturing the bubo. A sterilized hypodermic syringe was inserted into the glandular swelling, and from the serous fluid withdrawn the specific organism was demonstrated on direct microscopical examination of smear preparations. Culturally the organism isolated from each case responded to all the recognised tests for the identification of Yersin's bacillus, and, as in the first group of cases, was further verified by the biological test. In the case of Mrs. M. it was thought unnecessary to perform a bacteriological examination of the bubo, as the patient's daughter (Mrs. M.), granddaughter (baby M.), and son (Robert M., see Table II.), all died from bubonic plague. A special report regarding the last case in this table is given on page 55.

Table IV. comprises those comparatively mild cases of plague with characteristic bubo. From the first three of these the specific organism was isolated and identified as above, but only in the case of Mrs. G. was the proof completed by animal inoculation. In the last three cases (James C., Rosina M., and Dennis T.) it was found impossible to cultivate the organism either from the juice obtained by puncture of the glands, or at a later stage when the bubo had broken down from the sero-purulent discharges. The failure to obtain the bacillus in these cases was no doubt due to the comparatively late stage of the illness at which the patients first came under observation. As the disease ran an exactly similar course, however, to those from which the specific organism had been recovered, and as in each instance the serum possessed marked agglutinative power, there appears to be every possible reason to regard them as undoubted though mild cases of plague. The following synopsis of the clinical features of these cases reveals their character sufficiently:—

Dennis T. (Case 6), aged 5 years. This patient was admitted on the eighth day of illness with a glandular swelling in the right inguinal region which presented the characteristic appearance of a plague bubo in the stage of resolution. The enlargement was limited to the vertical set of glands, the skin over and around it being inflamed and exceedingly tender. The patient, though not acutely ill, was drowsy and showed a lack of interest in his surroundings. Examination of the heart and lungs revealed nothing noteworthy. The admission temperature of 100·4° F. was never exceeded, and a few days later the patient seemed quite well, though the bubo, while less tender, showed no signs of resolution. On the sixteenth day of illness spontaneous rupture of the bubo took place, convalescence thereafter being rapid and complete. Cultures from the bubo, made as above described, proved sterile, though smear preparations showed the presence of numerous degenerated bacilli. No doubt, however, can be entertained as to the nature of this patient's illness both on account of the association and the clinical appearances. The patient's grandfather (James B., Table II.) died from plague, and his mother (Mrs. T., Table III.) passed through a very severe attack of this disease. The identity of the isolated organisms in both these latter cases was verified by animal experimentation.

James C. (Case 4), aged 24 years. This patient was admitted to hospital on August 30th, 1900. On August 16th he was seized with an illness, evidently of considerable severity, associated with headache, sickness, and vomiting, and pain in the left inguinal region. The report received from the medical attendant, Dr. G., is as follows:—On August 17th the temperature was 103° F., and the pulse 102. There was severe headache with vomiting. The patient complained of pain in the left inguinal region, where there were some redness and swelling. On the 21st the temperature was 102·6°, the pulse 98, while the swelling had increased in size and was still painful. On the 24th the temperature was 100, and the pulse 90. The swelling was sausage-shaped and lay along the upper border of Poupart's ligament; it was fairly hard and pitted on pressure. On admission the patient was evidently convalescent, no sign of illness being present. The temperature was normal. On examination of the left groin, however, a swelling rather larger than a pigeon's egg was discovered immediately above Poupart's ligament, and evidently involving the horizontal set of glands. The overlying skin was inflamed and slightly oedematous, and fluctuation could be easily obtained. A hypodermic needle inserted into the glandular swelling withdrew a quantity of dark grumous fluid, which, on microscopical examination, showed the presence of numerous degenerated bacilli; and though a considerable number of agar tubes were inoculated on two separate occasions, no growth whatever could be obtained. Convalescence was uninterrupted, the bubo disappearing by absorption.

Rosina M. (Case 10) was admitted from the plague-infected area in her third week of illness. At this date all clamant symptoms had subsided, but examination of the inguinal region on each side showed the presence of a bilateral bubonic condition involving the group of glands situated immediately above Poupart's ligament. Each bubo was about the size of a large walnut, that on the left side being comparatively firm and painless, whilst in the other fluctuation could be easily detected. On both sides the overlying skin was inflamed and adherent to the glands beneath. The history of the illness obtained from various sources showed that the onset was sudden and acute, and was characterised by high fever (temperature 104° F.), accompanied by rigors and delirium; headache, sickness, and vomiting were also present, and continued for some time after the appearance of the buboes, which were discovered by the patient herself on the third day of illness. These were apparently exceedingly painful at this stage. They rapidly increased in size during the succeeding

two or three days, after which the tenderness slowly subsided. The bubo in right groin ruptured spontaneously in the fourth week of illness, discharging a sero-purulent fluid for about 10 days, whilst that on the left side underwent resolution without rupture. Both buboes were explored with a hypodermic needle as in previous cases, and culture tubes inoculated with the aspirated fluid remained sterile. At a later date the subcutaneous injection of a mouse with the discharges from the right bubo was unattended by any serious disturbance in the animal's health.

The remaining cases grouped in Table V. may be regarded, both from the etiological and clinical standpoint, as fairly typical examples of *pestis ambulans*. In all the illness was apparently so slight that, apart from a definite history of contact with infected persons, and in the absence of a bacteriological examination, it would have been quite impossible to pronounce upon the exact nature of the glandular affection. The general course and symptomatology of such cases has already been described in a previous article, and it will therefore be sufficient here to indicate briefly the salient points of each case.

Of these the most interesting is the case of a ward-maid in one of the pavilions set apart for the isolation and treatment of plague patients. Ten days prior to the commencement of her illness she had received a prophylactic injection of 10 cubic centimetres of Yersin's serum. The illness, however, was of a comparatively trifling nature, the patient only complaining of a moderate degree of indisposition for about three days. Bacteriological examination, however, demonstrated the presence of the plague bacillus in an exceedingly small cervical bubo. The serum taken during the third week of illness agglutinated an emulsion of plague bacilli in a dilution of 1 in 25, though the constitutional disturbance was so slight that the temperature and pulse throughout the illness never rose above normal.

Agnes R. (Case 17), aged three and a half years. This patient was a "contact" from the Molloy wake—one of the first discovered foci of infection. The illness, of sudden onset, was accompanied by headache, sickness, and vomiting, and pain in the left axilla. Examination of this region showed the presence of a small bubo, but an exploratory puncture failed to withdraw any lymphatic gland fluid. The temperature rose to 101° F. on the first day of illness, and subsided to normal two days later. Convalescence was rapid and complete.

In the remaining three cases the sudden appearance of bubo (axillary in one case, cervical in the others) was associated with symptoms of fairly acute onset, similar in all respects to those already described. In these, however, a bacteriological examination was not undertaken, but the peculiar nature of the illness, taken in conjunction with a very definite history of exposure to infection, seems sufficient to warrant these cases also being regarded as examples of the mildest variety of this disease. It may here be added that the serum of patients suffering from various forms of specific infectious disease, and taken at various stages of their illness was examined in different degrees of dilution with an emulsion of bacillus pestis. In no case was any reaction observed. The diagnostic value of its appearance, therefore, in cases associated with slight glandular enlargement is to this extent enhanced.

The following deductions appear fully warranted from an examination of the accompanying tables:—1. During the earlier days of the disease the reaction is not manifested, and consequently in rapidly fatal cases is probably never obtained. 2. Agglutinating properties first appear in the blood towards the close of the first week of illness (dilution 1 in 10). These gradually increase in intensity up to the sixth week of illness, and are sometimes maintained at a high level as late as the eighth week. After this date, however, in the majority of cases a gradual decline in the agglutinative power of the serum becomes apparent. The rates of increase and decrease of the reaction, generally speaking, are approximately equal; occasionally, however, the reaction wanes and disappears in a shorter period than that occupied between its appearance and point of maximum intensity. 3. In very severe cases ultimately proving fatal, the reaction, though present, never reaches a high degree of intensity. In cases of almost equal severity, however, in which an early and rapid convalescence followed, the reaction was of a more marked character. 4. In the mildest forms of plague a high degree of agglutinating power is probably never attained, and in some it appears to be absent. Stricker, in fact, states that the reaction never appears in this class of case; but this is undoubtedly too sweeping an assertion, as an undoubted and characteristic reaction in a dilution of 1 to 25 was obtained in two such cases. 5. The reaction, as a rule, is most marked in those severe cases characterised by an early and favourable crisis, and in such cases it disappears very slowly, having been shown to be present as late as the fifth month after the primary illness.

*Other methods.*—The technique just described is, however, perhaps unnecessarily complicated, as in order to avoid any possible source of fallacy a number of precautions were adopted which later experience showed to be superfluous. The initial difficulty—the preparation of a perfectly homogeneous bacillary emulsion—having been overcome, an almost precisely similar technique to that employed in the ordinary Widal reaction may be adopted. As already stated, the dilution of serum with emulsion can be carried to a much higher degree, and the time-limit considerably shortened when the microscopical method is employed. By this means reactions in which the bacilli are completely agglutinated in from 5 to 10 minutes are fairly common with potent sera in dilutions of 1 in 10 and 1 in 25. If, however, the dilution be carried further, it is absolutely necessary for trustworthy results to observe the reaction in hanging-drop preparations. In this way well-marked reactions have been obtained in dilutions of 1 in 200 with a time-limit of two hours, though preparations made between an ordinary slide and cover-glass showed no evidence whatever of any agglutinative process. The time-limit may be safely extended to 24 hours if the edge of the cover-glass be sealed with vaseline. By this method a reaction can often be demonstrated with sera of feeble agglutinative power, or with potent sera which have been highly diluted. As a control



experiment, preparations of (1) emulsion and (2) emulsion plus normal serum have been kept for over a week without any signs of undoubted agglutination supervening. Numerous observations of plague sera in progressively increasing dilutions have been made, and the time-limit in each case has been carefully noted. The data so obtained may be compared with those got by the sedimentation test at corresponding periods. To illustrate this, the results obtained by this method from two severe cases of plague terminating in recovery (Table III.) are exhibited in the accompanying table (Table VI.).

Like results may be obtained with similarly prepared emulsions of dead plague bacilli, but in this case the reaction is not so reliable, as the dead organisms are not agglutinated so readily. When working with dead cultures, however, the microscopical is to be preferred to the sedimentation method, since it yields more trustworthy results even in higher degrees of dilution. In the absence of facilities for obtaining a homogeneous emulsion of living or dead bacilli, Haffkine's prophylactic (which contains the latter) may be used to dilute a suspected plague serum. No satisfactory reaction, however, has been got by this means in a higher dilution than 1 in 25, and the sedimentation method is alone applicable owing to Haffkine's prophylactic being a bouillon culture. This last method can only be regarded as a makeshift.

*Concluding remarks.*—From the point of view of hygienic administration, the very mild cases of plague are of the utmost importance. The analogy presented by all other infectious diseases indicates that such cases must be regarded as of equal importance with the more severe forms in the possible dissemination of the disease, and constitute, therefore, a grave source of danger to the community. It is well known that epidemics of measles, scarlet fever, and diphtheria are frequently preceded by a type of the disease so mild that many cases are allowed to remain untreated, and it is interesting to note that several of the outbreaks of plague in the East have been heralded by the mildest possible form of the disease. Moreover, the difficulties attendant on a successful exploratory puncture of a small deep-set gland are sufficiently obvious, and any other means of arriving at a definite conclusion as to the nature of an obscure glandular swelling is certainly entitled to the most careful consideration.

In the severer forms of the disease the possibilities of a serum diagnosis are much greater. It has already been shown that during the early stages of the illness the agglutinative properties of the blood are but feebly developed, and that unless a careful technique be adopted for its demonstration the reaction is liable to be missed altogether. After the second week of illness, however, and particularly in those cases where the bubo undergoes resolution, the chances of obtaining the bacillus by puncture of the gland diminish rapidly during convalescence. This fact is well illustrated by the last three cases in Table IV., in which attempts to cultivate the organism by this method at the end of the first, second, and third weeks of illness respectively completely failed, though numerous degenerated bacillary forms were seen in smear preparations. Indeed, in the case of Mrs. M. (Table III.) culture tubes inoculated on the 8th day of illness with fluid obtained from puncture of the bubo proved sterile, though two days previously an actively growing pure culture had been obtained. On the other hand, the agglutinative power of the serum, insignificant at the commencement of the illness, progressively increases up to the sixth or seventh week of the disease, by which time a comparatively high degree of potency has been attained, especially in the severer forms of the disease which recover. Thereafter it begins to decline, but, as already shown, may be present in well-marked cases four or five months after the primary illness. It is, therefore, during and subsequently to the stage of convalescence, when the possibility of a bacteriological diagnosis is more or less remote, that the diagnostic value of the reaction becomes most apparent. In all cases, moreover, associated with the presence of glandular enlargements of dubious nature, the occurrence of which from time to time during the progress of an epidemic of plague may present a diagnostic problem of perplexing character, the application of this reaction cannot fail to prove of signal service.

TABLE I.—RESULT OF BACTERIOLOGICAL EXAMINATION OF ORGANS IN FATAL CASES OF PLAGUE.

Case Number.	Name.	Date of Sickness.	Bacteriological Examination during life.	Bubo.	Spleen.	Blood of Heart.	Lungs.	Liver.	Other Tissues.
22.	Mrs. M., aged 20 years; admitted Sept. 15th; died Sept. 16th.	Sept. 13th.	Bubo: bacillus pestis (pure culture). Blood: bacillus pestis (pure culture).	(1) Bacillus pestis (almost pure culture); and (2) bacillus coli communis (scanty).	(1) Bacillus pestis (scanty); and (2) bacillus coli communis (abundant).	Bacillus pestis (pure culture).	(1) Bacillus pestis; (2) diplococcus (Friedlander's); and (3) bacillus catarrhalis.	—	Retro-peritoneal glands; bacillus pestis (pure culture).
28.	Baby M.; born Sept. 16th; died Sept. 27th.	Sept. 24th.	Not undertaken.	(1) Bacillus pestis; and (2) bacillus coli communis.	(1) Bacillus pestis; and (2) bacillus coli communis.	(1) Bacillus pestis; and (2) bacillus coli communis.	(1) Bacillus pestis; and (2) bacillus coli communis.	(1) Bacillus pestis; and (2) bacillus coli communis.	—
27.	Mary G., aged 6 years; admitted Sept. 19th; died Sept. 25th.	Sept. 18th.	Bubo: bacillus pestis (pure culture). Blood: sterile (7 daily consecutive examinations).	—	Post-mortem examination refused.		—	—	—
18.	George H., aged 46 years; admitted Sept. 12th; died Sept. 13th.	—	Not undertaken.	(1) Bacillus pestis; 2 streptococcus; and (3) large diplococcus.	(1) Bacillus pestis; and (2) streptococcus.	(1) Bacillus pestis; and (2) streptococcus.	—	(1) Bacillus pestis; and (2) streptococcus.	Kidneys; (1) bacillus pestis; (2) streptococcus; and (3) large bacillus.
1.	James B., aged 60 years; admitted August 28th; died Sept. 24th.	August 12th.	Bubo: bacillus pestis (pure culture). Blood: sterile.	(1) Bacillus pestis (scanty); and (2) chiefly a small putrefactive bacillus.	(1) Bacillus pestis (scanty); and (2) staphylococcus pyogenes albus.	—	—	—	—
25.	Robert M., aged 12 years; admitted Sept. 16th; died Sept. 28th.	Sept. 14th.	Blood: sterile. Bubo: staphylococcus pyogenes aureus, Sept. 25th.	(1) Bacillus pestis (scanty); and (2) staphylococcus pyogenes aureus (abundant).	(1) Bacillus pestis (abundant); (2) staphylococcus pyogenes aureus (scanty); and (3) bacillus coli communis.	(1) Bacillus pestis (scanty); (2) staphylococcus pyogenes aureus (abundant); and (3) bacillus coli communis.	(1) Bacillus pestis; (2) staphylococcus pyogenes aureus; and (3) bacillus coli communis.	—	Urine: sterile. Peritoneal fluid: sterile. Mediastinal abscess: (1) bacillus pestis; (2) staphylococcus pyogenes aureus; and (3) bacillus coli communis.
11.	William W., aged 48 years; admitted Sept. 20th; died Oct. 6th.	About August 24th.	Bubo: (1) degenerated plague bacilli; (2) staphylococcus pyogenes aureus; and (3) staphylococcus pyogenes albus.	(1) Staphylococcus pyogenes albus; (2) streptococcus; and (3) large diplococcus.	(1) Staphylococcus pyogenes albus; (2) bacillus pestis; and (3) bacillus coli communis.	—	—	(1) Bacillus pestis; and (2) bacillus coli communis.	—



TABLE II.—FATAL CASES.

Case No.	Name.	Age.	Day of illness on admission.	Date of examination of serum, &c.	Nature of fluid examination.	Amount of serum (Yersin) injected.	Result of bacteriological examination.	Result of animal inoculation.	Dilution of serum with emulsion of bacillus pestis in proportions of—		
									1 in 10	1 in 25	1 in 50
22.	Mrs. M., - -	20	Third day.	Third day.	Blood, post mortem.	60 c.c.	+	+	-	-	-
28.	Baby M., - -	7 days	...	Seventh day.	Blood, post mortem. Pleural effusion.	...	+	+	+	-	-
									+	+	-
27.	Mary G., - -	6	Second day.	Fourth day. Seventh day.	Blood serum. Blood, post mortem. Pleural effusion.	100 c.c.	+	+	+ f +	- +	- -
										+ f	-
25.	Robert M., - -	12	Third day.	Twelfth day.	Blood, post mortem. Pericardial effusion. Peritoneal effusion.	80 c.c.	+	+	+	-	-
									+	+	-
									+	+	-
1.	James B., - -	60	Fourteenth day	Sixth week.	Blood, post mortem.	...	+	+	++	+	-
11.	William W., -	48	Fourth week.	Sixth week.	Blood, post mortem. Bile, post mortem.	...	+	+	+	+ f + f	- -

TABLE III.—SEVERAL CASES ENDING IN RECOVERY.

Case N	Name.	Age.	Date of illness on admission.	Date of serum examination.	Amount of serum (Yersin) injected.	Result of bacteriological examination.	Result of animal inoculation.	Dilution of serum with emulsion of bacillus pestis in proportions of—				
								1 in 10	1 in 25	1 in 50	1 in 75	1 in 100
3.	Pat. F., - -	56	Second week.	Seventh week. Twelfth week.	...	+	+	++ ++	+	+	-	-
5.	Mrs. M., - -	40	Sixth day.	Third week. Sixth week. Ninth week. Twelfth week.	...	+	+	+	-	-	+	-
								++	++	++	+ f	-
								+	+	+	-	-
								+	+ f	-	-	-
2.	Mrs. T., - -	40	Thirteenth day.	Third week. Eighth week. Tenth week. Twelfth week.	...	+	+	++	+	-	-	-
								++	+	+	+ f	-
								+	+	-	-	-
								+	+	-	-	-
9.	Thomas H., -	15	Seventh day.	Fourth week. Fifth week. Sixth week. Eighth week. Eleventh week. Fifth month.	40 c.c.	+	+	++	++	+	-	-
								+	+	-	+	-
								++	+	+	+ f	-
								++	+	+	+ f	-
								++	++	+	-	-
								+	+	-	-	-
19.	Charles M., -	27	Second day.	Sixteenth day. Fourth week. Sixth week. Eighth week. Four and a half months.	40 c.c.	+	+	+	+	-	-	-
								++	+	+	+ f	-
								++	+	+	-	-
								+	+	-	-	-
23.	Mrs. M., - -	41	Second day.	Seventh day. Eighteenth day. Fifth week.	40 c.c.			+	+ f	-	-	-
								+	+	+	-	-
								+	+	+ f	-	-
X	Adam A., - -	18	Second day.	Sixth day. Second week. Sixth week. Ninth week.	...	+ ?		-	-	-	-	-
								+	+	-	-	-
								+	+	-	-	-
								+	+ ?	-	-	-

TABLE IV.—MILD CASES.

Case No.	Name.	Age.	Day of illness on admission.	Date of serum examination.	Amount of serum (Yersin) injected.	Result of bacteriological examination.	Result of animal inoculation.	Dilution of serum with emulsion of bacillus pestis in proportions of—				
								1 in 10	1 in 25	1 in 50	1 in 75	1 in 100
24.	Mary M., - -	14	Second day.	Sixth day. Sixteenth day. Third week. Fifth week.	40 c.c.	+		+	—	—		
								+	+	—		
								++	+	+f	—	
								++	+	—		
20.	Mrs. B., - -	29	Second day.	Ninth day. Eighteenth day. Sixth week.	40 c.c.	+		+	+f	—		
								++	+f	—		
								+	—	—		
26.	Mrs. G., - -	28	Second day.	Third week. Fourth week. Sixth week. Eighth week. Four and a half months.	...	+	+	++	++	+	—	—
								++	++	++	+	—
								+	+	+	—	—
								+	—	—	—	—
								+	—	—	—	—
4.	James C., - -	24	Third week.	Third week. Fifth week. Seventh week. Ninth week.	...	—	—	+	+?	—		
								+	+	+?		
								+	+	—		
								+	+	—		
6.	Dennis T., - -	6	Ninth day.	Fifth week.	...	—	—	++	++	+	—	
10.	Rosa M., - -	28	Third week.	Fifth week.	...	—	—	+	+	—		

TABLE V.—CASES OF PESTIS AMBULANS.

Case No.	Name.	Age.	Day of illness on admission.	Date of serum examination.	Result of bacteriological examination.	Amount of serum (Yersin) injected.	Dilution of serum with emulsion of bacillus pestis in proportions of—			
							1 in 10	1 in 25	1 in 50	1 in 75
21.	Nellie R., - -	21	Second day.	Third week.	+	10 c.c.	+f	+f	—	—
17.	Agnes R., - -	3½	First day.	Second week.	—		+	+	—	—
14.	Arch. D., - -	18	Seventh day.	Fourth week.	—		+	+	—	—
8.	William M., - -	3	Fifth day.	Twentieth day.	—		—	—	—	—
15.	Jeanie M., - -	14	Second day.	Second week.	—		—	—	—	—
13.	Annie M'K., - -	12	Second day.	Second week.	—		—	—	—	—
16.	Pat. M'G., - -	18	Second day.	Fourth week.	—		—	—	—	—

TABLE VI.—MICROSCOPICAL SERUM AGGLUTINATIONS.

*Thomas H. (Case No. 9).*

Date of serum examination.	Dilution 1 in 10.	Time.	Dilution 1 in 25.	Time.	Dilution 1 in 50.	Time.	Dilution 1 in 75.	Time.	Dilution 1 in 100.	Time.	Dilution 1 in 150.	Time.	Dilution 1 in 200.	Time.	Dilution 1 in 300.	Time.
Fifth week, -	++	5 mins.	++	10 mins.	++	15 mins.	++	30 mins.	++	1 hour.	+	45 mins.		...	—	...
Eighth week, -	++	5 mins.	++	10 mins.	++	15 mins.	++	20 mins.	++	1 hour.	+	1 hour.	+	2 hours.	...	...
Eleventh week, -	++	5 mins.	++	20 mins.	++	30 mins.	++	45 mins.	+	1 hour.	+	1 hour.	+	1 hour.	+f	2 hours.
Four and a half months, -	++	10 mins.	++	30 mins.	+	1 hour.	++	...	+	2 hours.	—	18 hours.		...		...

*Charles M. (Case No. 19).*

Fourth week, -	++	5 mins.	++	10 mins.	+	1 hour.	+	2 hours.	+	12 hours.	—	18 hours.		...		...
Sixth week, -	++	5 mins.	++	10 mins.	+	45 mins.	+	2 hours.	+	2 hours.	+	4 hours.		...		...
Eighth week, -	++	5 mins.	++	15 mins.	+	2 hours.		...		...		...		...		...
Four and a half months, -	++	20 mins.	++	30 mins.	+	2 hours.		...		...		...		...		...





## MORBID ANATOMY AND BACTERIOLOGY.

By R. M. BUCHANAN, M.B. (Glas.), F.F.P.S.G., Bacteriologist to the Corporation.

The morbid anatomy and bacteriology of plague as observed in the outbreak in Glasgow during the autumn of 1900 are considered in this Report under the following divisions:—

INTRODUCTORY.

DETAILS OF MORBID ANATOMY AS RECORDED IN POST - MORTEM REPORTS, AND NOTES THEREANENT.

MICROSCOPICAL EXAMINATION OF THE FRESH TISSUES.

MICROSCOPICAL EXAMINATION OF THE TISSUES IN SECTION.

CULTURE EXPERIMENTS.

INOCULATION EXPERIMENTS.

MODE OF INFECTION.

BACTERIOLOGICAL DIAGNOSIS.

PRECAUTIONS OBSERVED IN CONNECTION WITH POST - MORTEM EXAMINATIONS AND INOCULATION EXPERIMENTS.

EXAMINATION OF RATS IN RELATION TO THE OUTBREAK OF PLAGUE IN GLASGOW.

### INTRODUCTORY.

It has been reckoned that at least 36 persons were attacked during the outbreak, and that 16 succumbed to the disease. Of the fatal cases, 7 died in their own homes before the disease declared itself, and were inferentially regarded as Plague from their definite association with authentic cases, and 9 died in Belvidere Hospital. One of the latter appeared in the Hospital Returns as "Typhus," and the true nature of the case was only revealed on *post-mortem* examination. The *post-mortem* records deal with seven cases.

The *post-mortem* examinations were conducted at Belvidere Hospital, and followed up by bacterioscopic investigation at the Hospital, and at the Public Health Laboratory. The first examination was conducted by Professor Muir, of Glasgow University, in my absence, and the last by Professor Pertik, of Buda-Pesth.

The condition of the bodies as regards nutrition was notably good where death had occurred early in the course of the illness, while emaciation was more or less evident in the cases of longer duration.

The presence of petechiæ in the skin was noted in two cases only. In one of these there was also a faint macular staining over the abdomen (a condition which clinically had contributed to a provisional diagnosis of typhus). There were no gross hæmorrhagic lesions visible in the skin, but in about one-half of the cases extravasations of blood were discovered in various tissues and organs.

In all the bodies some swelling was evident either in the groin, the arm-pit, or the neck, constituting the characteristic bubo.

The tendency of this characteristic lesion to occur with much greater frequency in the groin than in other parts was shown by its presence in this region in four of the seven cases. In other two cases the primary bubo was situated in the axilla with a secondary bubo in the neck in the one and in the mediastinum in the other, while in the remaining case multiple buboes appeared in both sides of the neck.

The bubo in each instance was formed of a group of lymphatic glands in a setting of œdematous, hæmorrhagic, or indurated connective tissue. In four of the seven cases the bubo was in a more or less acute stage, unaccompanied by any very manifest lesion in the internal organs; in two it was complicated with pneumonia; and in the remaining one it had reached a stage of complete necrosis and sloughing.



It will thus be seen that the cases naturally grouped themselves into three classes according to the lesions presented, namely—

1. Acute bubonic cases, without complication.
2. Acute bubonic cases, complicated with pneumonia.
3. Chronic bubonic case, with necrosis and sloughing.

#### DETAILS OF MORBID ANATOMY.

The details of the morbid anatomy are fully recorded in the *post-mortem* reports appended to the clinical histories of the fatal cases, and it is, therefore, unnecessary to present these reports again in full. But, in order to permit of a collective view of the cases from a pathological standpoint, and to facilitate reference to outstanding features in their morbid anatomy, the *post-mortem* reports are epitomised and grouped together here in the three classes just mentioned. Above each epitome will be found the case number, the initials and age of the patient, the approximate period of incubation, the duration of illness, and the date of examination.

##### I.—ACUTE BUBONIC CASES WITHOUT COMPLICATION.

CASE 7.—P.M., AGED 20 YEARS.

*Approximate Period of Incubation, 3 Days. Duration of Illness, 5 Days.*

*Post-mortem Examination, 28th August, 1900.*

Bubonic enlargement of axillary and cervical glands, with periglandular œdema and hæmorrhage. Hæmorrhagic adenitis with marked swelling of mediastinal, prevertebral, and inguinal glands. Heart muscle paler than normal, but not specially soft. Hypostatic congestion and some collapse of the lungs, but no pneumonia; the glands at the root not visibly affected. No fluid in the pleural cavities. Spleen enlarged, weighing  $12\frac{1}{2}$  ounces, and softer than normal; splenic pulp pale and mottled, and malpighian bodies small but distinct. Liver swollen, pale, and soft, with parenchymatous degeneration in a marked degree. Kidneys swollen and soft, owing to cloudy swelling of cortex. Pancreas and supra-renals also swollen and soft.

*Bacterioscopic Examination.*—*Bacillus pestis* in buboes in enormous numbers.

CASE D.—MRS. G., AGED 55 YEARS.

*Approximate Period of Incubation, 10 Days. Duration of Illness, 14 Days.*

*Post-mortem Examination, 4th September, 1900.*

Left inguinal bubo involving the transverse set of glands and forming a sausage-like swelling along the line of Poupart's ligament. The individual glands of the bubo are about  $\frac{3}{4}$  of an inch in diameter, and appear as well-defined abscesses, walled by a thin rind of hæmorrhagic gland tissue, containing shreds of necrosed tissue and brownish viscid pus. Periglandular tissues œdematous and densely matted together. Right inguinal glands (transverse set) hyperæmic and enlarged, one being the size of a marble, hæmorrhagic and purulent. Iliac and prevertebral glands of left side hyperæmic and enlarged. Glands in other parts appear normal. Faint typhus-like macular staining of abdomen. Petechiæ on abdomen and thighs. Heart muscle pale brown, soft and flabby. Lungs hyperæmic and œdematous, the right lower lobe showing some areas of consolidation. Spleen soft and affluent. Liver and kidneys manifest parenchymatous degeneration.

*Bacterioscopic Examination.*—*Bacillus pestis* not recovered from bubo.

CASE 18.—G.H., AGED 46 YEARS.

*Approximate Period of Incubation, 7 Days. Duration of Illness, 10 Days.*

*Post-mortem Examination, 13th September, 1900.*

Right inguinal bubo, with periglandular œdema and hæmorrhage. The bubo comprises the vertical set of glands which vary in size from that of a pea to a walnut, the distal gland being the largest, and presenting a granular brownish-red marbled appearance, somewhat resembling a mixed thrombus in transverse section. The retroperitoneal gland just above Poupart's ligament shows the same hæmorrhagic enlargement. The prevertebral glands on the right side and the inguinal glands on the left side are slightly enlarged and intensely hyperæmic. Bronchial glands enlarged and infiltrated with blood. The lymphatic glands of the neck and axillæ are conspicuous by their red colour. The loose connective tissues in the neck and in the posterior mediastinum are infiltrated with blood. Subpericardial ecchymoses and some parenchymatous degeneration of heart muscle. Large exudation of fluid in both pleural cavities. Lungs hyperæmic and œdematous. Spleen somewhat soft and hyperæmic. Liver normal in size, but presenting cloudy swelling in a marked degree. Kidneys large and hyperæmic, and the loose tissues in the hilus of each extensively infiltrated with blood. In the mucous membrane of the stomach and intestines numerous small punctiform hæmorrhages are found.

*Bacterioscopic Examination.*—*Bacillus pestis* in bubo; in prevertebral, bronchial, and left inguinal glands; and in blood, lungs, spleen, liver, and kidneys. *Pneumococcus* in bubo, left inguinal gland, lungs, and kidneys.

(Figs. 1, 8, 24, 25, and 26.)

## CASE 22.—MRS. M., AGED 20 YEARS.

*Approximate Period of Incubation uncertain; Case in household 16 Days previously.**Duration of Illness, 3 Days.**Gave birth to Child in Hospital (Baby M., Case No. 28).**Post-mortem Examination, 18th September, 1900.*

Right inguinal bubo, comprising vertical set of glands and retroperitoneal gland just above Poupart's ligament, with periglandular œdema. The various glands of the bubo are fully half-an-inch in diameter, of firm consistence, intensely hyperæmic and finely mottled. Prevertebral glands on same side also notably affected. The lymphatic glands generally, including those of the mesentery, are slightly enlarged and hyperæmic. Skin pale, and no cutaneous hæmorrhage evident; some putrefactive discolouration of abdomen. Heart firm in consistence, with subpericardial ecchymoses at apex of left ventricle, and some cloudy swelling of myocardium. Hypostatic congestion of the lungs. Liver, spleen, and kidneys somewhat hyperæmic. Uterus characteristic of recent delivery.

*Bacterioscopic Examination.*—*Bacillus pestis* in bubo, blood, lungs, liver, and spleen. *Pneumococcus* in bubo and lungs. *Streptococcus* in lungs.

(Figs. 9, 10, 11, and 27.)

These cases formed a series in which the buboes were exhibited in various stages, from the earlier stage of congestion and hæmorrhage to the later one of softening or suppuration. These stages corresponded with periods of illness, ranging from three to fourteen days. Periglandular œdema, alone or with hæmorrhage, was a marked feature of the swelling. The appearance of the glands was very remarkable. The somewhat dry, granular, brownish red, finely marbled or mottled cut surface, betokening congestion, hæmorrhage, and necrosis, was characteristic, and quite distinct from other glandular affections.

In each case, also, there was considerable involvement of the neighbouring group of glands, and more or less polyadenitis, as evidenced by some hyperæmia and enlargement of the lymphatic glands generally.

The larger viscera presented no marked departure from the normal. In the heart, liver, and kidneys there was some cloudy swelling, and the spleen was more or less soft and hyperæmic. Extravasations of blood, apart from the buboes, were found in two of these cases (G. H. and Mrs. M.). In both there were subpericardial ecchymoses, while in the former there was also extensive hæmorrhage in the loose cervical, mediastinal, and retro-peritoneal tissues.

## II.—ACUTE BUBONIC CASES COMPLICATED WITH PNEUMONIA.

## CASE 28.—BABY M., AGED 10 DAYS.

*Approximate Period of Incubation, 8 Days. Duration of Illness, 3 Days.**Child of Mrs. M. (Case No. 22); born in Hospital.**Post-mortem Examination, 27th September, 1900.*

Buboes on both sides of neck. General enlargement and hyperæmia of axillary, bronchial, mesenteric, inguinal, and prevertebral lymphatic glands. Hæmorrhage and œdema of subcutaneous tissue of neck. Marked parenchymatous degeneration of heart, liver, and kidneys, and coagulation necrosis of right supra-renal capsule. Numerous small hæmorrhagic condensations in lungs, many of which show a yellowish necrotic centre. Fibrinous exudation on surface of both lungs. Opaque yellow fluid in pleural cavities. Spleen much enlarged, intensely hyperæmic, and of firm, liver-like consistence. Liver enlarged and extremely hyperæmic, with very marked cloudy swelling at parts; a number of small yellow points like tubercles throughout the hepatic tissue. Kidneys very hyperæmic, and revealing on section minute hæmorrhagic foci, each with a greyish centre, situated chiefly in the pyramids. Right supra-renal gland transformed into a dense yellow, cheesy-looking mass by coagulation necrosis.

*Bacterioscopic Examination.*—*Bacillus pestis* in buboes, blood, lungs, spleen, liver, kidneys, and suprarenals.

(Figs. 2, 3, 4, 12, and 16 to 22.)

## CASE 25.—R.M., AGED 12 YEARS.

*Approximate Period of Incubation uncertain; Case in household 16 Days previously.**Duration of Illness, 14 Days.**Post-mortem Examination, 28th September, 1900.*

Purulent axillary and subclavicular buboes. Surgical drainage opening in left mammillary line over second intercostal space, traversing the pectoralis major and minor towards the axilla. A mass of purulent tissue, consisting of enlarged lymphatic glands and softened connective tissue, extending



from axilla under pectoralis minor, the glands being partly softened and yellowish grey, partly firm and granular, with dull areas of coagulation necrosis. Pectoralis minor and serratus anticus major streaked with purulent infiltration. Abscess in thymus gland, and purulent infiltration of anterior mediastinum. Polyadenitis. Lobar and lobular pneumonia, with numerous well defined reddish-grey necrotic areas about the size of a hazel nut, in both lungs; fibrinous exudation on both pleural surfaces. Myocardium pale yellowish-brown, friable, and opaque from cloudy swelling. Spleen enlarged, the cut surface being smooth, the pulp firm, and the malpighian bodies dark brown. The kidneys are of medium size, and the cortex in each is friable and opaque. Liver of medium size, pale yellowish brown, and friable from cloudy swelling. Punctiform hæmorrhages in stomach.

*Bacterioscopic Examination.*—*Bacillus pestis* in buboes, blood, lungs, bile, and spleen. *Staphylococcus aureus* in suppurating bubo, in blood, lungs, and spleen.

(Figs 5, 6, and 13.)

The presence of pneumonia in these two cases afforded the only illustrations of involvement of the lungs. Moreover, the conditions were very different in each. In Baby M., a hæmorrhagic broncho-pneumonia appeared, the consolidations being distinguished by a peripheral zone of hæmorrhage, and frequently also by a minute yellow necrotic centre of firm consistence. In the case of R. M., on the other hand, a mixed croupous and lobular pneumonia extensively involved both lungs. Large and well-defined nodular necrotic consolidations were disseminated throughout the pulmonary tissue. These appeared sharply defined in the intensely hyperæmic and œdematous upper lobes, and with less distinctness, in the midst of grey hepatisation, in the lower lobes (Figs. 5 and 6). A fibrinous exudation was manifest on the pleural surfaces in both cases.

The buboes in the two cases, while displaying the same general characteristics as those in the first class of cases, presented some points of special interest. The multiple buboes on both sides of the neck of Baby M., involving the superficial and deep cervical glands, pointed to the path of infection as having been by the nose and mouth (most probably at the time of birth), and this view receives further support in the presence of the broncho-pneumonia. The purulent infiltration of the tissues in the neighbourhood of the buboes in the case of R. M. had resulted from mixed infection with *staphylococcus pyogenes aureus*.

As regards the condition of the other internal organs of these two cases, the most notable change was the pronounced cloudy swelling, especially of the heart. In the right suprarenal capsule of Baby M., this degenerative change had ultimated in coagulation necrosis. The multiple metastatic foci in the liver and kidneys were also a remarkable manifestation of the morbid process in this case (Figs. 3 and 4)., Similar foci were also observed in one other case namely, (J.B. No. 1.), but only in the kidneys. A similar condition was found in the liver of a mouse which died on the sixth day after experimental inoculation.

Professor Zabolotny, of St. Petersburg, who was present at most of the *post-mortem* examinations, and whose kindness and assistance during the epidemic I have the greatest pleasure in acknowledging, informed me that he had frequently observed these foci in the course of his work in connection with plague in various countries.

### III.—CHRONIC BUBONIC CASE, WITH NECROSIS AND SLOUGHING.

CASE 1.—J.B., AGED 60 YEARS.

*Approximate Period of Incubation, 9 Days. Duration of Illness, 43 Days.*

*Post-mortem Examination, 25th September, 1900.*

Right inguinal bubo, with indolent sloughing ulcer in skin. Under floor of ulcer a dense mass of soft granular yellowish necrotic substance, like inspissated pus, extending upwards in the course of the vessels under Poupart's ligament, and continuous with a chain of partitioned abscesses partly filling the right iliac fossa, the right side of the pelvis, and impinging on the right wall of the bladder. Purulent infiltration of psoas muscle upwards to lumbar vertebræ. A sinus leads from the lower of these abscesses downwards to discharge from a small opening in upper end of ulcer. Purulent

infiltration of the subcutaneous and deeper tissues half-way down the thigh. \* Glands in other regions appear normal. Lungs hyperæmic and œdematous. Heart muscle pale and cloudy; fibrous thickening of aortic and mitral curtains. Liver hyperæmic. Spleen enlarged and of firm consistence. In both kidneys there are numerous small yellow points like tubercles visible in the cortex. A small ulcer appears in the gastric mucous membrane near the pylorus.

*Bacterioscopic Examination.*—*Bacillus pestis* not recovered from bubo or organs. Colonies of *staphylococcus* in periphery of glands of bubo.

(Fig. 7.)

This case is of special interest, in contrast with those already described, on account of the long duration of illness, and the consequent modification of the bubo. The whole of the bubonic tissue had undergone necrosis and was in process of sloughing, while a number of large abscesses followed the course of the vessels upwards into the pelvis. Extensive purulent infiltration also involved the subcutaneous and intermuscular tissues of the thigh.

With the exception of the kidneys, the internal organs presented no features calling for special reference. The small yellow foci observed in the kidneys have already been referred to in connection with the case Baby M. They resembled somewhat metastatic abscesses, but were of firm consistence, and unaccompanied by any evidence of inflammation.

#### MICROSCOPICAL EXAMINATION OF THE FRESH TISSUES.

Preparations were made at the time of the *post-mortem* examination from the glandular swellings. This was done by drawing the edge of a cover glass, charged with material from the cut surface of the gland, lightly across the slide, so as to make a thin uniform film. A series of film specimens was in like manner secured from the blood and organs generally. The films were fixed with absolute alcohol, and stained for about five minutes with carbol-thionin-blue, or for as many seconds with carbol-fuchsin. Gram's method proved of great value as a control stain, inasmuch as the *bacillus pestis* characteristically failed to hold the stain by this method, while other species, such as *pneumococcus*, *staphylococcus*, and *streptococcus*, if present, were rendered prominent by retaining it.

In those preparations from buboes in the acute stage *bacillus pestis* was found in great number, and in what might be called its typical vegetative or normal form—namely, a short thick bacillus with rounded ends, the ends staining deeply in contrast with the faintly stained or colourless centre, and producing the picture known as “polar staining” (Plate II.). The bacilli were generally evenly distributed throughout a thin film as isolated elements, while in the thicker films they were often found heaped together in very great numbers.

In preparations from lesions of longer duration the bacilli showed a degenerative tendency, losing the plump appearance, and becoming irregular in size, stunted or elongated, ovoid, and finely globular (Fig. 9). The degree of staining at the same time appeared less and less, until there was only a thin crescent at the position of the polar protoplasm, or a faint marginal rim all round. Finally, bloated, colourless forms could be seen, by intense staining of the specimen, forming great areas, in which a comparatively small number of more recent forms were scattered. An erroneous impression of the number of bacilli might thus at first sight be obtained.

A mixed infection was very apparent in the films made from two cases (G. H. and Mrs. M.), in which the *bacillus pestis* was found in association with the *pneumococcus*. Figs. 9 and 10 show this mixed infection in the lung and bubo of one of these cases.

Considerable interest attaches to the case in which the stage of suppuration of the bubo had been reached (Case D, Mrs. G.). Here no trace of the plague bacillary forms could be obtained under the microscope, although there were



numerous round bodies and tadpole-like forms, which might be regarded as involution forms of bacillus pestis, from the close resemblance to similar forms obtained in artificial cultures, especially on gelatine. The duration of this case was about 14 days, and the entire disappearance of the plague bacillus from the body within this period is noteworthy.

In the case of J. B. (No. 1) it is not surprising that the bacillus pestis was not obtained from the bubo, considering that the patient lived for fully six weeks. The same evidence of the presence of degenerated forms was manifest however, and the transition from the bacillary to the distorted form was quite traceable.

## MICROSCOPICAL EXAMINATION OF THE TISSUES IN SECTION.

Sections for microscopical examination were made from specimens of the organs and tissues of each case.

The tissues were fixed and hardened in absolute alcohol, and sections were obtained by embedding in paraffin, according to the following method:—Selected pieces were immersed for a few hours in fresh absolute alcohol, and then transferred to cedar oil overnight, the bottle containing the oil being placed on the top of the paraffin bath. Next morning the pieces were placed in soft paraffin (45° C.), after being freed of superfluous cedar oil by means of filter paper, and kept in the bath for about three hours at a temperature of 53° C. The pieces were then transferred to hard paraffin (52° C.) for about two hours, and finally embedded in fresh hard paraffin.

The staining of the bacillus pestis *in situ* in the various organs and tissues was frequently difficult to accomplish satisfactorily, on account of its feeble hold on stains in the presence of decolourising agents. Various methods were tried, and the following, in which carbol-thionin-blue and eosin were used as stain and counterstain, was the one which gave the best results:—The sections were (1) stained on the slide for five minutes with carbol-thionin-blue, rinsed in water to get rid of excess of the stain, differentiated in water to which a few drops of acetic acid had been added, and washed in water; (2) counterstained with  $\frac{1}{4}$  per cent. watery solution of eosin for 30 seconds, washed in water, dehydrated in absolute alcohol, cleared in xylol, and mounted in Canada balsam.

## THE BUBO.

In the earlier stages of the glandular swelling the periglandular blood vessels are found to be greatly engorged (Fig. 24). Extravasations of blood are also numerous and extensive in the investing tissues of the glands. Thrombosis of the periglandular vessels appears in the bubo of one of the cases (Mrs. M., No. 22).

The affected glands exhibit various conditions, depending apparently on the duration and intensity of the morbid process—namely, (*a*) bacillary invasion of the periphery of the gland only; (*b*) bacillary invasion of the entire gland, with great congestion and hæmorrhage; (*c*) bacillary invasion and necrosis of the gland along certain tracks; (*d*) bacillary invasion and necrosis of the whole gland; and (*e*) softening or suppuration, with entire disappearance of the bacilli.

(*a*) *Bacillary invasion of the periphery of the gland only.*—In several instances it is found that bacillus pestis has become aggregated in great masses in the periphery of the lymphatic glands, in what appears to have been a very early stage in the formation of the bubo. In other respects the glands appear fairly normal (Fig. 16). This tendency of the bacillus pestis to accumulate in enormous numbers in the periphery of the gland is also seen in the bubo of a plague-infected mouse.

(b) *Bacillary invasion of the entire gland, with great congestion and hæmorrhage.*—In the more acute buboes congestion and hæmorrhage are the outstanding features. A great engorgement of the blood vessels and a general extravasation of blood—not uniformly, but in homogeneous areas and infiltrations—are visible throughout the gland. The gland tissue, as such, has almost entirely disappeared, and the section is more like that of a spongy vascular tissue. Extending throughout the gland are also homogeneous masses and tracts of plague bacilli. Their number is so great and their aggregation so close that they completely obliterate all trace of gland structure. In the upper part, and to the right of Fig. 24, such a mass of bacilli is shown in the periphery of a bronchial gland, the lighter parts in the dark mass being due to extravasated blood. The enormous numbers in which these bacilli pervade the affected tissues cannot but be regarded as a special feature of the disease.

(c) *Bacillary invasion and necrosis of the gland along certain tracts.*—Taking a gland which appears to the naked eye as only slightly affected, a condition differing very materially from that just described is found. Although the vessels are engorged, there is comparatively little or no hæmorrhage. Certain tracts of gland tissue invaded by plague bacilli have undergone necrosis. The cellular necrosis exhibited in these tracts is a very striking feature. It is seen in the various stages which mark coagulation necrosis—namely, swelling with fine granulation of the cell protoplasm, disappearance of the nucleus, and, finally, disappearance of the cell outline. It is notable that this necrosis appears to have involved the bacilli themselves in like manner, for where it is most advanced the bacilli have also become indistinct, and refuse to take the stain. The other parts of the gland lying between these necrotic tracts are normal in appearance, and free from bacillary invasion (Fig. 25).

(d) *Bacillary invasion, and more or less complete necrosis of the whole gland tissue.*—This condition is evidenced to the naked eye by a greyish or yellowish-grey appearance of parts of the gland or of the whole gland, or, when much hæmorrhage is also present, by a mottled brownish red and grey. The tissues of the gland have lost much of their outline, appearing more or less homogeneous, and devoid of nuclear staining. The bacilli have almost disappeared, and can only be seen in faintest outline. In marginal parts of the gland, however, they are still to be found in distinct and characteristic swarms. The walls of the blood vessels, in one case (Mrs. M.), are homogeneous, swollen and convoluted, and the larger vessels in many instances are filled with leucocytes. A number of leucocytes also remain distinct throughout the dead tissue (Fig. 27). As all these conditions could be found in a case in which the illness was only of three days' duration, the entire disappearance of the bacillus pestis from the bubo would presumably be a matter of a few days more. In this tendency to early extinction of the bacillus pestis in a bubo rests the explanation of the negative results sometimes obtained after exploratory puncture for purposes of diagnosis, even in the end of the first week (see Dr. McClure's Report on Clinical Bacteriology, page 57), and also of the diminution or complete loss of infectivity which, as a rule, distinguishes the discharge from a plague bubo.

(e) *Softening or suppuration, with entire disappearance of the bacilli.*—In the case of Mrs. G. (Case D) the glands of the bubo had all undergone softening, and resembled so many well-defined abscesses containing brownish viscid pus. Sections from a less affected gland from the other groin show no trace of plague bacilli; but a considerable number of round bodies, varying greatly in size, are readily detected. The large number of these bodies, and their resemblance to similar bodies in old cultures, especially old gelatine cultures, of bacillus pestis, indicate that they are bacilli which have undergone modification into the characteristic "involution" form. Again, in the case of J. B. (Case No. 1), in which some of the glands were soft and yellow, like inspissated pus, and others were in the form of large abscesses (Fig. 7), the same bodies are found in even greater number.



## LUNGS.

The two cases of secondary pneumonia present very different conditions under the microscope. In the case of Baby M. numerous small foci of condensation are visible to the naked eye throughout the section. Under the microscope these are found to be due to the occupation of groups of lung alveoli by colonies of plague bacilli, the appearance presented bearing a remarkable resemblance to an artificial coloured injection of the air spaces (Fig. 17). Each group of invaded alveoli marks the distribution of a bronchiole. The central part of the invaded area is necrosed, and in the peripheral part the alveoli are occupied by blood corpuscles. Very few leucocytes are present. The pulmonary vessels generally are engorged with blood, and the perivascular lymph channels and those of the pleura are occupied by enormous numbers of plague bacilli (Fig. 18). In the case R. M. the conditions presented are those of croupous pneumonia. The lung alveoli are occupied by a network of fibrin, and notably few cell elements are present. Plague bacilli are scattered diffusely throughout the alveoli in great number. In the necrotic areas the same general appearances are found, but with the additional evidence of coagulation necrosis.

## LIVER.

The liver in the case of Baby M. shows focal accumulations of bacillus pestis in the capillary vessels. On surveying the section under the low power, it is found that these colonies or foci are very numerous, and are distributed almost uniformly throughout the organ. In and around them is a small number of leucocytes (Figs. 21 and 22). The capillaries generally are greatly distended, and show comparatively few bacilli. The yellow foci mentioned in the *post-mortem* report, and shown in Fig. 4, are essentially of the same structure, being composed simply of a proportionately greater number of bacilli and leucocytes. Necrosis of the hepatic cells in the vicinity of the nodules is not seen, and the hepatic cells actually involved in the lesion have disappeared, apparently as the result of pressure. Fig. 23 shows the liver of a plague-infected mouse which died on the sixth day, and in which a similar condition is observed. Here, however, the plague bacilli have disappeared. Only a few are to be found in the part which is attached to the ruptured vessel wall.

## SPLEEN.

The microscopical examination of the spleen reveals the bacillus pestis uniformly distributed in great numbers throughout the capillaries in the cases of G. H. and Mrs. M., but extremely scanty in the cases of Baby M. and R. M. A notable contrast is afforded by the spleen and the bubo, in the absence of coagulation necrosis in the spleen, although the accumulation of pest bacilli may be very great. In Fig. 26 the distribution of bacillus pestis throughout the splenic tissue is shown, but only a comparatively small number of the bacilli are in focus.

## KIDNEY.

An interesting condition is exhibited in the kidney of G. H. Bacillus pestis is seen throughout the organ adhering closely to the intima of the capillaries, and apparently passing through their walls into the perivascular tissue, in which considerable accumulations of the bacilli frequently appear. Capillary vessels are here and there obstructed by small groups of bacilli. Careful search fails to reveal the presence of a single bacillus within the renal tubules.

In Fig. 19 a localised growth of bacillus pestis is shown in the kidney of Baby M., and represents one of the "foci" observed *post-mortem*. The bacilli are aggregated in great masses between the tubules within a certain area, and are associated with a considerable amount of leucocyte infiltration of the part.

In the case of J. B. the yellow foci appear in small, well-defined subcapsular areas in which tubular structure is to some extent retained. The tubules are, however, distorted and distended, and a semblance to papilliform structure is noticed here and there. They mostly show a lining of proliferating epithelium, and many of the cells have been shed singly and in casts. A few spaces are occupied by granular contents composed of degenerated epithelium and red blood corpuscles. No trace of *B. pestis* or other organism is found. The interstitial tissue of the kidney is increased, and shows a large amount of round cell infiltration. Many of the glomeruli have undergone fibroid change.

#### SUPRARENAL GLAND.

The microscopical examination of the necrosed suprarenal found in the case of Baby M. shows the same focal developments of *bacillus pestis* as pertains in the other organs of this case (Fig. 20). Only a thin rind of gland tissue just under the fibrous capsule appears normal, the great mass of the parenchyma having undergone coagulation necrosis. In the suprarenal of G. H. the *bacillus pestis* is uniformly and sparsely distributed in the blood vessels, but otherwise the gland appears normal.

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#### CULTURE EXPERIMENTS.

Cultures were obtained by the inoculation of *agar* at the time of the *post-mortem* examination. Material from the bubo, the blood, and the viscera generally was taken by means of a Pasteur pipette, and immediately implanted on agar surfaces in test tubes or in plates. The latter had the comparative advantage that they afforded a larger surface for the spread of the infective material, and also that the growth could be more readily examined under the microscope. It also permitted of easy separation of the species in the cases of mixed infection.

No growth became visible in the medium until the second day. A crop of minute greyish colonies then appeared. On closer inspection with a lens, and by transmitted light, these showed a greyish white centre and a translucent uneven margin. Under a low power an average colony looked finely granular, with an opaque brown centre, a broad translucent marginal zone, and a very irregularly indented edge. With the high power the smallest colonies were very translucent thin films, slightly more dense in the centre, and marked all over by a very fine mosaic pattern; while larger colonies had the same general appearance as under the low power. The features thus exhibited in the smallest colonies were remarkably characteristic.

After this earliest appearance the growth gradually became more and more pronounced, and attained a maximum in about ten days. With increase in size the colonies became white and opaque in the centre, and, when numerous and closely set, produced an opaque finely granular surface, which has been well likened to the appearance of a bit of ground glass (Fig. 28). At the same time numerous colonies of larger size appeared here and there, dense, glistening, waxy white with reflected light, and brownish yellow with transmitted light. These large or "giant colonies" when sufficiently isolated showed very characteristic outlines, namely, a raised yellowish dome-like centre and a clear crenated border.

In cultures in which the colonies were well isolated from one another, each colony attained a size of 1 to 4 mm., and presented the same general characteristics as the giant colonies, but with the border exaggerated and characteristically crimped or knobbed. This appearance, which might be regarded as the impress of full development, persisted afterwards as the distinguishing feature of the growth, even after it had become dried.

Another very marked characteristic of the growths was their viscidness, which manifested itself on attempting to remove colonies, especially when confluent, by means of the platinum wire.



The *microscopic appearances of the bacillus in cultures* were as follows:—When an agar culture was examined between 24 and 48 hours, the colonies yielded a small squat bacillus,<sup>1</sup> only slightly longer than broad, and rounded in the ends (Fig. 30). In some cultures longer forms were met with, and so irregular were the elements in this respect as to suggest a mixed growth. In these latter cultures the longer bacilli were often slightly curved and clubbed, resembling in outline somewhat the *bacillus diphtheriæ*, with one of the ends often squared or fractured looking. This square-cut end was often exhibited in specimens from the fresh tissues, and appeared to mark recent division through the clear centre of the parent bacillus.

In older agar cultures the polymorphism of the bacillus was further and still more remarkably exhibited by so-called “involution forms.” A certain minority of the bacilli was seen to have become greatly enlarged, and capable of intense staining. In this enlargement they retained the bacillary form, or assumed a globular, piriform, or knobbed shape (Fig. 33). Forms like fragments of mycelial threads were also frequently seen. In the midst of these grotesque forms the great majority of the bacilli could still be seen in faint outline degenerated and unstained. These “involution forms” were obtained from an ordinary agar culture at the end of six weeks. They were not, however, uniformly so obtainable in the cultures from all the cases. In many old cultures on ordinary agar, it was commoner to find this involutionary change much less pronounced, as shown on Fig. 34; the modification of form not being so extreme, and the number of elements undergoing involution not so great.

Solidified *blood serum* yielded an abundant yellowish-white glistening growth in well marked colonies, or in ridges, having the same general outline as the growth on agar, namely, a raised centre sloping to a flattened, crimped, or crenated border.

On *gelatine* very copious growths were obtained. The colonies also closely resembled those on agar, but were whiter, being silvery grey with transmitted light, and faintly grey or dewdrop-like with reflected light. There was nothing specially notable in stab cultures, except the tendency to frond-like expansions on the surface of the gelatine. No liquefaction took place.

On serum and on gelatine the bacillus presented the same morphological characters as on agar. It was observed that the involution forms on serum were mostly elongated, while those on gelatine were mostly globular and extremely varied in size.

In ordinary *bouillon* sub-cultures were made as control experiments. It was found that the bacillus isolated from each case gave a characteristic growth of chain forms. The growth appeared as a creamy-white deposit in a clear medium. Sometimes it also formed a fine whitish dusting on the sides of the tubes, and sometimes the fluid was at first rendered turbid, to become ultimately clear however. This tendency to cause turbidity of the medium seemed to belong to certain cultures.

The chains of bacilli obtained from these cultures were composed of four to six elements as a rule, and are shown in Fig. 31 as they appeared at the end of forty-eight hours. When the same culture was examined at the end of four days, the individual elements forming the chains had become rounded and swollen, and many of them degenerated so that they would not stain, as may be seen in Fig. 32.

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## INOCULATION EXPERIMENTS.

Inoculation experiments were undertaken only for the purpose of diagnosis, and reference may be made to several which were attended by results of exceptional nature.

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<sup>1</sup> The bacillus was readily stained by ordinary aniline dyes, and as readily decolourised by the Gram method.

The animals used were mice. Two of these animals were inoculated from the bubo of G. H. (Case No. 18), in which there was a mixed infection. Mouse I., inoculated subcutaneously, died in 36 hours without glandular enlargement, and only the pneumococcus was found under the microscope, and in cultures from the blood and spleen. Mouse II. had the infected material applied to the nostrils, and died in 48 hours with typical lesions of plague in the lungs and lymphatic glands, the bacillus being obtained in pure culture. The value of this method of inoculation, as a control experiment, was thus corroborated.

Material from the case of R. M. (No. 25) produced results of exceptional interest. Mouse VII. was inoculated subcutaneously from the axillary bubo (which was much necrosed) and survived *six* days—the inguinal and axillary glands appearing as yellowish-white bubonic swellings, and the liver being studded throughout with minute yellow foci. Only a few bacilli were found in the blood. The first sub-culture from the same bubo proved fatal to Mouse XIV. in *three* days. On the other hand, Mouse VIII., inoculated from the pneumonic lung of this case, lived for 27 days. After ten days, nervous symptoms appeared in the form of twitchings of the head backwards, some paralysis of the hind legs, and a tendency on the part of the animal to go round and round, as if chasing its tail. Those symptoms were present for about a fortnight, but were only very marked when the animal was disturbed, and were gradually disappearing up to the time of death. No lesions were found on *post-mortem* examination, and no bacilli developed in cultures.

Mouse XII., inoculated subcutaneously from the retroperitoneal bubo of Mrs. M. (Case No. 22), died in two days.

Mouse XIII., inoculated from the *second sub-culture* obtained from the cervical bubo of Baby M. (Case No. 28), lived for 15 days.

A marked contrast with the latter experiment was seen in Mouse XI., which succumbed in three days after subcutaneous inoculation with the *third sub-culture* from the bubo of G. H.

These few experiments serve to illustrate a remarkable variation in the degree of virulence of the virus under the different conditions presented.

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### MODE OF INFECTION.

The study of the macroscopic and microscopic appearances in these seven cases does not permit of the expression of a definite opinion as to the mode of infection or the path of entrance of the plague bacillus into the body. At the same time certain considerations have been noted as bearing on this important question, and demand a passing reference. There is a very prevalent opinion that the virus gains entrance through some solution of continuity in the skin in a large number of cases, and that this is the common mode of infection in bubonic cases. That the infection can be acquired in this way there is no reason to doubt, as many painful instances of accidental inoculation amply testify, but that it is the common mode of infection is far from being conclusively proved. In the cases just described, which were all bubonic, no skin lesion was found at the time of the *post-mortem* examination which might have served as the point of entrance, although it is possible that a trivial wound, quite sufficient for this purpose, might have entirely disappeared by the time of the patient's death.

The preponderance of inguinal buboes is quite in harmony with what has been found in other epidemics, and this lesion would appear to be altogether too regularly frequent in its incidence to admit of explanation on the ground of accidental inoculation through the skin of the lower extremity. One would expect the primary bubo to be as common, if not commoner, in the axilla did the bacillus usually gain entrance through the skin. A peculiarity of the bacillus exhibited in a number of specimens is of special interest in this connection, namely, its tendency



to pass out of the blood stream. In the capillary vessels the bacillus is distributed along the internal surface of the vessels, and is frequently seen to have passed through their walls into the perivascular spaces. In this fact most probably lies the explanation of the relative frequency of the lesion in the lymphatic glands. There is reason to believe that in plague, as in some other infective diseases, infection of the blood takes place during the period of incubation, but that the bacillus *pestis* during this period tends to pass out of the blood vessels into lymph channels in the majority of cases, to be ultimately arrested in a particular chain of glands, most commonly the inguinal, and give rise to the characteristic bubo.

In one of the cases (Baby M.), the evidence points to infection by the nostrils and mouth at the time of birth. Here, however, it will be apparent that the process of infection was more like that of an experimental inoculation than infection under ordinary circumstances.

In a few of the cases, at the beginning of the epidemic, the symptoms were chiefly gastro-intestinal, and pointed to infection by ingesta, but no corroborative evidence of this was elicited.

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#### BACTERIOLOGICAL DIAGNOSIS.

The diagnosis of plague, in its earlier stages at least, can readily be placed beyond doubt by bacteriological methods. The application of these methods was therefore of the utmost importance at the commencement of the epidemic, and in connection with doubtful cases of glandular enlargement and pneumonia. The procedure was determined by the nature of the lesion, the material for examination having to be obtained from the bubo, the blood, or the sputum, as the case might be.

The successful puncture by means of a hypodermic needle of small painful glandular swellings (for it was chiefly in connection with these that any doubt existed) and the withdrawal of some fluid for examination was a matter of considerable difficulty, especially in children, and more especially amidst the squalor of the patient's surroundings. Further, the time required for bacteriological proof was apt to run into several days, if animal experiments were required. The application of the bacteriological test to doubtful cases in their own homes was therefore not found to be of much practical value from an administrative point of view, and these cases were accordingly removed to hospital at once for observation.

The supposititious danger of infecting surrounding tissues, or even of causing a general blood infection, and so changing a simple bubonic case into one of septicæmia, by puncture of the bubo, was always kept in view, but in no case did any local or general disturbance follow to give it any credence. The operation was accomplished in every instance without any apparent harmful effect.

A number of patients with ordinary inflammatory swellings were brought under observation by virtue of the general suspicion extant regarding all glandular lesions. Clinically but little doubt remained as to the true nature of these cases, and bacteriological examination served at once to remove any uncertainty as to the diagnosis. In this connection also the following case has a special interest of its own:—A boy, about ten years of age, died somewhat suddenly at home, under circumstances of a suspicious nature, in view of the presence of plague in the city. The probability of plague was further increased by the history of the illness and the presence of enlarged lymphatic glands. The body was removed to Belvidere Hospital for post-mortem examination, with the result that an acute suppurative tonsillitis was found associated with considerable enlargement of the deep cervical glands and tumefaction of the lymphatic glands generally. The lymphoid tissues generally were in a state of extreme hyperplasia. No plague bacilli were discovered

in the blood or organs. A general tumefaction of the lymphatic glands was also observed in two fatal cases of broncho-pneumonia, which came under suspicion by reason of their occurrence in a tenement from which a case of plague had been removed.

A case of pneumonia which was removed from the plague-infected area to one of the general hospitals gave rise to the suspicion of plague. Bacterioscopic examination showed pneumococcal infection only. This was one of a number of pneumonic cases that came under observation, and required verification by bacteriological methods.

An equipment was provided for the use of medical members of the staff. It consisted of a sterilised hypodermic syringe and needle placed in a sterilised glass tube, which in turn was placed within a box of convenient size. The syringe and needle, after being charged with fluid from the suspected swelling, were replaced in the glass tube, and conveyed at once to the laboratory. By these means personal risk to the physician and others was reduced to a minimum, and the morbid material was received in a condition to be at once subjected to examination by the microscope, by cultures, and by inoculation experiments.

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#### PRECAUTIONS OBSERVED IN CONNECTION WITH POST-MORTEM EXAMINATIONS AND INOCULATION EXPERIMENTS.

At *post-mortem* examinations the utmost precautions were observed to prevent any spread of infection. The sheet which had enveloped the body was at once burned. Fluids from the body were received in vessels containing perchloride of mercury solution (1 : 500) before being run into the drain. All sponges were burned immediately after use. The body was thoroughly washed with perchloride solution, and after its removal in fresh dressing, the instruments, the table, and the floor were thoroughly disinfected. The Pathologists' hands were protected by carbolised vaseline and thin indiarubber gloves.

Film preparations on slides from the fresh tissues, for microscopic examination, were fixed by completely immersing the glass for three minutes in absolute alcohol. This had the advantage over the heat of the flame as a fixing agent, that it secured at the same time complete sterilization of the whole film. Specimens were washed in a fine stream of water over a basin containing perchloride of mercury solution (1 : 1000) and dried with small squares of cloth, which were afterwards destroyed by burning.

The animals experimentally inoculated with plague material or cultures for the purpose of diagnosis were kept under conditions which aimed at preventing access of rats, mice, or flies. Mice were used in preference to guinea-pigs as giving results more rapidly, and as being more easily and safely accommodated.

The mice were kept in ordinary museum jars provided with a tight-fitting lid of finely perforated zinc. Accommodation for guinea-pigs on similar lines in large jars was found to be quite unsuitable, and was at once abandoned for a large glass cylinder, open at both ends. This was supported over a disinfectant in a deep tray, while in the bottom was placed a raised perforated zinc platform, and on the top a tight-fitting perforated zinc lid. Such a cylinder had the double advantage of permitting a constant circulation of air and immediate disinfection of the excreta. At first the jars containing the animals were placed in a large tin case, 24 inches by 24 inches by 30 inches, provided with a finely perforated zinc lid, with the object of still further guarding against the access of other animals, but with the completion of a special room (which was actually in process of construction when the outbreak took place) the use of the metal case was no longer found to be necessary.



The room which has been set apart for the reception of plague-infected animals is 13 feet by 9 feet by 8½ feet, with concrete floor. It is heated by a gas stove, is well lighted, and has cross ventilation by the windows.

The dissection of the animals which succumbed to the disease was carried out so that no infective material should escape destruction or sterilisation. The skin of the animals was thoroughly soaked with lysol. Mice were fixed on cardboard, and on completion of the examination the carcase and cardboard were cremated together. Guinea-pigs were likewise cremated after examination. The board on which they were placed for examination rested on the bottom of a deep enamelled tray, and was steeped over night in 5 per cent. carbolic solution.

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#### EXAMINATION OF RATS IN RELATION TO THE OUTBREAK OF PLAGUE IN GLASGOW.

The part played by rats in disseminating the infection of plague is still involved in much uncertainty. The literature of the subject clearly testifies that a number of plague epidemics have been immediately preceded by or intimately associated with the disease in rats. In some of these epidemics there seems to be no doubt that the rodents were the means of diffusing the infection and transmitting it to man. On the other hand, there have been epidemics in which the rat has not appeared to play any part, and some also in which a great mortality amongst the rats, even in the dwellings of the people, was not accompanied by a correspondingly serious outbreak of human plague. It would appear, therefore, that as a carrier of infection from port to port, and as a distributor of infection on land, the rat is presumably an important factor; but the assumption that it necessarily plays a part in disseminating infection during an epidemic of human plague is not warranted by facts.

In Glasgow, whatever the original source of the infection may have been, there was no evidence that rats played any part in carrying it amongst those who were attacked by the disease. From the end of August till the middle of November, 236 rats were caught within the plague area—mostly in the neighbourhood of infected houses—and no trace of the disease was discovered in any of them. Further, no exceptional mortality or migration was noticed amongst the rats in this or any other part of the city, either before, during, or after the epidemic. A continual vigilance has been exercised by the sanitary and cleansing staffs for evidence of any unusual disease or mortality among the rats, and the additional number of 124 was submitted for examination from all parts of the town during the winter. In the great majority it was found that death had taken place as the result of violence, while in no instance was there any sign of plague.

PLATE I.

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PLAGUE—ILLUSTRATIONS OF MORBID ANATOMY.



## DESCRIPTION OF PLATE I.

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Fig. 1.—Inguinal bubo in longitudinal section, composed of one large and several smaller glands. Large gland hæmorrhagic and necrotic. Surrounding tissues infiltrated with blood. Formalin. Natural size. (Case—G. H. No. 18.)

Fig. 2.—Cervical buboes of infant in longitudinal and transverse section, the darker rounded areas in figures being congested, hæmorrhagic, and partly necrosed glands. Formalin. Natural size. (Case—Baby M. No. 28.)

Fig. 3.—Kidneys of infant, showing hæmorrhage foci in the pyramids and hyperæmia. One Suprarenal Capsule shown, altered by coagulation necrosis and hæmorrhage. Formalin. Natural size. (Case—Baby M. No. 28.)

Fig. 4.—Liver of infant. Transverse section, presenting a number of small plague tubercles (the white circular points from 0.5 to 3 mm. in diameter), and very marked cloudy swelling (the greyish hazy areas). Formalin. Natural size. (Case—Baby M. No. 28.)

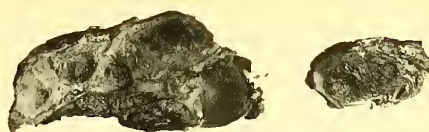
Fig. 5.—Right lung, posterior half, showing large areas of necrosis (white) in midst of pneumonic tissue. To the right is shown a mass of enlarged glands which lay in front of the trachea and impinged on the pericardium. Formalin.  $\frac{4}{5}$ ths natural size. (Case—R. M. No. 25.)

Fig. 6.—Left lung, posterior portion, showing pneumonic consolidation of the lower lobe, with extensive necrosis (the whiter areas). Lobular consolidation, with some necrosis in upper lobe. Alcohol.  $\frac{4}{5}$ ths natural size. (Case—R. M. No. 25.)

Fig. 7.—Right inguinal bubo. Specimen represents mass of tissue from Scarpa's triangle to internal iliac artery. Under the skin (on left of figure) is shown a great mass of necrotic gland tissue. Towards the artery (on the right) is the rounded contour of a large abscess, impinging on the bladder wall—a part of which is shown below. Alcohol.  $\frac{3}{4}$ rd natural size. (Case—J. B. No. 1.)



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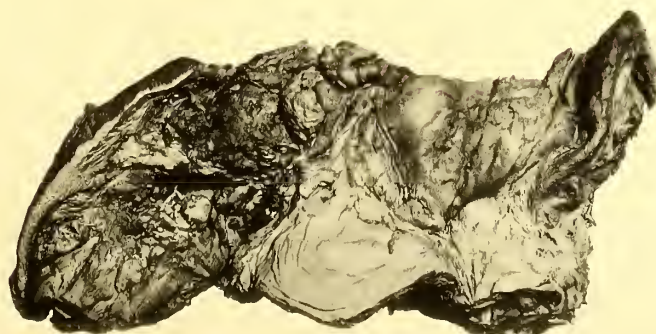
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PLATE II.

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PLAGUE—FILM PREPARATIONS FROM FRESH TISSUES.



## DESCRIPTION OF PLATE II.

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Fig. 8.—*Bacillus pestis* from inguinal bubo. Shows the bacillus in process of degeneration and extinction. (Great numbers of degenerated, unstained, bacilli occupied the field, but their forms are scarcely visible in the picture.) Gentian-violet.  $\times 1000$ . (Case—G. H. No. 18.)

Fig. 9.—*Bacillus pestis*, pneumococcus and streptococcus from lung. A distinct halo or capsule is shown by some of the plague bacilli in lower part of figure. Blood corpuscles appear vacuolated owing to imperfect fixation. Carbol-fuchsin.  $\times 1000$ . (Case—Mrs. M. No. 22.)

Fig. 10.—*Bacillus pestis* and pneumococcus from retro-peritoneal bubo, to show mixed infection. Carbol-fuchsin.  $\times 1000$ . (Case—Mrs. M. No. 22.)

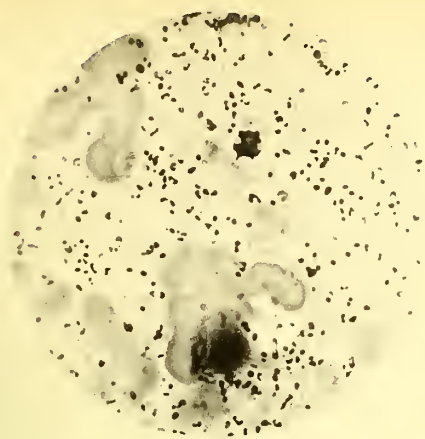
Fig. 11.—*Bacillus pestis* from spleen. Gentian-violet.  $\times 1000$ . (Case—Mrs. M. No. 22.)

Fig. 12.—*Bacillus pestis* from cervical bubo of infant. A pure infection; bacilli in great number. Carbol-thionin-blue.  $\times 1000$ . (Case—Baby M. No. 28.)

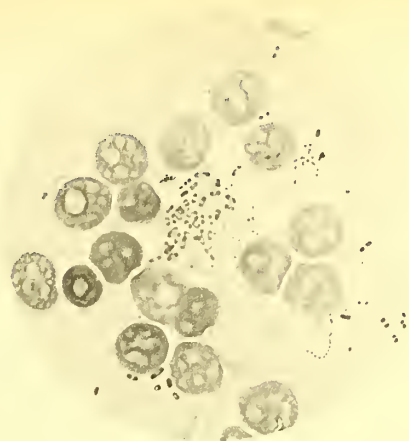
Fig. 13.—*Bacillus pestis* from pneumonic lung. Carbol-fuchsin.  $\times 1000$ . (Case—R. M. No. 25.)

Fig. 14.—*Bacillus pestis* from spleen of infected mouse, showing the bacillus in very typical form and in active proliferation. Carbol-fuchsin.  $\times 1000$ .

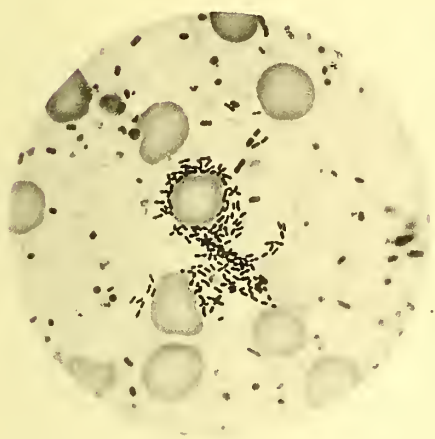
Fig. 15.—*Bacillus pestis* in blood of infected mouse. Carbol-fuchsin.  $\times 1000$ .



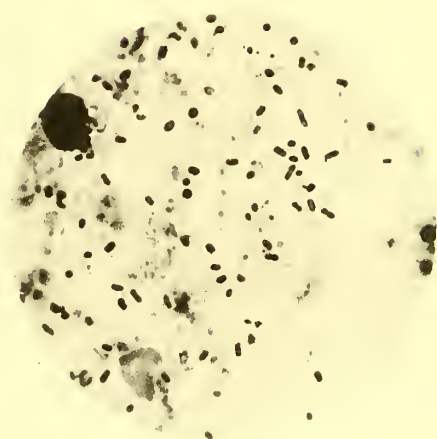
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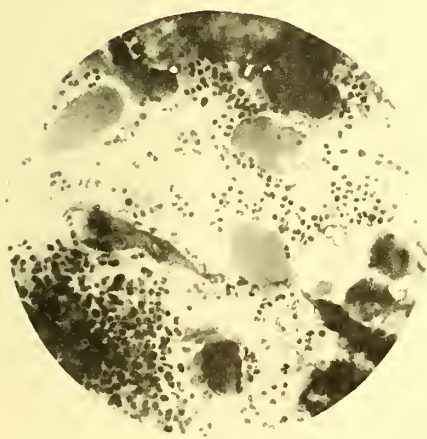
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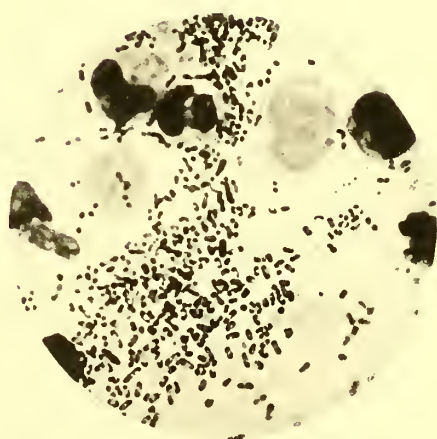
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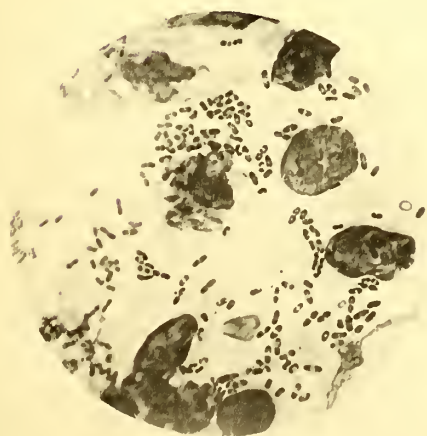
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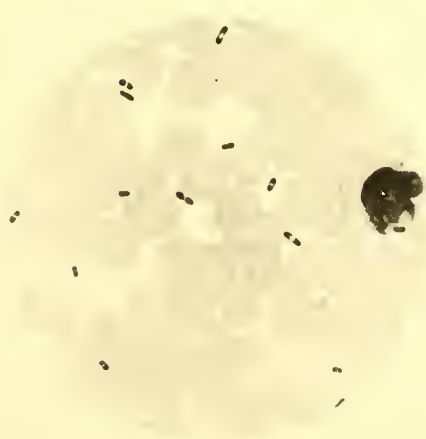
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PLATE III.

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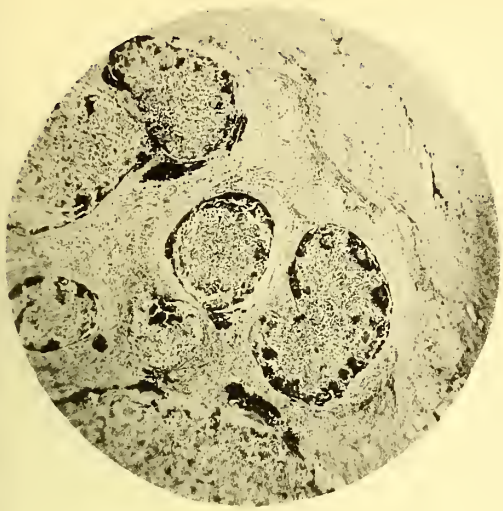
PLAGUE—MICROSCOPICAL ILLUSTRATIONS OF MORBID ANATOMY,



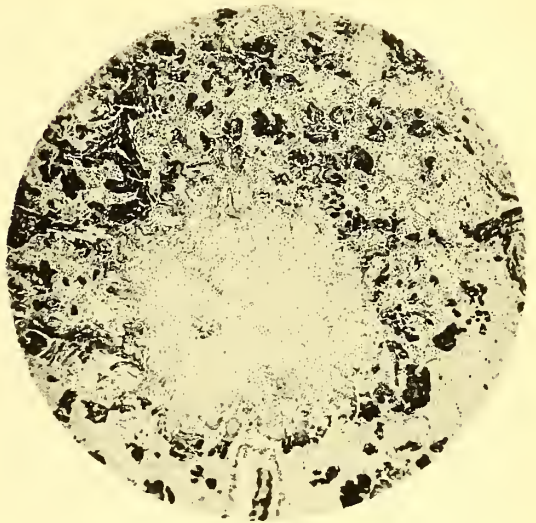
### DESCRIPTION OF PLATE III.

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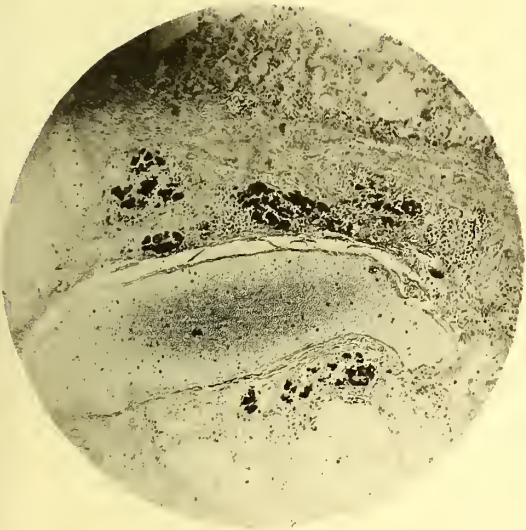
- Fig. 16.—Cervical bubo, showing several lymphatic glands with plague bacilli massed in the periphery of each gland in enormous numbers. Carbol-thionin-blue and Eosin.  $\times 60$ . (Case—Baby M. No. 28.)
- Fig. 17.—Lung, showing an area of alveoli (in the distribution of a bronchiole) occupied by dense masses of *B. pestis* (black in figure). The central portion has undergone necrosis. Carbol-thionin-blue.  $\times 60$ . (Case—Baby M. No. 28.)
- Fig. 18.—Lung, showing a large vessel with its perivascular spaces occupied by *B. pestis*. Carbol-thionin-blue and Eosin.  $\times 60$ . (Case—Baby M. No. 28.)
- Fig. 19.—Kidney, showing a portion of the cortex in which *B. pestis* has developed between the tubules in great masses, and leucocyte infiltration in an early stage. Carbol-thionin-blue and Eosin.  $\times 100$ . (Case—Baby M. No. 28.)
- Fig. 20.—Suprarenal gland, showing part of fibrous capsule (at top of figure), masses of *B. pestis* in the cortex, and coagulation necrosis of the deeper tissue as evidenced by disappearance of nuclei. Carbol thionin-blue.  $\times 60$ . (Case—Baby M. No. 28.)
- Fig. 21.—Liver, showing the distribution in the organ of small isolated groups of *B. pestis* (the black patches in right half of figure) Great distension of vascular system. Carbol-thionin-blue and Eosin.  $\times 60$ . (Case—Baby M. No. 28.)



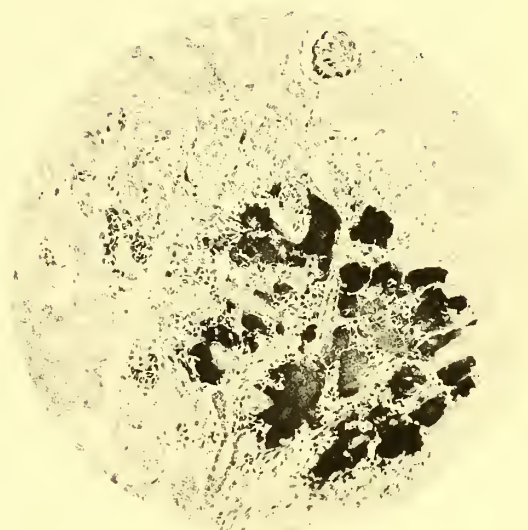
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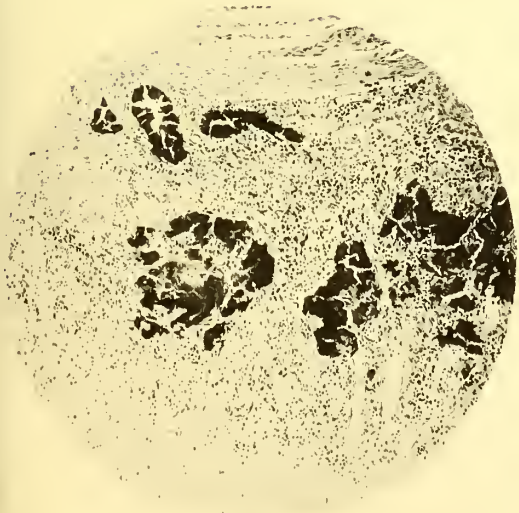
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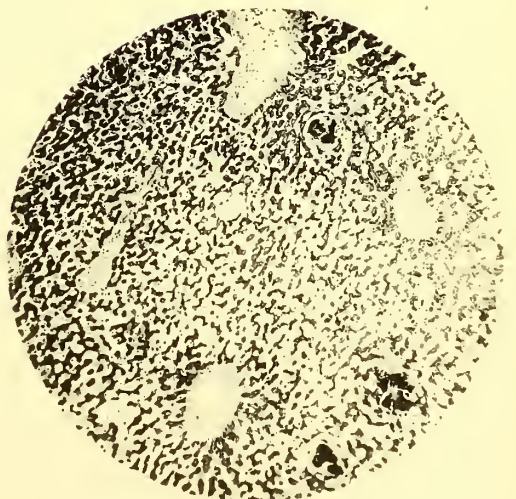
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PLATE IV.

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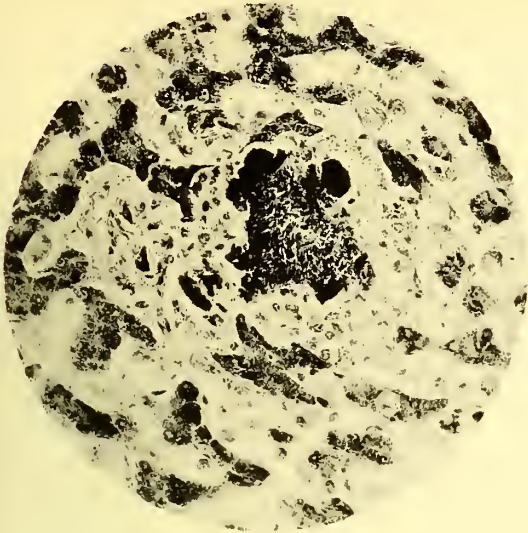
PLAGUE—MICROSCOPICAL ILLUSTRATIONS OF MORBID ANATOMY.



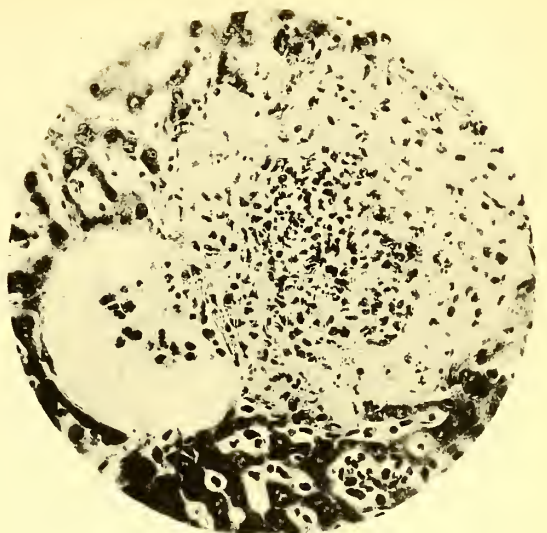
## DESCRIPTION OF PLATE IV.

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- Fig. 22.—Liver. Same section as in Fig 22, showing, under a higher power, one of the bacillary foci with commencing aggregation of leucocytes. Carbol-thionin-blue and Eosin.  $\times 250$ . (Case—Baby M. No. 28.)
- Fig. 23.—Liver of plague-infected mouse (which died on sixth day), for comparison with Fig. 23. The metastatic process is more advanced, showing abscess formation and partial necrosis, and the disappearance of the bacilli. The abscess has extended through the wall of an intralobular vein. Carbol-thionin-blue and Eosin.  $\times 250$ .
- Fig. 24.—Margin of bronchial gland, showing the fibrous capsule, with three greatly distended blood-vessels, and a small portion of the periphery of the gland occupied by bacilli in almost homogeneous mass (black in figure). The darker parts in the capsule are also due to bacillary invasion. Carbol-thionin-blue and Eosin.  $\times 60$ . (Case—G. H. No. 18.)
- Fig. 25.—Right inguinal gland (which was only slightly enlarged). Right half of field shows a tract of necrosis, associated with invasion of *B. pestis*. Left half represents normal tissue free from bacilli. Carbol-thionin-blue and Eosin.  $\times 1000$ . (Case—G. H. No. 18.)
- Fig. 26.—Spleen, showing the distribution of *B. pestis* throughout the tissue. Only a comparatively small number of the bacilli in focus. Carbol-thionin-blue and Eosin.  $\times 450$ . (Case—G. H. No. 18.)
- Fig. 27.—Retroperitoneal bubo, showing almost complete necrosis of the tissues. A large vessel in the middle of the field is filled with leucocytes, and a few leucocytes are scattered throughout the field. The darker shading in the figure indicates the presence of enormous numbers of plague bacilli.  $\times 60$ . (Case—Mrs. M. No. 22.)



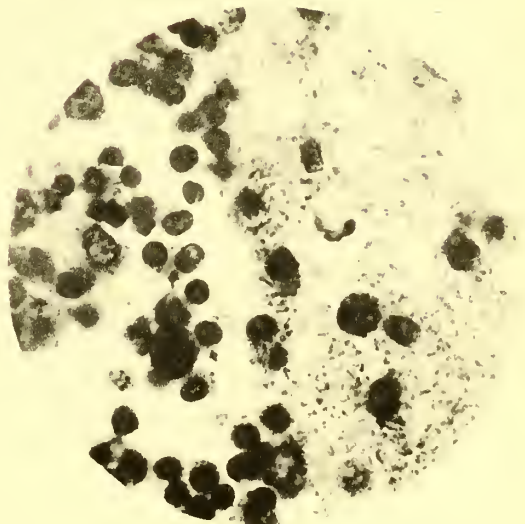
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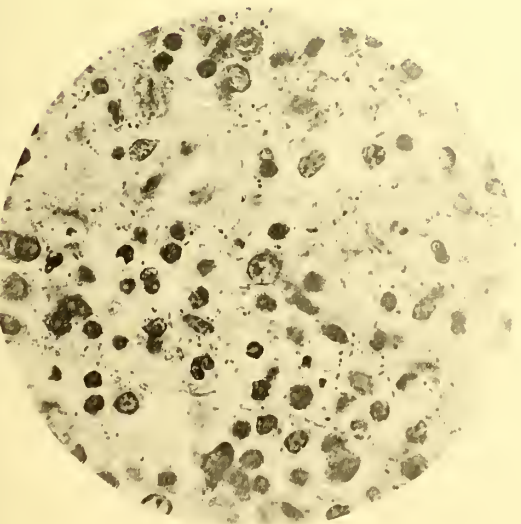
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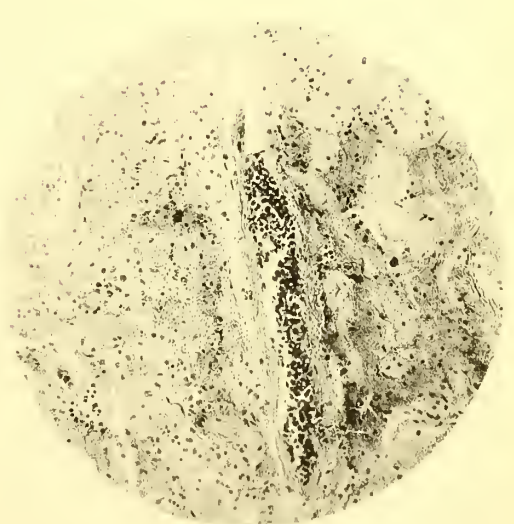
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PLATE V.

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PLAGUE—BACILLUS PESTIS IN CULTURE.



## DESCRIPTION OF PLATE V.

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Fig. 28.—Culture of *B. pestis* on agar. Colonies very numerous and small. (Case—R. M. No. 25.)

Fig. 29.—Mixed growth of *B. pestis* and pneumococcus on agar. The plague colonies, being few in number, have attained a large size. The pneumococcus colonies are small, and only just visible. (Case—G. H. No. 18.)

Fig. 30.—*Bacillus pestis*. Culture on agar after twenty-four hours. Carbol-fuscin.  $\times 1000$ . (Case—G. H. No. 18.)

Fig. 31.—*Bacillus pestis* in chains. Culture in bouillon after forty-eight hours. Carbol-fuscin.  $\times 1000$ . (Case—R. M. No. 25.)

Fig. 32.—*Bacillus pestis* in chains. Culture in bouillon after four days. Bacilli swollen, and many of them degenerated, so that they do not take the stain well. Carbol-fuscin.  $\times 1000$ . (Case—R. M. No. 25.)

Fig. 33.—*Bacillus pestis*. Involution forms from a six weeks old culture on ordinary agar. A faint groundwork is formed of degenerate unstained bacilli. Carbol-fuscin.  $\times 1000$ . (Case—R. M. No. 25.)

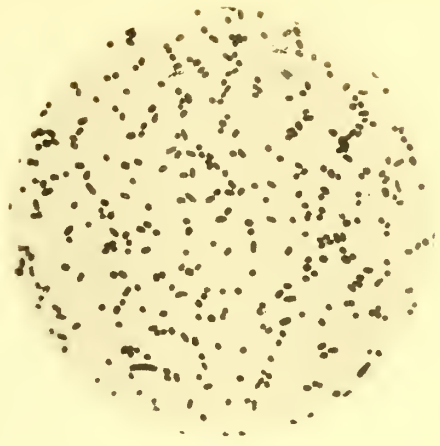
Fig. 34.—*Bacillus pestis* from old agar culture, to show the common appearance presented by old cultures.  $\times 1000$ . (Case—R. M. No. 25.)



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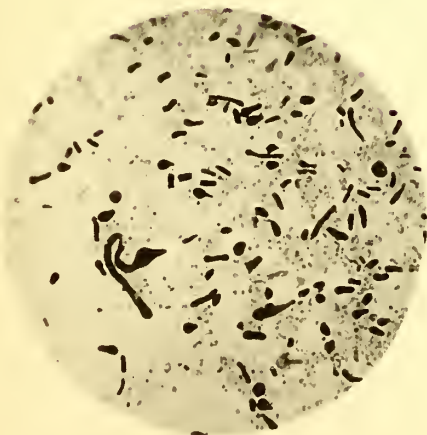
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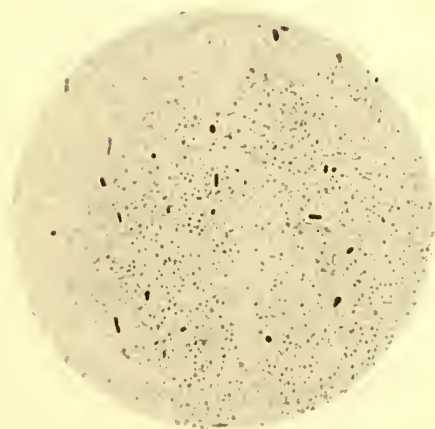
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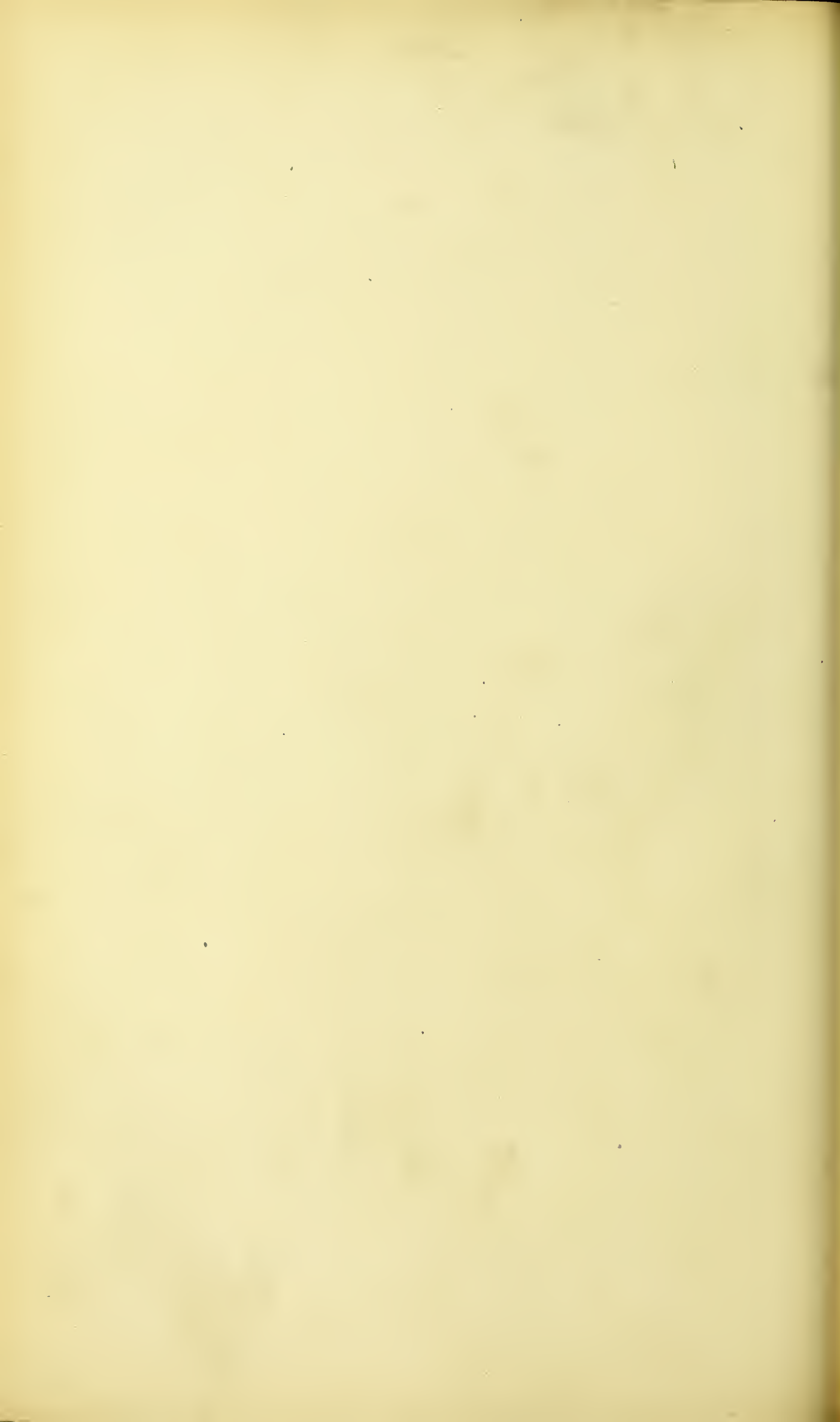


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2  
CORPORATION OF GLASGOW.

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CENSUS, 1901.

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REPORT

ON

GLASGOW: ITS SANITARY DISTRICTS AND MUNICIPAL WARDS.

BY

A. K. CHALMERS, M.D.,

*Medical Officer of Health.*



GLASGOW:

PRINTED BY ROBERT ANDERSON, 142 WEST NILE STREET.





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## PREFATORY NOTE.

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Through the courtesy of the Registrar General, and with the approval of the Secretary for Scotland, the facilities which had been granted to the Medical Officer of Health for the City in 1871, 1881, and 1891, were renewed on the occasion of the recent Census; but the altered requirements of the Census (Great Britain) Act of 1900, and, more especially, the provision contained in Section 9 thereof, led to an alteration in the method by which the extraction of the details which are dealt with in the following pages was accomplished. This occasioned only an unimportant delay in obtaining the information, but it implied the prosecution of the work of extracting in Edinburgh, when the books were in the possession of the Registrar-General, instead of as formerly while they were still here in the custody of the Town-Clerk. It was thus necessary to obtain the use of suitable premises in Edinburgh in which the work could be done, and Sir James D. Marwick, Town-Clerk, whose courteous and continued effort to obtain the requisite facilities and to further the progress of the work I desire most heartily and thankfully to acknowledge, brought our needs before Mr. Hunter, Town-Clerk, Edinburgh, through whose kindly interest a large hall, attached to the Collector's Office there, was placed at our disposal.

I also desire to acknowledge the cordial assistance rendered by Mr. Gunn, Collector, and his fellow officials, in connection with the preliminary arrangements and during the progress of the work.

A staff of 37 clerks was thereafter employed; the work of extracting was begun on 18th July and finished on 27th July.

As on the occasion of the former Census, this was carried on under the direct personal superintendence of Mr. Elborn, Statistical Clerk to the Department here.

In connection with a suggestion to reconstitute the Sanitary Districts within the Municipal Wards, Tables have been prepared which for the first time contain details of the Housing and Age Distribution of the population in these latter.

A. K. CHALMERS,

*Medical Officer of Health.*

SANITARY CHAMBERS,  
GLASGOW, *January, 1902.*



## CENSUS 1901—GLASGOW.

### POPULATION.

At the Census on the night of Sunday, 31st March, 1901, the population of the City of Glasgow numbered 761,712.\* The area of the City extends to 12,681 acres; the number of persons per acre is 60.† At the Census on 5th April, 1891, the population numbered 658,073, of which 565,710 were resident in Old Glasgow and 92,363 in the districts added to the City in the following November.

The increase during the present decade amounts, therefore, to 103,639 persons, and represents a rate equal to 15·75 per cent. The extent and source of this are alike interesting. Numerically it is almost twice that of 1881-91, and four times that of 1871-81. During the decade 1861-71 the increase was at the rate of 21·64 per cent., in 1871-81 it fell to 4 per cent., while during 1881-91 it was 10·62 per cent. But the natural increment alone, *i.e.*, the excess of births over deaths during 1861-71 was equal to an increase of 11·5 per cent. on the 1861 population, and although this was maintained at a fractionally higher rate, *viz.*, 11·7 per cent., during 1871-81, the actual increase at the Census of 1881 amounted only to 4 per cent. on the 1871 population, while during 1881-91 the actual increase fell short by 2·1 of the rate per cent. which the excess of births over deaths represented. The actual increase represents the balance between births *plus* immigrants on the one hand and deaths *plus* emigrants on the other, so that in the period 1871 to 1891 the City was losing a considerable portion of its natural growth through emigration, or (what more correctly describes the actual movement) through the overflow of its excess population into the surrounding districts—an artificial restriction on the growth of its population which the extension of the boundaries in 1891 has removed.

The following Table has been compiled to show this:—

CENSUS PERIOD.	Births.	Deaths.	Difference representing Natural Increase.	Census Increase.
1861-71,     ...     ...     ...	178,582	132,260	46,522	87,532
1871-81,     ...     ...     ...	200,766	143,116	57,650	19,674
1881-91 (Old Glasgow),     ...	196,767	131,446	65,321	54,295
1892-1901‡ (Greater Glasgow),	218,269	142,974	75,295	103,639

\* The Registrar-General gives 761,665 in his preliminary Census Tables, but until every entry has been scrutinised and verified, discrepancies will exist between summaries from different sources, and the difference of 47 here shown will introduce no error of material value.

† At the Census of 1891 Glasgow contained 6,111 acres, and its density was 93 persons per acre; the extension in the following November added 5,750 acres and 92,363 persons, reducing the density to 56. In 1896 Bellahouston Park and district, containing 450 acres, with a population in 1891 of 510, was annexed; and in 1899 Richmond Park and district, on the south side of the Clyde, and the districts of Provanmill and Blackhill, on the north, with an acreage of 370 and a population in 1891 of 385, were annexed.

‡ The details for April-December, 1891, are not available. (See text.)



The figures for the decade just closed cannot be stated with precision because the births and deaths in the added districts during the last nine months of 1891 are not readily available. In the Table these are given from 1st January, 1892, to 31st March, 1901, and show an excess of births over deaths of 75,295. Assuming a rate for both births and deaths to have obtained during the nine months of 1891 for which the records are not available similar to that which obtained throughout the remainder of the decade, we shall only slightly overstate the actual excess of births at 81,405, which leaves 22,234 of the Census increase to be accounted for by excess of immigration over emigration during the whole period. We shall see later in what proportion males and females respectively contribute to this, but for the present it may be observed that the proportion which the natural increment bears to the total increase in the past decade is 78 per cent. as compared with 53 per cent. during 1861-71.

#### RATE OF INCREASE IN SEVERAL TOWNS COMPARED.\*

The following Table is interesting for the reason that although in several towns, both in England and Scotland, the rate of increase in Glasgow has been exceeded, no population approaching it in size has approached it in the rate of increase :—

TOWNS.	Enumerated Population.		Increase per cent.	
	1891.	1901.	1891-1901.	
London, ... ..	4,228,317	4,536,063	...	7·28
Liverpool, ... ..	629,548	684,947	...	8·80
Manchester, ... ..	505,368	543,969	...	7·64
Birmingham, ... ..	478,113	522,182	...	9·22
Leeds, ... ..	367,505	428,953	...	16·72
Sheffield, ... ..	324,243	380,717	...	17·42
Edinburgh, ... ..	276,066	316,793	...	14·75
Dundee, ... ..	154,118	161,166	...	4·57
Aberdeen, ... ..	124,943	153,497	...	22·85
Paisley, ... ..	66,425	79,364	...	19·48
Leith, ... ..	68,707	77,438	...	12·71
Greenock, ... ..	63,422	68,115	...	7·40
Govan, ... ..	63,625	76,351	...	20·00
Partick, ... ..	36,538	54,274	...	48·54
GLASGOW, ... ..	658,073	761,712	...	15·75
ENGLAND AND WALES,	—	—	...	12·17
SCOTLAND, ... ..	—	—	...	11·09

#### INSTITUTIONAL POPULATION AND SHIPPING.

For the purpose of the Census and for certain sanitary purposes, the persons residing in Institutions and on board ships in the Harbour and Canals are enumerated and dealt with separately. At the enumeration of 1891 and 1901 these were :—

Census.	1891.	1901.	Increase per cent.
Population in Institutions, ... ..	12,800	19,347	51·1
„ Shipping, ... ..	750	1,241	65·5

\* The areas of some of those towns were extended in the decennium of 1891-1901, but in every case the population in 1891 relates to the town as constituted in 1901.

The following quotation from the Registrar-General's instructions to Registrars will indicate the reasons which govern the inclusion of any Institution within this class.

"13. At the end of the form [for plan of division] you will insert the name of every public institution having more than 100 inmates, and the Governor or head of which you recommend to the Registrar-General to be appointed its enumerator. All smaller institutions will be dealt with as ordinary houses in the enumeration district in which they are respectively situated."

The Institutional population, as thus defined, shows an increase of 6,547. The inmates of Model Lodging-houses alone would appear to show an increase of 3,651, but the records in the present Census cover 26 Institutions of this class, compared with 13 at the Census of 1891. Some of these now added existed in 1891, but were then dealt with as houses. In addition, certain other Institutions are now also included for the first time, and these, with the added Model Lodging-houses, are marked with an asterisk in the subjoined Table.

The only valuable comparison therefore which can be made is between the Model Lodging-houses of which there is a record at both periods, and in them the inmates have increased from 4,160 to 4,737.

CENSUS 1901.—GLASGOW—TABLE SHOWING THE NUMBER OF INMATES IN INSTITUTIONS OF DIFFERENT KINDS.

Institution.	Inmates.
Model Lodging-Houses—	
Corporation—	
Drygate, ... ..	369
Greendyke Street, ... ..	286
Clyde Street, ... ..	369
North Woodside Road, ... ..	358
Hydepark Street, ... ..	349
Portugal Street, ... ..	429
Moncur Street (Females), ... ..	267
*Family Home, ... ..	375
	2,802
Private—	
*66 Moncur Street, ... ..	193
179 Great Hamilton Street, ... ..	700
*173 High Street, ... ..	170
*195 High Street, ... ..	146
*34 Stirling Street, ... ..	195
*48 Duke Street, ... ..	207
39 Watson Street, ... ..	352
21 Watson Street, ... ..	520
14 Watson Street, ... ..	111
*6-14 Miller's Place, ... ..	114
28 M'Alpine Street, ... ..	316
*22 James Watt Street, ... ..	379
*1 Burns Street, ... ..	401
*16 Garscube Lane, ... ..	255
*(Clydesdale), Hydepark Street, ... ..	134
*(Carlton), Buchan Street, ... ..	403
(Kingston), Centre Street, ... ..	311
*Maryhill, ... ..	102
	5,009
	7,811
Carry forward, ... ..	7,811

\* Included as Institutions for the first time in 1901.

Institution.	<i>Brought forward,</i> ... ..						Inmates.
							7,811
Hotels (4 in number), ... ..							615
Royal Infirmary, ... ..							738
Western Infirmary, ... ..							635
Victoria Infirmary, ... ..							218
Eye Infirmary, ... ..							111
Royal Hospital for Sick Children, ... ..							114
Eastpark Home, ... ..							109
Royal Lunatic Asylum, Gartnavel, ... ..							556
*City Fever Hospital, Parliamentary Road, ... ..							298
Do. Belvidere, ... ..							689
* Do. Ruchill, ... ..							766
*City Reception-House, South York Street, ... ..							102
							4,336
Slatefield Industrial School, ... ..							177
St. Mary's do. (Boys), ... ..							210
Do. do. (Girls), ... ..							208
Maryhill do. (Girls), ... ..							200
							795
Central Police Office, ... ..							130
H.M. Prison, Duke Street, ... ..							419
							549
St. Joseph's Home, Garngadhill, ... ..							241
*Homes for Old Men and Old Women, Rottenrow, ... ..							201
*City Orphan Home, James Morrison Street, ... ..							123
Night Asylum for the Houseless, ... ..							254
*Mission Hall for Friendless Females, ... ..							87
Magdalene Institution, Maryhill, ... ..							102
City Poorhouse, ... ..							1,667
Barnhill Poorhouse, ... ..							1,431
Deaf and Dumb Institution, Langside, ... ..							142
*Roman Catholic Training College, Dowanhill, ... ..							160
*Old Barracks Show Ground, Gallowgate, ... ..							132
Government Military Barracks, Maryhill, ... ..							761
							5,241
Total within Municipal Boundaries, ... ..							<u>19,347</u>

## SHIPPING.

The number of persons resident on board ships in the Harbour and Canals increased from 750 in 1891 to 1,241 in 1901. Formerly the number of persons thus returned maintained a fair degree of constancy, the figures for each Census, 1861-1891, being 639, 569, 590, and 750 respectively.

As the quayaĝe within the Municipality has not increased during the decade, the increase in the Harbour population is most likely related to some alteration in the manning of large steamships by Lascar and Chinese crews, who live on board while the vessels are in port—the proportion resident on board those in the Canals being so small that it may be discarded. Regarding this Mr. T. R. Mackenzie writes:—

“I have made some inquiry into the matter you refer to, and think there can be no doubt that the explanation you suggest is the true one for the abnormal increase in the number of persons living on board ship, as shown by last Census.

“When the previous Census was taken the Anchor Line's eastern vessels, and the Clan Line, had only partially introduced coloured crews, now their employment of Lascars is greatly extended, while the City Line and Messrs. P. Henderson & Co. have also manned their vessels in the same way.”

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\* Included as Institutions for the first time in 1901.



The extent of quayage is given in 1891 as 10,920 lineal yards, but this does not distinguish between the Docks of Glasgow, Govan, and Partick, and I am indebted to Mr. Mackenzie for the following measurements as at 30th June, 1901:—

#### CLYDE NAVIGATION.

Length of Quays (including ferry stairs, &c.) as at 30th June, 1901:—

##### CITY OF GLASGOW.

			Lin. Yards.	Lin. Yards.
Glasgow Upper Harbour, ...	...	...	501 $\frac{2}{3}$	
„ Lower Harbour, ...	...	...	4,911	
Kingston Dock, ...	...	...	830	
Queen's Dock, ...	...	...	3,334	
			<hr/>	9,576 $\frac{2}{3}$

##### BURGH OF GOVAN.

Glasgow Lower Harbour, ...	...	...	1,373 $\frac{1}{3}$	
Prince's Dock, ...	...	...	3,737	
			<hr/>	5,110 $\frac{1}{3}$
Govan Passenger Wharf, ...	...	...	...	46 $\frac{2}{3}$
Shieldhall Old and New Wharves, ...	...	...	...	381 $\frac{1}{3}$
				<hr/>
		Total Lineal Yards, ...		15,115
				<hr/>

#### AGE AND SEX DISTRIBUTION.

At each enumeration since 1861 the proportion of males to females in the population has increased, a circumstance which would appear to be related to some alteration in industrial conditions resulting in a relative increase of the opportunities for male employment. Since 1851 the proportion of males to every 100 females has been as follows:—

1851, ...	89·0	1881, ...	94·5
1861, ...	88·5	1891,* ...	94·6
1871, ...	94·0	1901, ...	96·2
1901.—Scotland, 94·5. England and Wales, 93·5.			

#### NUMBERS OF EACH SEX LIVING AT VARIOUS AGE PERIODS.—AGE AND SEX DISTRIBUTION.

In the following Table the number of each sex living at certain age periods is given for the whole City.

Table II. in the Appendix contains the number of each sex living in each of the Sanitary Districts at corresponding age periods, and in Table V. these are stated as a percentage of the total living at all ages.

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\* Greater Glasgow.

## GLASGOW—CENSUS 1901.—AGE AND SEX DISTRIBUTION.

AGE.	MALES.	FEMALES.	PERSONS.
Under 1 year, ... ..	10,423	10,243	20,666
1-5 years, ... ..	34,908	35,251	70,159
5-10 „ ... ..	40,156	39,665	79,821
10-15 „ ... ..	37,049	37,617	74,666
15-20 „ ... ..	37,670	39,136	76,806
20-25 „ ... ..	40,955	42,364	83,319
25-35 „ ... ..	65,768	67,319	133,087
35-45 „ ... ..	46,605	47,729	94,334
45-55 „ ... ..	32,356	33,029	65,385
55-65 „ ... ..	18,351	21,638	39,989
65 „ and upwards, ...	9,244	14,128	23,372
Not known, ... ..	50	58	108
All Ages, ... ..	373,535	388,177	761,712
1891, All Ages, ... ..	319,909	338,164	658,073

Compared with 1891 this shows a numerical increase of 53,526 males and 50,013 females, representing a rate of 16·7 per cent. for males and 14·5 for females. In Scotland, as a whole, males increased by 11·8 per cent. during the decennium, and females by 10·37 per cent., while in England and Wales the increase of females exceeded that of males, the rates being 12·4 and 11·9 per cent. respectively.

Before we can compare the sources of increase in each sex, we must fall back upon the assumption already referred to in dealing with the population as a whole, and supply for the period from 1st April to 31st December, 1891, a number which will represent the rate which obtained in remainder of the decade.

## GLASGOW.—NATURAL INCREASE BY EXCESS OF BIRTHS OVER DEATHS DURING THE PERIOD FROM 1ST JANUARY, 1892, TO 31ST MARCH, 1901.\*

The births and deaths registered during the 37 quarters of the decennium ending 31st March, 1901, were as follows :—

	Births.	Deaths.	Excess of Births.
Males, ... ..	111,270	73,222	38,048
Females, ... ..	106,999	69,752	37,247
Both Sexes, ... ..	218,269	142,974	75,295

\* The Births are taken throughout from the Registrar-General's Monthly Reports.

The Deaths are from the Registrar-General's detailed Reports from 1892 to 1899, and from the Monthly Reports for 1900 and the first quarter of 1901.

We can now, after adding the estimated births and deaths in the last three quarters of 1891, use these figures to build up a Table which will show the balance of increase resulting from the excess of immigration over emigration.

	Males.	Females.
Census, 1891, ... ..	319,909	338,164
Births minus Deaths, April, 1891, to April, 1901,	41,137	40,268
Population, 1901, by natural increment, ...	361,046	378,432
„ „ as enumerated, ... ..	373,535	388,177
Difference—being gain by excess of arrivals over departures, ... ..	12,489	9,745

The natural increment of males constitutes 76·7 per cent. of the total increase, that of females, 80·5 per cent., so that the proportion of males added by immigration is greater than females. There is a balance of influx equal to 2,223 persons annually, of whom 1,249 are males and 974 are females.

PROPORTION OF MALES AND FEMALES LIVING AT SEVERAL AGE PERIODS IN EVERY 100,000 OF EACH SEX IN 1891 AND 1901 COMPARED.

1901.		Age.	1891.	
Males.	Females.		Males.	Females.
12,136	11,722	0- 5 years,	13,051	12,332
10,752	10,220	5-10 „	11,531	10,788
9,920	9,692	10-15 „	10,635	10,192
10,086	10,083	15-20 „	10,249	10,247
10,966	10,915	20-25 „	10,378	10,098
17,609	17,345	25-35 „	16,666	16,640
12,479	12,298	35-45 „	12,166	11,642
8,663	8,510	45-55 „	8,348	8,855
4,914	5,575	55-65 „	4,548	5,479
2,475	3,640	65 and upwards,	2,428	3,727
100,000	100,000	All Ages,	100,000	100,000

This Table enables us to compare the age constitution of the population in 1891 and 1901, and the comparison is not without significance. At all ages under 20 there are now relatively fewer persons of each sex living than in 1891, and the converse holds true for each age period above this, save for females at ages 45-55, and again over 65. The factors contributing to this are a falling birthrate and an influx of immigrants, who are usually young adults. We are thus, as a population, becoming older in the literal sense to which the phrase is applicable to the individual, and an extension of the comparison will help to gauge the extent of this.



Without any serious error this comparison may be carried back to 1881, bearing in mind the extension of the area in 1891. The limited influence of this, however, on the age distribution, is indicated by the proportions living at ages 0-25 and 25-65 in 1891, forming almost a middle term to those in 1881 and 1901.

PROPORTION PER CENT. OF THE POPULATION LIVING AT VARIOUS AGE PERIODS  
IN THREE SUCCESSIVE CENSUS ENUMERATIONS.

AGE.	1881.	1891.	1901.
0-5 ... ..	13·70	12·68	11·92
5-10 ... ..	11·12	11·15	10·48
10-15 ... ..	9·76	10·41	9·81
15-20 ... ..	10·28	10·25	10·08
20-25 ... ..	10·56	10·23	10·94
25-35 ... ..	16·39	16·65	17·47
35-45 ... ..	11·95	11·90	12·39
45-55 ... ..	8·30	8·61	8·59
55-65 ... ..	5·06	5·03	5·25
65 and upwards, ...	2·88	3·09	3·07

Taking the ages 25-65 as representing the period of maturity, the proportion of the population living therein has increased in 20 years from 41·7 to 43·7 per cent., while the proportion of the population at ages 0-25 has fallen from 55·4 to 53·2 per cent. Although the adult ages contain the most actively productive period of life, there are fewer recruits coming forward to fill their places.

IRISH BORN.

							Per Cent. of Total Population.
1851,	...	...	...	60,058	...	...	18
1861,	...	...	...	63,574	...	...	15·8
1871,	...	...	...	70,410	...	...	14·4
1881,	...	...	...	65,185	...	...	13
1891,	...	...	...	57,618	...	...	10·2
1901*,	...	...	...	66,106	...	...	8·7

HOUSING.

The inhabited houses numbered 155,404, compared with 134,882 at last Census, an increase of 20,522, or 15·2 per cent. In addition, 7,274 were found empty, compared with 6,663 at the Census of 1891. The inhabited houses contained 401,543 windowed rooms, and were occupied by 741,124 persons, the balance of the population being distributed among Institutions and Shipping, as formerly described.

Were the houses of equal size, each would contain 2·584 rooms, and were the population equally distributed among them, each house would contain 4·769

\* Greater Glasgow.

persons, and each room 1·846. This affords a convenient way of expressing the size of an *average* house and the average number of persons inhabiting it, but it lacks the advantage of conveying information regarding the average size of the rooms. Obviously, also, it is only relatively applicable to existing conditions, and later, when considering the occupancy of one and two apartment houses, we shall see how widely it is departed from. But it enables a comparison to be established between the average size and the average occupancy of houses in this and former decades, and between the average conditions in this respect existing in Glasgow and other towns. *It affords evidence that the average house is undergoing a gradual enlargement in size, and the occupants per room a gradual reduction in number.*

To obtain, however, any clear estimate of the changes which have taken place during the decade in the character of the housing accommodation, it will be necessary to keep in view the area of the City before and after the extension of 1891. This is owing to the character of the average house in the added districts. It had a greater average number of inmates, but fewer in relation to the number of occupied rooms. In Old Glasgow, at the 1891 Census, the average house had 2·325 rooms and contained 4·727 persons, or 2·033 per room; in the added area it had 4·167 rooms, and was occupied by 5·128 persons, but it had only 1·230 inmates per room; in both together it contained 2·562 rooms and 4·778 persons, but the average number of persons per room was reduced to 1·865. With this explanation we can now compare corresponding details for three Censuses:—

	Rooms per House.	Persons per House.	Persons per Room.
1881, ... ..	2·322	4·738	2·040
1891 (Old Glasgow), ... ..	2·325	4·727	2·033
Added Districts, ... ..	4·167	5·128	1·230
Whole Area, ... ..	2·562	4·778	1·865
1901, ... ..	2·584	4·769	1·846

The removal of the decimal point will facilitate the reading of these figures, so that they may be taken as whole numbers applicable to 1,000 houses of average size. These now contain 22 rooms more than a similar number of houses in 1891, which may also be expressed in this form: that 1,000 houses of the present average size are the equivalent of 1,008·6 houses in 1891.

The indication which this affords of a gradual upward tendency in the standard of house accommodation accords with experience elsewhere in Scotland. In the following Table, Edinburgh and Dundee alone show a continuous reduction in the *size of the average house* during three decades, but in all the towns quoted for which the information is available for more than one Census, there is a reduction in the *average number of inhabitants per room*, which is the most important sanitary factor in the question of housing.

In Edinburgh, Aberdeen, and Perth the size of the average house exceeds the average for Scotland, and they have also fewer persons per room. In Dundee, Paisley, and Govan it is smaller than in Glasgow; in Paisley and Govan the number of persons per room is greater.

CENSUS, 1901.—TABLE SHOWING THE AVERAGE NUMBER OF ROOMS PER INHABITED HOUSE, AND OF PERSONS PER ROOM (INCLUDING INSTITUTIONS), IN CERTAIN TOWNS AND BURGH OF SCOTLAND, AT THE CENSUSES OF 1881, 1891, AND 1901.\*

	Rooms per Inhabited House.			Persons per Room.		
	1881.	1891.	1901.	1881.	1891.	1901.
Glasgow, ... ..	2·34	2·34	—	2·054	2·054	—
Greater Glasgow, ...	—	2·59	2·62	—	1·884	1·868
Edinburgh, ... ..	4·19	4·16	3·93	1·320	1·231	1·221
Dundee, ... ..	2·85	2·62	2·50	1·870	1·842	1·752
Aberdeen, ... ..	3·42	3·22	3·27	1·511	1·437	1·405
Greenock, ... ..	2·64	2·71	2·74	1·907	1·823	1·796
Leith, ... ..	2·98	3·06	3·07	1·671	1·608	1·567
Paisley, ... ..	2·42	2·47	2·50	1·984	1·969	1·948
Perth, ... ..	4·96	3·86	3·87	1·312	1·233	1·174
Kilmarnock, ... ..	—	2·59	2·63	—	1·876	1·829
Govan, ... ..	—	—	2·26	—	—	2·191
Partick, ... ..	—	—	2·95	—	—	1·630
Scotland, ... ..	3·21	3·20	3·26	1·60	1·55	1·48

#### GROUPING OF THE POPULATION IN HOUSES OF VARIOUS SIZES.

The following Tables illustrate the widely-varying conditions under which the population is housed. Attention will chiefly be directed to the proportion of houses of one and two apartments, which together form 67 per cent. of the total houses, and accommodate 61 per cent. of the population :—

Glasgow.—Census 1901.	Inhabited Houses.	Population.	PERSONS.	
			Per House.	Per Room.
1 Apartment, ... ..	32,709	104,128	3·183	3·183
2 Apartments, ... ..	70,784	348,731	4·927	2·463
3 Apartments, ... ..	28,055	151,754	5·409	1·803
4 Apartments, ... ..	10,933	58,272	5·330	1·332
5 Apartments and upwards,	12,923	78,239	6·054	1·270
	155,404	741,124	4·769	1·846

\* As the population of Institutions cannot be excluded in the case of the other towns, it has been necessary to deal with the whole population of Glasgow in this calculation, which accounts for the slight difference between the figures given here and elsewhere.



PROPORTION PER CENT. OF HOUSES OF CERTAIN SIZES, AND PROPORTION PER CENT. OF POPULATION INHABITING THEM IN 1891 AND 1901 COMPARED.

These proportions can be accurately stated for the area as existing at the Census of 1891 and at that of 1901, but they are only comparable within the limits afterwards described.

Sizes of Houses.	Percentage of Houses of Different Sizes.			Percentage of Population occupying each Class.		
	1891.	1901.	1901.	1891.	1901.	1901.
1 apartment, ...	(1) 26·40	(2) 23·80	(3) 21·05	(4) 18·051	(5) 15·89	(6) 14·050
2 apartments, ...	45·34	47·93	45·55	47·482	49·95	47·054
3 „ ...	16·85	17·52	18·05	19·668	20·49	20·476
4 „ ...	6·05	5·77	7·03	7·204	6·86	7·863
5 „ and upwards,	5·36	4·98	8·32	7·595	6·81	10·557

Columns 1, 2, 4, and 5 of the above Table apply to the area of the City at the Census of 1891, while columns 3 and 6 apply to the present area. The data for the corresponding calculation for the whole of the added districts at 1891 do not exist, but columns 2 and 5 have been calculated to show the changes which had taken place in 1901 within the area of the 1891 Census. They are, therefore, comparable with columns 1 and 4.

*One-Apartment Houses.*—In 1891, 26·4 per cent. of the houses were of one apartment, and 18 per cent. of the population lived in them. In 1901 these proportions were 21 and 14 per cent. respectively, but when the comparison is confined to the area of Old Glasgow, the reduction is only to 23·8 per cent. for houses and to 15·9 per cent. for population.

*Two-Apartment Houses.*—The proportion of houses of this class is little altered when the old and new areas are compared, while the proportion of population inhabiting them is only slightly lowered in the latter. Now, as formerly, therefore, almost one-half the population live in houses of two apartments. But within the older area the proportion of such houses has increased by 2·59 per cent., and the proportion of population in them by 2·47 per cent.

Taking houses of one and two apartments together, they now form 66·6 per cent. of the total inhabited houses, compared with 71·7 per cent. in 1891, and are now inhabited by 61 per cent. of the population, instead of 65·5 in 1891; but, confining the comparison to the limits of the old area, the proportion in both cases is practically maintained, being 71·74 against 71·73 for houses, and 65·53 against 65·84 for population.

#### REDUCTION IN ONE-APARTMENT HOUSES.

This constancy in the proportion of houses of both sizes within this area has, as we have seen, been accompanied by a change in the relative proportion of each, so that the actual change which has taken place must be further examined on the basis of the numbers existing at each Census.

There were 31,032 houses of one apartment at the Census of 1891. At the present Census they numbered 32,709, but 2,273 of these are in the added

districts—1,779 being in the districts of Maryhill (30) and Possilpark and Barnhill (31) alone—leaving 30,436 for the old area. The reduction in the proportion of one-apartment houses in Old Glasgow, therefore, has been accompanied by an actual reduction of their number by 596.

OLD GLASGOW.—ONE-APARTMENT HOUSES, 1891 AND 1901, COMPARED.

	Houses.	Population.	Proportion of Houses of all Sizes.	Proportion of Population Occupying.	Persons per Room.
1891. ... ..	31,032	100,298	26.40	18.05	3.232
1901, ... ..	30,436	96,586	23.80	15.89	3.173
Decrease, ... ..	596	3,712	2.60	2.16	.059
Added Districts, 1901,	2,273	7,542	9.0	5.7	3.318

Coincident with this reduction in the number of houses of this size within the older area, the population inhabiting them has been reduced by 3,712 and the average number of persons per room from 3.232 to 3.173. This latter figure is to be compared with 3.183, which is the average occupancy of all one-apartment houses, and brings into contrast the relatively greater average number of occupants of one-apartment houses in the suburbs, which is 3.318 per house.

This had been observed in 1891 as applicable to houses of one and two apartments in the landward portions of the Glasgow Registration Districts\* (Dennistoun, St. Rollox, Hutchesontown, Gorbals, Tradeston, and Kinning Park), which were then already otherwise partly urban, while in three and four apartment houses the reverse was the case, and the figures are repeated in the following Table for convenient reference:—

AVERAGE NUMBER OF INMATES PER ROOM IN OLD GLASGOW AND ADDED DISTRICTS, AND IN GREATER GLASGOW.

	1 Apartment.	2 Apartments.	3 Apartments.	4 Apartments.
1891, Old Glasgow, ...	3.23	2.47	1.84	1.41
Landward Portions of Registration Districts,	3.58	2.60	1.74	1.19
1901, Glasgow, ... ..	3.18	2.46	1.80	1.33
Old Glasgow, ... ..	3.17	2.48	1.85	1.41
Added Districts, ...	3.32	2.38	1.61	1.17

We shall have an opportunity further on of considering the actual change which has taken place during the decade in the number of one-apartment houses in the several Sanitary Districts within Old Glasgow; but, as representing in a minor degree the change in social conditions which an increase in houses of this size indicates, the following Table shows those districts in which the proportion of houses of this size is now greater than in 1891:—

\* Along with these are included the figures for the Burghs of Hillhead and Maryhill and the District of Kelvininside.

DISTRICTS OF OLD GLASGOW IN WHICH THE PROPORTION OF ONE-APARTMENT  
HOUSES HAS INCREASED.

		No. of 1 apartment Houses.		Inhabitants.	
		1891.	1901.	1891.	1901.
2.	Port-Dundas, ... ..	254	332	813	1,019
9.	Monteith Row, ... ..	174	172	524	542
13.	Brownfield, ... ..	128	135	356	409
17.	Kelvinhaugh and Sandy- ford, ... ..	359	392	1,063	1,119

Monteith Row has been included here, although there is a reduction of two in the number of such houses. The total number of houses of all sizes in this district has, however, decreased, but to a greater extent, so that the proportion of houses of one apartment is now greater than it was ten years ago.

SUB-DIVIDED HOUSES.

There is some reason for thinking that were the condition of individual occupancies accurately known, some portion at least of the houses which we have just been considering as of two or more apartments would be transferred to the list of one-apartment houses, and each room regarded as separately occupied. This consideration does not affect the comparison with former years, but it should be borne in mind.

A house, as defined for Census purposes, has certain limitations. It must have—

- (1) A distinct outside entrance from a street, court, lane, road, &c., or
- (2) A door opening *directly* into a common stair or passage; *but any such dwelling if subdivided and occupied by different families is to be reckoned as one house.*

From this definition, it is obvious that the primary conception of a house for Census purposes may, in respect of the latter qualification, fail to convey its significance as a sanitary factor, and, indeed, in the final Reports of former Censuses the Registrar-General has been in the habit of regarding the number of families as the index of the number of houses. For the present we must deal with them as now defined.

We have already seen that the total number of inhabited houses is 155,404. In his preliminary Report on the present Census the Registrar-General gives the number of "families" as 163,422, so that the "families" exceed the houses by 8,018. What does this disparity cover? As here used, however, the term "family" has a restricted and purely conventional meaning, which we need only for the present consider in so far as it relates to the separate occupancy of rooms in the subdivided houses referred to in the definition just quoted.

A common illustration is afforded by a two-apartment house, where each apartment is entered separately from a common lobby and occupied by a separate family. Some semblance of privacy is still possible to the several occupants, although the water supply for both is at the kitchen sink; but where the room or second apartment is only reached *through* the kitchen, independent family life



becomes impossible. The house and its appurtenances, originally designed for the requirements of one family, are now shared by two, and each apartment becomes a one-roomed house under the worst possible conditions. We know that this not infrequently occurs in several houses in one tenement under fluctuating conditions of occupancy. The farmed-out house is largely of this class. In January of this year (1902), 859 such were on the register; 531 of these were classed as single-apartment houses, the remaining 328 were houses varying in size from 2 to 9\* apartments. These latter contained 741 rooms, which, added to the 531 properly regarded as single apartments, gives a total of 1,272 rooms used mostly as single apartments, and not necessarily restricted in their occupancy even to separate families until Section 17 of the Provisional Order of 1901 came into operation this year.

The following Table shows the number of farmed-out houses in each sanitary district, with the number of each of various sizes, as known in January, 1892 :—

FARMED-OUT HOUSES.

Sanitary Sub-Divisions.	1 Apt.	2 Apts.	3 Apts.	4 Apts.	5 Apts.	6 Apts.	7 Apts.	9 Apts.	Total.	Apartments.	Percentage of Farmed-out Houses to Total Houses.
1.	...	8	...	3	...	...	...	...	11	28	·3
3.	27	6	2	...	1	1	...	...	37	56	2·0
4.	32	...	...	...	...	...	...	...	32	32	1·0
5.	62	19	5	2	...	...	...	...	88	123	0·5
6.	26	26	2	...	...	...	...	...	54	84	4·9
8.	10	4	...	...	...	...	...	...	14	18	0·2
9.	13	13	5	...	...	2	1	1	35	82	4·2
10.	6	7	1	...	1	...	...	...	15	28	2·0
11.	143	50	9	2	...	...	...	...	204	278	4·4
12.	4	4	...	...	...	...	...	...	8	12	1·8
13.	37	33	4	...	...	...	...	...	74	115	10·8
14.	37	30	2	2	...	...	...	...	71	111	9·2
16.	46	5	...	...	...	...	...	...	51	56	1·3
18.	58	31	3	...	...	...	...	...	92	129	1·6
19.	1	1	...	...	...	...	...	...	2	3	0·0
20.	4	...	...	...	...	...	...	...	4	4	0·2
21.	1	14	2	...	...	...	...	...	17	35	0·1
22.	24	24	2	...	...	...	...	...	50	78	2·0
Total,	531	275	37	9	2	3	1	1	859	1,272	

\* The inclusion of houses having more than two rooms among farmed-out houses is a sanitary necessity, but it has not at present legal sanction (*vide* Public Health Act, Section 72 (2)).

The growth of the farmed-out house needs the most constant watchfulness and it is a matter for consideration whether an annual census of its occupants would not well repay the trouble and cost involved.

Its existence had no legal recognition until the passing of the Public Health (Scotland) Act, 1897, but its evolution from the class of "Houses Let in Lodgings" began prior to this. Its occupant falls short of the standard by which the caretaker or house-factor estimates the desirable tenant. Yet his rent-paying power is considerable. £13 annually represents the sum of the weekly payments for a single room so occupied, only £2 less than the average rent of a three-apartment house. The attraction to the occupant is that he need produce no evidence of former regularity in rent-paying; that it now may be paid in nightly doles of 10d., or 5s. per week, for which also he has the use of certain domestic furnishings in their simplest form. The solatium to the house-farmer for occasional loss from unlet rooms or destruction of furnishings is the return of 20s. per four weeks from premises which he leases at something between 6s. and 8s. a month.

There is another point of view, however, from which these houses may be considered. The present legal standard of air-space per adult in these and other smaller-sized houses in private occupancy is 400 cubic feet, and this is applicable also to the dormitories of Common Lodging-houses, which are under regulation as to ventilation and cleanliness. But the 400 cubic feet of a Common Lodging-house is reserved exclusively for sleeping purposes, while the corresponding space in the private house is in constant occupancy, and is used both for living and sleeping purposes. The value, therefore, to the inhabitant of each, of the legal allowance of air-space at his disposal must be appraised by a different standard, if indeed, they are to be regarded as at all comparable, which, in fact, they are not. The balance is against the occupant of the smaller dwelling, the air of which, under conditions of almost continuous occupancy, can rarely be rendered pure.

#### QUESTION OF OVERCROWDING.

We have already seen that 14 per cent. of the population are living in houses of one apartment, with an average occupancy of more than three persons per room, and that 47 per cent. of the population are living in houses of two apartments, with an *average* occupancy per room of almost 2·5 persons. Both figures are in excess of the average room-density, and, as this affects 61 per cent. of the population, some effort is requisite to discover what it implies.

In considering the question of overcrowding in England and Wales at the Census of 1891, the Registrar-General adopted the standard of two persons per room as representing the limit of reasonable occupancy, and regarded any excess over this in houses of less than five rooms as indicating, save in exceptional circumstances, the degree of overcrowding which existed. On this basis most of the recent enquiries into overcrowding in English cities has proceeded, and a comparison \* has lately been established in which the figure which represents the proportion of the Glasgow population living more than two in a room is used to indicate a comparable condition.

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\* "Poverty: A Study of Town Life," p. 171. By B. Seebohm Rowntree. London: Macmillan & Co., Ltd., 1901.

The method here adopted proceeds by excluding the proportion of one, two, three, and four-apartment houses, in which the persons resident do not exceed twice the number of apartments in each size of house, and calculating the number living in excess of this as a percentage of the total population. Corresponding detail is not yet available for the present Census, but the figures referable to that of 1891 are sufficiently illustrative. The figures of the following table are from Mr. Rowntree's work, and reference may also be made to Volume VI. of the Census Report for England, Table 30, Appendix A, and to the Tenth Decennial Report for Scotland, Volume I., page 331.

TOWNS.	Proportion per cent. of Persons living more than 2 per Room to Total Population.	TOWNS.	Proportion per cent. of Persons living more than 2 per Room to Total Population.
1891.		1891.	
Newcastle-on-Tyne,	... 35	Sheffield,	... 11
London, ...	... 19	Liverpool,	... 10
Leeds, ...	... 16	Manchester,	... 8
Glasgow,	... 59		

The social significance of this contrast has its value, but the disparity presented by the proportion of persons so living in the several cities suggests a fundamental difference in the average size of room which we may endeavour to elucidate.

Dr. Sykes, in the Milroy Lectures for 1901, states that in England the cubic space per room may be stated as varying from 600 to 1,400 cubic feet, but mainly from 800 to 1,200, and takes the average of 1,000 cubic feet as fairly representing the air-space per room in houses of less than five apartments in large towns.

Before, however, this can be compared with corresponding measurements in Glasgow some further consideration is necessary. It is customary in Glasgow to exclude the bed space and lobby, if that is separated by a door, in calculating the cubic capacity of a room. In London, on the other hand, where, as Dr. Sykes informs me,\* the ordinary house has a front and a back room on each floor, there is no lobby and no bed recess, while any recess within a room would be reckoned as part of the cubic space therein.

Keeping these differences in view, a comparison of the internal air-space in houses in both cities may be approached.

#### CUBIC SPACE PER HOUSE IN GLASGOW.

By the Glasgow Police Act, 1866, the minimum air-space per apartment in new houses was fixed at 900 cubic feet, and was raised to 1,000 cubic feet by the Building Regulations Act, 1892. The following measurements taken in 1886 represent the average in three districts.†

\* Dr. Sykes since writes me:—"The Housing of the Working Classes Committee of the London County Council made building regulations approved by the Council on 3rd December, 1889, and these regulate the size of rooms in new buildings for the working classes in London. With a minimum of  $8\frac{1}{2}$  feet (ceiling), the minimum floor area for bedrooms is 96 square feet, and for living rooms 144 square feet. This means respectively 816 and 1,244 cubic feet, and the mean of the two is 1,020. The average always seems to come near 1,000."

† See "Vital Statistics," Part II., pp. 70, 71. (Dr. Russell.)



## (1) CUBIC CONTENTS OF HOUSES IN TRADESTON.

SIZE OF HOUSE.	No. of Houses.	Mean Cubic Space per House.	Mean Cubic Space per Room.
1 Apartment, ... ..	100	1,007	1,007
2 Apartments, ... ..	104	2,077	1,038
3 Apartments, ... ..	110	3,656	1,219

There are 314 houses in this group, all in Tradeston, which was feued by the Trades' House at the end of last century.

## (2) CUBIC CONTENTS OF HOUSES IN DISTRICT 15, OR WOODSIDE.

SIZE OF HOUSE.	No. of Houses.	Mean Cubic Space per House.	Mean Cubic Space per Room.
1 Apartment, ... ..	100	1,268	1,268
2 Apartments, ... ..	100	2,498	1,249
3 Apartments, ... ..	23	3,722	1,240

These 223 houses are nearly all in tenements then recently built in Hopehill Road, and fairly represent the ordinary run of artizans' dwellings erected by private enterprise under the usual conditions of the Glasgow Police Act, 1866.

## (3) CUBIC CONTENTS OF HOUSES—OATLANDS AND OVERNEWTON.

SIZE OF HOUSE.	No. of Houses.	Mean Cubic Space per House.	Mean Cubic Space per Room.
1 Apartment, ... ..	116	1,344	1,344
2 Apartments, ... ..	137	2,637	1,318
3 Apartments, ... ..	101	3,999	1,333

These 354 houses are all situated on the lands of Oatlands and Overnewton, which were purchased by the Improvement Trust, and feued in accordance with a plan carefully laid out by the Master of Works, reserving in each case a central square as breathing space. They represent the best class of modern artizans' dwellings in the City.

This is the record of measurements taken in 1886, and may be compared with the following figures, which show the average cubic space in houses whose erection was sanctioned during the past decade, and for which I am indebted to the Master of Works.

SIZE OF HOUSE.	No. erected Sept. 1891, Aug. 1901.	Cubic Contents, Including Lobby and Bed Space.	Cubic Contents, Excluding Lobby and Bed Space.
1 apartment, ... ..	5,665	1,700	1,300*
2 apartments, ... ..	17,355	—	—
(a) Room, ... ..	—	—	1,400
(b) Kitchen, ... ..	—	—	1,200
Together, ... ..	—	3,400	2,600

This gives the average free air-space per room in houses of recent construction at 1,300 cubic feet, and, if we add the 240 cubic feet of bed-space, to meet the inclusion of recesses within a room which are reckoned in London as forming part of the entire cubic space thereof, we have in our most recently erected one and two-apartment houses air-space which exceeds by one-half the average contents of the room in London, and indicates three persons per room as the equivalent of the English standard of two. In ten\* of our districts only is the *average* occupancy of one-apartment houses lower than this.

#### INTERCENSAL CHANGES OF POPULATION AND IN HOUSE ACCOMMODATION IN THE VARIOUS SANITARY DISTRICTS DURING 1891-1901.

In order to epitomise this, the following Table has been prepared :—It shows that in twelve Districts of Old Glasgow the population has decreased during the decade at rates varying from 1·5 per cent. in Blythswood to 33 per cent. in Bridgegate and Wynds. Between these extremes lie High Street and Closes East and West, Monteith Row, St. Andrew Square, Calton, and St. Enoch Square in the Central and East Central Districts; Anderston in the West; Kingston, Laurieston, and Gorbals in the South. In all, save High Street and Closes West, the houses have likewise been reduced in number.

In the other Districts of Old Glasgow the increase in population has ranged from 1 per cent. in St. Rollox to 25·6 per cent. in Springburn and Rockvilla, and in these also the houses have increased in number, save in Brownfield, where the population has increased by 3 per cent., while the houses have been reduced by 1·9 per cent.

In all the added Districts the rates of increase have reached a high level, save in Hillhead where the population has increased by 10·3 per cent. and the houses by 9·9 per cent.

In Maryhill the population has been doubled during the decade, and its houses have been added to by 118·6 per cent.

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\* See Table VII., Appendix.

MOVEMENTS OF THE POPULATION IN RELATION TO HOUSING DURING THE  
DECENNIUM 1891-1901.

SANITARY DISTRICTS.	Population, exclusive of Institutions and Shipping.		Inhabited Houses.		Empty Houses.	
	Percentage Increase.	Percentage Decrease.	Percentage Increase.	Percentage Decrease.	1891.	1901.
— Blythswood, ... ..	...	1·5	...	3·2	4·7	2·8
1. Exchange, ... ..	11·2	...	11·4	...	6·6	3·9
2. Port-Dundas, ... ..	14·4	...	16·7	...	4·6	17·0
3. High Street and Closes West, ...	...	4·3	1·2	...	4·6	5·5
4. St. Rollox, ... ..	1·0	...	1·7	...	2·6	3·1
5. Bellgrove and Dennistoun, ...	25·3	...	25·5	...	3·8	4·5
6. High Street and Closes East, ...	...	10·6	...	8·3	7·9	4·2
7. Greenhead and London Road, ...	25·7	...	23·7	...	3·1	4·2
8. Barrowfield, ... ..	2·8	...	0·6	...	8·2	4·7
9. Monteith Row, ... ..	...	8·1	...	10·0	3·1	4·1
10. St. Andrew Square, ... ..	...	2·8	...	7·7	5·0	4·1
11. Calton, ... ..	...	5·1	...	7·5	5·3	6·2
12. St. Enoch Square, ... ..	...	30·7	...	31·0	11·2	3·5
13. Brownfield, ... ..	3·3	...	...	1·9	3·1	5·3
14. Bridgegate and Wynds, ... ..	...	33·8	...	30·4	12·5	2·4
15. Woodside, ... ..	19·8	...	19·6	...	4·4	3·7
16. Cowcaddens, ... ..	8·1	...	5·2	...	6·5	7·4
17. Kelvinhaugh and Sandyford, ...	3·8	...	3·9	...	3·8	3·6
18. Anderston, ... ..	...	2·8	...	3·8	2·7	2·6
19. Kingston, ... ..	...	1·9	...	3·3	4·4	2·7
20. Laurieston, ... ..	...	2·1	...	5·1	3·9	3·6
21. Hutcheson Square, ... ..	10·4	...	9·4	...	3·3	3·2
22. Gorbals, ... ..	...	7·1	...	10·2	3·7	3·7
— Springburn and Rockvilla, ...	25·6	...	29·5	...	3·7	3·8
23. Govanhill, ... ..	36·3	...	43·2	...	3·6	3·4
24. Crosshill, ... ..	76·5	...	87·7	...	6·0	5·7
25. Langside and Mount Florida, ...	58·5	...	73·6	...	10·7	7·8
26. Pollokshields, E., and Strathbungo,	30·0	...	41·3	...	7·0	6·2
27. Pollokshields, W., and Bellahouston,	61·4	...	69·2	...	5·4	5·7
28. Hillhead, ... ..	10·3	...	9·9	...	9·0	5·1
29. Kelvinside, ... ..	28·0	...	34·2	...	8·3	8·0
30. Maryhill, ... ..	100·4	...	118·6	...	6·8	8·4
31. Possilpark and Barnhill, ... ..	35·9	...	36·7	...	5·5	5·2
— Institutions, ... ..	51·1	...	...	...	...	...
— Shipping, ... ..	65·5	...	...	...	...	...
City,* ... ..	15·75	...	15·21	...	4·7	4·5

\* Including Institutions and Shipping.



In a general way, houses and population have increased or decreased together, and the movement in both presents a fair degree of relationship. But in High Street and Closes West and in Brownfield the population and houses have moved in opposite directions.

The percentage increase and decrease in population and in houses in these districts will be found in the foregoing Table. The actual change in the houses is as follows:—

HIGH STREET AND CLOSES WEST—									
	1 Apt.	2 Apts.	3 Apts.	4 Apts.	5 Apts. and upwards.	All Sizes.			
1891, ...	708	... 772	... 257	... 94	... 36	...	...	...	1,867
1901, ...	595	... 894	... 299	... 73	... 28	...	...	...	1,889
Difference,	- 113	+ 122	+ 42	- 21	- 8	...	...	...	+ 22
BROWNFIELD—									
1891, ...	128	... 422	... 88	... 50	... 8	...	...	...	696
1901, ...	135	... 426	... 71	... 40	... 11	...	...	...	683
Difference,	+ 7	+ 4	- 17	- 10	+ 3	...	...	...	- 13

In High Street and Closes West there has been much demolition and rebuilding. It contains one of the areas of the Improvement Trust Act, 1897.

Brownfield is completely built over, and 10·8 per cent. of the total houses are farmed out.

In a former section we have seen that the one-roomed houses within the area of Old Glasgow were reduced by 596 and their population by 3,712. Can this displaced population be traced? It has, as we have also seen, failed to affect the average occupancy of the remaining one-roomed houses in Old Glasgow, which has been reduced from 3·232 to 3·173. But in carrying the enquiry into the several districts, we find *seven in which the average occupancy has increased*. These are stated in the following Table:—

ONE-APARTMENT HOUSES.—AVERAGE NUMBER OF INMATES PER HOUSE IN DISTRICTS WHERE THE PROPORTION IN 1901 EXCEEDS THAT OF 1891. (See also Table VII., Appendix.)

	Average Number of Persons per Room.		Difference per 1,000 Houses.
	1891.	1901.	
St. Andrew Square, ... ..	3·352	3·601	249
High Street and Closes East, ... ..	3·240	3·440	200
Cowcaddens, ... ..	3·164	3·255	91
Laurieston, ... ..	3·050	3·162	112
Monteith Row, ... ..	3·011	3·151	140
Brownfield, ... ..	2·781	3·030	249
St. Enoch Square, ... ..	2·962	2·973	11
Old Glasgow, ... ..	3·232	3·173	- 59

It will be observed that the order of room density is maintained in both periods, save in Brownfield; and if we here again discard the decimal, and regard the change as expressing the actual increase in the number of inmates per 1,000 houses of this size, we find Brownfield and St. Andrew Square to have their occupants increased by 249, High Street and Closes East by 200, Monteith Row by 140,\* and Laurieston by 112. This is one result in detail of the displacement, while the balance will be fairly expressed in the increased occupancy of two-apartment houses. Within the old area this has changed only from 4·950 to 4·952 persons per house, a difference which may be neglected. But, again, when we carry the comparison into the several districts and tabulate those only in which it has increased, a striking cleavage occurs between those districts which have also had an increase in their one-roomed occupancy and those in which this has not occurred. The column of differences in the following Table has been arranged to show this:—

TWO-APARTMENT HOUSES.—AVERAGE NUMBER OF INMATES PER HOUSE IN DISTRICTS WHERE IT HAS INCREASED IN 1901.

DISTRICTS.	Average Number of Persons per House.		Difference per 1,000 Houses.	
	1891.	1901.	A.	B.
High Street and Closes West (3), ...	4·763	4·775	—	12
Do. do. East (6), ...	4·837	4·899	62	—
Greenhead and London Road (7), ...	5·237	5·267	—	30
Barrowfield ... (8), ...	5·073	5·156	—	83
Monteith Row ... (9), ...	4·814	5·166	352	—
St. Andrew Square ... (10), ...	4·582	4·806	224	—
Calton ... (11), ...	4·927	4·949	—	22
St. Enoch Square ... (12), ...	4·616	4·758	142	—
Brownfield ... (13), ...	4·912	5·115	203	—
Kelvinhaugh and Sandyford (17), ...	4·498	4·560	—	62
Anderston ... (18), ...	5·052	5·063	—	11
Laurieston ... (20), ...	4·960	5·121	161	—
Hutcheson Square ... (22), ...	4·926	4·988	—	62
Old Glasgow, ...	4·950	4·952	2	—

The first point to be noted in this Table is that it contains all save one of the districts in which we have already seen the one-roomed occupancy to have increased. The exception is Cowcaddens, in which the two-roomed occupancy

\* The portion of this district chiefly affected is that which lies between Gallowgate, Kent Street, London Street, and Charlotte Street.

has been fractionally reduced, viz., from 5·128 to 5·121 per house. But it also shows that the increase which has taken place in the two-roomed occupancy is, with one exception, relatively greater in those districts where there is also an increase in the one-roomed occupancy. A comparison of the columns of difference shows the extent of this, columns A and B distinguishing between the districts which have and those which have not a coincident increase in the rate of occupancy of one-apartment houses.

In a manner these Tables focus results only, but they present in a fairly concrete form the districts in which increasing pressure on one and two apartment houses has occurred. To proceed beyond this requires some local knowledge of the boundaries of the Sanitary Districts. But, in a general way, High Street and Closes East and West, Bridgegate and Wynds, Calton, Monteith Row, St. Andrew Square, and St. Enoch Square fairly lie within the the centre of the area of Old Glasgow, and in these the one-apartment houses have been reduced in number during the ten years by 975. Against this, there has been an increase in Exchange District of 70, and in Port-Dundas, which, however, is further removed, of 78. Bellgrove and Dennistoun District has 163 added houses of one apartment; Greenhead and London Road, 291; but, save in the extreme western limit of the former, it is doubtful whether any of the displaced inhabitants of the Central Districts seek accommodation so far removed from their original houses.

In the Western District, Anderston has 204 fewer houses of this size, and it is difficult to dissociate from this the increased pressure in Brownfield with its rapid development of the farmed-out house, although Kelvinhaugh and Sandyford has added to its number by 33.

Similarly, on the South-Side, Kingston, Laurieston, and Gorbals have fewer one-apartment houses by 449, against which there is alone an increase of 191 in Hutcheson Square. In the Northern District of the old City, Springburn and Rockvilla and Woodside have added 461, but the relatively low rate of increase in the occupancy of one-roomed houses in Cowcaddens suggests that more is wanted than the mere provision of house-room to attract the inhabitant of one district to another which is probably more remote in its associations than in actual distance from that to which he has been accustomed. Rent and employment are powerful factors in determining residence, but local associations must be reckoned with; and the Tables point to the formation of limited areas of increased pressure on house accommodation round every centre of considerable displacement. Broadly speaking, three such exist, in the Central, West, and Southern Districts of the City.



NUMBER OF ONE-APARTMENT HOUSES IN THE SANITARY DISTRICTS OF  
OLD GLASGOW IN 1891 AND 1901.

SANITARY DISTRICTS.		1891.	1901.	Increase.	Decrease.
Bl.	Blythswood, ... ..	413	313	—	100
1	Exchange, ... ..	670	740	70	—
2	Port-Dundas, ... ..	254	332	78	—
3	High Street and Closes W., ...	708	595	—	113
4	St. Rollox, ... ..	823	781	—	42
5	Bellgrove and Dennistoun, ...	3,196	3,359	163	—
6	High Street and Closes East, ...	501	425	—	76
7	Greenhead and London Road, ...	4,461	4,752	291	—
8	Barrowfield, ... ..	2,672	2,543	—	129
9	Monteith Row, ... ..	174	172	—	2
10	St. Andrew Square, ... ..	216	173	—	43
11	Calton, ... ..	1,957	1,593	—	364
12	St. Enoch Square, ... ..	133	74	—	59
13	Brownfield, ... ..	128	135	7	—
14	Bridgegate and Wynds, ... ..	555	237	—	318
15	Woodside, ... ..	2,156	2,245	89	—
16	Cowcaddens, ... ..	1,464	1,473	9	—
17	Kelvinhaugh and Sandyford, ...	359	392	33	—
18	Anderston, ... ..	1,854	1,650	—	204
19	Kingston, ... ..	1,482	1,249	—	233
20	Laurieston, ... ..	481	437	—	44
21	Hutcheson Square, ... ..	4,086	4,277	191	—
22	Gorbals, ... ..	752	580	—	172
—	Springburn and Rockvilla. ...	1,537	1,909	372	—

EMPTY HOUSES.

Within the area of Old Glasgow in 1891, 5,440 houses, or 4·4 per cent. of the total, were unoccupied on the night of the Census; in the added Districts, 1,223, or 6·6 per cent., were unoccupied, together forming 4·7 per cent. of the total number of houses within the whole area. At the present Census, 7,274 were unoccupied, which is 4·5 per cent. of the total.

It is unfortunate that the returns cannot be made to convey information regarding the size of these.

Within the area of Old Glasgow at the present Census the number of empty houses was 5,427, or 4·1 per cent.; in the added Districts they numbered 1,847, or 6·3 per cent., proportions which do not vary much from these obtaining in 1891. In 1881 the proportion of empty houses was 10 per cent.; in 1871, 2 per cent.

# FORMULA FOR CALCULATING THE ANNUAL INCREASE, 1901-1911.

During the intercensal period 1891-1901, the Annual Estimates of the population, based on the rate of increase in the previous decade and on the number of inhabited houses returned by the City Assessor in June of each year, differed very little from each other. In the earlier years of the decade, the estimate based on inhabited houses was somewhat lower than the other, but the difference gradually inclined the other way, until in 1900 the Medical Officer's estimate exceeded that of the Registrar-General by 11,761. For 1901\* it would have exceeded the Census by 900, but as this assumed the shipping population of 1891 as constant, the actual difference would have been about 1,500. The result, therefore, has once more established the superiority of a method based upon data which can be obtained with a fair degree of accuracy each year over one which is based on conditions which may be very widely departed from when it comes to be applied. The close approximation of recent results is no doubt largely attributable to the annexation of the outer ring in November, 1891, which, as we have seen, preserved to the City its natural increase, although it may be partially explained by a steadier growth of the population in recent years.

The method of calculating the population on the basis of the number of "Inhabited Houses" was fully discussed in the Census Report for 1891, and we need only consider here the alterations which have occurred in the factors employed. At the Census of 1891 the average number of persons per house was found to be 4·778, and this at the Census of 1901 had fallen to 4·769.

In June, 1901, the number of "Inhabited Houses" as returned by the City Assessor was 159,988, or 4,584 in excess of those found occupied at the Census. After allowing for the natural increase of the City during the intervening quarter, there remains a difference of about 2·5 per cent. to be accounted for chiefly by houses *tenanted* but not *occupied* on the Census day. This difference has been allowed for in the Annual Estimates of the past decade by deducting 1·5 per cent. from the Assessor's Return, and, though the data at command might suggest a larger allowance, no change will for the present be made, so that the formula for the annual estimate of the population during the current decade will be:—

$$[(\text{Tenanted Houses} - 1\frac{1}{2} \text{ per cent.}) \times 4\cdot769] + \text{Shipping} + \text{Institutions} = \text{Population.}$$

## AVERAGE RENT OF HOUSE PER YEAR AND OF ROOM PER WEEK.

Mr. Henry has kindly supplied me with information from which the following approximate average rentals have been calculated for 1901; the figures referable to former years being recast from earlier Census Reports:—

Year.	Total Rental.	Number of			Average Rent of		
		Houses.	Windowed Rooms.		House per Year.	Room per Week.	
1881, ...	—	...	—	...	£11 6 9	...	—
1891, ...	£1,793,255	142,985	348,858	...	12 10 9·98	...	1s. 11½d.†
1901,‡	2,162,920	158,779	—	...	13 12 3	...	2s. 0½d.

\* See note thereon in Annual Report of Medical Officer of Health for 1899-1900.

† The average weekly rent per room in old Glasgow in 1891 was 1s. 9½d.

‡ These figures apply to houses alone, but there were, in addition, 3,040 combined houses and shops yielding a rental of £50,826, which are excluded from the calculation of average rentals. The increase in the average rent per house is, in part at least, related to the increase which we have seen to have occurred in the size of the average house; but the increase in the average room rental quite definitely indicates that for corresponding accommodation the rent paid has risen during the decennium.

## GLASGOW'S OUTER RING.

The outer ring of population surrounding Glasgow proper, which the Registrar-General in 1881 first constituted into a Principal Town District as "Glasgow Landward and Suburban" is described in his 27th Detailed Annual Report as consisting of the landward parts of the City (Registration) Districts, together with the Registration Districts of Cathcart, Eastwood, Maryhill, Govan, and Partick.

The inclusion of a considerable portion of the population of this area within the City boundary by the extension of 1891 has terminated the existence of the outer ring as thus constituted, but the rate at which the population around Glasgow is increasing may be deduced from a comparison of the rate of growth of the combined population of the civil parishes within which the registration districts just mentioned were contained, and adding thereto that of Rutherglen. These approximately represent the total population within a radius of four miles of the Exchange.

The population in 1891 and 1901 was as follows:—

Parishes.		1891.		1901.
Glasgow,	...	486,636	...	571,569
Govan,	...	286,281	...	341,443
Eastwood,	...	16,042	...	18,886
Cathcart,	...	16,589	...	28,358
Rutherglen,	...	16,178	...	21,012
Total,		<u>821,726</u>		<u>981,268</u>

We have thus a numerical increase during the decennium of 159,542, representing a rate of 19·4 per cent. for the whole population within the four-mile radius, or 3·6 in excess of the rate per cent. of increase within the Municipal boundary.

## PROPOSED CHANGE FROM PRESENT SANITARY DISTRICTS TO MUNICIPAL WARDS.

The present Sanitary Districts were formed in 1871, when Sir William T. Gairdner was Medical Officer of Health for Glasgow. The history of the various attempts to sub-divide the City so as to "exhibit the local variations in our vital statistics" is contained in Part I. of the "Vital Statistics of Glasgow," by Dr. Russell, late Medical Officer of Health of the City. From the account there given, it appears that the present sub-divisions were a compromise between the ten Registration Districts of the City then existing, and which, "embracing a population of 30,000 to 40,000, were too large," and an earlier proposal "that the 960 Enumeration Districts of the City, formed for the purposes of the Census of 1861, might be taken as the basis." The complexity of this latter scheme proved a barrier to its realisation, and although some use was for a time made of another proposal, which had been submitted to the Board of Police in 1865, for dividing the City into 54 districts, these also were, for the most part, soon abandoned. Recourse was then had to the Registration Districts, and



finally, in 1871, these were sub-divided into the present Sanitary Districts. The following Table shows the scheme of division, the numbers only of the Sanitary Districts being given :—

Old Registration Districts.				Sanitary Districts.
Central,	...	...	...	1, 2, 3, 4.
High Church,	...	...	...	5, 6.
Bridgeton,	...	...	...	7, 8.
Calton,	...	...	...	9, 10, 11.
Clyde,	...	...	...	12, 13, 14.
Blythswood,	...	...	...	Bl.
Milton,	...	...	...	15, 16.
Anderston,	...	...	...	17, 18.
Tradeston,	...	...	...	19, 20.
Hutchesontown,	...	...	...	21, 22.
Maryhill (part),	...	...	...	Rv.
Springburn (part),	...	...	...	Sp.

This scheme had in it the merits and defects of a compromise. By making the Sanitary Districts sub-divisions of the Registration Districts the statistical work of the Department was simplified, and the possibility of a continued error in the estimate of their populations could be avoided by comparison with the recurring Census Returns of each Registration District. The chief defect lay in the arbitrary character of the boundaries of the sub-divisions imposed by the limits of the Registration Districts. These latter had not been arranged for sanitary purposes, and though an effort was made within the limits thus prescribed to make each of the sub-divisions as homogeneous in its social condition and sanitary circumstances as possible, it was in the nature of things only partially successful. In 1875 the Registration Districts were completely rearranged, and any advantage gained by subordinating the Sanitary Districts to them was lost, but very wisely no attempt was then made to remodel these latter, for they had already proved most serviceable, and were destined in the next quarter of a century to exercise a powerful influence on the sanitary history of Glasgow.

Great changes have passed over the City since these Sanitary Districts were formed. The various improvement schemes and railway extensions have transformed many of the old plague-spots of the City, and swept away not a few of its historic slums, so that districts like the notorious No. 14, which in these early days of sanitation were a synonym for all that was insanitary and unhealthy, are now rapidly approaching the average death-rate of the City. This transformation is reflected in the movements of the population as shown in the following Table, which, for obvious reasons, relates only to Old Glasgow :—

## POPULATION.

SANITARY DISTRICTS.	1871.	1881.	1891.	1901.	Percentage, Increase and Decrease, 1871-1901.
14. Bridgegate and Wynds, ... ..	14,294	7,798	5,689	3,880	} Over 50 % decrease.
12. St. Enoch Square, ... ..	7,807	3,660	3,458	3,000	
6. High Street and Closes East, ...	17,532	7,745	7,487	7,102	
10. St. Andrew Square, ... ..	8,026	4,151	4,418	4,794	Over 40 % „
20. Laurieston, ... ..	12,305	9,131	9,108	8,986	} Over 20 % „
3. High Street and Closes West, ...	12,621	10,058	9,356	9,669	
22. Gorbals, ... ..	16,811	13,156	13,544	13,096	
— Blythswood, ... ..	33,442	26,789	28,543	28,548	} Over 10 % „
11. Calton, ... ..	25,637	22,094	22,637	22,169	
18. Anderston, ... ..	31,630	29,031	29,670	28,858	} Under 10 % „
8. Barrowfield, ... ..	30,108	28,807	26,944	27,696	
1. Exchange, ... ..	26,354	20,617	21,663	24,431	
9. Monteith Row, ... ..	4,513	4,914	4,643	4,267	
16. Cowcaddens, ... ..	19,270	15,233	16,235	18,206	} Under 10 % increase.
2. Port-Dundas, ... ..	5,305	4,704	4,678	5,346	
13. Brownfield, ... ..	3,702	3,826	3,797	3,924	
19. Kingston, ... ..	36,897	37,935	41,113	40,407	
4. St. Rollox, ... ..	12,988	14,252	15,751	15,907	Over 20 % „
17. Kelvinhaugh and Sandyford, ...	21,083	26,628	30,523	32,234	Over 50 % „
21. Hutcheson Square, ... ..	38,811	54,704	63,493	70,229	Over 80 % „
5. Bellgrove and Dennistoun, ...	40,938	54,195	63,348	79,211	Over 90 % „
7. Greenhead and London Road, ...	30,520	44,795	52,747	66,197	Over 100 % „
15. Woodside, ... ..	27,116	45,080	58,609	70,145	} Over 150 % „
— Springburn and Rockvilla, ...	12,732	22,217	28,278	35,527	

In this summary the districts are arranged in order, beginning with those showing the largest decrease, and the result is to bring out in bold relief the revolution which they have undergone. This is further illustrated by the following comparison :—

District Populations.	1871.	Number of Districts.		1901.
Over 70,000, ... ..	—	...	...	3
60,000 to 70,000, ... ..	—	...	...	1
50,000 to 60,000, ... ..	—	...	...	—
40,000 to 50,000, ... ..	1	...	...	1
30,000 to 40,000, ... ..	6	...	...	2
20,000 to 30,000, ... ..	4	...	...	5
10,000 to 20,000, ... ..	8	...	...	3
Under 10,000, ... ..	5	...	...	9

In both 1871 and 1901 seven of the districts had populations exceeding 30,000; but whilst in 1871 only one district had a population exceeding 40,000, now four have populations exceeding that number, and three of these have populations exceeding 70,000. By contrast, while formerly only five districts had populations under 10,000, now there are nine such. It is manifest that some of the present districts have overgrown the limits of suitability for sanitary statistical purposes, and local knowledge indicates that whatever claim to homogeneity they at one time possessed has been almost entirely lost. For both reasons it seems desirable to alter the present arrangement either partially or wholly, and the present time is particularly

opportune for the consideration of the question. Two methods of dealing with it suggest themselves. We may retain the present divisions, grouping those which have become too small and sub-dividing those which have outgrown their usefulness, or we may substitute a scheme of sub-division of the City on entirely different lines. If the former plan is adopted, Districts 3 and 6, 9 and 10, and 12 and 14 suggest themselves as convenient combinations, while the larger districts, some of which have grown to the proportions of considerable towns, could be some of which have grown to the proportions of considerable towns, could be sub-divided so as to produce Sanitary Districts of more reasonable size. But there is much to recommend a complete change of basis for these sub-divisions; and the quickening of local interest in every detail of communal life points to the Municipal Ward as affording the limits within which these may be recast. Vital statistics gain much both in interest and value when viewed in the light of an intimate knowledge of the local circumstances which influence them, and a Ward death-rate would afford a standard by which its least sanitary areas might be compared. It is probable also that the present Registration Districts of the City will, ere long, require revision, and if this is done, there can be little doubt that the present Municipal Wards will form the basis of the reconstruction scheme. The only objection which can be urged against this proposal is that continuity in our vital statistics will for a time be broken; but in view of the changes which have taken place in the present Districts within the last thirty years, this objection loses much of its force. As it is expected that the Census Reports will in future furnish information as to the Wards which has hitherto only been given for the City as a whole (and which it has been impossible to abstract in the limited time during which the special staff of this Department is permitted access to the enumeration books), investigations of considerable importance—as, for example, into occupational death-rates—which are now impossible, might be pursued with advantage. This would not, however, lessen the need for the facilities which have been afforded us at each Census since 1871, because it will still be necessary to sub-divide the larger Wards, and the data for the sub-divisions can only be obtained from the enumeration books as hitherto.

The first question to be considered is the population of the Wards, and, by adopting a grading similar to that already used for the Sanitary Districts, we have the following series—the figures for the present Sanitary Districts being added for comparison:—

POPULATION.	WARDS.		SANITARY DISTRICTS.	
	Number.	Average Population.	Number.	Average Population.
Over 50,000, ... ..	1	53,476	4	71,445
40,000 to 50,000, ...	4	42,835	1	40,407
30,000 to 40,000, ...	11	34,768	3	34,473
20,000 to 30,000, ...	4	26,145	7	25,227
10,000 to 20,000, ...	3	14,089	5	14,977
Under 10,000, ... ..	2	3,801	13	6,202
Average for City.	—	30,468	—	—



From these data it will be seen that the Wards, sub-divided as proposed, will form as suitable districts as any that can be produced by a rearrangement of those presently existing.

If, as a general principle, the adoption of the Municipal Ward as the basis of future statistics commends itself, a plan of sub-division will require to be formulated, which, while maintaining fairly comparable numerical proportions, will aim at a certain uniformity of social conditions and surroundings. District 14 formerly had these qualities; Districts 13, 16, and Kelvinside now present them; but Blythswood, Monteith Row, and Bellgrove and Dennistoun have each populations living under conditions as diverse as those presented by the City itself.

In view of a rearrangement on the lines here suggested, the whole details of housing and population already dealt with in relation to the present Sanitary Districts have been recast for the several Municipal Wards, and form Tables VIII. to XIV. of the Appendix.



## APPENDIX.



TABLE I.—GLASGOW: ACREAGE; COMPARATIVE STATEMENT OF POPULATION; HOUSES (INHABITED AND EMPTY) AND PER WINDOWED ROOM; AND PERCENTAGE OF IRISH BORN AT THE

SANITARY DISTRICTS.				Acreage.	POPULATION.								Difference of Total Populations.	
					Without Institutions and Shipping.		Institutions.		Shipping.		Total.			
					1901.	1891.	1901.	1891.	1901.	1891.	1901.	1891.	1901.	Increase.
—	BLYTHSWOOD, ... ..	266	28,438	28,016	105	532	...	...	28,543	28,548	5	...		
1.	EXCHANGE, ... ..	215	19,983	22,212	1,680	2,219	...	...	21,663	24,431	2,768	...		
2.	PORT-DUNDAS, ... ..	73	4,655	5,326	...	...	23	20	4,678	5,346	668	...		
3.	HIGH STREET AND CLOSES WEST,...	42	9,223	8,827	133	842	...	...	9,356	9,669	313	...		
4.	ST. ROLLOX, ... ..	45	15,751	15,903	...	...	...	4	15,751	15,907	156	...		
5.	BELMGROVE AND DENNISTOUN, ...	1,327	62,208	77,923	1,140	1,288	...	...	63,348	79,211	15,863	...		
6.	HIGH STREET AND CLOSES EAST, ...	50	5,635	5,037	1,852	2,065	...	...	7,487	7,102	...	385		
7.	GREENHEAD AND LONDON ROAD, ...	897	51,787	65,090	960	1,107	...	...	52,747	66,197	13,450	..		
8.	BARROWFIELD, ... ..	123	26,944	27,696	...	...	...	...	26,944	27,696	752	...		
9.	MONTEITH ROW, ... ..	115	4,643	4,267	...	...	...	...	4,643	4,267	...	376		
10.	ST. ANDREW SQUARE, ... ..	22	4,124	4,010	294	784	...	...	4,418	4,794	376	...		
11.	CALTON, ... ..	66	21,747	20,640	890	1,529	...	...	22,637	22,169	...	468		
12.	ST. ENOCH SQUARE, ... ..	84	3,429	2,376	...	576	29	48	3,458	3,000	...	458		
13.	BROWNFIELD, ... ..	11	3,451	3,564	337	316	9	44	3,797	3,924	127	...		
14.	BRIDGEGATE AND WYND, ... ..	35	5,689	3,766	...	114	...	...	5,689	3,880	...	1,809		
15.	WOODSIDE, ... ..	336	58,257	69,787	352	358	...	...	58,609	70,145	11,536	...		
16.	COWCADDENS, ... ..	61	16,235	17,550	...	656	...	...	16,235	18,206	1,971	...		
17.	KELVINHAUGH AND SANDYFORD, ...	626	29,538	30,673	642	880	343	681	30,523	32,234	1,711	...		
18.	ANDERSTON,... ..	127	29,251	28,422	361	349	58	87	29,670	28,858	...	812		
19.	KINGSTON, ... ..	389	40,863	40,079	45	...	205	328	41,113	40,407	...	706		
20.	LAURIESTON, ... ..	49	8,850	8,662	179	311	79	13	9,108	8,986	...	122		
21.	HUTCHESON SQUARE, ... ..	453	63,493	70,127	...	102	...	...	63,493	70,229	6,736	...		
22.	GORBALS, ... ..	48	13,199	12,264	345	832	...	...	13,544	13,096	...	448		
—	SPRINGBURN AND ROCKVILLA, ...	866	28,278	35,527	...	...	...	...	28,278	35,527	7,249	...		
23.	GOVANHILL,... ..	360	17,014	23,191	...	...	...	...	17,014	23,191	6,177	...		
24.	CROSSHILL, ... ..	334	4,320	7,626	...	...	...	...	4,320	7,626	3,306	...		
25.	LANGSIDE AND MOUNT FLORIDA, ...	420	9,141	14,487	196	360	...	...	9,337	14,847	5,510	...		
26.	POLLOKSHIELDS AND STRATHBUNGO.	243	9,869	12,830	...	...	...	...	9,869	12,830	2,961	...		
27.	POLLOKSHIELDS, WEST, AND BELLA-HOUSTON,... ..	1,278	3,538	5,711	...	...	...	...	3,538	5,711	2,173	...		
28.	HILLHEAD, ... ..	130	7,738	8,537	...	...	...	...	7,738	8,537	799	...		
29.	KELVINSIDE, ... ..	765	5,526	7,074	664	716	...	...	6,190	7,790	1,600	...		
30.	MARYHILL, ... ..	1,183	16,798	33,661	1,528	1,980	4	16	18,330	35,657	17,327	...		
31.	POSSILPARK AND BARNHILL, ...	1,642	14,908	20,263	1,097	1,431	...	...	16,005	21,694	5,689	...		
TOTALS WITHIN MUNICIPAL BOUNDARY.				12,681	644,523	741,124	12,800	19,347	750	1,241	658,073	761,712	103,639	...

WINDOWED ROOMS (TOTAL NUMBER AND NUMBER PER HOUSE); PERSONS PER ACRE, PER INHABITED HOUSE, CENSUS PERIODS, 1891 AND 1901, IN EACH SANITARY DISTRICT.

HOUSES.				WINDOWED ROOMS.						PERSONS PER						Percentage of Irish born. (Whole Population.)		
1891.		1901.		1891.		1901.		Number per Inhabited House (excluding Institutions and Shipping).		Acre (including Institutions and Shipping).		House (excluding Institutions and Shipping).		Room (excluding Institutions and Shipping).				
habited.	Empty.	Inhabited.	Empty.	Inhabited Houses.	Institutions.	Inhabited Houses.	Institutions.	1891.	1901.	1891.	1901.	1891.	1901.	1891.	1901.			
5,537	276	5,360	154	22,568	36	21,956	771	4.076	4.096	107	107	5.136	5.227	1.260	1.276	4.73	5.39	Bl.
4,002	285	4,458	181	11,834	386	12,387	435	2.957	2.779	101	114	4.993	4.983	1.689	1.793	6.95	6.74	1.
977	47	1,140	234	1,830	...	2,072	...	1.873	1.818	64	73	4.765	4.672	2.544	2.570	14.37	12.31	2.
1,867	91	1,889	110	3,803	44	3,808	216	2.037	2.016	223	230	4.940	4.673	2.425	2.318	11.14	7.73	3.
3,279	86	3,334	107	6,541	...	6,705	...	1.995	2.011	350	353	4.804	4.770	2.408	2.372	10.44	9.71	4.
13,092	517	16,429	777	30,071	296	37,902	346	2.297	2.307	55	60	4.752	4.743	2.069	2.056	9.64	8.41	5.
1,205	104	1,105	48	2,240	637	2,088	721	1.859	1.890	150	142	4.676	4.558	2.516	2.412	15.21	12.73	6.
11,288	367	13,959	616	20,160	288	25,466	377	1.786	1.824	62	74	4.587	4.663	2.569	2.556	9.26	8.26	7.
6,235	555	6,273	307	10,445	...	10,786	...	1.675	1.719	219	225	4.321	4.415	2.580	2.568	12.29	10.05	8.
936	30	842	36	2,861	...	2,502	...	3.057	2.971	40	37	4.960	5.068	1.623	1.705	9.76	7.87	9.
814	43	751	32	1,973	9	1,819	240	2.424	2.422	201	218	5.066	5.340	2.090	2.205	16.00	13.73	10.
4,989	281	4,616	303	8,895	41	8,523	48	1.783	1.846	343	336	4.359	4.471	2.445	2.422	12.40	10.36	11.
635	80	438	16	2,399	...	1,565	298	3.778	3.573	41	36	5.400	5.425	1.429	1.518	12.23	15.23	12.
696	22	683	38	1,482	14	1,427	16	2.129	2.089	345	357	4.958	5.218	2.329	2.498	17.41	19.37	13.
1,110	158	773	19	2,110	...	1,700	12	1.901	2.199	163	111	5.125	4.872	2.696	2.215	23.26	14.28	14.
12,444	567	14,882	572	32,698	11	39,273	11	2.628	2.639	174	209	4.682	4.689	1.782	1.777	6.25	5.69	15.
3,651	254	3,842	309	6,334	...	6,770	19	1.735	1.762	266	296	4.447	4.568	2.563	2.592	18.54	14.80	16.
6,002	239	6,235	232	22,599	237	23,061	453	3.765	3.699	49	51	4.921	4.919	1.307	1.330	5.88	6.31	17.
6,169	173	5,932	158	12,366	13	12,069	17	2.005	2.035	234	227	4.742	4.791	2.365	2.355	16.91	15.84	18.
8,483	391	8,205	226	22,449	41	22,083	...	2.646	2.691	106	104	4.817	4.885	1.820	1.815	6.97	7.12	19.
1,856	76	1,761	66	3,892	7	3,695	12	2.097	2.098	186	183	4.768	4.919	2.274	2.344	12.87	13.83	20.
13,866	474	15,168	505	27,097	...	29,689	19	1.954	1.957	140	155	4.579	4.623	2.343	2.362	8.73	8.34	21.
2,722	106	2,444	93	5,698	18	5,250	36	2.093	2.148	282	273	4.849	5.018	2.316	2.336	16.36	14.84	22.
5,699	218	7,379	288	11,003	...	14,255	...	1.931	1.932	33	41	4.962	4.815	2.570	2.492	15.24	13.05	S. & R.
3,483	129	4,987	175	9,677	...	12,972	...	2.778	2.601	54	64	4.885	4.650	1.758	1.788	...	4.16	23.
851	54	1,597	97	4,319	...	6,952	...	5.075	4.353	13	23	5.076	4.775	1.000	1.097	...	2.82	24.
1,786	215	3,100	264	8,547	113	13,527	274	4.786	4.364	22	35	5.118	4.673	1.069	1.071	...	2.51	25.
1,951	146	2,756	183	9,626	...	13,032	...	4.934	4.729	41	53	5.058	4.655	1.025	.984	...	2.07	26.
559	32	946	57	5,396	...	8,118	...	9.653	8.581	4	4	6.329	6.037	1.656	.703	...	2.71	27.
1,585	156	1,742	94	10,137	...	11,213	...	6.396	6.437	60	66	4.882	4.901	.763	.761	...	2.18	28.
926	84	1,243	108	8,944	525	11,132	441	9.659	8.956	8	10	5.968	5.691	.618	.635	...	2.79	29.
3,268	238	7,145	652	9,046	417	18,811	848	2.768	2.633	15	30	5.139	4.711	1.857	1.789	...	12.68	30.
2,919	169	3,990	217	6,509	176	8,935	85	2.230	2.239	11	13	5.107	5.078	2.290	2.268	...	10.82	31.
134,882	6,663	155,404	7,274	345,549	3,309	401,543	5,695	2.562	2.584	55.48	60.07	4.778	4.769	1.865	1.846	10.19*	8.68	

\* Applies to Old Glasgow.



TABLE II.—CENSUS, 1901—GLASGOW: AGE AND SEX OF THE POPULATION IN SANITARY DISTRICTS

SANITARY DISTRICTS.				ALL AGES.			UNDER 1 YEAR.		
				Males.	Females.	Total.	Males.	Females.	Total.
—	BLYTHSWOOD, ...	{ Without Institutions, ...	...	13,414	14,602	28,016	191	207	398
		{ Institutions, ...	...	321	211	532	2	3	5
1.	EXCHANGE, ...	{ Without Institutions, ...	...	11,068	11,144	22,212	303	299	602
		{ Institutions, ...	...	1,121	1,098	2,219	22	12	34
2.	PORT-DUNDAS, ...	{ Without Shipping, ...	...	2,767	2,559	5,326	115	97	212
		{ Shipping, ...	...	20	...	20	...	...	...
3.	HIGH STREET AND CLOSES WEST,	{ Without Institutions, ...	...	4,333	4,494	8,827	123	128	251
		{ Institutions, ...	...	582	260	842	...	2	2
4.	ST. ROLLOX, ...	{ Without Shipping, ...	...	8,028	7,875	15,903	225	236	461
		{ Shipping, ...	...	4	...	4	...	...	...
5.	BELGROVE & DENNISTOUN,	{ Without Institutions, ...	...	38,188	39,735	77,923	1,232	1,164	2,396
		{ Institutions, ...	...	711	577	1,288	1	...	1
6.	HIGH STREET AND CLOSES EAST,	{ Without Institutions, ...	...	2,452	2,585	5,037	57	64	121
		{ Institutions, ...	...	1,661	404	2,065	5	1	6
7.	GREENHEAD AND LONDON ROAD,	{ Without Institutions, ...	...	31,935	33,155	65,090	1,139	1,088	2,227
		{ Institutions, ...	...	439	668	1,107	3	12	15
8.	BARROWFIELD, ...	...	...	13,298	14,398	27,696	438	457	895
9.	MONTEITH ROW, ...	...	...	1,994	2,273	4,267	39	36	75
10.	ST. ANDREW SQUARE, ...	{ Without Institutions, ...	...	1,970	2,040	4,010	44	51	95
		{ Institutions, ...	...	620	164	784	...	1	1
11.	CALTON, ...	{ Without Institutions, ...	...	9,907	10,733	20,640	336	288	624
		{ Institutions, ...	...	1,260	269	1,529	1	...	1
12.	ST. ENOCH SQUARE, ...	{ Without Insts. & Shipping, ...	...	1,280	1,096	2,376	14	16	30
		{ Institutions, ...	...	487	89	576	...	...	...
		{ Shipping, ...	...	48	...	48	...	...	...
13.	BROWNFIELD, ...	{ Without Insts. & Shipping, ...	...	1,769	1,795	3,564	51	53	104
		{ Institutions, ...	...	314	2	316	...	...	...
		{ Shipping, ...	...	44	...	44	...	...	...
14.	BRIDGEGATE AND WYND, ...	{ Without Institutions, ...	...	1,883	1,883	3,766	58	60	118
		{ Institutions, ...	...	80	34	114	...	...	...
15.	WOODSIDE, ...	{ Without Institutions, ...	...	33,489	36,298	69,787	914	923	1,837
		{ Institutions, ...	...	352	6	358	...	...	...
16.	COWCADDENS, ...	{ Without Institutions, ...	...	8,685	8,865	17,550	260	262	522
		{ Institutions, ...	...	654	2	656	...	...	...
17.	KELVINHAUGH AND SANDY-FORD,	{ Without Insts. & Shipping, ...	...	14,290	16,383	30,673	328	312	640
		{ Institutions, ...	...	451	429	880	1	...	1
		{ Shipping, ...	...	676	5	681	...	...	...
18.	ANDERSTON, ...	{ Without Insts. & Shipping, ...	...	14,490	13,932	28,422	419	425	844
		{ Institutions, ...	...	347	2	349	...	...	...
		{ Shipping, ...	...	84	3	87	...	...	...
19.	KINGSTON, ...	{ Without Shipping, ...	...	19,842	20,237	40,079	462	447	909
		{ Shipping, ...	...	326	2	328	...	...	...
20.	LAURIESTON, ...	{ Without Insts. & Shipping, ...	...	4,436	4,226	8,662	124	109	233
		{ Institutions, ...	...	311	...	311	...	...	...
		{ Shipping, ...	...	13	...	13	...	...	...
21.	HUTCHESON SQUARE, ...	{ Without Institutions, ...	...	34,339	35,788	70,127	1,082	1,035	2,117
		{ Institutions, ...	...	52	50	102	1	3	4
22.	GORBALS, ...	{ Without Institutions, ...	...	6,216	6,048	12,264	171	164	335
		{ Institutions, ...	...	828	4	832	...	...	...
—	SPRINGBURN & ROCKVILLA, ...	...	...	18,407	17,120	35,527	568	587	1,155
23.	GOVANHILL, ...	...	...	11,391	11,800	23,191	357	315	672
24.	CROSSHILL, ...	...	...	3,365	4,261	7,626	58	71	129
25.	LANGSIDE & MT. FLORIDA,	{ Without Institutions, ...	...	6,382	8,105	14,487	135	170	305
		{ Institutions, ...	...	153	207	360	1	...	1
26.	POLLOKSHIELDS & STRATH-BUNGO, ...	...	...	5,472	7,358	12,830	80	94	174
27.	POLLOKSHIELDS, WEST, & BELLAHOUSTON, ...	...	...	2,276	3,435	5,711	35	28	63
28.	HILLHEAD, ...	...	...	3,089	5,448	8,537	38	42	80
29.	KELVINSIDE, ...	{ Without Institutions, ...	...	2,382	4,692	7,074	48	49	97
		{ Institutions, ...	...	227	489	716	...	...	...
		{ Without Insts. & Shipping, ...	...	16,541	17,120	33,661	569	591	1,160
30.	MARYHILL, ...	{ Institutions, ...	...	968	1,012	1,980	8	7	15
		{ Shipping, ...	...	16	...	16	...	...	...
31.	POSSILPARK & BARNHILL, ...	{ Without Institutions, ...	...	10,301	9,962	20,263	358	319	677
		{ Institutions, ...	...	686	745	1,431	7	15	22
TOTAL WITHOUT INSTITUTIONS AND SHIPPING, ...				359,679	381,445	741,124	10,371	10,187	20,558
TOTAL INSTITUTIONS, ...				12,625	6,722	19,347	52	56	108
TOTAL SHIPPING, ...				1,231	10	1,241	...	...	...
TOTAL WITHIN MUNICIPAL BOUNDARY, ...				373,535	388,177	761,712	10,423	10,243	20,666



## DISTINGUISHING THE INMATES OF INSTITUTIONS AND SHIPPING; ALSO NUMBER OF IRISH-BORN.

1—4.			5—9.			10—14.			15—19.		
Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
758	775	1,533	1,005	1,022	2,027	1,159	1,166	2,325	1,539	1,579	3,118
11	13	24	24	13	37	10	6	16	31	21	52
903	846	1,749	1,030	1,068	2,098	1,033	1,042	2,075	1,170	1,146	2,316
72	78	150	57	79	136	27	40	67	22	39	61
294	257	551	332	281	613	268	313	581	276	271	547
...	...	...	...	...	...	...	...	...	1	...	1
433	471	904	522	469	991	442	405	847	450	460	910
1	...	1	1	6	7	4	4	8	23	11	34
785	803	1,588	896	873	1,769	784	816	1,600	819	766	1,585
...	...	...	...	...	...	...	...	...	...	...	...
3,946	3,983	7,929	4,486	4,365	8,851	3,917	4,055	7,972	3,744	3,991	7,735
24	23	47	45	25	70	186	32	218	78	35	113
262	240	502	261	268	529	221	268	489	221	238	459
...	...	...	3	2	5	12	3	15	80	19	99
3,619	3,644	7,263	4,004	3,879	7,883	3,487	3,553	7,040	3,231	3,323	6,554
12	18	30	20	27	47	194	167	361	19	43	62
1,402	1,412	2,814	1,613	1,604	3,217	1,484	1,464	2,948	1,367	1,447	2,814
131	159	290	191	205	396	194	215	409	224	250	474
170	166	336	175	216	391	214	191	405	207	213	420
17	10	27	47	48	95	46	49	95	98	30	128
1,030	1,074	2,104	1,152	1,152	2,304	960	1,117	2,077	970	1,050	2,020
1	4	5	2	7	9	7	5	12	35	11	46
90	88	178	115	101	216	96	107	203	111	119	230
...	...	...	3	...	3	7	...	7	46	20	66
...	...	...	...	...	...	1	...	1	7	...	7
152	167	319	189	183	372	166	177	343	190	168	358
...	...	...	1	1	2	1	...	1	3	...	3
...	...	...	...	...	...	...	...	...	2	...	2
177	185	362	184	172	356	118	161	279	153	178	331
...	...	...	...	...	...	...	...	...	12	...	12
3,186	3,166	6,352	3,517	3,636	7,153	3,558	3,457	7,015	3,472	3,634	7,106
...	2	2	...	...	...	...	1	1	7	2	9
894	980	1,874	1,035	1,079	2,114	923	873	1,796	823	858	1,681
...	...	...	1	...	1	4	1	5	22	...	22
1,111	1,136	2,247	1,342	1,341	2,683	1,362	1,347	2,709	1,511	1,634	3,145
12	7	19	24	16	40	29	16	45	29	54	83
...	...	...	...	...	...	1	...	1	54	...	54
1,353	1,384	2,737	1,535	1,518	3,053	1,449	1,405	2,854	1,511	1,366	2,877
...	...	...	...	...	...	...	...	...	4	...	4
...	...	...	...	...	...	...	...	...	5	...	5
1,594	1,572	3,166	1,946	1,965	3,911	1,875	1,997	3,872	2,222	2,145	4,367
...	...	...	...	...	...	...	...	...	36	...	36
388	409	797	484	479	963	432	472	904	485	432	917
...	...	...	...	...	...	1	...	1	3	...	3
...	...	...	...	...	...	...	...	...	...	...	...
3,689	3,708	7,397	4,189	4,062	8,251	3,603	3,563	7,166	3,473	3,567	7,040
7	2	9	8	4	12	10	9	19	5	8	13
558	529	1,087	644	661	1,305	603	639	1,242	631	633	1,264
...	...	...	...	...	...	...	...	...	10	1	11
1,903	2,002	3,905	2,141	2,040	4,181	1,820	1,934	3,754	1,812	1,659	3,471
1,135	1,113	2,248	1,318	1,246	2,564	1,214	1,170	2,384	1,154	1,153	2,307
229	227	456	310	316	626	348	329	677	369	501	870
571	568	1,139	714	708	1,422	637	692	1,329	623	917	1,540
6	4	10	31	27	58	40	39	79	16	26	42
...	...	...	...	...	...	...	...	...	...	...	...
395	369	764	513	498	1,011	529	521	1,050	568	884	1,452
...	...	...	...	...	...	...	...	...	...	...	...
146	144	290	224	200	424	237	250	487	259	459	718
152	135	287	244	226	470	267	274	541	369	591	960
173	155	328	221	242	463	214	260	474	239	431	670
...	...	...	...	1	1	2	5	7	3	38	41
1,872	1,896	3,768	1,900	1,899	3,799	1,630	1,651	3,281	1,533	1,558	3,091
101	94	195	126	147	273	64	217	281	224	112	336
...	...	...	...	...	...	...	...	...	...	...	...
1,120	1,214	2,334	1,313	1,271	2,584	1,149	1,133	2,282	1,054	1,032	2,086
23	19	42	18	17	35	10	6	16	15	13	28
...	...	...	...	...	...	...	...	...	...	...	...
34,621	34,977	69,598	39,745	39,245	78,990	36,393	37,017	73,410	36,780	38,653	75,433
287	274	561	411	420	831	654	600	1,254	785	483	1,268
...	...	...	...	...	...	2	...	2	105	...	105
34,908	35,251	70,159	40,156	39,665	79,821	37,049	37,617	74,666	37,670	39,136	76,806

TABLE II.

SANITARY DISTRICTS.				20—24.			25—34.		
				Males.	Females.	Total.	Males.	Females.	Total.
—	BLYTHSWOOD, ...	Without Institutions, ...	...	2,098	1,954	4,052	2,599	2,724	5,323
		Institutions, ...	...	56	64	120	86	63	149
1.	EXCHANGE, ...	Without Institutions, ...	...	1,464	1,312	2,776	2,003	1,939	3,942
		Institutions, ...	...	30	73	103	106	141	247
2.	PORT-DUNDAS, ...	Without Shipping, ...	...	278	263	541	453	385	838
		Shipping, ...	...	5	...	5	7	...	7
3.	HIGH STREET AND CLOSES WEST,	Without Institutions, ...	...	451	392	843	717	758	1,475
		Institutions, ...	...	40	14	54	105	58	163
4.	ST. ROLLOX, ...	Without Shipping, ...	...	879	818	1,697	1,413	1,305	2,718
		Shipping, ...	...	1	...	1	...	...	...
5.	BELMGROVE & DENNISTOUN,	Without Institutions, ...	...	4,001	4,074	8,075	6,719	6,788	13,507
		Institutions, ...	...	55	121	176	85	112	197
6.	HIGH STREET AND CLOSES EAST,	Without Institutions, ...	...	243	258	501	469	461	930
		Institutions, ...	...	153	71	224	398	145	543
7.	GREENHEAD AND LONDON ROAD,	Without Institutions, ...	...	3,158	3,308	6,466	5,411	5,419	10,830
		Institutions, ...	...	42	94	136	86	180	266
8.	BARROWFIELD, ...	...	...	1,280	1,373	2,653	2,072	2,135	4,207
9.	MONTEITH ROW, ...	...	...	249	274	523	319	348	667
10.	ST. ANDREW SQUARE, ...	Without Institutions, ...	...	222	223	445	323	329	652
		Institutions, ...	...	43	7	50	81	8	89
11.	CALTON, ...	Without Institutions, ...	...	957	1,030	1,987	1,624	1,646	3,270
		Institutions, ...	...	51	6	57	236	31	267
12.	ST. ENOCH SQUARE, ...	Without Insts. & Shipping, ...	...	175	118	293	263	170	433
		Institutions, ...	...	64	42	106	129	21	150
		Shipping, ...	...	2	...	2	18	...	18
13.	BROWNFIELD, ...	Without Insts. & Shipping, ...	...	191	172	363	282	279	561
		Institutions, ...	...	15	...	15	70	1	71
		Shipping, ...	...	9	...	9	11	...	11
14.	BRIDGEGATE AND WYNDS,	Without Institutions, ...	...	275	200	475	390	371	761
		Institutions, ...	...	7	3	10	10	7	17
15.	WOODSIDE, ...	Without Institutions, ...	...	3,670	3,873	7,543	5,917	6,462	12,379
		Institutions, ...	...	26	...	26	78	...	78
16.	COWCADDENS, ...	Without Institutions, ...	...	920	856	1,776	1,485	1,395	2,880
		Institutions, ...	...	33	...	33	144	...	144
17.	KELVINHAUGH AND SANDY-FORD,	Without Insts. & Shipping, ...	...	1,780	1,917	3,697	2,465	3,191	5,656
		Institutions, ...	...	58	100	158	92	156	248
		Shipping, ...	...	146	...	146	265	5	270
18.	ANDERSTON, ...	Without Insts. & Shipping, ...	...	1,673	1,456	3,129	2,549	2,239	4,788
		Institutions, ...	...	19	1	20	71	...	71
		Shipping, ...	...	10	1	11	25	...	25
19.	KINGSTON, ...	Without Shipping, ...	...	2,437	2,285	4,722	3,552	3,367	6,919
		Shipping, ...	...	67	...	67	116	2	118
20.	LAURIESTON, ...	Without Insts. & Shipping, ...	...	555	392	947	722	614	1,336
		Institutions, ...	...	22	...	22	74	...	74
		Shipping, ...	...	1	...	1	5	...	5
21.	HUTCHESON SQUARE, ...	Without Institutions, ...	...	3,508	3,669	7,177	6,014	6,090	12,104
		Institutions, ...	...	2	2	4	5	8	13
22.	GORBALS, ...	Without Institutions, ...	...	753	650	1,403	1,102	921	2,023
		Institutions, ...	...	53	...	53	205	1	206
—	SPRINGBURN & ROCKVILLA,	...	...	2,109	1,657	3,766	3,317	2,727	6,044
23.	GOVANHILL, ...	...	...	1,206	1,245	2,451	2,119	2,179	4,298
24.	CROSSHILL, ...	...	...	395	537	932	573	821	1,394
25.	LANGSIDE & MT. FLORIDA,	Without Institutions, ...	...	543	885	1,428	1,149	1,607	2,756
		Institutions, ...	...	11	25	36	15	49	64
26.	POLLOKSHIELDS & STRATH-BUNGO, ...	...	...	538	868	1,406	887	1,392	2,279
27.	POLLOKSHIELDS, WEST, & BELLAHOUSTON, ...	...	...	240	691	931	308	656	964
28.	HILLHEAD, ...	...	...	369	937	1,306	524	1,210	1,734
29.	KELVINSIDE, ...	Without Institutions, ...	...	243	890	1,133	381	1,287	1,668
		Institutions, ...	...	19	125	144	45	67	112
30.	MARYHILL, ...	Without Insts. & Shipping, ...	...	1,720	1,860	3,580	3,240	3,272	6,512
		Institutions, ...	...	196	151	347	136	188	324
		Shipping, ...	...	8	...	8	6	...	6
31.	POSSILPARK & BARNHILL,	Without Institutions, ...	...	1,113	992	2,105	1,643	1,506	3,149
		Institutions, ...	...	18	35	53	54	83	137
TOTAL WITHOUT INSTITUTIONS AND SHIPPING, ...				39,693	41,429	81,122	63,004	65,993	128,997
TOTAL INSTITUTIONS, ...				1,013	934	1,947	2,311	1,319	3,630
TOTAL SHIPPING, ...				249	1	250	453	7	460
TOTAL WITHIN MUNICIPAL BOUNDARY, ...				40,955	42,364	83,319	65,768	67,319	133,087



continued.

35—44.			45—54.			55—64.			65 AND UPWARDS.			NOT KNOWN.			BORN IN IRELAND.
Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	M.	F.	TL.	
1,562	1,858	3,420	1,246	1,548	2,794	826	1,062	1,888	431	705	1,136	...	2	2	1,490
55	16	71	25	10	35	13	...	13	8	2	10	...	...	...	48
1,337	1,369	2,706	992	1,041	2,033	585	664	1,249	248	418	666	...	...	...	1,147
148	95	243	159	85	244	204	158	362	274	298	572	...	...	...	499
306	289	595	274	211	485	128	113	241	43	79	122	...	...	...	653
3	...	3	4	...	4	...	...	...	...	...	...	...	...	...	5
522	576	1,098	376	374	750	194	273	467	103	186	289	...	2	2	588
118	43	161	108	28	136	55	23	78	127	71	198	...	...	...	159
990	934	1,924	700	661	1,361	369	434	803	168	229	397	...	...	...	1,544
1	...	1	...	...	...	1	...	1	1	...	1	...	...	...	1
4,658	4,885	9,543	2,990	3,094	6,084	1,612	2,032	3,644	854	1,265	2,119	29	39	68	6,367
63	51	114	41	39	80	39	36	75	93	103	196	1	...	1	294
332	328	660	217	239	456	112	130	242	57	91	148	...	...	...	413
434	92	526	320	48	368	185	20	205	71	3	74	...	...	...	491
3,665	3,876	7,541	2,316	2,484	4,800	1,262	1,577	2,839	639	1,002	1,641	4	2	6	5,384
46	72	118	14	36	50	2	15	17	1	4	5	...	...	...	85
1,566	1,788	3,354	1,158	1,259	2,417	599	881	1,480	316	578	894	3	...	3	2,783
261	307	568	201	232	433	106	150	256	78	96	174	1	1	2	336
286	253	539	173	180	353	109	139	248	47	79	126	...	...	...	514
133	5	138	96	2	98	46	3	49	13	1	14	...	...	...	144
1,279	1,374	2,653	865	936	1,801	510	652	1,162	224	413	637	...	1	1	1,937
369	55	424	304	59	363	175	54	229	79	37	116	...	...	...	360
185	144	329	120	111	231	75	77	152	36	45	81	...	...	...	315
104	6	110	82	...	82	41	...	41	11	...	11	...	...	...	139
7	...	7	7	...	7	6	...	6	...	...	...	...	...	...	3
233	240	473	198	172	370	90	119	209	27	65	92	...	...	...	673
68	...	68	89	...	89	46	...	46	21	...	21	...	...	...	83
11	...	11	10	...	10	1	...	1	...	...	...	...	...	...	4
257	229	486	147	165	312	83	101	184	41	61	102	...	...	...	515
15	8	23	14	7	21	17	8	25	5	1	6	...	...	...	39
4,192	4,531	8,723	2,820	3,190	6,010	1,506	2,075	3,581	735	1,347	2,082	2	4	6	3,930
95	1	96	81	...	81	51	...	51	14	...	14	...	...	...	60
1,094	1,104	2,198	718	735	1,453	391	464	855	142	258	400	...	1	1	2,557
180	...	180	153	1	154	83	...	83	34	...	34	...	...	...	138
1,793	2,142	3,935	1,315	1,577	2,892	863	1,060	1,923	420	725	1,145	...	1	1	1,829
87	35	122	66	24	90	39	16	55	14	5	19	...	...	...	164
131	...	131	52	...	52	21	...	21	5	...	5	1	...	1	44
1,778	1,673	3,451	1,238	1,248	2,486	691	790	1,481	292	426	718	2	2	4	4,422
104	...	104	91	1	92	42	...	42	16	...	16	...	...	...	129
21	1	22	13	1	14	8	...	8	1	...	1	1	...	1	21
2,349	2,416	4,765	1,755	1,927	3,682	1,129	1,359	2,488	518	755	1,273	3	2	5	2,834
54	...	54	39	...	39	13	...	13	1	...	1	...	...	...	41
538	535	1,073	423	383	806	204	261	465	79	140	219	2	...	2	1,169
82	...	82	77	...	77	37	...	37	15	...	15	...	...	...	70
2	...	2	2	...	2	2	...	2	1	...	1	...	...	...	1
4,080	4,231	8,311	2,642	2,879	5,521	1,417	1,824	3,241	642	1,160	1,802	...	...	...	5,848
7	7	14	4	3	7	3	3	6	...	1	1	...	...	...	10
787	768	1,555	517	545	1,062	318	367	685	132	171	303	...	...	...	1,722
223	1	224	196	1	197	99	...	99	42	...	42	...	...	...	222
2,165	1,990	4,155	1,485	1,320	2,805	750	772	1,522	337	432	769	...	...	...	4,638
1,334	1,436	2,770	867	986	1,853	476	578	1,054	210	379	589	1	...	1	964
426	557	983	332	437	769	205	286	491	120	179	299	...	...	...	215
878	1,095	1,973	592	613	1,205	322	487	809	218	363	581	...	...	...	347
8	22	30	15	11	26	5	2	7	5	2	7	...	...	...	26
793	1,075	1,868	576	728	1,304	358	483	841	235	446	681	...	...	...	266
238	392	630	274	306	580	192	189	381	123	120	243	...	...	...	155
407	768	1,175	362	552	914	210	405	615	147	307	454	...	1	1	186
321	633	954	244	376	620	196	217	413	102	152	254	...	...	...	169
57	61	118	38	88	126	41	57	98	22	47	69	...	...	...	48
2,037	2,071	4,108	1,184	1,239	2,423	597	684	1,281	259	399	658	...	...	...	4,363
68	71	139	23	15	38	17	10	27	5	...	5	...	...	...	154
1	...	1	1	...	1	...	...	...	...	...	...	...	...	...	4
1,186	1,143	2,329	796	740	1,536	433	400	833	136	212	348	...	...	...	2,001
75	77	152	119	82	201	141	128	269	206	270	476	...	...	...	346
43,835	47,010	90,845	30,113	32,488	62,601	16,918	21,105	38,023	8,159	13,283	21,442	47	58	105	62,274
2,539	718	3,257	2,115	540	2,655	1,381	533	1,914	1,076	845	1,921	1	...	1	3,708
231	1	232	128	1	129	52	...	52	9	...	9	2	...	2	124
46,605	47,729	94,334	32,356	33,029	65,385	18,351	21,638	39,989	9,244	14,128	23,372	50	58	108	66,106



TABLE III.—CENSUS, 1901—GLASGOW: AGE AND SEX OF THE INMATES OF INSTITUTIONS WITHIN

SANITARY DISTRICTS.				NAME OF INSTITUTION.		ALL AGES.		
						Males.	Females.	Total.
—	BLYTHSWOOD, ... ..			Hotel, ... ..		127	80	
				Hotel, ... ..		29	48	
				Y.M.C.A., 100 Bothwell Street, ... ..		121	13	
				Sick Children's Hospital, ... ..		44	70	
1	EXCHANGE, ... ..			City Poorhouse, ... ..		863	804	1,667
				Fever Hospital, Kennedy Street, ... ..		94	204	
				The Night Asylum for the Houseless, ... ..		164	90	
				Old Man's Home and Asylum for Old Women, ... ..		126	75	
3	HIGH STREET AND CLOSES WEST, ... ..			Lodging-House, 173 High Street, ... ..		168	2	
				Do., 195-207 do., ... ..		1	145	
				Do., 34 Stirling Street, ... ..		192	3	
				Central Police Office, ... ..		95	35	
5	BELGROVE AND DENNISTOUN, ... ..			Slatefield Industrial School, ... ..		175	2	
				Glasgow Royal Infirmary, ... ..		375	363	
				St. Joseph's Home, ... ..		104	137	
				Old Barracks, Gallowgate, ... ..		57	75	
				Drygate Model Lodging-House, ... ..		365	4	
				H.M. Prison, Duke Street, ... ..		105	314	
6	HIGH STREET AND CLOSES EAST, ... ..			Lodging-House, 48 Duke Street, ... ..		206	1	
				Do., 39 Watson Street, ... ..		352	...	
				Do., 21 do., ... ..		519	1	
				Do., 14-16 do., ... ..		111	...	
				Home for Friendless Females, 8 Watson Street, ... ..		3	84	
7	GREENHEAD AND LONDON ROAD, ... ..			Catholic Orphanage for Boys, ... ..		205	5	
				Do. do. Girls, ... ..		...	208	
				Belvidere Fever Hospital, ... ..		234	455	
10	ST. ANDREW SQUARE, ... ..			City Orphan Home, ... ..		88	35	
				Lodging-House, 45-49 Greendyke Street, ... ..		282	4	
				Family Home, St. Andrew Street, ... ..		250	125	
				Lodging-House (Female), 20 Moncur Street, ... ..		4	263	
11	CALTON, ... ..			Do., 66 Moncur Street, ... ..		193	...	
				Do., 179 Great Hamilton Street, ... ..		700	...	
				Do., 58-52 Clyde Street, ... ..		363	6	
12	ST. ENOCH SQUARE, ... ..			James Watt Street Home, 22 James Watt St., ... ..		377	2	
13	BROWNFIELD, ... ..			Hotel, ... ..		110	87	
14	BRIDGEGATE AND WYNDS, ... ..			Model Lodging-House, 28 M'Alpine Street, ... ..		314	2	
15	WOODSIDE, ... ..			Lodging-House, 6-14 Miller's Place, ... ..		80	34	
16	COWCADDENS, ... ..			Lodging-House, 51 North Woodside Road, ... ..		352	6	
				Lodging-House, 1 Burns Street, ... ..		399	2	
				Do., 16 Garscube Lane, ... ..		255	...	
17	KELVINHAUGH AND SANDYFORD, ... ..			Western Infirmary, ... ..		253	382	
				Eye do., ... ..		65	46	
18	ANDERSTON, ... ..			Clydesdale Model Lodging-House, Cheapside St., ... ..		133	1	
20	LAURIESTON, ... ..			Hydepark Model Lodging-House, ... ..		347	2	
21	HUTCHESON SQUARE, ... ..			Kingston Model Lodging-House, ... ..		311	...	
22	GORBALS, ... ..			Sanitary Reception-House, ... ..		52	50	
				Carlton Model Lodging-House, ... ..		403	...	
25	LANGSIDE AND MOUNT FLORIDA, ... ..			Portugal Street Model Lodging-House, ... ..		425	4	
				Victoria Infirmary, ... ..		87	131	
29	KELVINSIDE, ... ..			Deaf and Dumb Institution, ... ..		66	76	
				Training College, ... ..		...	160	
				Royal Asylum, Gartnavel, ... ..		227	329	
				Girls' Industrial School, ... ..		...	200	
30	MARYHILL, ... ..			Magdalene Institution, ... ..		...	102	
				Eastpark Home, ... ..		44	65	
				Maryhill Lodging-House, ... ..		98	4	
31	POSSILPARK AND BARNHILL, ... ..			Ruchill Fever Hospital, ... ..		269	497	
				Government Barracks, ... ..		557	144	
				Barnhill Poorhouse, ... ..		686	745	1,431
TOTAL WITHIN MUNICIPAL BOUNDARY, ... ..						12,625	6,722	19,347

THE CITY; ALSO NUMBER OF IRISH-BORN, AND NUMBER OF WINDOWED ROOMS IN EACH.

UNDER 1 YEAR.			1—4.			5—9.			10—14.			15—19.			20—24.		
Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
...	...	...	...	...	...	2	1	3	1	1	2	16	14	30	21	31	52
...	...	...	...	...	...	...	1	1	...	1	1	1	3	4	3	16	19
...	...	...	...	...	...	...	...	...	2	...	2	14	...	14	31	3	34
2	3	5	11	13	24	22	11	33	7	4	11	...	4	4	1	14	15
16	11	27	34	32	66	26	27	53	16	16	32	10	25	35	18	37	55
3	...	3	36	42	78	27	47	74	10	20	30	7	14	21	5	35	40
3	1	4	2	4	6	4	5	9	1	4	5	5	...	5	7	1	8
...	...	...	...	...	...	...	...	...	...	...	...	...	3	3	...	5	5
...	...	...	...	...	...	...	1	1	...	...	...	1	...	1	8	...	8
...	2	2	1	...	1	...	5	5	...	3	3	...	6	6	...	7	7
...	...	...	...	...	...	1	...	1	3	1	4	5	1	6	10	...	10
...	...	...	...	...	...	...	...	...	1	...	1	17	1	18	22	2	24
...	...	...	1	1	2	7	...	7	142	...	142	21	...	21	2	...	2
1	...	1	16	8	24	31	19	50	36	23	59	50	23	73	48	109	157
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	3
...	...	...	7	14	21	7	6	13	8	9	17	7	12	19	5	9	14
...	...	...	...	...	...	...	...	...	...	1	1	4	1	5	25	...	25
3	1	4	...	...	...	...	...	...	1	...	1	12	14	26	35	65	100
...	...	...	...	...	...	1	...	1	1	...	1	31	...	31	29	...	29
...	...	...	...	...	...	1	...	1	4	...	4	18	...	18	34	...	34
...	...	...	...	...	...	1	...	1	6	...	6	14	...	14	27	...	27
...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	3	...	3
2	...	2	...	...	...	...	2	2	...	2	2	...	4	4	...	6	6
...	...	...	...	1	1	11	...	11	189	...	189	2	1	3	...	...	...
...	...	...	...	...	...	...	18	18	...	152	152	...	25	25	...	...	...
3	12	15	12	17	29	9	9	18	5	15	20	17	17	34	42	94	136
...	...	...	...	...	...	...	...	...	8	3	11	70	17	87	6	5	11
...	...	...	...	1	1	...	...	...	...	...	...	9	2	11	23	...	23
...	1	1	17	9	26	47	48	95	38	46	84	19	11	30	14	2	16
1	...	1	1	3	4	2	6	8	...	4	4	...	11	11	...	5	5
...	...	...	...	...	...	...	...	...	4	...	4	18	...	18	16	...	16
...	...	...	...	...	...	...	...	...	3	...	3	10	...	10	16	...	16
...	...	...	...	1	1	...	1	1	...	1	1	7	...	7	19	1	20
...	...	...	...	...	...	3	...	3	6	...	6	24	1	25	37	...	37
...	...	...	...	...	...	...	...	...	1	...	1	22	19	41	27	42	69
...	...	...	...	...	...	1	1	2	1	...	1	3	...	3	15	...	15
...	...	...	...	...	...	...	...	...	...	...	...	12	...	12	7	3	10
...	...	...	...	2	2	...	...	...	...	1	1	7	2	9	26	...	26
...	...	...	...	...	...	1	...	1	4	1	5	20	...	20	22	...	22
...	...	...	...	...	...	...	...	...	...	...	...	2	...	2	11	...	11
1	...	1	12	7	19	16	10	26	25	11	36	18	51	69	32	89	121
...	...	...	...	...	...	7	6	13	3	5	8	6	3	9	12	11	23
...	...	...	...	...	...	1	...	1	1	...	1	5	...	5	14	...	14
...	...	...	...	...	...	...	...	...	...	...	...	4	...	4	19	1	20
...	...	...	...	...	...	...	...	...	1	...	1	3	...	3	22	...	22
1	3	4	7	2	9	8	4	12	10	9	19	5	8	13	2	2	4
...	...	...	...	...	...	...	...	...	...	...	...	7	...	7	25	...	25
...	...	...	...	...	...	...	...	...	...	...	...	3	1	4	28	...	28
1	...	1	6	4	10	10	9	19	5	7	12	8	10	18	11	23	34
...	...	...	...	...	...	21	18	39	35	32	67	8	16	24	...	2	2
...	...	...	...	...	...	...	...	...	...	4	4	...	31	31	...	93	93
...	...	...	...	...	...	...	1	1	2	1	3	3	7	10	19	32	51
...	...	...	...	...	...	...	13	13	...	150	150	...	27	27	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	36	36	...	22	22
...	...	...	...	...	...	28	28	56	15	16	31	...	7	7	...	4	4
...	...	...	...	...	...	...	...	...	...	1	1	2	1	3	5	...	5
1	2	3	68	69	137	78	83	161	35	40	75	24	38	62	23	110	133
7	5	12	33	25	58	20	23	43	14	10	24	198	3	201	168	15	183
7	15	22	23	19	42	18	17	35	10	6	16	15	13	28	18	35	53
52	56	108	287	274	561	411	420	831	654	600	1,254	785	483	1,268	1,013	934	1,947



TABLE III.—

SANITARY DISTRICTS.		NAME OF INSTITUTION.	25—34.		
			Males.	Females.	Total.
—	BLYTHSWOOD, ... ..	Hotel, ... ..	40	25	65
		Hotel, ... ..	10	14	24
		Y.M.C.A., 100 Bothwell Street, ... ..	35	6	41
		Sick Children's Hospital, ... ..	1	18	19
1	EXCHANGE, ... ..	City Poorhouse, ... ..	58	87	145
		Fever Hospital, Kennedy Street, ... ..	4	36	40
		The Night Asylum for the Houseless, ... ..	44	18	62
		Old Man's Home and Asylum for Old Women, ... ..	...	9	9
3	HIGH STREET AND CLOSES WEST, ...	Lodging-House, 173 High Street, ... ..	29	...	29
		Do., 195-207 do., ... ..	...	27	27
		Do., 34 Stirling Street, ... ..	49	...	49
		Central Police Office, ... ..	27	22	49
5	BELLGROVE AND DENNISTOUN, ...	Slatefield Industrial School, ... ..	...	1	1
		Glasgow Royal Infirmary, ... ..	76	95	171
		St. Joseph's Home, ... ..	...	4	4
		Old Barracks, Gallowgate, ... ..	9	12	21
6	HIGH STREET AND CLOSES EAST, ...	Drygate Model Lodging-House, ... ..	105	1	106
		H.M. Prison, Duke Street, ... ..	30	123	153
		Lodging-House, 48 Duke Street, ... ..	46	...	46
		Do., 39 Watson Street, ... ..	79	...	79
7	GREENHEAD AND LONDON ROAD, ...	Do., 21 do., ... ..	112	1	113
		Do., 14-16 do., ... ..	26	...	26
		Home for Friendless Females, 8 Watson Street, ... ..	...	20	20
		Catholic Orphanage for Boys, ... ..	2	...	2
10	ST. ANDREW SQUARE, ... ..	Do. do. Girls, ... ..	...	5	5
		Belvidere Fever Hospital, ... ..	84	175	259
		City Orphan Home, ... ..	2	4	6
		Lodging-House, 45-49 Greendyke Street, ... ..	56	...	56
11	CALTON, ... ..	Family Home, St. Andrew Street, ... ..	23	4	27
		Lodging-House (Female), 20 Moncur Street, ... ..	...	30	30
		Do., 66 Moncur Street, ... ..	43	...	43
		Do., 179 Great Hamilton Street, ... ..	122	...	122
12	ST. ENOCH SQUARE, ... ..	Do., 58-52 Clyde Street, ... ..	71	1	72
		James Watt Street Home, 22 James Watt St., ... ..	100	1	101
		Hotel, ... ..	29	20	49
		Model Lodging-House, 28 M'Alpine Street, ... ..	70	1	71
13	BROWNFIELD, ... ..	Lodging-House, 6-14 Miller's Place, ... ..	10	7	17
14	BRIDGEGATE AND WYNDS, ... ..	Lodging-House, 51 North Woodside Road, ... ..	78	...	78
15	WOODSIDE, ... ..	Lodging-House, 1 Burns Street, ... ..	99	...	99
16	COWCADDENS, ... ..	Do., 16 Garscube Lane, ... ..	45	...	45
17	KELVINHAUGH AND SANDYFORD, ...	Western Infirmary, ... ..	53	147	200
		Eye do., ... ..	9	8	17
		Clydesdale Model Lodging-House, Cheapside St., ... ..	30	1	31
		Hydepark Model Lodging-House, ... ..	71	...	71
18	ANDERSTON, ... ..	Kingston Model Lodging-House, ... ..	74	...	74
20	LAURIESTON, ... ..	Sanitary Reception-House, ... ..	5	8	13
21	HUTCHESON SQUARE, ... ..	Carlton Model Lodging-House, ... ..	98	...	98
22	GORBALS, ... ..	Portugal Street Model Lodging-House, ... ..	107	1	108
25	LANGSIDE AND MOUNT FLORIDA, ...	Victoria Infirmary, ... ..	13	45	58
		Deaf and Dumb Institution, ... ..	2	4	6
		Training College, ... ..	...	22	22
		Royal Asylum, Gartnavel, ... ..	45	45	90
29	KELVINSIDE, ... ..	Girls' Industrial School, ... ..	...	4	4
		Magdalene Institution, ... ..	...	20	20
		Eastpark Home, ... ..	1	7	8
		Maryhill Lodging-House, ... ..	24	1	25
30	MARYHILL, ... ..	Ruchill Fever Hospital, ... ..	27	110	137
		Government Barracks, ... ..	84	46	130
		Barnhill Poorhouse, ... ..	54	83	137
31	POSSILPARK AND BARNHILL, ...				
TOTAL WITHIN MUNICIPAL BOUNDARY, ... ..			2,311	1,319	3,630



continued.

35 — 44.			45 — 54.			55 — 64.			65 AND UPWARDS.			NOT KNOWN.			BORN IN IRELAND.	WIDOWED ROOMS.
Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.		
27	6	33	12	1	13	4	...	4	4	1	5	...	...	...	21	379
7	6	13	1	6	7	5	...	5	2	1	3	...	...	...	18	91
21	2	23	12	2	14	4	...	4	2	...	2	...	...	...	2	208
...	2	2	...	1	1	...	...	...	...	...	...	...	...	...	7	93
104	70	174	131	65	196	183	139	322	267	295	562	...	...	...	426	256
1	6	7	...	2	2	1	2	3	...	...	...	...	...	...	10	122
43	19	62	28	18	46	20	17	37	7	3	10	...	...	...	63	57
...	2	2	...	2	2	13	2	15	113	52	165	...	...	...	18	77
53	1	54	50	...	50	20	...	20	7	...	7	...	...	...	65	5
...	33	33	...	23	23	...	20	20	...	19	19	...	...	...	16	18
50	...	50	49	1	50	18	...	18	7	...	7	...	...	...	36	33
15	7	22	9	2	11	4	1	5	...	...	...	...	...	...	24	83
1	...	1	...	...	...	...	...	...	...	...	...	...	...	1	9	32
56	39	95	36	26	62	20	15	35	5	6	11	...	...	...	93	206
...	5	5	...	8	8	17	20	37	87	97	184	...	...	...	190	48
6	7	13	5	5	10	2	1	3	1	...	1	...	...	...	2	60
103	...	103	74	1	75	42	...	42	12	...	12	...	...	...	149	16
13	71	84	8	28	36	2	11	13	1	1	2	...	...	...	65	643
39	1	40	29	...	29	25	...	25	5	...	5	...	...	...	37	15
85	...	85	71	...	71	39	...	39	21	...	21	...	...	...	66	8
165	...	165	109	...	109	59	...	59	26	...	26	...	...	...	134	8
29	...	29	28	...	28	18	...	18	6	...	6	...	...	...	33	4
...	20	20	1	19	20	...	9	9	...	2	2	...	...	...	7	27
...	...	...	1	2	3	...	...	...	...	1	1	...	...	...	14	21
...	3	3	...	2	2	...	2	2	...	1	1	...	...	...	14	29
46	69	115	13	32	45	2	13	15	1	2	3	...	...	...	57	327
1	3	4	...	1	1	1	1	2	...	1	1	...	...	...	1	52
87	1	88	63	...	63	34	...	34	10	...	10	...	...	...	122	12
45	1	46	33	1	34	11	2	13	3	...	3	...	...	...	21	176
...	54	54	...	59	59	...	54	54	...	37	37	...	...	...	43	14
38	...	38	30	...	30	29	...	29	15	...	15	...	...	...	42	11
219	...	219	188	...	188	98	...	98	44	...	44	...	...	...	155	11
12	1	113	86	...	86	48	...	48	20	...	20	...	...	...	120	12
93	...	93	65	...	65	39	...	39	10	...	10	...	...	...	103	16
11	6	17	17	...	17	2	...	2	1	...	1	...	...	...	36	282
68	...	68	89	...	89	46	...	46	21	...	21	...	...	...	83	16
15	8	23	14	7	21	17	8	25	5	1	6	...	...	...	39	12
95	1	96	81	...	81	51	...	51	14	...	14	...	...	...	60	11
08	...	108	83	1	84	41	...	41	21	...	21	...	...	...	74	10
72	...	72	70	...	70	42	...	42	13	...	13	...	...	...	64	9
49	33	82	30	19	49	12	12	24	5	3	8	...	...	...	80	381
6	2	8	8	5	13	9	4	13	5	2	7	...	...	...	13	65
32	...	32	28	...	28	18	...	18	4	...	4	...	...	...	71	7
04	...	104	91	1	92	42	...	42	16	...	16	...	...	...	129	17
82	...	82	77	...	77	37	...	37	15	...	15	...	...	...	70	12
7	7	14	4	3	7	3	3	6	...	1	1	...	...	...	10	19
02	...	102	92	...	92	59	...	59	20	...	20	...	...	...	104	12
21	1	122	104	1	105	40	...	40	22	...	22	...	...	...	118	24
8	19	27	15	11	26	5	1	6	5	2	7	...	...	...	24	206
...	3	3	...	...	...	...	1	1	...	...	...	...	...	...	2	68
...	6	6	...	3	3	...	1	1	...	...	...	...	...	...	32	94
57	55	112	38	85	123	41	56	97	22	47	69	...	...	...	16	347
...	3	3	...	2	2	...	1	1	...	...	...	...	...	...	3	70
...	21	21	...	2	2	...	1	1	...	...	...	...	...	...	7	23
...	2	2	...	...	...	...	1	1	...	...	...	...	...	...	3	46
30	...	30	15	1	16	17	...	17	5	...	5	...	...	...	33	10
9	32	41	4	7	11	...	6	6	...	...	...	...	...	...	53	415
29	13	42	4	3	7	...	1	1	...	...	...	...	...	...	55	284
75	77	152	119	82	201	141	128	269	206	270	476	...	...	...	346	85
339	718	3,257	2,115	540	2,655	1,381	533	1,914	1,076	845	1,921	1	...	1	3,708	5,695

TABLE IV.—CENSUS, 1901—GLASGOW: PROPORTION PER CENT. LIVING AT VARIOUS PERIODS OF LIFE OF THE TOTAL POPULATION (EXCLUSIVE OF THE INMATES OF INSTITUTIONS AND SHIPPING) IN EACH SANITARY DISTRICT, AND OF THE TOTAL INMATES OF INSTITUTIONS AND SHIPPING IN THE CITY.

	ALL AGES.		UNDER 1 YEAR.			1—4.			5—9.			10—14.			15—19.			20—24.																					
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.																					
SANITARY DISTRICTS.																																							
1	47-880	52-120	0-682	0-739	1-421	2-706	2-766	5-472	3-587	3-648	7-235	4-137	4-162	8-299	5-493	5-636	11-129	7-489	6-974	14-463																			
2	49-829	50-171	1-364	1-346	2-710	4-065	3-809	7-874	4-637	4-808	9-445	4-651	4-691	9-342	5-268	5-139	10-427	6-591	5-907	12-498																			
3	51-953	48-047	2-159	1-821	3-980	5-520	4-825	10-345	6-234	5-276	11-510	5-032	5-877	10-909	5-182	5-088	10-270	5-220	4-938	10-158																			
4	49-088	50-912	1-394	1-484	2-899	4-905	5-336	10-241	5-914	5-313	11-227	5-007	4-588	9-595	5-098	5-211	10-309	5-109	4-441	9-550																			
5	50-481	49-519	1-415	1-484	2-899	4-937	5-049	9-986	5-634	5-490	11-124	4-930	5-131	10-061	5-150	4-817	9-967	5-327	5-144	10-671																			
6	49-007	50-993	1-581	1-494	3-075	5-064	5-111	10-175	5-757	5-602	11-359	5-027	5-204	10-231	4-804	5-122	9-926	5-135	5-228	10-363																			
7	48-680	51-320	1-132	1-270	2-402	5-201	4-765	9-966	5-182	5-321	10-503	4-388	5-320	9-708	4-388	4-725	9-113	4-825	5-122	9-947																			
8	49-063	50-937	1-750	1-671	3-421	5-560	5-598	11-158	6-151	5-960	12-111	5-357	4-964	10-316	4-964	5-105	10-069	4-852	5-082	9-934																			
9	48-014	51-986	1-582	1-630	3-282	5-062	5-098	10-160	5-824	5-791	11-615	5-358	5-286	10-644	4-935	5-225	10-160	4-622	4-957	9-579																			
10	46-731	53-269	0-914	0-844	1-758	3-070	3-726	6-796	4-476	4-804	9-280	4-546	5-039	9-585	5-250	5-839	11-109	5-836	6-421	12-257																			
11	49-127	50-873	1-097	1-272	2-369	4-239	4-140	8-379	4-364	5-387	9-751	5-337	4-763	10-100	5-162	5-312	10-474	5-336	5-561	11-097																			
12	47-999	52-001	1-628	1-395	3-023	4-990	5-204	10-194	5-582	5-581	11-163	4-651	5-412	10-063	4-700	5-087	9-787	4-990	4-990	9-627																			
13	53-872	46-128	0-589	0-674	1-263	3-788	3-703	7-491	4-840	4-251	9-091	4-041	4-503	8-544	4-672	5-008	9-680	7-366	4-966	12-332																			
14	49-635	50-365	1-431	1-487	2-918	4-265	4-686	8-951	5-303	5-135	10-438	4-658	4-966	9-624	5-331	4-714	10-045	5-359	4-826	10-185																			
15	50-000	50-000	1-540	1-593	3-133	4-700	4-912	9-612	4-886	4-567	9-453	3-133	4-275	7-408	4-063	4-726	8-789	7-302	5-311	12-613																			
16	47-987	52-013	1-310	1-322	2-632	4-565	4-537	9-102	5-040	5-210	10-250	5-098	4-954	10-052	4-975	5-207	10-182	5-259	5-550	10-809																			
17	49-487	50-513	1-481	1-493	2-974	5-094	5-584	10-678	5-898	5-148	12-046	5-260	4-974	10-234	4-689	4-889	9-578	5-242	4-878	10-120																			
18	46-588	53-412	1-070	1-017	2-087	3-622	3-704	7-326	4-375	4-372	8-747	4-440	4-392	8-832	4-926	5-327	10-253	5-803	6-250	12-053																			
19	50-982	49-018	1-475	1-495	2-970	4-761	4-869	9-630	5-401	5-341	10-742	5-098	4-943	10-041	5-316	4-806	10-122	5-886	5-123	11-009																			
20	49-507	50-493	1-153	1-115	2-268	3-977	3-922	7-899	4-855	4-903	9-758	4-678	4-983	9-661	5-544	5-352	10-896	6-081	5-701	11-782																			
21	51-212	48-788	1-432	1-258	2-690	4-479	4-722	9-201	5-588	5-530	11-118	4-987	5-449	10-436	5-600	4-987	10-587	6-407	4-526	10-933																			
22	48-967	51-033	1-543	1-476	3-019	5-260	5-288	10-548	5-974	5-792	11-766	5-138	5-081	10-219	4-952	5-087	10-639	5-002	5-232	10-234																			
23	51-811	48-189	1-399	1-357	2-752	4-550	4-313	8-863	5-251	5-390	10-641	4-917	5-210	10-127	5-145	5-162	10-307	6-140	5-300	11-440																			
24	49-118	50-882	1-540	1-358	2-898	4-894	4-799	9-693	6-026	5-743	11-769	5-123	5-444	10-567	5-100	4-670	9-770	5-936	4-664	10-600																			
25	44-125	55-875	0-761	0-931	1-692	3-003	2-977	5-980	4-065	4-144	8-209	4-563	4-314	10-280	4-976	4-972	9-948	5-200	5-369	10-569																			
26	44-053	55-947	0-932	1-173	2-105	3-941	3-921	7-862	4-929	4-887	9-816	4-397	4-777	9-174	4-300	6-330	10-630	5-002	5-232	10-234																			
27	42-650	57-350	0-623	0-733	1-356	3-079	2-876	5-955	3-999	3-881	7-880	4-123	4-061	8-184	4-427	6-890	11-317	4-194	6-765	10-959																			
28	39-853	60-147	0-613	0-490	1-103	2-557	2-521	5-078	3-922	3-502	7-424	4-150	4-378	8-528	4-535	8-037	12-572	4-202	12-100	16-302																			
29	36-184	63-816	0-445	0-492	0-937	1-781	1-581	3-362	2-858	2-647	5-505	3-128	3-299	6-337	4-322	6-923	11-245	4-322	10-976	15-298																			
30	33-673	66-327	0-078	0-093	1-371	2-446	2-191	4-637	3-124	3-421	6-545	3-025	3-676	6-701	3-378	6-093	9-471	3-435	12-581	16-016																			
31	49-140	50-860	1-690	1-756	3-446	5-561	5-633	11-194	5-645	5-041	11-286	4-842	4-905	9-747	4-554	4-629	9-183	5-110	5-525	10-635																			
32	50-836	49-164	1-767	1-574	3-341	5-527	5-992	11-519	6-480	6-272	12-752	5-670	5-592	11-262	5-202	5-093	10-295	5-493	4-895	10-388																			
33	65-256	34-744	0-269	0-289	0-558	1-484	1-416	2-900	2-124	2-171	4-295	3-381	3-101	6-482	4-057	2-497	6-554	5-236	4-827	10-063																			
34	99-193	0-807	...	...	...	...	...	...	...	...	...	0-161	...	0-161	8-461	...	8-461	20-064	0-081	20-145																			
CITY (without Institutions and Shipping),																				5-356	5-590	10-946																	
CITY (including Institutions and Shipping),																				5-377	5-562	10-939																	

CITY (without Institutions and Shipping),  
CITY (including Institutions and Shipping),



TABLE IV.—Continued.

	SANITARY DISTRICTS.	25—34.			35—44.			45—54.			55—64.			65 AND UPWARDS.			NOT KNOWN.		
		Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
1	BLYTHSWOOD, ... ..	9-277	9-723	19-000	5-575	6-632	12-207	4-448	5-525	9-973	2-948	3-791	6-739	1-538	2-517	4-055	...	0-007	0-007
2	EXCHANGE, ... ..	9-018	8-729	17-747	6-019	6-164	12-183	4-466	4-687	9-153	2-634	2-989	5-623	1-116	1-882	2-998	...	...	...
3	FORT DUNDAS, ... ..	8-505	7-229	15-734	5-746	5-426	11-172	4-260	4-237	8-497	2-403	2-122	4-525	0-808	1-483	2-291	...	...	...
4	HIGH STREET AND CLOSES WEST, ... ..	8-123	8-587	16-710	5-913	6-526	12-439	4-260	4-237	8-497	2-198	3-093	5-291	1-167	2-107	3-274	...	0-023	0-023
5	ST. ROLLOX, ... ..	8-885	8-206	17-091	6-225	5-873	12-098	4-402	4-156	8-558	2-320	2-729	5-049	1-056	1-440	2-496	...	...	...
6	BELLGROVE AND DENNISTOUN, ... ..	8-623	8-711	17-334	5-978	6-269	12-247	3-837	3-971	7-808	2-068	2-608	4-676	1-096	1-623	2-719	0-037	0-050	0-087
7	HIGH STREET AND CLOSES EAST, ... ..	9-311	9-152	18-463	6-591	6-512	13-103	4-308	4-745	9-053	2-223	2-581	4-804	1-131	1-807	2-938	...	...	...
8	GREENHEAD AND LONDON ROAD, ... ..	8-313	8-326	16-639	5-631	5-955	11-586	3-558	3-816	7-374	2-163	2-423	4-582	0-982	1-539	2-521	0-006	0-003	0-009
9	BARROWFIELD, ... ..	7-481	7-709	15-190	5-654	6-456	12-110	4-181	4-546	8-727	2-163	3-181	5-344	1-141	2-087	3-228	0-011	0-011	0-011
10	MONTEITH ROW, ... ..	7-476	8-156	15-632	6-117	7-195	13-312	4-711	5-437	10-148	2-484	3-515	5-999	1-828	2-250	4-078	0-023	0-023	0-046
11	ST. ANDREW SQUARE, ... ..	8-055	8-204	16-259	7-132	6-309	13-441	4-314	4-489	8-803	2-719	3-466	6-185	1-172	1-970	3-142	...	...	...
12	CALTON, ... ..	7-868	7-975	15-843	6-196	6-657	12-853	4-191	4-535	8-726	2-471	3-159	5-630	1-085	2-001	3-086	...	0-005	0-005
13	ST. ENOCH SQUARE, ... ..	11-069	7-155	18-224	7-786	6-061	13-847	5-050	4-672	9-722	3-156	3-241	6-397	1-515	1-894	3-409	...	...	...
14	BROWNFIELD, ... ..	7-913	7-828	15-741	6-338	6-734	13-072	5-555	4-826	10-381	2-525	3-339	5-864	0-757	1-824	2-581	...	...	...
15	BRIDGEGATE AND WYNDS, ... ..	10-356	9-851	20-207	6-824	6-081	12-905	3-903	4-382	8-285	2-204	2-682	4-886	1-089	1-620	2-709	...	...	...
16	WOODSIDE, ... ..	8-478	9-260	17-738	6-007	6-493	12-500	4-041	4-571	8-612	2-158	2-973	5-131	1-053	1-930	2-983	0-003	0-006	0-009
17	COWCADDENS, ... ..	8-461	7-949	16-410	6-234	6-290	12-524	4-091	4-188	8-279	2-228	2-644	4-872	0-809	1-470	2-279	0-006	0-006	0-006
18	KELVINHAUGH AND SANDYFORD, ... ..	8-037	10-403	18-440	5-846	6-983	12-829	4-287	5-141	9-428	2-813	3-456	6-269	1-369	2-364	3-733	0-003	0-003	0-003
19	ANDERSTON, ... ..	8-968	7-878	16-846	6-256	5-886	12-142	4-356	4-391	8-747	2-431	2-780	5-211	1-027	1-499	2-526	0-007	0-007	0-014
20	KINGSTON, ... ..	8-862	8-401	17-263	5-861	6-028	11-889	4-379	4-808	9-187	2-817	3-391	6-208	1-292	1-884	3-176	0-008	0-005	0-013
21	LAURISTON, ... ..	8-335	7-089	15-424	6-211	6-176	12-387	4-883	4-422	9-305	2-355	3-013	5-368	0-912	1-616	2-528	0-023	...	0-023
22	HUTCHESON SQUARE, ... ..	8-576	8-684	17-260	5-818	6-033	11-851	3-768	4-105	7-873	2-021	2-601	4-622	0-915	1-654	2-569	...	...	...
23	GORBALS, ... ..	8-986	7-510	16-496	6-417	6-262	12-679	4-215	4-444	8-659	2-593	2-992	5-585	1-076	1-395	2-471	...	...	...
24	SPRINGBURN AND ROCKVILLA, ... ..	9-336	7-676	17-012	6-094	5-601	11-695	4-180	3-715	7-895	2-111	2-173	4-284	0-949	1-216	2-165	...	...	...
25	GOVANHILL, ... ..	9-137	9-396	18-533	5-752	6-192	11-944	3-738	4-252	7-990	2-053	2-492	4-545	0-906	1-634	2-540	0-004	...	0-004
26	CROSSHILL, ... ..	7-514	10-766	18-280	5-586	7-304	12-890	4-354	5-730	10-084	2-688	3-750	6-438	1-574	2-347	3-921	...	...	...
27	LANGSIDE AND MOUNT FLORIDA, ... ..	7-931	11-093	19-024	6-061	7-558	13-619	4-087	4-231	8-318	2-222	3-362	5-584	1-505	2-506	4-011	...	...	...
28	POLLOKSHIELDS AND STRATHBUNGO, ... ..	6-913	10-850	17-763	6-181	8-879	14-560	4-489	5-674	10-163	2-790	3-765	6-555	2-154	3-476	5-308	...	...	...
29	POLLOKSHIELDS, W., AND BELLAHOUSTON, ... ..	5-393	11-487	16-880	4-167	8-674	11-031	4-798	5-358	10-156	3-362	3-309	6-671	2-154	2-101	4-255	...	...	...
30	HILLHEAD, ... ..	6-138	14-174	20-312	4-768	8-996	13-764	4-240	6-466	10-706	2-460	4-744	7-204	1-722	3-596	5-318	...	0-012	0-012
31	KELVINSIDE, ... ..	5-386	18-193	23-579	4-538	8-948	13-486	3-450	5-315	8-765	2-771	3-067	5-838	1-442	2-149	3-591	...	...	...
32	MARYHILL, ... ..	9-625	9-721	19-346	6-052	6-152	12-204	3-617	3-681	7-198	1-774	2-032	3-806	0-770	1-185	1-955	...	...	...
33	POSSILPARK AND BARNHILL, ... ..	8-108	7-433	15-541	5-853	5-641	11-494	3-928	3-652	7-580	2-137	1-974	4-111	0-671	1-046	1-717	...	...	...
34	INSTITUTIONS, ... ..	11-945	6-818	18-763	13-124	3-711	16-835	10-932	2-791	13-723	7-138	2-755	9-893	5-561	4-368	9-929	0-005	...	0-005
35	SHIPPING, ... ..	36-503	0-564	37-067	18-614	0-081	18-695	10-314	0-081	10-395	4-190	...	4-190	0-725	...	0-725	0-161	...	0-161
36	CITY (without Institutions and Shipping), ... ..	8-501	8-905	17-406	5-915	6-343	12-258	4-063	4-384	8-447	2-283	2-847	5-130	1-101	1-792	2-893	0-006	0-008	0-014
37	CITY (including Institutions and Shipping), ... ..	8-634	8-838	17-472	6-119	6-266	12-385	4-248	4-386	8-584	2-409	2-841	5-250	1-213	1-855	3-068	0-007	0-007	0-014



TABLE V.—CENSUS, 1901.—GLASGOW: INHABITANTS GROUPED ACCORDING TO THE SIZE OF THEIR HOUSES (EXCLUSIVE OF INSTITUTIONS), ALSO NUMBER OF WINDOWED ROOMS AND EMPTY HOUSES IN EACH SANITARY DISTRICT.

SANITARY DISTRICTS.		1		2		3		4		5		ALL SIZES.		WINDOWED ROOMS.	EMPTY HOUSES.
		No.	Inhabi- tants.	No.	Inhabi- tants.	No.	Inhabi- tants.	No.	Inhabi- tants.	No.	Inhabi- tants.	No.	Inhabi- tants.		
Bl.	BLYTHWOOD, ...	313	826	1,279	5,705	1,505	7,737	923	5,127	1,340	8,621	5,360	28,016	21,956	154
1	EXCHANGE, ...	740	2,174	1,883	8,882	955	5,302	475	2,793	405	3,061	4,458	22,212	12,387	181
2	PORT-DUNDAS, ...	332	1,019	708	3,699	81	490	17	105	2	13	1,140	5,326	2,072	234
3	HIGH STREET AND CLOSES WEST, ...	595	1,819	894	4,269	299	1,848	73	514	28	377	1,889	8,827	3,808	110
4	ST. ROLLOX, ...	781	2,342	1,954	9,752	478	2,890	99	722	22	197	3,334	15,903	6,705	107
5	BELGROVE AND DENNISTOUN, ...	3,359	11,371	8,018	38,876	3,470	18,437	989	5,417	593	3,822	16,429	77,923	37,902	777
6	HIGH STREET AND CLOSES EAST, ...	425	1,462	467	2,288	166	1,007	36	208	11	72	1,105	5,037	2,088	48
7	GREENHEAD AND LONDON ROAD, ...	4,752	15,426	7,612	40,096	1,244	7,413	200	1,175	151	980	13,959	65,090	25,466	616
8	BARROWFIELD, ...	2,543	7,906	3,102	15,995	552	3,270	46	283	30	242	6,273	27,696	10,786	307
9	MONTEITH ROW, ...	172	542	241	1,245	213	1,134	80	457	136	889	842	4,267	2,502	36
10	ST. ANDREW SQUARE, ...	173	623	330	1,586	154	971	57	420	37	410	751	4,010	1,819	32
11	CALTON, ...	1,593	4,790	2,349	11,625	576	3,389	65	409	33	427	4,616	20,640	8,523	303
12	ST. ENOCH SQUARE, ...	74	220	153	728	82	468	71	447	58	513	438	2,376	1,565	16
13	BROWNFIELD, ...	135	409	426	2,179	71	452	40	286	11	238	683	3,564	1,427	38
14	BRIDGEGATE AND WYND, ...	237	736	370	1,731	93	573	57	378	16	348	773	3,766	1,700	19
15	WOODSIDE, ...	2,245	6,819	6,905	32,697	2,839	15,246	1,554	7,613	1,339	7,412	14,882	69,787	39,273	572
16	COWCADDENS, ...	1,473	4,795	1,997	10,237	290	1,854	61	433	21	241	3,842	17,550	6,770	309
17	KELVINHAUGH AND SANDYFORD, ...	392	1,119	2,391	10,903	1,561	7,938	681	3,541	1,210	7,172	6,235	30,673	23,061	232
18	ANDERSTON, ...	1,650	5,174	2,889	14,626	1,125	6,775	205	1,360	63	487	5,932	28,422	12,069	158
19	KINGSTON, ...	1,249	3,926	2,858	13,484	2,498	12,930	996	5,755	604	3,984	8,205	40,079	22,083	226
20	LAURISTON, ...	437	1,382	892	4,568	310	1,854	102	696	20	162	1,761	8,662	3,695	66
21	HUTCHESON SQUARE, ...	4,277	13,581	8,112	40,464	2,265	12,794	365	2,280	149	1,008	15,168	70,127	29,689	505
22	GORBALS, ...	580	1,870	1,130	5,655	589	3,669	107	743	38	327	2,444	12,264	5,250	93
23	SPRINGBURN AND ROCKVILLA, ...	1,909	6,255	4,342	22,274	987	6,107	82	515	59	376	7,379	35,527	14,255	288
24	GOVANHILL, ...	366	1,160	2,503	10,978	1,326	6,838	522	2,610	270	1,605	4,987	23,191	12,972	175
25	CROSSHILL, ...	36	101	229	896	452	2,082	417	1,998	463	2,549	1,597	7,626	6,952	97
26	LANGSIDE AND MOUNT FLORIDA, ...	27	62	223	990	1,083	4,329	787	3,520	980	5,586	3,100	14,487	13,527	264
27	POLLOKSHIELDS AND STRATHBUNGO, ...	28	65	150	628	487	1,924	826	3,591	1,265	6,622	2,756	12,830	13,032	183
28	POLLOKSHIELDS, W., AND BELLARHOUSTON, ...	22	78	108	550	28	124	52	340	736	4,619	946	5,711	8,118	57
29	HILLHEAD, ...	8	17	37	163	268	1,074	264	1,134	1,165	6,149	1,742	8,537	11,213	94
30	KELVINSIDE, ...	7	18	136	638	146	626	104	501	850	5,291	1,243	7,074	11,132	108
31	MARYHILL, ...	1,040	3,467	3,823	18,346	1,199	6,318	410	1,919	673	3,611	7,145	33,661	18,811	652
	POSSILPARK AND BARNHILL, ...	739	2,574	2,273	11,988	663	3,891	170	982	145	828	3,990	20,263	8,935	217
TOTAL WITHIN MUNICIPAL BOUNDARY,		32,709	104,128	70,784	348,731	28,055	151,754	10,933	58,272	12,923	78,239	155,404	741,124	401,543	7,274

TABLE VI.—CENSUS, 1901.—GLASGOW: PROPORTION PER CENT. OF HOUSES OF VARIOUS SIZES, AND OF THE TOTAL POPULATION DWELLING IN THEM IN SANITARY DISTRICTS.

SANITARY DISTRICTS.		1 APARTMENT.		2 APARTMENTS.		3 APARTMENTS.		4 APARTMENTS.		5 APARTMENTS AND UPWARDS.		
		Houses.	Inhabitants.	Houses.	Inhabitants.	Houses.	Inhabitants.	Houses.	Inhabitants.	Houses.	Inhabitants.	
—	BLYTHSWOOD, - - -	5-84	2-948	23-86	20-364	28-08	27-616	17-22	18-300	25-00	30-772	Bl.
1.	EXCHANGE, - - -	16-60	9-788	42-24	39-987	21-42	23-870	10-66	12-574	9-08	13-781	1.
2.	PORT-DUNDAS, - - -	29-12	19-133	62-11	69-452	7-10	9-200	1-49	1-971	0-18	0-244	2.
3.	HIGH STREET AND CLOSES WEST, - - -	31-50	20-607	47-33	48-363	15-83	20-936	3-86	5-823	1-48	4-271	3.
4.	ST. ROLLOX, - - -	23-43	14-727	58-61	61-321	14-33	18-173	2-97	4-540	0-66	1-239	4.
5.	BELGROVE AND DENNISTOUN, - - -	20-45	14-593	48-80	49-890	21-12	23-660	6-02	6-952	3-61	4-905	5.
6.	HIGH STREET AND CLOSES EAST, - - -	38-46	29-025	42-26	45-424	15-02	19-992	3-26	4-130	1-00	1-429	6.
7.	GREENHEAD AND LONDON ROAD, - - -	34-04	23-699	54-53	61-601	8-91	11-389	1-44	1-805	1-08	1-506	7.
8.	BARROWFIELD, - - -	40-54	28-545	49-45	57-752	8-80	11-807	0-73	1-022	0-48	0-874	8.
9.	MONTEITH ROW, - - -	20-43	12-702	28-62	29-178	25-30	26-576	9-50	10-710	16-15	20-834	9.
10.	ST. ANDREW SQUARE, - - -	23-03	15-536	43-94	39-551	20-51	24-215	7-59	10-474	4-93	10-224	10.
11.	CALTON, - - -	34-53	23-207	50-89	56-323	12-47	16-419	1-41	1-982	0-70	2-069	11.
12.	ST. ENOCH SQUARE, - - -	16-90	9-259	34-93	30-640	18-72	19-697	16-21	18-813	13-24	21-591	12.
13.	BROWNFIELD, - - -	19-77	11-476	62-37	61-139	10-39	12-682	5-86	8-025	1-61	6-678	13.
14.	BRIDGEGATE AND WYND, - - -	30-66	19-543	47-87	45-964	12-03	15-215	7-37	10-037	2-07	9-241	14.
15.	WOODSIDE, - - -	15-08	9-771	46-40	46-853	19-08	21-846	10-44	10-909	9-00	10-621	15.
16.	COWCADDENS, - - -	38-34	27-322	51-98	58-274	7-55	10-564	1-59	2-467	0-54	1-373	16.
17.	KELVINHAUGH AND SANDYFORD, - - -	6-29	3-648	38-35	35-546	25-03	25-879	10-92	11-545	19-41	23-382	17.
18.	ANDERSTON, - - -	27-82	18-204	48-70	51-460	18-96	23-838	3-46	4-785	1-06	1-713	18.
19.	KINGSTON, - - -	15-22	9-796	34-83	33-644	30-45	32-261	12-14	14-359	7-36	9-940	19.
20.	LAURISTON, - - -	24-82	15-955	50-65	52-736	17-60	21-404	5-79	8-035	1-14	1-870	20.
21.	HUTCHESON SQUARE, - - -	28-20	19-366	53-48	57-701	14-93	18-244	2-41	3-251	0-98	1-438	21.
22.	GORBALS, - - -	23-73	15-248	46-24	46-111	24-10	29-917	4-38	6-058	1-55	2-666	22.
—	SPRINGBURN AND ROCKVILLA, - - -	25-87	17-606	58-84	62-696	13-38	17-190	1-11	1-450	0-80	1-058	S. & R.
23.	GOVANHILL, - - -	7-34	5-002	50-19	47-337	26-59	29-485	10-47	11-255	5-41	6-921	23.
24.	CROSSHILL, - - -	2-26	1-325	14-34	11-749	28-30	27-301	26-11	26-200	28-99	33-425	24.
25.	LANGSIDE AND MOUNT FLORIDA, - - -	0-87	0-428	7-19	6-834	34-94	29-882	25-39	24-297	31-61	38-559	25.
26.	POLLOKSHIELDS AND STRATHBUNGO, - - -	1-02	0-507	5-44	4-895	17-67	14-996	29-97	27-989	45-90	51-613	26.
27.	POLLOKSHIELDS, WEST, AND BELLAHOUSTON, - - -	2-32	1-366	11-42	9-630	2-96	2-171	5-50	5-953	77-80	80-880	27.
28.	HILLHEAD, - - -	0-46	0-199	2-12	1-909	15-38	12-581	15-15	13-283	66-89	72-028	28.
29.	KELVINSIDE, - - -	0-56	0-255	10-94	9-019	11-75	8-849	8-37	7-082	68-38	74-795	29.
30.	MARYHILL, - - -	14-55	10-300	53-51	54-502	16-78	18-769	5-74	5-701	9-42	10-728	30.
31.	POSSILPARK AND BARNHILL, - - -	18-52	12-703	56-97	59-162	16-62	19-203	4-26	4-846	3-63	4-086	31.
CITY, - - -		21-05	14-050	45-55	47-054	18-05	20-476	7-03	7-863	8-32	10-557	



TABLE VII.—CENSUS, 1901.—GLASGOW: AVERAGE NUMBER OF INMATES PER HOUSE OF EACH SIZE, AND OF ALL SIZES, ALSO PERCENTAGE OF EMPTY HOUSES, IN SANITARY DISTRICTS.

SANITARY DISTRICTS.		1	2	3	4	5	ALL SIZES.	PERCENTAGE OF EMPTY HOUSES.	
—		APARTMENT.	APARTMENTS.	APARTMENTS.	APARTMENTS.	APARTMENTS AND UPWARDS.			
1	BLYTHSWOOD, - - -	2·639	4·461	5·141	5·555	6·434	5·227	2·8	BL.
2	EXCHANGE, - - -	2·938	4·717	5·552	5·880	7·558	4·983	3·9	1
3	PORT-DUNDAS, - - -	3·069	5·225	6·049	6·176	6·500	4·672	17·0	2
4	HIGH STREET AND CLOSES WEST, - - -	3·057	4·775	6·181	7·041	13·464	4·673	5·5	3
5	ST. ROLLOX, - - -	2·999	4·991	6·046	7·293	8·955	4·770	3·1	4
6	BELGROVE AND DENNISTOUN, - - -	3·385	4·849	5·313	5·477	6·445	4·743	4·5	5
7	HIGH STREET AND CLOSES EAST, - - -	3·440	4·899	6·066	5·778	6·545	4·558	4·2	6
8	GREENHEAD AND LONDON ROAD, - - -	3·246	5·267	5·959	5·875	6·490	4·663	4·2	7
9	BARROWFIELD, - - -	3·109	5·156	5·924	6·152	8·067	4·415	4·7	8
10	MONTEITH ROW, - - -	3·151	5·166	5·324	5·713	6·537	5·068	4·1	9
11	ST. ANDREW SQUARE, - - -	3·601	4·806	6·305	7·368	11·081	5·340	4·1	10
12	CALTON, - - -	3·007	4·949	5·885	6·292	12·940	4·471	6·2	11
13	ST. ENOCH SQUARE, - - -	2·973	4·758	5·707	6·296	8·845	5·425	3·5	12
14	BROWNFIELD, - - -	3·030	5·115	6·361	7·150	21·636	5·218	5·3	13
15	BRIDGEGATE AND WYND, - - -	3·105	4·678	6·161	6·632	21·750	4·872	2·4	14
16	WOODSIDE, - - -	3·037	4·735	5·370	4·899	5·535	4·689	3·7	15
17	COWCADDENS, - - -	3·255	5·121	6·393	7·098	11·476	4·568	7·4	16
18	KELVINHAUGH AND SANDYFORD, - - -	2·855	4·560	5·086	5·200	5·927	4·919	3·6	17
19	ANDERSTON, - - -	3·136	5·063	6·022	6·634	7·730	4·791	2·6	18
20	KINGSTON, - - -	3·143	4·718	5·176	5·778	6·596	4·885	2·7	19
21	LAURISTON, - - -	3·162	5·121	5·981	6·824	8·100	4·919	3·6	20
22	HUTCHESON SQUARE, - - -	3·175	4·988	5·649	6·247	6·765	4·623	3·2	21
23	GORBALS, - - -	3·224	5·004	6·229	6·944	8·605	5·018	3·7	22
24	SPRINGBURN AND ROCKVILLA, - - -	3·277	5·130	6·186	6·280	6·373	4·815	3·8	S.&R.
25	GOVANHILL, - - -	3·169	4·386	5·157	5·000	5·944	4·650	3·4	23
26	CROSSHILL, - - -	2·806	3·913	4·606	4·791	5·505	4·775	5·7	24
27	LANGSIDE AND MOUNT FLORIDA, - - -	2·296	4·439	3·997	4·473	5·700	4·673	7·8	25
28	POLLOKSHIELDS AND STRATHBUNGO, - - -	2·312	4·187	3·951	4·347	5·235	4·655	6·2	26
29	POLLOKSHIELDS WEST AND BELLARHOUSTON, - - -	3·545	5·093	4·429	6·538	6·276	6·037	5·7	27
30	HILLHEAD, - - -	2·125	4·405	4·007	4·295	5·278	4·901	5·1	28
31	KELVINSIDE, - - -	2·571	4·691	4·288	4·817	6·225	5·691	8·0	29
32	MARYHILL, - - -	3·333	4·799	5·269	4·680	5·366	4·711	8·4	30
33	POSSILPARK AND BARNHILL, - - -	3·483	5·274	5·869	5·776	5·710	5·078	5·2	31
CITY, - - -		3·183	4·927	5·409	5·330	6·054	4·769	4·5	



TABLE VIII.—GLASGOW: ACREAGE, STATEMENT OF POPULATION, HOUSES (INHABITED AND EMPTY), WINDOWED ROOMS (TOTAL NUMBER AND NUMBER PER HOUSE), PERSONS PER ACRE, PER HOUSE, AND PER ROOM, AND PERCENTAGE OF IRISH-BORN, AT THE CENSUS PERIOD 1901, IN EACH MUNICIPAL WARD.

MUNICIPAL WARDS.	Acreage.	POPULATION.			HOUSES.		WINDOWED ROOMS.			PERSONS PER			Percentage of Irish-Born (Whole Population).	
		Without Shipping and Institutions.	Institutions.	Shipping.	Total Population.	Inhabited.	Empty.	Inhabited Houses.	Institutions.	Per Inhabited House.	Acre (including Institutions and Shipping).	House (excluding Institutions and Shipping).		Room.
1 DALMARNOCK, -	562	52,787	689	...	53,476	11,479	541	20,391	327	1-776	95	4-599	2-589	9-44
2 CALTON, -	337	35,468	2,313	...	37,781	7,637	440	15,887	288	2-080	112	4-644	2-233	10-00
3 MILE-END, -	512	42,110	418	...	42,528	9,099	420	16,078	50	1-767	83	4-628	2-619	8-12
4 WHITEVALE, -	321	35,705	1,586	...	37,291	7,481	195	15,639	154	2-091	116	4-773	2-283	8-73
5 DENNISTOUN, -	718	30,482	1,526	...	32,008	6,585	256	18,376	865	2-791	45	4-629	1-659	4-89
6 SPRINGBURN, -	1,531	37,744	1,672	24	39,416	7,797	521	15,221	133	1-952	26	4-841	2-480	16-25
7 COWLAIRS, -	865	26,597	...	...	26,597	5,358	243	10,928	...	2-040	31	4-964	2-434	9-78
8 TOWNHEAD, -	261	40,492	1,965	...	42,481	8,445	439	18,917	378	2-240	163	4-795	2-140	8-35
9 BLACKFRIARS, -	146	31,406	956	...	32,362	6,498	325	13,981	228	2-152	222	4-833	2-246	10-48
10 EXCHANGE, -	123	2,326	451	5	2,782	423	28	1,965	339	4-645	23	5-499	1-184	10-71
11 BLYTHSWOOD, -	90	4,609	211	...	4,820	846	27	4,941	299	5-840	54	5-448	0-933	5-31
12 BROOMIELAW, -	104	9,633	902	87	10,622	1,814	70	4,835	411	2-665	102	5-310	1-992	14-30
13 ANDERSTON, -	462	29,934	483	768	31,185	6,256	166	14,105	24	2-255	68	4-785	2-122	13-58
14 SANDYFORD, -	138	26,449	111	...	26,560	5,456	184	16,547	65	3-033	192	4-848	1-598	8-06
15 PARK, -	346	24,903	749	...	25,652	5,002	159	23,821	474	4-762	74	4-979	1-045	2-88
16 COWCADDENS, -	173	39,872	1,014	...	40,886	8,376	480	18,153	30	2-167	236	4-760	2-196	10-97
17 WOODSIDE, -	283	45,447	...	...	45,447	9,792	404	23,506	...	2-401	161	4-641	1-933	5-92
18 HUTCHESONTOWN, -	224	33,403	102	...	33,505	7,312	204	12,902	19	1-765	150	4-568	2-589	7-56
19 GOREALS, -	243	35,750	832	...	36,582	7,245	284	18,918	36	2-611	151	4-934	1-890	9-43
20 KINGSTON, -	412	34,386	311	341	35,038	7,122	192	17,404	12	2-444	85	4-828	1-976	8-37
21 GOVANHILL, -	449	31,564	...	...	31,564	6,826	242	16,250	...	2-380	70	4-624	1-942	5-82
22 LANGSIDE, -	840	25,412	360	...	25,772	5,484	421	23,310	274	4-251	31	4-634	1-090	2-54
23 POLLOKSHIELDS, -	1,353	15,317	...	...	15,317	2,933	183	18,370	...	6-263	11	5-222	0-834	2-32
24 KELVINSIDE, -	917	15,611	716	...	16,327	2,985	202	22,345	441	7-486	18	5-230	0-699	2-47
25 MARYHILL, -	1,278	33,717	1,980	16	35,713	7,153	648	18,753	848	2-622	28	4-714	1-798	12-69
TOTALS WITHIN MUNICIPAL BOUNDARY, -	12,688*	741,124	19,347	1,241	761,712	155,404	7,274	401,543	5,695	2-584	60	4-769	1-846	8-68

\* This is the most recent measurement of the area of the City. It exceeds by seven acres that given in Table I., Appendix.





## DISTINGUISHING THE INMATES OF INSTITUTIONS AND SHIPPING; ALSO NUMBER OF IRISH-BORN.

1—4.			5—9.			10—14.			15—19.		
Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
2,810	2,876	5,686	3,197	3,060	6,257	2,806	2,882	5,688	2,592	2,810	5,402
12	17	29	9	9	18	5	15	20	17	17	34
1,655	1,721	3,376	1,878	1,928	3,806	1,736	1,890	3,626	1,746	1,831	3,577
18	14	32	49	55	104	53	54	107	133	41	174
2,433	2,387	4,820	2,650	2,627	5,277	2,284	2,259	4,543	2,080	2,076	4,156
...	1	1	11	18	29	189	152	341	2	26	28
1,780	1,798	3,578	2,050	1,970	4,020	1,815	1,858	3,673	1,721	1,816	3,537
8	15	23	17	8	25	161	11	172	92	16	108
1,425	1,451	2,876	1,645	1,572	3,217	1,365	1,477	2,842	1,390	1,573	2,963
16	8	24	31	19	50	37	24	61	66	38	104
2,136	2,116	4,252	2,287	2,204	4,491	1,910	2,064	3,974	1,877	1,777	3,654
23	19	42	18	17	35	10	6	16	15	13	28
1,375	1,567	2,942	1,647	1,636	3,283	1,512	1,505	3,017	1,408	1,337	2,745
1,913	1,832	3,745	2,215	2,079	4,294	1,970	2,028	3,998	2,088	2,007	4,095
70	74	144	53	74	127	26	36	62	17	39	56
...	...	...	...	...	...	...	...	...	1	...	1
1,464	1,534	2,998	1,720	1,681	3,401	1,527	1,550	3,077	1,583	1,639	3,222
1	...	1	1	6	7	4	4	8	35	11	46
66	90	156	108	107	215	88	96	184	135	146	281
2	4	6	4	5	9	2	4	6	27	19	46
...	...	...	...	...	...	...	...	...	...	...	...
90	106	196	114	134	248	155	162	317	245	255	500
...	...	...	...	1	1	2	1	3	15	3	18
390	380	770	459	446	905	432	449	881	540	472	1,012
...	...	...	6	2	8	8	1	9	43	15	58
...	...	...	...	...	...	1	...	1	9	...	9
1,417	1,500	2,917	1,595	1,615	3,210	1,529	1,483	3,012	1,544	1,449	2,993
...	...	...	1	...	1	1	...	1	9	...	9
...	...	...	...	...	...	1	...	1	59	...	59
1,002	968	1,970	1,217	1,144	2,361	1,197	1,196	2,393	1,391	1,412	2,803
...	...	...	7	6	13	3	5	8	6	3	9
588	598	1,186	730	851	1,581	971	969	1,940	1,211	1,509	2,720
23	20	43	38	21	59	32	15	47	18	55	73
1,795	1,951	3,746	2,130	2,199	4,329	2,073	1,974	4,047	2,043	2,000	4,043
...	2	2	1	...	1	4	2	6	29	2	31
2,312	2,242	4,554	2,521	2,557	5,078	2,387	2,319	4,706	2,206	2,262	4,468
1,906	1,908	3,814	2,084	2,048	4,132	1,756	1,789	3,545	1,641	1,681	3,322
7	2	9	8	4	12	10	9	19	5	8	13
1,411	1,387	2,798	1,745	1,781	3,526	1,694	1,761	3,455	1,906	1,910	3,816
...	...	...	...	...	...	...	...	...	10	1	11
1,493	1,492	2,985	1,773	1,780	3,553	1,685	1,737	3,422	1,891	1,789	3,680
...	...	...	...	...	...	1	...	1	3	...	3
...	...	...	...	...	...	...	...	...	36	...	36
1,615	1,574	3,189	1,844	1,741	3,585	1,627	1,578	3,205	1,576	1,561	3,137
966	957	1,923	1,215	1,189	2,404	1,134	1,151	2,285	1,090	1,576	2,666
6	4	10	31	27	58	40	39	79	16	26	42
379	356	735	554	539	1,093	622	644	1,266	731	1,185	1,916
325	290	615	465	468	933	481	534	1,015	608	1,022	1,630
...	...	...	...	1	1	2	5	7	3	38	41
1,875	1,896	3,771	1,902	1,889	3,791	1,637	1,662	3,299	1,537	1,558	3,095
101	94	195	126	147	273	64	217	281	224	112	336
...	...	...	...	...	...	...	...	...	...	...	...
34,621	34,977	69,598	39,745	39,245	78,990	36,393	37,017	73,410	36,780	38,653	75,433
287	274	561	411	420	831	654	600	1,254	785	483	1,268
...	...	...	...	...	...	2	...	2	105	...	105
34,908	35,251	70,159	40,156	39,665	79,821	37,049	37,617	74,666	37,670	39,136	76,806



TABLE IX.—

MUNICIPAL WARDS.				20—24.			25—34.		
				Males.	Females.	Total.	Males.	Females.	Total.
1.	DALMARNOCK, - - -	{ Without Institutions, -	-	2,497	2,699	5,196	4,273	4,345	8,618
		{ Institutions, - - -	-	42	94	136	84	175	259
2.	CALTON, - - -	{ Without Institutions, -	-	1,739	1,873	3,612	2,787	2,840	5,627
		{ Institutions, - - -	-	94	13	107	317	39	356
3.	MILE-END, - - -	{ Without Institutions, -	-	2,062	1,991	4,053	3,372	3,353	6,725
		{ Institutions, - - -	-	...	...	...	2	5	7
4.	WHITEVALE, - - -	{ Without Institutions, -	-	1,935	1,793	3,728	2,987	2,988	5,975
		{ Institutions, - - -	-	100	15	115	272	34	306
5.	DENNISTOUN, - - -	{ Without Institutions, -	-	1,460	1,780	3,240	2,783	3,036	5,819
		{ Institutions, - - -	-	108	174	282	211	219	430
6.	SPRINGBURN, - - -	{ Without Institutions, -	-	2,162	1,831	3,993	3,599	2,981	6,580
		{ Institutions, - - -	-	18	38	56	54	87	141
7.	COWLAIRS, - - -	- - -	-	1,516	1,257	2,773	2,188	1,923	4,111
8.	TOWNHEAD, - - -	{ Without Insts. & Shipping,	-	2,404	2,152	4,556	3,627	3,349	6,976
		{ Institutions, - - -	-	23	72	95	62	123	185
		{ Shipping, - - -	-	6	...	6	7	...	7
9.	BLACKFRIARS, - - -	{ Without Insts. & Shipping,	-	1,749	1,660	3,409	2,590	2,609	5,199
		{ Institutions, - - -	-	47	17	64	115	65	180
10.	EXCHANGE, - - -	{ Without Institutions, -	-	151	148	299	225	196	421
		{ Institutions, - - -	-	34	43	77	73	38	111
		{ Shipping, - - -	-	1	...	1	...	...	...
11.	BLYTHSWOOD, - - -	{ Without Institutions, -	-	354	364	718	439	528	967
		{ Institutions, - - -	-	34	19	53	45	20	65
12.	BROOMIELAW, - - -	{ Without Insts. & Shipping,	-	646	504	1,150	949	721	1,670
		{ Institutions, - - -	-	73	31	104	210	27	237
		{ Shipping, - - -	-	10	...	10	29	...	29
13.	ANDERSTON, - - -	{ Without Insts. & Shipping,	-	1,718	1,472	3,190	2,650	2,530	5,180
		{ Institutions, - - -	-	33	1	34	101	1	102
		{ Shipping, - - -	-	156	1	157	290	5	295
14.	SANDYFORD, - - -	{ Without Institutions, -	-	1,671	1,574	3,245	2,268	2,355	4,623
		{ Institutions, - - -	-	12	11	23	9	8	17
15.	PARK, - - -	{ Without Institutions, -	-	1,572	1,946	3,518	1,941	2,870	4,811
		{ Institutions, - - -	-	33	103	136	54	165	219
16.	COWCADDENS, - - -	{ Without Institutions, -	-	2,365	2,086	4,451	3,450	3,233	6,683
		{ Institutions, - - -	-	59	...	59	222	...	222
17.	WOODSIDE, - - -	- - -	-	2,183	2,391	4,574	3,863	4,260	8,123
18.	HUTCHESONTOWN, - - -	{ Without Institutions, -	-	1,558	1,727	3,285	2,738	2,847	5,585
		{ Institutions, - - -	-	2	2	4	5	8	13
19.	GORBALS, - - -	{ Without Institutions, -	-	2,288	2,024	4,312	3,311	2,979	6,290
		{ Institutions, - - -	-	53	...	53	205	1	206
20.	KINGSTON, - - -	{ Without Insts. & Shipping,	-	1,992	1,818	3,810	2,942	2,843	5,785
		{ Institutions, - - -	-	22	...	22	74	...	74
		{ Shipping, - - -	-	68	...	68	121	2	123
21.	GOVANHILL, - - -	- - -	-	1,614	1,660	3,274	2,931	2,946	5,877
22.	LANGSIDE, - - -	{ Without Institutions, -	-	1,033	1,552	2,585	2,012	2,820	4,832
		{ Institutions, - - -	-	11	25	36	15	49	64
23.	POLLOKSHIELDS, - - -	- - -	-	683	1,430	2,113	913	1,664	2,577
24.	KELVINSIDE, - - -	{ Without Institutions, -	-	612	1,827	2,439	905	2,497	3,402
		{ Institutions, - - -	-	19	125	144	45	67	112
25.	MARYHILL, - - -	{ Without Insts. & Shipping,	-	1,729	1,870	3,599	3,261	3,280	6,541
		{ Institutions, - - -	-	196	151	347	136	188	324
		{ Shipping, - - -	-	8	...	8	6	...	6
TOTAL WITHOUT INSTITUTIONS AND SHIPPING, - - -				39,693	41,429	81,122	63,004	65,993	128,997
TOTAL INSTITUTIONS, - - - - -				1,013	934	1,947	2,311	1,319	3,630
TOTAL SHIPPING, - - - - -				249	1	250	453	7	460
TOTAL WITHIN MUNICIPAL BOUNDARY, - - -				40,955	42,364	83,319	65,768	67,319	133,087

Continued,

35—44.			45—54.			55—64.			65 AND UPWARDS.			NOT KNOWN.			BORN IN IRELAND.
Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	M.	F.	Tl.	
2,982	3,265	6,247	1,944	2,121	4,065	1,081	1,358	2,439	510	876	1,386	3	...	3	4,989
46	69	115	13	32	45	2	13	15	1	2	3	...	...	...	57
2,178	2,347	4,525	1,487	1,632	3,119	875	1,174	2,049	427	727	1,154	1	2	3	3,273
502	60	562	400	61	461	221	57	278	92	38	130	...	...	...	504
2,416	2,504	4,920	1,592	1,636	3,228	762	1,062	1,824	436	685	1,121	4	2	6	3,425
...	3	3	1	4	5	...	2	2	...	2	2	...	...	...	28
2,168	2,231	4,399	1,351	1,472	2,823	787	992	1,779	461	641	1,102	28	38	66	2,968
325	28	353	243	24	267	143	10	153	59	2	61	1	...	1	288
1,834	2,001	3,835	1,214	1,274	2,488	666	819	1,485	335	526	861	1	1	2	1,259
172	110	282	118	55	173	64	26	90	18	7	25	...	...	...	307
2,306	2,157	4,463	1,478	1,331	2,809	739	758	1,497	288	390	678	...	...	...	5,868
75	82	157	119	90	209	158	148	306	293	367	660	...	...	...	536
1,554	1,475	3,029	1,123	1,026	2,149	592	559	1,151	235	328	563	...	...	...	2,601
2,433	2,389	4,822	1,836	1,771	3,607	1,002	1,116	2,118	412	662	1,074	...	...	...	3,107
105	76	181	131	67	198	184	141	325	267	295	562	...	...	...	436
4	...	4	4	...	4	1	...	1	1	...	1	...	...	...	6
1,947	2,026	3,973	1,288	1,419	2,707	678	957	1,635	341	584	925	...	2	2	3,196
133	51	184	122	35	157	72	31	103	132	72	204	...	...	...	198
142	143	285	123	108	231	72	66	138	36	47	83	...	...	...	198
54	25	79	45	18	63	22	17	39	8	3	11	...	...	...	99
...	...	...	2	...	2	2	...	2	...	...	...	...	...	...	1
258	333	591	222	259	481	153	197	350	85	113	198	...	...	...	236
28	8	36	13	8	21	9	...	9	4	1	5	...	...	...	20
628	575	1,203	485	455	940	287	317	604	99	181	280	2	2	4	1,306
188	6	194	166	1	167	89	...	89	35	1	36	...	...	...	207
18	...	18	15	...	15	5	...	5	...	...	...	...	...	...	6
1,885	1,805	3,690	1,281	1,259	2,540	717	788	1,505	303	499	802	...	...	...	3,971
136	...	136	119	1	120	60	...	60	20	...	20	...	...	...	200
152	1	153	65	1	66	29	...	29	6	...	6	2	...	2	65
1,537	1,670	3,207	1,181	1,411	2,592	766	957	1,723	369	602	971	...	1	1	2,128
6	2	8	8	5	13	9	4	13	5	2	7	...	...	...	13
1,383	2,061	3,444	1,045	1,464	2,509	676	1,064	1,740	415	759	1,174	...	1	1	652
49	35	84	30	20	50	12	12	24	5	3	8	...	...	...	87
2,425	2,407	4,832	1,699	1,818	3,517	919	1,164	2,083	412	670	1,082	1	4	5	4,286
275	1	276	234	1	235	134	...	134	48	...	48	...	...	...	198
2,754	2,856	5,610	1,759	1,931	3,690	929	1,190	2,119	403	762	1,165	1	2	3	2,691
1,928	2,039	3,967	1,206	1,337	2,543	643	735	1,378	254	487	741	...	...	...	2,523
7	7	14	4	3	7	3	3	6	...	1	1	...	...	...	10
2,143	2,131	4,274	1,502	1,628	3,130	940	1,213	2,153	471	695	1,166	...	...	...	3,226
223	1	224	196	1	197	99	...	99	42	...	42	...	...	...	222
2,039	2,085	4,124	1,542	1,590	3,132	926	1,101	2,027	398	600	998	5	2	7	2,820
82	...	82	77	...	77	37	...	37	15	...	15	...	...	...	70
56	...	56	41	...	41	15	...	15	2	...	2	...	...	...	42
1,805	1,914	3,719	1,189	1,289	2,478	622	769	1,391	265	479	744	1	...	1	1,836
1,562	1,934	3,496	1,039	1,188	2,227	580	859	1,439	401	637	1,038	...	...	...	630
8	22	30	15	11	26	5	2	7	5	2	7	...	...	...	26
782	1,193	1,975	736	896	1,632	498	586	1,084	296	475	771	...	...	...	356
728	1,401	2,129	606	928	1,534	406	622	1,028	249	459	708	...	1	1	355
57	61	118	38	88	126	41	57	98	22	47	69	...	...	...	48
2,018	2,068	4,086	1,185	1,245	2,430	602	682	1,284	258	399	657	...	...	...	4,374
68	71	139	23	15	38	17	10	27	5	...	5	...	...	...	154
1	...	1	1	...	1	...	...	...	...	...	...	...	...	...	4
43,835	47,010	90,845	30,113	32,488	62,601	16,918	21,105	38,023	8,159	13,283	21,442	47	58	105	62,274
2,539	718	3,257	2,115	540	2,655	1,381	533	1,914	1,076	845	1,921	1	...	1	3,708
231	1	232	128	1	129	52	...	52	9	...	9	2	...	2	124
46,605	47,729	94,334	32,356	33,029	65,385	18,351	21,638	39,989	9,244	14,128	23,372	50	58	108	66,106







TABLE X.—Continued.

MUNICIPAL WARDS.		25—34.		35—44.		45—54.		55—64.		65 AND UPWARDS.		NOT KNOWN.		
		Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	
1	DALMARNOCK,	8'095	8'231	16'326	3'683	4'018	7'701	2'048	2'572	4'620	0'966	1'660	2'626	1
2	CALTON, ...	7'858	8'007	15'865	4'192	4'602	8'794	2'467	3'310	5'777	1'204	2'030	3'234	2
3	MILE-END, ...	8'008	7'962	15'970	3'781	3'885	7'666	1'810	2'522	4'332	1'035	1'627	2'662	3
4	WHITEVALE,	8'366	8'368	16'734	3'784	4'123	7'907	2'204	2'779	4'983	1'291	1'795	3'086	4
5	DENNISTOWN,	9'130	9'960	19'090	3'983	4'179	8'162	2'185	2'687	4'872	1'069	1'726	2'825	5
6	SPRINGBURN,	9'535	7'898	17'433	6'110	5'715	11'825	3'916	2'008	3'966	0'763	1'033	1'796	6
7	COWLAIRS,	8'226	7'230	15'456	5'843	5'546	11'389	4'222	3'858	8'080	0'884	1'233	2'117	7
8	TOWNHEAD,	8'957	8'271	17'228	6'009	5'900	11'909	4'334	2'756	5'231	1'017	1'635	2'652	8
9	BLACKFRIARS,	8'247	8'307	16'554	6'199	6'451	12'650	4'101	3'047	5'206	1'086	1'839	2'945	9
10	EXCHANGE,	9'673	8'427	18'100	6'105	6'148	12'253	3'095	2'838	5'933	1'548	2'020	3'568	10
11	BLYTHSWOOD,	9'525	11'456	20'981	5'398	7'225	12'823	3'320	4'274	7'594	1'844	2'452	4'296	11
12	BROOMIELAW,	9'851	7'485	17'336	6'519	5'969	12'488	2'979	3'291	6'270	1'028	1'879	2'907	12
13	ANDERSTON,	8'853	8'452	17'305	6'297	6'030	12'327	2'896	2'632	5'028	1'012	1'667	2'679	13
14	SANDYFORD,	8'575	8'904	17'479	5'811	6'314	12'125	2'896	3'618	6'514	1'395	2'276	3'671	14
15	PARK, ...	7'794	11'525	19'319	5'554	8'276	13'830	2'714	4'273	6'987	1'666	3'048	4'714	15
16	COWCADDENS,	8'653	8'108	16'761	6'082	6'037	12'119	2'305	2'919	5'224	1'034	1'680	2'714	16
17	WOODSIDE,	8'500	9'374	17'874	6'060	6'284	12'344	2'044	2'618	4'662	0'887	1'677	2'564	17
18	HUTCHESONTOWN,	8'197	8'323	16'720	5'772	6'104	11'876	1'925	2'201	4'126	0'760	1'458	2'218	18
19	GORBALS, ...	9'261	8'333	17'594	5'994	5'961	11'955	2'629	3'393	6'022	1'318	1'944	3'262	19
20	KINGSTON,	8'556	8'268	16'824	5'930	6'063	11'993	2'693	3'202	5'895	1'157	1'745	2'902	20
21	GOVANHILL,	9'286	9'333	18'619	5'718	6'064	11'782	1'971	2'436	4'407	0'839	1'518	2'357	21
22	LANGSIDE,	7'918	11'097	19'015	6'147	7'610	13'757	2'282	3'381	5'663	1'578	2'507	4'085	22
23	POLLOKSHIELDS,	5'960	10'864	16'824	5'105	5'850	10'955	3'251	3'826	7'077	1'933	3'101	5'034	23
24	KELVINSIDE,	5'797	13'995	21'792	4'663	8'975	13'638	2'601	3'984	6'585	1'305	2'940	4'355	24
25	MARYHILL,	9'672	9'728	19'400	5'985	6'134	12'119	1'785	2'023	3'808	0'766	1'183	1'949	25
—	INSTITUTIONS,	11'945	6'818	18'763	13'124	3'711	16'835	7'138	2'755	9'893	5'361	4'368	9'929	Inst.
—	SHIPPING, ...	36'503	0'564	37'067	18'614	0'081	10'385	4'190	...	4'190	0'725	...	0'725	Ship.
CITY (without Institutions and Shipping), ...		8'501	8'905	17'406	5'915	6'343	12'258	2'283	2'847	5'130	1'101	1'792	2'893	0'005
CITY (including Institutions and Shipping), ...		8'634	8'838	17'472	6'119	6'266	12'385	2'409	2'841	5'250	1'213	1'855	3'068	0'007
											0'006	0'008	0'014	0'014

TABLE XI.—CENSUS, 1901—GLASGOW: NUMBER OF INMATES, WINDOWED ROOMS, AND IRISH-BORN IN INSTITUTIONS IN EACH MUNICIPAL WARD.

MUNICIPAL WARDS.	NAME OF INSTITUTION.	NUMBER OF INMATES.			Born in Ireland.	Windowed Rooms.
		Males.	Females.	Total.		
1 DALMARNOCK, ...	Belvidere Hospitals, ...	234	455	689	57	327
	Lodging-House, 20 Moncur Street, ...	4	263	267	43	14
	Do., 66 do., ...	193	...	193	42	11
	Do., 179 Great Hamilton Street, ...	700	...	700	155	11
2 CALTON, ...	Do., 52-58 Clyde Street, ...	363	6	369	120	12
	City Orphan Home, ...	88	35	123	1	52
	Lodging-House, 45-49 Greendyke Street, ...	282	4	286	122	12
	Family Home, St. Andrew Street, ...	250	125	375	21	176
3 MILE-END, ...	Catholic Orphanage for Boys, ...	205	5	210	14	21
	Do. do. Girls, ...	...	208	208	14	29
	Slatefield Industrial School, ...	175	2	177	9	32
	Old Barracks, Gallowgate, ...	57	75	132	2	60
	Lodging-House, 48 Duke Street, ...	206	1	207	37	15
4 WHITEVALE, ...	Do., 39 Watson Street, ...	352	...	352	66	8
	Do., 21 do., ...	519	1	520	134	8
	Do., 14-16 do., ...	111	...	111	33	4
	Mission Hall for Friendless and Fallen Females, ...	3	84	87	7	27
5 DENNISTOUN, ...	Glasgow Royal Infirmary, ...	375	363	738	93	206
	Drygate Model Lodging-House, ...	365	4	369	149	16
	H.M. Prison, ...	105	314	419	65	643
6 SPRINGBURN, ...	St. Joseph's Home, ...	104	137	241	190	48
	Barnhill Poorhouse, ...	686	745	1,431	346	85
8 TOWNHEAD, ...	City Poorhouse, ...	863	804	1,667	426	256
	Fever Hospital, Parliamentary Road, ...	94	204	298	10	122
	Old Man's Home and Asylum for Old Women, ...	126	75	201	18	77
	Lodging-House, 173 High Street, ...	168	2	170	65	5
9 BLACKFRIARS, ...	Do., 195-207 do., ...	1	145	146	16	18
	Do., 34 Stirling Street, ...	192	3	195	36	33
	Do., 6-14 Miller's Place, ...	80	34	114	39	12
	Central Police Office, ...	95	35	130	24	83
10 EXCHANGE, ...	The Night Asylum for the Houseless, ...	164	90	254	63	57
	Hotel, ...	110	87	197	36	282
11 BLYTHSWOOD, ...	Hotel, ...	29	48	77	18	91
	Y.M.C.A., 100 Bothwell Street, ...	121	13	134	2	208
12 BROOMIELAW, ...	Lodging-House, 28 M'Alpine Street, ...	314	2	316	83	16
	James Watt Street Home, ...	377	2	379	103	16
	Hotel, ...	127	80	207	21	379
13 ANDERSTON, ...	Hydepark Lodging-House, ...	347	2	349	129	17
14 SANDYFORD, ...	Clydesdale do., ...	133	1	134	71	7
	Eye Infirmary, ...	65	46	111	13	65
15 PARK, ...	Western Infirmary, ...	253	382	635	80	381
	Sick Children's Hospital, ...	44	70	114	7	93
16 COWCADDENS, ...	Lodging-House, 51 North Woodside Road, ...	352	6	358	60	11
	Do., 1 Burns Street, ...	399	2	401	74	10
	Do., 16 Garscube Lane, ...	255	...	255	64	9
18 HUTCHESONTOWN, ...	Sanitary Reception-House, ...	52	50	102	10	19
19 GORBALS, ...	Carlton House, ...	403	...	403	104	12
	Lodging-House, Portugal Street, ...	425	4	429	118	24
20 KINGSTON, ...	Lodging-House, Centre Street, ...	311	...	311	70	12
22 LANGSIDE, ...	Victoria Infirmary, ...	87	131	218	24	206
	Deaf and Dumb Institution, ...	66	76	142	2	68
24 KELVINSIDE, ...	Training College, ...	...	160	160	32	94
	Royal Asylum, Gartnavel, ...	227	329	556	16	347
	Girls' Industrial School, ...	...	200	200	3	70
	Magdalene Institution, ...	...	102	102	7	23
25 MARYHILL, ...	Eastpark Home, ...	44	65	109	3	46
	Maryhill Lodging-House, ...	98	4	102	33	10
	Ruchill Fever Hospital, ...	269	497	766	53	415
	Government Barracks, ...	557	144	701	55	284
	TOTAL, ...	12,625	6,722	19,347	3,708	5,695



TABLE XII.—CENSUS, 1901.—GLASGOW: INHABITANTS GROUPED ACCORDING TO THE SIZE OF THEIR HOUSES (EXCLUSIVE OF INSTITUTIONS), ALSO NUMBER OF WINDOWED ROOMS AND EMPTY HOUSES IN EACH MUNICIPAL WARD.

MUNICIPAL WARDS.		1		2		3		4		5		Total Inhabited Houses.	Total Inhabitants.	Windowed Rooms.	Empty Houses.
		No.	Inhabitants.	No.	Inhabitants.	No.	Inhabitants.	No.	Inhabitants.	No.	Inhabitants.				
1	DALMARNOCK, -	4,173	13,428	6,147	32,370	929	5,519	136	784	94	686	11,479	52,787	20,391	541
2	CALTON, -	2,308	7,037	3,646	18,091	1,174	6,746	245	1,547	264	2,047	7,637	35,468	15,887	440
3	MILE-END, -	3,323	10,922	4,837	25,309	807	5,004	88	548	44	327	9,099	42,110	16,078	420
4	WHITEVALE, -	1,784	5,896	3,926	19,375	1,411	7,962	256	1,511	104	961	7,481	35,705	15,639	195
5	DENNISTOUN, -	627	1,879	2,761	12,000	1,977	9,847	744	3,967	476	2,789	6,585	30,482	18,376	256
6	SPRINGBURN, -	2,230	7,713	4,444	23,178	800	4,965	175	1,017	148	871	7,797	37,744	15,221	521
7	COWLAIRS, -	1,190	3,961	3,057	15,927	965	5,804	86	539	60	366	5,358	26,597	10,928	243
8	TOWNHEAD, -	1,725	5,142	4,457	21,753	1,473	8,445	526	3,227	264	1,925	8,445	40,492	18,917	439
9	BLACKFRIARS, -	1,771	5,604	3,278	16,345	943	5,536	291	1,919	215	2,002	6,498	31,406	13,981	325
10	EXCHANGE, -	77	208	112	512	100	612	65	364	69	630	423	2,326	1,965	28
11	BLYTHSWOOD, -	18	47	137	544	159	794	233	1,165	299	2,059	846	4,609	4,941	27
12	BROOMIELAW, -	257	745	865	4,252	439	2,541	182	1,234	71	861	1,814	9,633	4,835	70
13	ANDERSTON, -	1,235	3,749	3,214	15,692	1,325	7,596	282	1,622	200	1,275	6,256	29,934	14,105	166
14	SANDYFORD, -	796	2,518	2,010	9,555	1,335	6,997	483	2,703	832	4,676	5,456	26,449	16,547	184
15	PARK, -	124	300	705	2,987	925	4,378	1,458	6,863	1,790	10,375	5,002	24,903	23,821	159
16	COWCADDENS, -	2,202	6,977	4,074	20,391	1,436	8,096	355	2,214	309	2,194	8,376	39,872	18,153	480
17	WOODSIDE, -	1,770	5,400	5,111	24,090	1,865	10,050	528	2,899	518	3,008	9,792	45,447	23,506	404
18	HUTCHESONTOWN, -	2,489	7,909	4,175	21,358	589	3,724	39	276	20	136	7,312	33,403	12,902	204
19	GOREALS, -	1,286	3,799	2,619	12,488	2,110	11,594	696	4,246	534	3,623	7,245	35,750	18,918	284
20	KINGSTON, -	1,194	3,838	2,877	13,929	2,152	11,235	683	3,963	216	1,421	7,122	34,386	17,404	192
21	GOVANHILL, -	956	3,233	3,585	16,194	1,478	7,805	533	2,704	274	1,628	6,826	31,564	16,250	242
22	LANGSIDE, -	74	194	547	2,262	1,952	7,970	1,301	6,002	1,610	8,984	5,484	25,412	23,310	421
23	POLLOKSHIELDS, -	39	112	166	824	113	542	781	3,447	1,834	10,392	2,933	15,317	18,370	183
24	KELVINSIDE, -	15	35	173	801	414	1,700	368	1,635	2,015	11,440	2,985	15,611	22,345	202
25	MARYHILL, -	1,046	3,482	3,861	18,504	1,184	6,292	399	1,876	663	3,563	7,153	33,717	18,753	648
CITY, -		32,709	104,128	70,784	348,731	28,055	151,754	10,933	58,272	12,923	78,239	155,404	741,124	401,543	7,274



TABLE XIII.—CENSUS, 1901.—GLASGOW : PROPORTION PER CENT. OF HOUSES OF VARIOUS SIZES, AND OF THE TOTAL POPULATION DWELLING IN THEM, IN MUNICIPAL WARDS.

MUNICIPAL WARDS.		1 APARTMENT.		2 APARTMENTS.		3 APARTMENTS.		4 APARTMENTS.		5 APARTMENTS AND UPWARDS.		
		Houses.	Inhabitants.	Houses.	Inhabitants.	Houses.	Inhabitants.	Houses.	Inhabitants.	Houses.	Inhabitants.	
1	DALMARNOCK,	36.35	25.438	53.55	61.322	8.09	10.455	1.19	1.485	0.82	1.300	1
2	CALTON, -	30.22	19.840	47.74	51.007	15.37	19.020	3.21	4.362	3.46	5.771	2
3	MILE-END, -	36.52	25.937	53.16	60.102	8.87	11.883	0.97	1.301	0.48	0.777	3
4	WHITEVALE, -	23.85	16.513	52.48	54.264	18.86	22.299	3.42	4.232	1.39	2.692	4
5	DENNISTOWN, -	9.52	6.164	41.93	39.368	30.02	32.304	11.30	13.014	7.23	9.150	5
6	SPRINGBURN, -	28.60	20.435	57.00	61.408	10.26	13.154	2.24	2.695	1.90	2.308	6
7	COWLAIRS, -	22.21	14.893	57.05	59.883	18.01	21.822	1.61	2.026	1.12	1.376	7
8	TOWNHEAD, -	20.43	12.699	52.78	53.721	17.44	20.856	6.23	7.970	3.12	4.754	8
9	BLACKFRIARS, -	27.25	17.844	50.45	52.044	14.51	17.627	4.48	6.110	3.31	6.375	9
10	EXCHANGE, -	18.20	8.943	26.48	22.012	23.64	26.311	15.37	15.649	16.31	27.085	10
11	BLYTHSWOOD, -	2.13	1.020	16.19	11.803	18.80	17.227	27.54	25.277	35.34	44.673	11
12	BROOMIELAW, -	14.17	7.734	47.69	44.140	24.20	26.378	10.03	12.810	3.91	8.938	12
13	ANDERSTON, -	19.74	12.524	51.37	52.422	21.18	25.376	4.51	5.419	3.20	4.259	13
14	SANDYFORD, -	14.59	9.520	36.84	36.126	24.47	26.455	8.85	10.220	15.25	17.679	14
15	PARK, -	2.48	1.205	14.09	11.994	18.49	17.580	29.15	27.559	35.79	41.662	15
16	COWCADDENS, -	26.29	17.498	48.64	51.141	17.14	20.305	4.24	5.553	3.69	5.503	16
17	WOODSIDE, -	18.07	11.882	52.20	53.007	19.05	22.113	5.39	6.379	5.29	6.619	17
18	HUTCHESONTOWN, -	34.04	23.678	57.10	63.940	8.06	11.149	0.53	0.826	0.27	0.407	18
19	GORBALS, -	17.75	10.627	36.15	34.931	29.12	32.431	9.61	11.877	7.37	10.134	19
20	KINGSTON, -	16.76	11.162	40.40	40.508	30.22	32.673	9.59	11.525	3.03	4.132	20
21	GOVANHILL, -	14.01	10.243	52.52	51.305	21.65	24.727	7.81	8.567	4.01	5.158	21
22	LANGSIDE, -	1.35	0.764	9.98	8.901	35.59	31.363	23.72	23.619	2.936	35.353	22
23	POLLOKSHIELDS, -	1.33	0.731	5.66	5.380	3.85	3.539	26.63	22.505	62.53	67.845	23
24	KELVINSIDE, -	0.50	0.224	5.80	5.131	13.87	10.890	12.33	10.473	67.50	73.282	24
25	MARYHILL, -	14.62	10.327	53.98	54.880	16.55	18.661	5.58	5.564	9.27	10.568	25
CITY, - - - - -		21.05	14.050	45.55	47.054	18.05	20.476	7.03	7.863	8.32	10.557	

TABLE XIV.—CENSUS, 1901—GLASGOW: AVERAGE NUMBER OF INMATES PER HOUSE OF EACH SIZE AND OF ALL SIZES, ALSO PERCENTAGE OF EMPTY HOUSES IN MUNICIPAL WARDS.

MUNICIPAL WARDS.		1 Apart- ment.	2 Apart- ments.	3 Apart- ments.	4 Apart- ments.	5 Apart- ments and Upwards.	All Sizes.	Per- centage of Empty Houses.	
1	DALMARNOCK, - -	3.218	5.266	5.941	5.765	7.298	4.599	4.5	1
2	CALTON, - - -	3.049	4.962	5.746	6.314	7.754	4.644	5.4	2
3	MILE-END, - - -	3.287	5.232	6.200	6.227	7.432	4.628	4.4	3
4	WHITEVALE, - -	3.305	4.935	5.643	5.902	9.240	4.773	2.5	4
5	DENNISTOUN, - -	2.997	4.346	4.981	5.332	5.859	4.629	3.7	5
6	SPRINGBURN, - -	3.459	5.216	6.206	5.811	5.885	4.841	6.3	6
7	COWLAIRS, - - -	3.329	5.210	6.015	6.267	6.100	4.964	4.3	7
8	TOWNHEAD, - - -	2.981	4.881	5.733	6.135	7.292	4.795	4.9	8
9	BLACKFRIARS, - -	3.164	4.986	5.871	6.595	9.311	4.833	4.8	9
10	EXCHANGE, - - -	2.701	4.571	6.120	5.600	9.130	5.499	6.2	10
11	BLYTHSWOOD, - -	2.611	3.971	4.994	5.000	6.886	5.448	3.1	11
12	BROOMIELAW, - -	2.899	4.916	5.788	6.780	12.127	5.310	3.7	12
13	ANDERSTON, - - -	3.036	4.882	5.733	5.752	6.375	4.785	2.6	13
14	SANDYFORD, - - -	3.163	4.754	5.241	5.596	5.620	4.848	3.3	14
15	PARK, - - - -	2.419	4.237	4.733	4.707	5.796	4.979	3.1	15
16	COWCADDENS, - -	3.168	5.005	5.638	6.237	7.100	4.760	5.4	16
17	WOODSIDE, - - -	3.051	4.714	5.389	5.491	5.807	4.641	4.0	17
18	HUTCHESONTOWN, -	3.178	5.115	6.323	7.077	6.800	4.568	2.7	18
19	GORBALS, - - -	2.954	4.768	5.495	6.101	6.785	4.934	3.8	19
20	KINGSTON, - - -	3.214	4.842	5.221	5.802	6.579	4.828	2.6	20
21	GOVANHILL, - - -	3.382	4.517	5.281	5.073	5.942	4.624	3.4	21
22	LANGSIDE, - - -	2.622	4.135	4.083	4.613	5.580	4.634	7.1	22
23	POLLOKSHIELDS, -	2.872	4.964	4.796	4.414	5.663	5.222	5.9	23
24	KELVINSIDE, - - -	2.333	4.630	4.106	4.443	5.677	5.230	6.3	24
25	MARYHILL, - - -	3.329	4.792	5.314	4.702	5.374	4.714	8.3	25
CITY - - -		3.183	4.927	5.409	5.330	6.054	4.769	4.5	

[illegible]



TABLE XVI.—STATEMENT BY MASTER OF WORKS SHOWING THE NUMBER OF HOUSES, FOR THE ERECTION OF WHICH AUTHORITY HAS BEEN GRANTED BY THE DEAN OF GUILD COURT DURING EACH YEAR, FROM 1st SEPTEMBER, 1891, TO 31st AUGUST, 1901.

Police District.	HOUSES OF ONE APARTMENT.											HOUSES OF TWO APARTMENTS.											HOUSES OF THREE APARTMENTS.										
	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	Total.	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	Total.	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	Total.
	A	45	24	33	14	72	...	14	...	...	202	125	22	171	28	153	9	73	15	3	...	599	40	2	45	15	24	...	16	41	37	...	220
B	...	5	24	49	35	9	15	25	...	...	162	32	24	33	60	79	59	27	38	...	...	352	100	...	23	13	9	1	3	9	15	...	173
C	36	45	145	229	192	168	468	289	132	194	1,898	154	334	339	613	694	605	1,242	576	360	393	5,310	166	215	170	73	147	273	231	32	121	163	1,591
D	102	123	18	191	29	24	6	...	...	...	493	149	252	23	332	103	70	21	18	...	8	976	21	44	9	32	90	18	23	8	...	7	252
E	...	36	76	54	59	190	23	79	51	12	580	28	57	349	192	272	508	116	198	154	53	1,927	47	37	148	60	45	117	12	43	9	7	525
F	28	21	56	45	97	284	221	453	272	76	1,553	240	53	212	113	89	656	743	497	421	412	3,436	104	5	85	34	90	169	181	64	55	161	948
G	...	4	5	5	9	2	...	3	3	27	58	4	130	126	117	107	255	420	296	107	137	1,69	53	368	286	204	246	254	215	296	165	116	2,203
H	49	77	113	87	30	134	108	11	42	68	719	175	264	266	328	236	593	725	187	161	121	3,05	92	121	108	61	125	140	175	99	12	100	1,033
	260	335	470	674	523	811	855	860	500	377	5,665	907	1,136	1,519	1,783	1,733	2,755	3,367	1,825	1,206	1,124	17,355	623	792	874	492	776	972	856	592	414	554	6,945
	HOUSES OF FOUR APARTMENTS.											HOUSES OF FIVE APARTMENTS.											HOUSES OF SIX APARTMENTS AND UPWARDS.										
	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	Total.	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	Total.	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	Total.
	A	7	...	1	...	...	1	4	...	40	...	53	1	...	...	...	...	...	1	...	...	...	2	1	...	...	...	...	...	...	...	...	...
B	25	47	20	56	56	35	35	...	40	42	356	15	34	26	42	41	7	6	...	14	2	187	...	...	...	8	...	9	...	...	2	24	25
C	23	57	32	10	4	17	23	7	22	8	203	...	7	3	13	...	...	8	8	...	...	43	8	2	6	7	6	11	1	2	6	...	49
D	...	...	...	...	19	...	5	6	...	1	31	...	...	...	...	5	1	...	...	...	...	6	...	...	...	2	...	1	...	...	...	...	3
E	24	5	11	8	12	23	1	13	...	...	97	9	10	...	...	...	...	11	...	...	...	30	8	...	...	3	...	...	...	17	...	...	39
F	3	6	8	2	8	...	13	29	...	12	81	...	...	...	2	...	...	11	2	4	2	21	...	...	1	...	...	5	4	...	2	1	14
G	2	28	165	116	37	118	43	115	98	51	773	6	22	8	83	17	...	44	79	61	59	395	41	50	6	114	71	47	52	67	59	91	654
H	43	9	132	8	30	10	11	14	...	9	266	21	6	52	28	5	...	134	34	22	25	327	24	23	68	50	19	31	145	44	46	82	532
	127	152	369	200	166	204	135	184	200	123	1,860	52	79	89	168	68	24	203	135	101	92	1,011	82	79	145	180	104	104	202	134	115	176	1,321











CORPORATION OF GLASGOW.

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SMALLPOX, 1900-1902.

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REPORT

BY

A. K. CHALMERS, M.D.,  
MEDICAL OFFICER OF HEALTH.

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## PROGRESS OF OUTBREAK.

### GENERAL OUTLINE.

The course of the Smallpox prevalence which began in April, 1900, has, up till the date of reporting, presented, in a general way, three phases—a pre-epidemic period; one of epidemic severity within a comparatively limited area; and, after an interval of four months, a period of re-emergence.

The pre-epidemic period may be said to have lasted from the introduction of the disease in April, 1900, until the following December. The epidemic attained its maximum prevalence between January and March, 1901, after which the number of attacks rapidly declined, and the last sickening in this phase of the outbreak occurred on 29th June. It reappeared early in the following November, and again displayed considerable vigour during the spring months of the present year.

The separation of these periods is fairly definite, although, even in the early weeks of the pre-epidemic stage, there was already evidence of widespread activity, and in the middle of the epidemic period an interval of decreasing prevalence occurred, which extended from 1st to 18th February, and separated the periods of maximum sickening, which had occurred on 17th January and again on 1st February, from a period of more sustained prevalence, beginning on 19th February and ending on 2nd March.

The disease was introduced, under circumstances to be afterwards described, into an overcrowded one-apartment house in District No. 11 (Calton), which forms part of the eastern limit of the Central Sanitary District.\* Ten or twelve days elapsed before medical attendance was sought and the nature of the disease recognised, with the result that in this and the next following fortnightly period cases occurred in eight households in the same tenement, and in others elsewhere, in persons, some of whom were only then found to have been resident in, or visitors to, this tenement during the unrecognised period of the first patient's illness. During the first fortnight of the outbreak (ending 21st April) all the cases registered were among residents in the tenement in question, but already in the second fortnight (ending 5th May) four almost simultaneous attacks occurred in one household in the Eastern (Preston Street), which had no traceable connection with the earlier cases, and in the third fortnight (ending 19th May) cases were recorded in all the districts save the South-Suburban and North-Western. In this last fortnight the cases numbered 21 in all, and 5 only of them could be associated with known sources of infection. In the fortnight which ended 2nd June the new cases registered had a similar distribution, with the inclusion, however, of two from the South-Suburban area. The North-Western remained free from the disease till the closing fortnight of the year, when one case was registered.

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\* For statistical purposes the whole area of the City is divided into 34 Districts, which, for purposes of administration, again are combined in 7 Groups, known also as Districts, and, for convenience, referred to as East, Central, Northern, Southern, Western, South-Suburban, and North-Western.



So far, a large proportion of the cases had occurred in the Central District, in which the disease began, and until the close of the fortnight ending 2nd June, of the 72 cases which had been registered, 33 were from the Central and 18 from the Eastern Districts of the City. In the following weeks a change in the distribution occurred, accompanied by evidence of increased activity in the propagation of the disease. During the fortnight ending 16th June 40 new cases were registered, 27 of which were in the Eastern District; and in the fortnight ending 30th June this district contributed 34 of the 58 cases then recorded. This exaggerated incidence in the Eastern District continued to characterise almost all the subsequent fortnights until the disease disappeared in the following summer, and it again became a feature in the development of the recrudescence in the spring of 1902. Although most of the other divisions in turn developed definite, and sometimes repeated foci of infection, there occurred in none of them any prevalence at all equal to that presented by the Eastern.

In the late summer and autumn of 1900 the disease abated, but late in November an increase began, which finally reached its maximum intensity in the week ending 19th January, 1901, when 255 new cases occurred.

In the following week the new cases fell to 93, but again in that ending 2nd February 111 sickened. The next fortnight was characterised by diminishing prevalence, 89 cases being recorded in the first and 62 in the second week; and the absence in this latter week of an increase, which might be assumed to have an incubation period in definite time-relationship with those which had occurred in the week ending 2nd February, appeared to indicate a moderation in the intensity of the outbreak. In the three weeks which followed, however (23rd February, 2nd and 9th March), 100, 172, and 107 newickenings occurred. In two periods, therefore, each of three weeks' duration, and separated by an interval of two weeks 459 and 379 cases occurred; but whereas in the first period there was a markedly diminished prevalence in the middle week, the prevalence during the last three weeks was maintained throughout. To this circumstance we shall return.

In the period of recrudescence the distribution followed the main lines of the pre-epidemic and epidemic prevalence.

It will be convenient here to tabulate the number of cases registered in the several Sanitary Districts in the successive fortnights of each of the three periods just referred to, and the accompanying maps should be referred to for information regarding the general arrangement of the districts. The figures given in the Tables here referred to include all admissions, and consequently contain some (27 in all) in which the subsequent development of symptoms warranted the exclusion of smallpox, although the records of the individual fortnights had been closed before the necessary corrections could be made. For this reason the numbers here given are in excess of the revised figures to be subsequently dealt with:—

TABLE I.—PRE-EPIDEMIC PERIOD, APRIL—DECEMBER, 1900.—CASES REPORTED IN THE SEVERAL FORTNGHTS.

Fortnight ending	Central.	East.	North.	South.	West.	S..S.	N..W.	Whole City.	No. in Hospital.
21st April, -	9	...	...	...	...	...	...	9	8
5th May, -	6	7	...	...	...	...	...	13	20
19th „ -	7	2	9	2	1	...	...	21	27
2nd June, -	11	9	5	1	1	2	...	29	40
16th „ -	4	27	2	7	...	...	...	40	61
30th „ -	10	34	7	5	1	1	...	58	93
14th July, -	2	9	1	1	...	...	...	13	68
28th „ -	5	18	...	2	...	...	...	25	49
11th August, -	2	18	1	1	1	...	...	23	55
25th „ -	...	3	...	...	...	...	...	3	29
8th September,	2	11	...	...	...	2	...	15	30
22nd „ -	1	6	...	3	...	1	...	11	23
6th October, -	2	9	...	...	...	...	...	11	26
*20th „ -	2	4	1	11	1	...	...	19	36
3rd November,	2	2	...	3	1	...	...	8	23
17th „ -	1	4	...	...	1	...	...	6	22
1st December, -	...	17	...	1	3	...	...	21	33
15th „ -	9	18	...	1	8	...	...	36	58
29th „ -	8	18	...	3	5	1	1	36	75
TOTAL, -	83	216	26	41	23	7	1	397	...

\* Nine of the cases in the Southern District here were employees in a wire factory in the district, and 1 in the Central was a trade canvasser, whose occupation led him to visit the works daily.

TABLE II.—EPIDEMIC PERIOD.—CASES REPORTED IN SEVERAL FORTNIGHTS, 1901.

Fortnight ending	Central.	East.	North.	South.	West.	S.-S.	N.-W.	Whole City.	No. in Hospital.
12th January, -	6	15	...	1	1	...	...	23	63
26th „ -	14	256	6	53	2	17	2	350	377
9th February, -	20	104	22	37	4	14	1	202	436
23rd „ -	20	67	11	17	2	7	3	127	368
9th March, -	30	219	18	26	2	3	1	299	435
23rd „ -	16	109	12	16	4	3	1	161	373
6th April, -	15	35	16	11	10	3	2	92	234
20th „ -	10	28	8	19	2	...	...	67	155
4th May, -	3	10	6	7	1	1	...	28	102
18th „ -	2	12	...	3	1	...	...	18	55
1st June, -	3	5	...	3	...	...	...	11	35
15th „ -	...	2	...	...	...	...	...	2	15
29th „ -	...	1	1	6	...	...	...	8	11
13th July, -	...	...	...	1	...	...	...	1	3
TOTAL, -	139	863	100	200	29	48	10	1,389	...

TABLE III.—RECRUDESCENCE, 1901-2.—CASES REPORTED IN THE SEVERAL FORTNIGHTS.

Fortnight ending	Central.	East.	North.	South.	West.	S.-S.	N.-W.	Total.	No. in Hospital.
16th November,	...	...	1	...	...	...	...	1	1
30th „	...	...	5	...	...	...	...	5	6
14th December,	...	...	3	1	...	...	...	4	7
28th „	...	...	...	...	...	...	...	...	7
11th January, -	2	1	24	...	...	...	1	28	33
25th „ -	4	3	13	2	1	...	...	23	55
8th February, -	3	4	13	3	...	...	...	23	50
22nd „ -	12	102	14	7	3	2	7	147	169
8th March, -	13	39	12	11	13	1	3	92	202
22nd „ -	6	32	14	25	1	3	4	85	104
5th April, -	5	15	2	11	2	1	...	36	105
19th „ -	3	6	2	1	2	1	...	15	71
3rd May, -	...	3	...	4	2	1	...	10	37
TOTAL, -	48	205	103	65	24	9	15	469	...



### CONDITIONS INFLUENCING EARLY SPREAD OF INFECTION.

The circumstances under which the first case occurred were exceptionally fitted for the dissemination of infection, and, as we have seen, cases were occurring before the end of April which were not traceably related to any known source.

This experience was frequently repeated, and independent foci of infection were established before the summer of 1900 had well advanced. Associated cases not infrequently occurred—grouped at one time in the neighbourhood of the residence, at another among the fellow-employees of some one whose illness had escaped recognition at the time of its occurrence. Mildness in type of the original attack not infrequently explained these groupings, the first illness being sometimes regarded as Chickenpox, or as a “bilious” affection, while in others it had not come under observation at all until the secondary attacks developed; but evidence of communication between the groups was not always, or indeed often, forthcoming, especially after the first weeks had passed.

It has already been indicated that the disease was unequally distributed throughout the City, and it will be well to indicate some details of its dissemination during the pre-epidemic period, so that we may be better able to consider whether new forces came into operation to determine its epidemic prevalence at a later period, and, if so, what they were.

### PRE-EPIDEMIC PERIOD.

Until the end of June, 1900, the numbers sickening increased steadily, but gave way during the autumn months, which were characterised rather by a persistent recurrence of the disease than by the actual numbers sickening. Chiefly, however, in the early period of increasing prevalence, a notable alteration in the distribution of the cases occurred, so that the districts invaded between April and the end of May may be contrasted with those invaded in subsequent weeks. For this purpose, on Map I. the localities in which cases were recorded in each of the fortnights ending 21st April, 5th May, 19th May, and 2nd June are distinctively marked in black, blue, and green dots respectively, and such details of their association with each other as were at the time discoverable, and are now necessary to enable their distribution to be followed, are transcribed from the reports of the several fortnights.

The invasion is thus described in the report to the Health Committee for the fortnight ending 21st April, 1900:—

For the first time since the early winter of 1897,\* indigenous cases of Smallpox have occurred, and the attendant circumstances create some apprehension as to the future spread of the disease. On 10th April I was asked to see a case of illness by the medical attendant of a man residing at 3 Tobago Street, and on visiting I found him suffering from Confluent Smallpox, the symptoms indicating that his attack was well advanced towards the end of the second week. He had not been brought under medical observation until the day preceding my visit.

The man had been a seaman on board the s.s. *Hispania*, which arrived in Glasgow on 18th March, from Bombay *via* Liverpool. I had been advised by the Medical Officer

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\* On 5th June, 1899, there was admitted to Hospital, suffering from Smallpox, a patient from the Northern District of the City, who had arrived in Glasgow on 23rd May from India, coming overland from Marseilles, at which port he arrived on 20th ultimo. His sickness began on 1st June, which would coincide with exposure to infection about the time of his arrival at Marseilles. There was no recognised case of Smallpox among the passengers or crew of the steamer in which he came from India.

of Liverpool of the occurrence of Smallpox on board this vessel while at that port, and, in consequence, had the crew kept under observation during the time she lay in port here, *i.e.*, from 18th to 21st March. This patient was re-vaccinated\* at Liverpool with the rest of the crew, and it had been reported to me that this had been successful, and that the patient had sailed with the ship on the 21st. Such, indeed, seems to have been his intention, as he had signed articles for the outgoing voyage, but had failed to join the ship, and his illness began towards the end of March. After his death no evidence of re-vaccination could be discovered.

It is a considerable time since any tenement in Glasgow has been exposed to such concentrated and continued infection as has occurred here, and the events which follow are of more than usual interest. Up till the present time (23rd April) eleven sicknesses have been discovered as the result of this man's illness. All of them, except the doctor who attended him and a pawnbroker's assistant who received articles in pledge from his household, are residents on the same stair in which the patient lived. Three of the cases occurred in the first patient's household—the two others being his wife and a female lodger—that is, all the inmates thereof. Three others occurred in a house on the top flat. The others—an unvaccinated child (who has since died) and its mother—were visitors to the first patient's house, and there are two single cases in separate households. In all, five households have been invaded, and four out of the five have been occupied in excess of their legal number. In the first patient's, for instance, three adults were found in one apartment ticketed for two, while two other houses, each ticketed for two, and one house ticketed for two and a-half, were each occupied by three adults and three children. Further illustration of the social habits of the family first attacked is afforded by the inclusion of the pawnbroker's assistant among the victims.

Tobago Street, where the first patient resided, is in Sub-District No. 11, and the invaded tenement is marked on Map I. with a circle enclosing a black dot.

In the next fortnight, ending 5th May, six of the recorded cases occurred in the Central District, and all were traceably associated with Tobago Street, although at the time of their discovery some were resident elsewhere.

In the Eastern District seven cases were registered, and some details of their association, and of the migratory character of some of the patients, are given in the subjoined extract:—

During the fortnight ending Saturday, 5th May, 13 cases of Smallpox were registered, making 22 in all from the beginning of the outbreak. 12 of these occurred in the first week of the fortnight, and 1 in the second. The connection of two of these occurring in the first week with the first case was noted in the report for last fortnight, and the following details have reference to the remaining 11 registered during the present one. 3 of the attacks developing in the first week involved three separate families residing at 3 Tobago Street, and occurred in persons under observation, while a fourth, nominally a tenant at this address, spent occasional nights in a Common Lodging-house, and had slept in one on the night preceding his discovery. A fifth case was discovered, through information gleaned from neighbours, in the person of a girl residing at 16 Kirk Street, Calton, who had been a visitor at infected houses in Tobago Street, but whose name had not been communicated at the time when the earlier infections were discovered. She was ten days ill when removed to Hospital. The sixth case was a woman who presented herself at the Central Dispensary for treatment. She had been resident at 3 Tobago Street during part of the illness of the first patient, but had left before the nature of his illness was recognised, and in the interval had changed

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\* Much correspondence resulted from this statement, and considerable use has been made of it by opponents of vaccination, who omit to notice the further statement in the report that no evidence of re-vaccination was discoverable after death. Several months after the incident was thus recorded the ship surgeon of the *Hispania* during this voyage returned to Glasgow, and it was then learned that the re-vaccination referred to in the minute had been performed, but unsuccessfully, during the voyage from India, in the month of February preceding, because of the occurrence of Smallpox on board, and that the operation had not been repeated on the occurrence of subsequent cases.



her abode—first to a friend's house in 34 Kent Street, leaving this to spend three or four nights (17th or 18th to 21st April) in the Moncur Street Model Lodging-house before taking a room at 139 Stockwell, in which she resided when her illness was brought to light. Case No. 7 occurred at 69 Main Street, Bridgeton, in the person of a rag-store worker, employed along with two residents at 3 Tobago Street, one of these being a lodger in the original patient's house, and now also in Hospital with the disease. The remaining four cases were in members of one family in Preston Street, Bridgeton, whose association with the Tobago Street centre cannot be directly traced. *They furnish the only exception in the history of direct association with 3 Tobago Street,* but, taken together with the incidents just recorded, they indicate that the source of infection has now spread beyond the original centre, and the keepers of Model Lodging-houses have been advised to be on the outlook for the disease among their patrons.

It is to be observed here that as early as the second fortnight evidence that the sources of infection were being widely distributed was supplied by the Dispensary patient, the rag-store worker, and the frequenter of the Common Lodging-house; while the illnesses in the Preston Street family, which began with the sickening of the mother on the 20th of April, after a period of confinement to the house for at least four weeks, brought her probable date of exposure to infection back to within a day or so of the time (10th April) when the first case was recognised.

The following fortnights, ending 19th May and 2nd June, showed an extension of the disease into the North, South, West, and South-Suburban areas; and as this latter fortnight brought one phase of the outbreak to a close, the details may be followed in the report of the period.

*(Extract from Report for Fortnight ending 19th May.)*

During the first week of the present fortnight 9, and in the second week 12 persons were admitted to Hospital suffering from Smallpox. This is an increase of 8 on the number registered during the previous fortnight, and while 5 of the cases occurring within the first week were in persons under observation in consequence of their association with one or other of the cases referred to in last report, none of those occurring during the second week belong to this category. Of these latter, however, one was supplied by a woman residing in Gallowgate, who had attended the Central Dispensary along with the patient noted in last report, and whose name we were in possession of, but whose address could not be ascertained, while another case arose in direct association with this one.

Of the cases not thus accounted for, 2 occurred in the Eastern, 9 in the Northern, 1 in the Central, and 1 in the Western District of the City—a sufficient indication that the sources of infection have now, as was anticipated from the facts which came to light in connection with the cases occurring during the previous fortnight, extended beyond the limits of the originally infected area. This is specially evident from the distribution of the disease in the Northern District of the City. The earlier cases occurring therein suggested contact during the hours of employment with some unrecognised case, and this impression was strengthened by the knowledge that several fellow-workmen had their residence in the neighbourhood originally infected; but the later cases had no such association, although the dates of sickening in all of them coincided with exposure to infection in the latter half of April. Indeed, the details of one of those later cases may be cited, because they illustrate the risks of infection to which the public are presently exposed, as well as the difficulty which attends the effort to bring particular attacks into direct connection with earlier cases. The patient in question is in the service of the Corporation as an attendant at one of the places of popular resort much patronised during the intervals of labour. He sickened on 7th May, but was able to attend to his duties till the evening of the 12th, by which time the eruption was at least two days old. As this latter date was a Saturday afternoon, quite an



indiscriminate exposure to infection must have occurred to a large number of persons, the result of which there is presently no means of estimating; but the incident will lend emphasis to the recommendation that, in the present distribution of the disease among the community, successful re-vaccination should be accepted as the only efficient means of acquiring protection from accidental exposure to infection.

Again, in the fortnight ending 2nd June, it is noted—

In the North-Western District alone has no case hitherto occurred. As in past outbreaks, we are again finding that one of the greatest obstacles to effectively coping with the disease is the occurrence of an extremely mild and modified form, which escapes recognition until, as a result, secondary cases of a graver nature arise. The history of these milder cases is strikingly uniform, and it may help towards a recognition of this form of the disease to briefly outline it here. In the majority of such cases medical advice is not sought; indeed, there may be said to be no definite illness—merely indisposition for a day or two, some little derangement of appetite, and then a few spots, of the appearance of pimples, on the face, body, or limbs. With the appearance of these spots the symptoms of indisposition pass off, and the patient is confirmed in his impression that the attack is a “bilious” one. The subsequent history of an example of this may be related at length, in the order in which the events came to knowledge. An employee of the Lighting Department was removed to Hospital with a well-marked and severe attack of the disease. During the investigation it was ascertained that a fellow-employee working at the same desk had suffered from a pimply eruption of the character already indicated, but was absent from work in consequence thereof only a day and a-half. On examining this latter a few stains only were found, two at least of which created an impression that they had been produced by Smallpox. By way of testing this impression he was re-vaccinated (unsuccessfully, as was afterwards found), and instructions were given to disinfect his house. On proceeding to carry out this, however, his wife was found actively employed in domestic duties with a quite recognisable, but very much modified, eruption of Smallpox, about three days old.

Of a different, but equally suggestive, character is the association of seven cases occurring near the junction of High Street and Duke Street. Proximity in residence here led to a comparison of dates of sickening, and these coincided so closely that a common source of infection was suggested. The information obtained pointed to a common acquaintanceship of the patients with the household of an eating-house keeper in the neighbourhood, whose wife, it was then learned, had died after some short-lived symptoms of acute illness on the night of 13th or early morning of 14th May. She had been a chronic sufferer from a skin eruption, which renders obscure the description of her last illness as told by friends, and there was no medical attendant. Haemorrhagic Smallpox, however, was suggested by some of the particulars gathered, but, without being able now to verify this impression, the practical value of the incident lies in the discovery during this investigation that a daughter of this household was then recovering from an attack of the disease so mild that not more than half-a-dozen spots could be detected.

One case admitted during the fortnight affords quite a striking, although negative, illustration of the protective value of re-vaccination. On 14th May a patient was removed to Hospital from a tenement in the Northern District, seven days ill of the disease, and on the same day each household in the tenement was advised to accept re-vaccination of its adult members. All the tenants had this operation performed save one woman, who sickened on 23rd May, and is now in Hospital with the disease, her husband, who was re-vaccinated, escaping.

With a vivid recollection of the extensive re-vaccination carried out in the Model Lodging-houses and Prisons in quite recent years, it is of considerable interest to note that, although up till the present three Models have had opportunities of “catching fire,” so to speak, from the occasional residence therein of persons in daily intercourse with houses in which Smallpox was present (in one case, indeed, a patient had already slept for one night in a Model with the eruption upon him), nothing has as yet occurred to indicate their successful invasion.

With regard to the immediate future, everything points to a period of considerable anxiety. It cannot be too strongly impressed on the community that our present knowledge of the distribution of the disease renders it a question of simple prudence for each to protect himself from risk by re-vaccination. The disease is no longer confined to the earlier associates of the neighbourhood of its origin. One of the most recent cases occurred in Pollokshields (District 25).

We have now reached the period when a definite invasion of the Eastern District occurred. In the following tabulation the district distribution of all the cases recorded in three successive periods ending 2nd, 16th, and 30th June (including in that ending 2nd June all the cases known to have occurred from the beginning of the outbreak) are given:—

Period ending.	Central.	East.	North.	South.	West.	S.-S.	N.-W.	Total.
2nd June, - - -	33	18	14	3	2	2	...	72
16th „ - - -	4	27	2	7	...	...	...	40
30th „ - - -	10	34	7	5	1	1	...	58

Of the 9 cases recorded in the Eastern District till the end of the fortnight ending 19th May, 4, as has been said, formed a detached group in Preston Street, and 3 others could be referred to an association with Tobago Street. Up till the occurrence of those now to be considered, there were only 2 others (in the fortnight ending 5th May), one of whom (residing in William Street, Bridgeton) had a similar association, but the other (residing in Montgomery Street) was untraced.

It will lend greater precision here to take the dates of sickening in preference to the period of notifications, and in the Map II. the eastern cases only which sickened in the fortnights ending 2nd, 16th, and 30th June are indicated, by black, blue, and green dots respectively. In the several fortnights these numbered 16, 29, and 22, and had the following distribution:—In the fortnight ending 2nd June a grouping occurs round Steven Parade, immediately to the west of the Hospital; two are situated in the neighbourhood of Dechmont Street, to the north; and several are more widely distributed, especially towards the lower end of Springfield Road, Baltic Street, and Boden Street. In the fortnight ending 16th June a more definite grouping occurs in the neighbourhood of Baltic Street, and generally in a south-westerly direction from the Hospital; while in the fortnight ending 30th June there occurred a congeries of cases round a tenement in London Road, under the following circumstances:—

*(Extract from Report for Fortnight ending 30th June, 1900.)*

The most striking incident in the history of the disease during the fortnight was occasioned through the notification of a case in a tenement in London Road, and the subsequent discovery, as a result of house-to-house visitation, that for about two weeks the disease had been present in another household in this tenement, and that several others had subsequently been invaded, in addition to the one in which the notified case occurred. The patient whose attack stands related to all these others as the source from which their infection was derived was a girl who, when discovered, was in an advanced stage of the disease—progressing, in fact, towards recovery, but still in a highly-infectious condition. Her illness had been a moderately severe one, as judged by the crusting present on discovery, but she had no medical attendance, and



intercourse between the members of her household and the community was unrestricted. Smallpox infection takes full advantage of the opportunities thus offered for spreading, and a record of the cases presently known to have resulted from this one is instructive. House-to-house visitation of the tenement resulted in the discovery of eleven cases in seven households, and there has since been notified or discovered a neighbouring shop-keeper doing business with the tenants of this land; a fellow-worker with a member of the originally infected household; three visitors to the tenement, one of whom resides in the Eastern and two in the Northern Districts of the City—all of which can be relegated to infection derived from this source.

In addition to these 16 cases, 10 others occurred in the Eastern District who were associated with each other, or with cases in the previous fortnight, and there were 6 others for whom no such association could be discovered.

In the other districts of the City, 9 occurred in the Central, 6 being associated cases; 7 in the Northern District, only 1 of which had no traceable association with the others; and 5 in the Southern, 4 of which had a traceable connection. The South-Suburban District and the Western had each 1 case. In all 58 cases were registered, against 40 for the previous fortnight; but it may be observed, as affording some ground for satisfaction, that the majority are coming under notice earlier in the illness than formerly, and the chances of secondary infections from them are, in consequence, considerably lessened.

#### OCCUPATIONAL INCIDENCE.

The occupational incidence of the attacks so far serves only to indicate the wide distribution of the disease among the industrial population, without presenting any contrast between the occupations of those attacked before and after the beginning of June. Prior to 2nd June 41 were males and 57 females. During June there were 37 males and 35 females.

During July and August the numbers sickening considerably diminished; gradual dissemination through unrecognised mild attacks of the disease took place; and the difficulty of stimulating popular interest regarding the probable nature of illnesses, however mild, when accompanied by eruption, was again proving an obstacle to the early recognition of cases.

An enquiry with regard to the probable sources of infection of 48 cases recorded during the four weeks ending 11th August showed that in 14 cases only could this be ascertained:—

Fortnight, 28th July.	Fortnight, 11th August.		
5	9	...	Associated with previous cases.
13	10	...	Occurring in infected neighbourhoods.
7	4	...	No definite association with known sources.

Renewed activity began towards the end of November. In the fortnight ending 1st December, 21 cases had been reported, and in each of these ending 15th and 29th, 36 cases, the numbers contributed by the Eastern Districts being respectively 17 in the first and 18 in each of the later fortnights.

In Map III. the distribution of the cases occurring in each of these fortnights is distinctively marked, and it will be seen that while those occurring in the fortnight ending 1st December are widely distributed over Districts 5, 7, and 8, there is a definite grouping in the next fortnight in one part of No. 5, and in the second fortnight in District No. 7, towards Nuneaton Street, and again at the foot of Springfield Road.

The following incident in connection with a threatened invasion of the City Poorhouse which occurred at this time is worthy of note:—



## CITY POORHOUSE.

Early in December two cases were simultaneously recognised among inmates of the City Poorhouse, one of whom had been resident from the previous September, while the other had been admitted only three days previously, his sickness having begun two days before that. They were in separate wards, and the suspicion created by the indigenous case that infection had been introduced either by a modified and not recognised attack or through visitors was confirmed on the following days by the occurrence of other cases. The dates of sickening were as follows:—5th, 7th, 12th, 13th, and 14th December; while, as has already been said, another inmate, admitted on the 6th of December, had already sickened on the 4th.

On the Poor Law Authorities becoming aware of the gravity of the outlook, the services of the whole medical staff were called into requisition for the purpose of re-vaccinating both inmates and applicants for relief, and it was subsequently reported to the Health Committee that in the City Poorhouse 1,610 and in Barnhill 360 inmates, and 551 applicants, had been re-vaccinated.

The result of this vigorous action by the Poor Law Authorities was that no subsequent cases occurred among the inmates until the following winter, when the *personnel* had considerably changed.

## EPIDEMIC PERIOD.

By this time we had reached the beginning of the epidemic period of the outbreak, to which the following extracts refer:—

*(Extract from Report for Fortnight ending 12th January, 1901.)*

During the fortnight 16 cases of Smallpox occurred in the Eastern District, 6 in the Central, and 1 in each of the Southern and Western Districts—a total of 24, against 36 in the preceding fortnight. Notwithstanding this reduction in the number of cases registered, the outlook is not reassuring, and the approaching months are likely to see a still further extension of the disease. Among the causes for apprehension is the indifference with which the milder forms of the disease are being regarded. The following is an illustration:—On New-Year's Day a case of suspected Smallpox was reported from Commerce Street, and the patient, on being visited, was found to have been only a fortnight in Glasgow, and for the most of that time to have lodged with a family in Argyle Street, where he had sickened on 28th December, and, in consequence, had been removed to a friend's house in Commerce Street. Coincident with this case being recognised, a telegram was received from the Medical Officer of Health, Aberdeen, stating that a case of the disease had developed there in the person of a man who had also been a lodger in the Argyle Street house, but had gone home for the holiday season. Enquiry at this house resulted in the discovery that one of the inmates, a girl, was still suffering from an attack of much modified Smallpox, but had recovered sufficiently to admit of her returning to work, in a tea-room in the City, for the last week of the year. It was further found that a younger sister had sickened of a still milder form of the disease a fortnight earlier—that is, in the end of November—so that for five weeks previous to the New Year this house had been in an infectious condition, while the inmates were pursuing their usual avocations. Neither patient had been under medical treatment. This incident occurred in a house of six apartments, inhabited by a family of eight persons, in addition to which there were seven lodgers, four of whom were still in residence, and three had either removed or were on holiday—one being at an unknown address in Morayshire when he sickened of the disease, but returned to Glasgow before its nature was recognised. On the circumstances being brought to the notice of the management of the tea-room in question, twenty-three members of the staff were re-vaccinated, and the period of incubation has now passed without any sickening among them having occurred. Seven cases in all, however, arising out of direct association with the household, have, up till the present, been discovered. One of these, a visitor, residing at Great Hamilton Street, afforded an excellent illustration

of how a mild form of the disease may give rise to a more severe form in a person not protected by vaccination. The patient in this instance had visited several times during the currency of the disease at Argyle Street, and on 28th December sickened; she was unvaccinated, and her attack became confluent.

The indifference to effective re-vaccination on the part of the general population is much to be regretted in the present position of Smallpox in the City. In connection with the cases reported during the fortnight, 599 persons were re-vaccinated in the tenements where the cases occurred, or in the workplaces in which they were employed, but 19 only of the general public took advantage of the opportunity of free vaccination offered by the Health Committee through medical practitioners. Smallpox is at present widely distributed, and the temporary inconvenience which re-vaccination gives rise to is a trifling consideration to place against the absolute protection from the disease which it ensures. District visiting and the work of the various philanthropic and charitable organisations of the City can only be conducted with safety at the present time by those who are fully protected by vaccination, and we must look for a large extension of the disease in our midst unless voluntary effort is made by every section of the community to obtain the protection which re-vaccination affords.

*(Extract from Report for Fortnight ending 26th January, 1901.)*

During the fortnight 350 cases of Smallpox were registered, and the resources of the administration have been taxed to a degree quite unknown in recent years.

In the Eastern District alone 256 of these cases occurred; in the South and South-Suburban there were 70; in the Central, 14; in the Northern, 6; while the Western and North-Western Districts have each 2 cases.

In the Eastern District the majority of the cases have occurred in certain well-defined groupings, which constitute infected areas within which the disease has assumed epidemic virulence, and in the Southern District a similar tendency is likewise manifest, although in a more limited form at present.

The areas in the Eastern District in which this has occurred are—

- (1) Parkhead generally, but with a tendency towards aggregation at the upper end of Dalmarnock Street and streets adjacent thereto, in Westmuir Street and in the streets adjoining, and in the line of Great Eastern Road towards the eastern boundary of the City.
- (2) London Road and streets east of Bridgeton Cross, and again beyond its junction with Springfield Road.
- (3) Dalmarnock Road.
- (4) Springfield Road.
- (5) Main Street, Bridgeton.

In the Southern District the area lies between Caledonia Road and the River, and extends eastward in the direction of Oatlands, while sporadic cases have occurred in Crosshill, Langside, and Mount Florida.

The rapid extension of the disease in this form requires the concurrence of two factors, which may be thus stated—the free movement of mild and unrecognised cases, and a population largely susceptible to the disease from inefficient vaccination. A comparison of the dates of sickening in a very striking manner demonstrates the circumstances under which this took place.

I have been able to ascertain those dates in 306 of the cases registered, and reproduce them here—



Dates of Sickening.			Numbers Sickening.	Dates of Sickening.			Numbers Sickening.
				<i>Brought forward,</i>			39
December	28th,	...	—	January	12th,	...	7
	29th,	...	1		13th,	...	24
	30th,	...	1		14th,	...	22
	31st,	...	—		15th,	...	26
January	1st,	...	1		16th,	...	32
	2nd,	...	—		17th,	...	43
	3rd,	...	—		18th,	...	40
	4th,	...	1		19th,	...	30
	5th,	...	—		20th,	...	23
	6th,	...	—		21st,	...	16
	7th,	...	—		22nd,	...	5
	8th,	...	3		23rd,	...	1
	9th,	...	7		24th,	...	—
	10th,	...	15		25th,	...	—
	11th,	...	10		26th,	...	—
							—
<i>Carry forward.</i>			39				308

Dealing, in the first place, with the days on which the number sickening was greatest, we have a period, extending from the 13th to the 21st January, in which 256 persons were attacked, and the scale of attacks rises towards the 17th, when 43 persons sickened.

The period of incubation of Smallpox varies from the ninth to the seventeenth day after exposure, the majority sickening about the twelfth day. The 17th of January would therefore correspond to exposure to infection on the Saturday of the New Year holidays (5th January).

By the 7th of January most persons had returned to their ordinary occupation, and the rapid decline in the sickenings occurring in the third week of the year is quite as striking as the rapidity of the increase, which began more than a week earlier.

This analysis might be pushed somewhat further into an explanation of the number sickening between the 8th and 12th, fifteen persons having sickened on 10th January, which again corresponds with an exposure at the end of Christmas week, when many of the observances of the season had in part commenced.

The outbreak is, therefore, definitely related to exposure to infection occurring during the holiday season.

The localities involved correspond very closely, it will have been seen, with those in which isolated cases of the disease were known to have been occurring for some considerable time past; in these districts, therefore, there has been a succession of cases quite unrecognised owing to their mildness, but gradually, from their numbers, acquiring an explosive intensity which only required a suitable occasion to show itself. This came with the holiday season, when intimate co-mingling occurred, and the mild cases had for the time being a newly-established relationship. That this has proved to be a susceptible one almost beyond belief brings home most forcibly the need for statutory re-vaccination if communities are to be protected from recurring outbursts of the disease at intervals of years.

In June last the Health Committee, in view of the then distribution of Smallpox, recommended the population to have recourse to re-vaccination, and, by way of placing at the disposal of every one who was unable to pay for the operation an opportunity of having it done, a fee was paid to practitioners for all such operations performed by them. The result of this appeal was extremely disappointing, and even under conditions of direct exposure to infection we not unseldom found that an offer of re-vaccination was refused. Several of these, it must be added, are now in Hospital with Smallpox, and in two instances at least death has occurred.

At the present moment the numbers before us indicate that the rush of cases created by the holiday period has passed, but a secondary rise is likely to occur at a period corresponding to infection on the 17th, which is the day on which the maximum amount of infection is known to have been present among the population. The present



lull in the occurrence of cases is, therefore, not to be taken to indicate that the danger is past.

It may be interesting at the present time to point to the complete exemption from the disease enjoyed by the Post Office service. The members of this service, probably more than any other in the community, are brought into quite definite relationship with every infected area, and yet no case of sickness has occurred among them. It is a condition of this service that each member be efficiently re-vaccinated.

In the four weeks which followed a steady decrease occurred in the numbers registered fortnightly, but this was again followed by an increasing prevalence, indicated first by the number of admissions to Hospital in the last week of February, which collectively did not equal that which we have just seen, but extended throughout a period of three weeks, and, in consequence, created greater public apprehension than the larger volume of the earlier rise.

*(Extract from Report for Fortnight ending 9th March, 1901.)*

The cases of Smallpox registered during the fortnight numbered 299, and their distribution over the several districts is shown in the following Table, the numbers for the three preceding fortnights being given for comparison—

	26th Jan.	Fortnight ending		9th March.
		9th Feb.	23rd Feb.	
Eastern, - - - - -	256	104	67	219
Central, - - - - -	14	20	20	30
Northern, - - - - -	6	22	11	18
Southern, - - - - -	53	37	17	26
Western, - - - - -	2	4	2	2
South-Suburban, - - - - -	17	14	7	3
North-Western, - - - - -	2	1	3	1
	<u>350</u>	<u>202</u>	<u>127</u>	<u>299</u>

After an interval of diminishing prevalence of the disease, extending from 1st to 19th February, an increase again began, which was first indicated in the number admitted to Hospital on 23rd February. The recrudescence in the Eastern, Central, Northern, and Southern Districts may be stated as an increase of 155 per cent. on the numbers registered during the previous fortnight, but varying from 227 per cent. in the Eastern to 50 per cent. in the Central District. In relation to population, there were 13 attacks per 10,000 living in the Eastern District, less than 3 in a similar number in the Central District, 2 in the Southern, and 1 in the Northern.

The occurrence of this increase after an interval which is longer than the maximum period of incubation displaces it from the swing of epidemic movement which marked 17th January and 1st February. When the increase in January occurred there was a definite time relationship between the period of sickening and the preceding holiday season. No incident of a similar character occurred by which the rapid increase in the numbers sickening from 19th February may be accounted for. A comparison of the dates of sickening of these latter cases points to the end of the first week of February as a period when an active dissemination of the disease took place. It was at the end of this week that the daily number of patients under treatment was at its greatest, a fact which undoubtedly suggests the introduction of a new factor, the operation of which was most probably intensified by the seasonal conditions under which it occurred.

In the fortnight ending 23rd March 161 cases were registered, and thereafter the outbreak rapidly declined. In the two periods of greatest prevalence just referred to the following numbers were registered:—

Fortnight ending			
26th January,	9th February,	9th March,	23rd March,
350	202	299	161
<u>550</u>		<u>460</u>	

## PERIOD OF RECRUDESCENCE.

The history of this may be shortly told. The disease first reappeared in the Northern District of the City, and in contrast with what had occurred during the greater prevalence earlier in the year, certain Model Lodging-houses were now invaded, owing to the unrecognised presence of cases of an exceptionally mild type in one of them during December.

In the early weeks of the recurrence the cases were chiefly drawn from the Northern District, but in the fortnight ending 22nd February, of a total of 147 new cases occurring throughout the City, 102 occurred in the Eastern District, and the distribution generally reverted to the lines it had followed earlier in the year. The following extracts contain a description of the principal features which it presented :—

*(Extract from Report for Fortnight ending 16th November, 1901.)*

The first case of Smallpox which is known to have occurred in the City since 29th June last was admitted to Hospital on 6th current. The patient is a spirit salesman, employed in the Northern District, and also residing there. He sickened on 31st October, leaving work on the following day, but his illness was believed to be Measles until 6th November current, when some doubt as to its nature arose, and we were informed thereof. Patient occupied a house of two apartments; his family includes his wife and two young children, and there were three male lodgers. He had not been re-vaccinated in spring, while in his wife and one lodger the operation was then unsuccessful. Two possible explanations of the source of infection offer themselves, but in the absence of all trace of illness among his intimates, the possibility of his obtaining it through any channel of missed infection remaining from the outbreak in spring is less probable than that it has reached him through one suffering from a mild attack of the disease. It is consistent with all that is known of the conditions determining the incidence of Smallpox that a recurrence of the disease in dissociated centres is now to be expected, that our present case is only the first illustration that mild and unrecognised cases most probably already exist, and that, in consequence, the occurrence of subsequent disconnected cases is to be anticipated as the winter advances. All the known contacts have been placed under supervision, the household being removed to the Reception House, where those formerly unsuccessfully re-vaccinated have since been done.

In this and the adjoining tenement 50 out of 76 persons over five years of age had been re-vaccinated in spring. Two only of those remaining could be persuaded to take advantage of the offer of re-vaccination again made on the occurrence of the present case. The census showed that the number of persons over five years of age within the municipal area exceeded 670,000. The total number of recorded re-vaccinations among these amounts to slightly over 400,000.

*(Extract from Report for Fortnight ending 30th November, 1901.)*

During the fortnight 5 cases of Smallpox were registered, as against 1 in the preceding fortnight. The first of these five was reported on 20th November, having sickened on 14th November, while resident in a Model Lodging-house in the neighbourhood of Garscube Road. The source of this patient's infection was not ascertained until 26th November, when a second case (M.), residing in 202 Possil Road, was notified. Here the patient had sickened on 20th November, and, on enquiry, a third case (C.), a neighbour, was found to have sickened on 21st, and a fourth (J. K.) on 14th November. All of these are secondary to an attack in a fifth (K. D.), whose illness began on 31st October, and who had almost recovered by the time the other cases came to be investigated. There is a close correspondence between the beginning of this last patient's illness and that of the patient reported last fortnight. Both sickened on 31st October, but otherwise they appear to have nothing in common. None of the six cases in Hospital had been re-vaccinated.

In the tenements in the immediate vicinity of the infected one at Possil Road, it has been found that during the vaccination last spring 279 persons out of 413 persons



living over five years of age, or 67 per cent., were re-vaccinated, and this has been raised to 84 per cent. as the result of the present cases.

Since May last, however, re-vaccination has practically ceased among the general public.

*(Extract from Report for Fortnight ending 14th December, 1901.)*

The cases of Smallpox known to have occurred during the fortnight were four in number. One attack was due to infection contracted in London, two were associated with the cases reported last fortnight occurring at 202 Possil Road, and the fourth case occurred in Springburn, and had no discoverable connection with any other.

In the first case patient arrived on 29th November from Tilbury, and sickened on the following day, the rash appearing on 2nd December. The family which this patient was visiting in Glasgow consisted of five adults, three of whom had been re-vaccinated last winter.

The cases occurring in association with Possil Road are—

1. R. G., residing at Rodney Street, sickened on 1st December, the eruption appearing on the 4th. Patient had friends at 202 Possil Road, and was a frequent visitor there. Although she appears not to have visited after 18th November, she was visited subsequently at her own house by persons from that address.

2. Mrs. P., residing at 210 Possil Road. 210 is the front land to which those tenements entered from 202 from the back building. The husband of this patient is employed in connection with some alterations being carried out in the houses in which former cases of Smallpox had occurred, and he himself had been re-vaccinated.

The Springburn case sickened on 2nd December, the eruption appearing on the 4th. This patient had no vaccination mark, and says she understands she never was vaccinated.

*(Extract from Report for Fortnight ending 11th January, 1902.)*

In the first week of the fortnight twenty-three cases of Smallpox were admitted to Hospital, in the second week five cases.

These, with two exceptions, occurred in persons who, at the time they contracted the disease, were inmates of, or visitors at, a Model in the Northern District, and they afford another illustration of what will happen when a mild case is permitted to live among persons who are only partially protected by vaccination. This Model had been under observation during November, and, although an interval of freedom from infection occurred between the case then removed and the first of the present series, we may regard them as at least indirectly associated.

The outbreak was brought under notice in the following circumstances:—On 30th December the Local Authority of Ayr intimated that a man who had lived in this Model between the 7th and 11th of December had sickened in Ayr on the 22nd, and, while enquiry was being made into this, another inmate applied for parochial relief, and was recognised to be suffering from the disease.

The enquiry in the Model had already led to the discovery of two other cases; subsequently a man was discovered whose eruption went back to 6th December. Directly associated with this man are twenty others resident in the Model, one being the Superintendent, who had, on the occasion of the case in November, assured us that he had been re-vaccinated last April, and only admitted the error of his statement when his attack declared itself; two living in Models elsewhere; a bedmaker in the Model, but living in M'Adam's Lane; one in Possil Road and one in Bernard Street, in the Eastern District, both of whom were occasional visitors to the Model in question. On the recognition of the outbreak the owner was informed that he must cease admitting new inmates, and a circular was addressed to the keepers of all Model Lodging-houses advising them of the occurrence, and inviting their co-operation in the discovery of suspected illness. The affected Model is under nightly medical examination.

In this Model 143 persons were re-vaccinated, and of 83 examined within the fortnight 44 had proved successful and 39 unsuccessful.

In addition to these twenty-six, two other cases occurred during the fortnight, one in St. Vincent Lane and one in a Model in the Eastern part of the City, and neither, so far as is known, has any association with the group in the Northern District. With



regard to one of the admissions, a male patient, aged thirty-three years, named W. B., it falls to be observed that he says he was successfully re-vaccinated three years ago in one of the Models, and that two marks exist. This is a further illustration of what has already been said in connection with the cases occurring last year.

*(Extract from Report for Fortnight ending 25th January, 1902.)*

During the fortnight 23 cases of Smallpox occurred, as against 28 in the preceding fortnight. Of these, 6 were removed from the Model Lodging-house in the Northern District referred to formerly; 4 were removed from other districts, but had been resident in the Model at the time of contracting the disease; 6 were indirectly associated therewith; and 7 had no traceable association. Of those contracting the disease in the Home, one had, prior to sickening, gone to reside in the Western District; a second sickened in the Model late in December, but had gone soon thereafter to reside with a friend in Possilpark, and his illness was only recognised when his friend developed the disease; a third was admitted to the City Poorhouse, also late in December, and thereafter developed the disease in so mild a form that its nature was not recognised until a second inmate sickened; and a fourth was known to have been present with a Smallpox patient in the consulting room of a surgeon, and refused at the time to be re-vaccinated. His attack affords another illustration of the selective action of the infection of Smallpox, because the others then present in the surgery (save a young boy) had been re-vaccinated last spring, and none have been attacked save himself.

Of the 6 associated cases, 2 were removed from the City Poorhouse, 1 from Bridgeton, 1 from Possilpark, and 2 from the Northern District.

Early in the fortnight one case in Bridgeton was brought to notice, and the circumstances suggest that endeavours had been made to suppress knowledge of its existence. The patient, a child aged ten years, on being seen, had been ill and was confined to bed for over two weeks; she was unvaccinated, as was also her sister, who, along with the father, have since developed the disease, and are now in Hospital.

*(Extract from Report for Fortnight ending 8th February, 1902.)*

23 cases of Smallpox were registered during the fortnight, compared with a similar number during the previous fortnight, the distribution remaining much as formerly, 13 having occurred in the Northern District, 4 in the Central, and 3 in each of the Eastern and Southern Districts. Inmates of Model Lodging-houses still supply the majority of the cases from the Northern District, 3 having occurred in that which was originally infected and 6 in another Model in the neighbourhood. The other cases here were removed from Church Place, Cowcaddens, Mary Street, and Springburn Road, one only being traceably associated with the Model cases.

In the Model which became secondarily infected there were several inmates who had formerly been seen as visitors in the other.

Of the 3 cases occurring in the Central District, 2 were in Model Lodging-houses, and 1, removed from the Calton District, is associated with a case in the previous fortnight.

Of the cases occurring in the Eastern District, one is father of the child referred to last fortnight as affording illustration of an endeavour to conceal the existence of the disease; a second is an unvaccinated baby who has been taken to visit this household, but information thereof withheld until the sickness occurred; while a third was a worker in the Provanmill Gas-works, and associated with a case in the North Woodside District.

Of the 3 cases occurring in the Southern District, 1 is associated with a case in Struthers Street; 1 was a lodger in the house of the case removed during the previous fortnight, and was, at the time of sickening, under observation in the Reception House; and in 1 the origin of the disease cannot be traced.

*(Extract from Report for Fortnight ending 22nd February, 1902.)*

The most striking feature in the movement of this disease during the past fortnight has been the sharp increase in the number of cases occurring during the first week. Between November, when the first cases of the present recrudescence of the disease began, and the end of December, only 10 were known to have occurred in the City, 9 of which were in the Northern and 1 in the Southern District.

In the first fortnight of this year a definite association of cases was discovered, as described at the time, in a Model Lodging-house, also in the Northern District, and of 84 cases in all reported prior to the end of the fortnight ending 8th February, 59 were in the Northern and only 8 in the Eastern District of the City. During the fortnight just closed, however, the area of distribution has not only widened, but the incidence has changed, as is shown in the following Table:—

	Central.	Eastern.	Northern.	Southern.	Western.	S.-S.	N.-W.	Total.
16th Nov.,	- ...	...	1	...	...	...	...	1
30th „	- ...	...	5	...	...	...	...	5
14th Dec.,	- ...	...	3	1	...	...	...	4
28th „	- ...	...	...	...	...	...	...	...
11th Jan.,	- 2	1	24	...	...	...	1	28
25th „	- 4	3	13	2	1	...	...	23
8th Feb.,	- 3	4	13	3	...	...	...	23
	<u>9</u>	<u>8</u>	<u>59</u>	<u>6</u>	<u>1</u>	<u>...</u>	<u>1</u>	<u>84</u>
Fortnight ending 22nd Feb.,	12	102	14	7	3	2	7	147
	<u>21</u>	<u>110</u>	<u>73</u>	<u>13</u>	<u>4</u>	<u>2</u>	<u>8</u>	<u>231</u>

The circumstances just related demonstrated the need for reverting to active re-vaccination in the Eastern District, and the Special Committee authorised the employment of twelve additional vaccinators, who, with the Inspectors, form a corps of about thirty-one officers, which is nightly engaged, chiefly in the Eastern Districts in infected tenements, but generally wherever we have reason to believe that vaccination has been imperfectly carried out.

*(Extract from Report for Fortnight ending 8th March, 1902.)*

During the fortnight 92 cases of Smallpox were registered, as against 146 for the previous fortnight.

Of 39 cases occurring in the Eastern District, 29 occurred in Districts 7 and 8.

Of the cases in the Western District, 12 have been associated with a hotel there, either directly or at the time they contracted the disease. As a result of this, it has been necessary to instruct the proprietor to prohibit new admissions until a fortnight has elapsed without any new case occurring. The staff and a considerable proportion of the visitors accepted re-vaccination.

During the fortnight the first illustration has occurred of Smallpox attacking one of the employees. In this case the patient is a washerwoman, employed at the washing-house, Belvidere, who was permitted to begin work without being re-vaccinated.

Several illustrations have also occurred where the sickness only developed after a period of complete confinement to the house for longer than the period of incubation. This has been especially noticed in connection with several cases in the Southern District of the City, and suggests the diffusion of the disease by vagrants or itinerant vendors of small wares. We are also having repeated illustrations of the selective power of Smallpox infection in the occurrence of the disease in families where the patient alone is the only member unprotected by previous re-vaccination.

The vaccination corps has been further reinforced, so that now about forty operators are engaged nightly in pressing re-vaccination in the infected districts. An almost complete apathy, however, prevails, and little re-vaccination is accomplished save in tenements where cases occur.

Little advantage is being taken of the arrangements formerly made, by which a fee is paid by the Corporation for successful re-vaccination of citizens by medical practitioners.

The details of the district distribution down to May, 1902, is contained in Table III. Up till 5th April the disease in District 7 had reappeared in 36 instances in a tenement from which cases had been removed during 1900-01, but in no case was there a recurrence in the same house, nor were any patients admitted in whom there was evidence of successful re-vaccination having been performed during the earlier period of the outbreak.\*

\* See Note of 11th January, 1902.



## DISTRICT DISTRIBUTION.

The number of cases admitted to Hospital, including 61 from beyond the City boundary, in each of the periods was as follows:—

	Cases.	Deaths.	Case-Mortality.
Pre-epidemic Period—			
April—December, 1900, ...	387	46	11·9
Epidemic Period—			
January—June, 1901, ...	1,423	192	13·5
Recrudescence—			
November, 1901—3rd May, 1902,	469	?	?

## PRE-EPIDEMIC AND EPIDEMIC PERIODS.

Till the close of the epidemic period the cases numbered 1,759, only 10 of which were not removed to Hospital, the attacks having ended in death or recovery at home before their nature was recognised. Two hundred and thirty-four deaths occurred. These figures represent an attack-rate for the whole population of 2·3 per 1,000, a death-rate of ·3 per 1,000, and a case-mortality of 13·3 per cent.

In Table IV. (p. 24) the population of each Sanitary District, the number of cases and deaths, and the rate per million of population is stated, the grouping of the districts being arranged from those in which the disease was most prevalent to those in which it was least so. The cases occurring during the recrudescence are not included.

The unequal incidence of the disease here shown will best be appreciated by a comparison of the attack-rate in the several districts.

Greenhead and London Road (District 7) had an attack-rate of 9·9 per 1,000 living, which is fully six times that of the other districts, and fully four times that of the City generally. Next in point of severity of incidence comes Barrowfield (District 8), which lies between the Greenhead and London Road sections of District 7), with an attack-rate of 6·4 per 1,000. District 11, where the outbreak began, stands third, but here the rate is less than half that of District 7, and barely twice the City rate.

Further comparison will be simplified by grouping the districts according to their administrative divisions, as in the following Table:—

POPULATION, CASES, AND DEATHS IN EACH ADMINISTRATIVE DISTRICT.

ADMINISTRATIVE DISTRICT.	Population.	Cases.	Deaths.	RATE PER MILLION.		Case-Mortality per Cent.
				Cases.	Deaths.	
Eastern, ... ..	173,104	1,063	134	6,141	692	12·6
Central, ... ..	111,784	216	31	1,932	277	14·4
Southern, ... ..	132,718	239	30	1,801	226	12·6
Northern, ... ..	166,825	123	19	737	114	15·4
Western, ... ..	61,092	52	9	851	147	17·3
South Suburban, ...	64,205	55	10	857	158	18·1
North-Western, ...	51,984	11	1	212	19	9·1
City, ... ..	761,712	1,759	234	2,309	307	13·25



TABLE IV.—RETURN OF CASES AND DEATHS IN EACH SANITARY DISTRICT.

SANITARY DISTRICTS.	Population.	CASES.		DEATHS.	
		Number.	Rate per Million.	Number.	Rate per Million.
EASTERN.					
7. Greenhead and London Road,	66,197	660	9,970	73	1,103
8. Barrowfield, ... ..	27,696	179	6,463	26	939
5. Bellgrove and Dennistoun, ...	79,211	224	2,828	35	442
CENTRAL.					
11. Calton, ... ..	22,169	94	4,240	12	541
6. High Street and Closes East,	7,102	21	2,957	2	282
9. Monteith Row, ... ..	4,267	11	2,578	1	234
13. Brownfield, ... ..	3,924	10	2,548	...	...
12. St. Enoch Square, ... ..	3,000	5	1,667	1	333
14. Bridgegate and Wynds, ...	3,880	6	1,546	1	258
1. Exchange, ... ..	24,431	34	1,392	8	327
10. St. Andrew Square, ... ..	4,794	5	1,043	1	209
3. High Street and Closes West,	9,669	8	827	1	103
Bl. Blythswood, ... ..	28,548	22	770	4	140
SOUTH.					
21. Hutcheson Square, ... ..	70,229	146	2,079	18	256
22. Gorbals, ... ..	13,096	24	1,833	2	153
19. Kingston, ... ..	40,407	63	1,559	10	247
20. Laurieston, ... ..	8,986	6	668	...	...
NORTH.					
4. St. Rollox, ... ..	15,907	31	1,948	6	377
16. Cowcaddens, ... ..	18,206	19	1,043	4	220
— Springburn and Rockvilla, ...	35,527	26	732	3	84
31. Possilpark and Barnhill, ...	21,694	11	507	1	46
15. Woodside, ... ..	70,145	34	485	5	71
2. Port-Dundas, ... ..	5,346	2	374	...	...
WEST.					
18. Anderston, ... ..	28,858	40	1,386	7	243
17. Kelvinhaugh and Sandyford,	32,234	12	372	2	62
SOUTH-SUBURBAN.					
24. Crosshill, ... ..	7,626	11	1,442	2	262
23. Govanhill, ... ..	23,191	26	1,121	5	216
27. Pollokshields, West, and Bella- houston, ... ..	5,711	5	875	...	...
25. Langside and Mount Florida,	14,847	9	606	1	67
26. Pollokshields and Strathbungo,	12,830	4	312	2	156
NORTH-WEST.					
28. Hillhead, ... ..	8,537	4	469	...	...
30. Maryhill, ... ..	35,657	6	168	1	28
29. Kelvinside, ... ..	7,790	1	128	...	...
	761,712	1,759	2,309	234	307

## QUESTION OF HOSPITAL INFLUENCE.

During the progress of the outbreak it became obvious that some circumstance not essential to epidemic movement was determining this undue prevalence in the Eastern District.

We have already seen that early in June, 1900, an indication of this had occurred. As the outbreak developed, although in actual numbers the cases from this district were largely increased, their relative proportion to cases occurring elsewhere was only slightly raised.

During the epidemic prevalence of the disease early in the seventies, a similar aggregation of cases occurred around Parliamentary Road Hospital, and we may, by comparing the district distribution in some of the intervening years, discover whether this concentration of cases in the neighbourhood of the hospital takes place only when smallpox is epidemic, or whether it occurs also at any time when cases have to be dealt with.

In the following Table this is calculated for each of the years in which Smallpox was present in the City since 1892, and, for purposes of comparison, the distribution of the cases in 1900-1901, and the proportion of population residing in each of the districts is included:—

SMALLPOX.—PROPORTION FROM EACH ADMINISTRATIVE DISTRICT OF THE TOTAL CASES OCCURRING IN SEVERAL YEARS.

Year.	Total Cases.	PERCENTAGE OF TOTAL CASES.						
		East.	Central.	South.	North.	West.	S.S.	N.W.
1900-1901 }	1,759	60·4	12·3	13·6	7·0	3·0	3·1	·6
1892	78	28·2	19·2	26·9	3·9	20·5	1·3	—
1893	386	45·9	24·7	9·7	12·8	3·8	·8	2·3
1894	49	32·7	36·7	16·3	8·2	2·0	4·1	—
1895	243	33·4	14·0	9·0	5·8	36·2	·8	·8
1896	5	—	—	—	—	—	—	—
1897	59	57·6	3·4	32·2	5·1	—	1·7	—
Percentage Population, 1901, }		23	15	17	22	8	8	7

In each year, therefore, in which smallpox has been present the proportion of cases contributed by the Eastern District has been uniformly in excess of the proportion of the population residing there.

The Central, Southern, and Western Divisions in occasional years present a similar excess, but this is due in most cases to the circumstances under which the several outbreaks were introduced. The excess in the Eastern District is constant, and in none of the other districts is this feature present.

When the Eastern prevalence began in June, 1900, the number of cases in Hospital was comparatively limited, and it is reasonable to assume that, if simple aggregation of smallpox creates an element of risk to surrounding populations, this risk should increase with the density of the aggregation, and result in an exaggerated prevalence in those districts which are exposed to it when compared with those which are beyond its influence.

Could a gradation of risk be thus established, the question of site for such hospitals would be simplified, because it might be assumed that some standard of cubic space per patient could be found at which risk would be reduced to a minimum, if not entirely abolished.

In the preceding Table there is a rough indication of this in the years 1895, 1893, and 1900-1, when the numbers dealt with were 243, 386, and 1,759 respectively, and the proportion of Eastern cases 33, 46, and 60 per cent.

The occurrence during the present outbreak of a period when the disease might be described as prevalent, as distinguished from a subsequent period of epidemic intensity, afforded a further opportunity of comparing the effect which might be attributed to simple aggregation in Hospital with that occurring during a time when the demand for accommodation introduced an element of density in the aggregation, and necessitated a reduction of cubic space per bed.

The proportion of the total cases occurring in the several districts during each of these periods is as follows:—

ADMINISTRATIVE DISTRICT.	Percentage Population (Census 1901).	PROPORTION PER CENT. OF ATTACKS TO TOTAL ATTACKS IN EACH PERIOD.		
		Pre-epidemic.	Epidemic.	Recrudescence till 5th April.
Eastern, - - - -	23	54·8	61·8	44·1
Northern, - - - -	22	5·4	7·3	22·8
Southern, - - - -	17	10·1	14·8	13·5
Central, - - - -	15	22·2	9·6	10·1
Western, - - - -	8	5·7	2·2	4·5
South-Suburban, - -	8	1·5	3·6	1·6
North-Western, - -	7	0·3	0·7	3·4

Again it will be observed that the Eastern District alone presents in each of these periods a proportion of the total attacks much in excess of its proportion of the total population, while the Central District, into which the disease was introduced, has likewise a larger proportion of cases than of population in the first period, which, however, is not maintained in the second.

We are, for the moment, endeavouring to obtain some indication of a relationship existing between the volume of infection contained within the Hospital as distinct from that which may be assumed at least to follow in the wake of a converging stream, both of patients and infected clothing, *plus* the opportunities for acquiring infection through contact, which the occurrence of a large number of cases created before their nature was recognised.



If a numerical relationship be established between the cases occurring before and after the beginning of the year 1901, this, for the City generally, would be expressed by the proportion of 1 to 3·5.

In the Eastern District it was 1 to 3·9, but these formed so large a proportion of the total that the difference is without importance. In the Northern District, however, the relationship is as 1 to 3·6, while in the South it is 1 to 4·9; in other words, there was almost a fivefold increase here during the epidemic period, as compared with a fourfold in the Eastern District; and the cases in the Southern District occurred at a part which is further removed from Belvidere than any portion of Bridgeton.

It is impossible to exclude from this the operation of widely distributed opportunities of infection which we know existed, but a comparison of the proportion of Eastern cases in the several stages of invasion, early activity, decrease, and subsequent epidemic prevalence of the disease, shows that a general correspondence existed, not so much with the accumulated numbers under treatment, as with the fluctuations in the number of admissions, although even here the parallel breaks down when applied to the early period of the epidemic increase.

PROPORTION OF CASES OCCURRING IN EACH DISTRICT TO TOTAL CASES IN SEVERAL PERIODS.

PERIOD ENDING	Total cases in each period.	PERCENTAGE OF TOTAL CASES.							
		East.	Central.	North.	South.	West.	S.S.	N.W.	
2nd June, - - -	72	25·0	45·8	19·4	4·2	2·8	2·8	...	
11th August, - - -	159	66·7	14·5	6·9	10·1	1·2	0·6	...	
17th November, - - -	73	53·4	13·7	1·4	23·3	4·1	4·1	...	
29th December, - - -	93	56·9	18·3	...	5·4	17·2	1·1	1·1	
9th February, - - -	550	65·5	6·2	5·1	16·3	1·1	5·6	0·2	
23rd February, - - -	127	52·7	15·7	8·7	13·4	1·6	5·5	2·4	
23rd March, - - -	460	71·2	10·0	6·5	9·2	1·3	1·3	·5	

In the period of activity between 2nd June and 11th August, 1900, 67 per cent. of the cases were Eastern, the average weekly admissions to Hospital at the earlier date being 12·5; during the period of autumnal decrease—between 11th August and 17th November—the proportion of admissions from the Eastern Division was 53 per cent., while the weekly admissions averaged 5·2; 57 per cent. of the admissions from the middle of November till the close of the year were Eastern, during which period the average weekly number of admissions was 15·5; that it rose to 65 per cent. in the four weeks ending 9th February, when the weekly admissions averaged 138, and to 71 per cent. in the four weeks ending 23rd March, when the weekly admissions averaged 115.

The proportion of Eastern cases during the epidemic period, but especially in the four weeks ending 23rd March, seems to suggest a definite time relationship with the numbers under treatment, which reached their maximum on 8th March, when there were 522 patients in Hospital, but a comparison of the fortnightly admissions for the several fortnights of this period does not confirm the impression.

PROPORTION OF CASES OCCURRING IN EASTERN DISTRICT TO TOTAL CASES REGISTERED IN SEVERAL FORTNIGHTS, WITH MAXIMUM AND MINIMUM NUMBER IN HOSPITAL DURING THE FOURTEEN DAYS PRECEDING EACH PERIOD.

		Fortnight ending				
		Jan. 26.	Feb. 9.	Feb. 23.	Mar. 9.	Mar. 23.
Proportion of Cases admitted from Eastern District to total for Fortnight, - - - -	}	73.1	51.4	52.7	73.2	67.7
Maximum under treatment during previous 14 days, - - -	}	106	409	500	485	522
Minimum do. do., -		98	96	409	387	394

Here an equal proportion of new cases was occurring in the fortnights ending 26th January and 9th March, although the numbers admitted in the fortnight preceding each (*i.e.*, 12th January and 23rd February) were respectively 23 and 127, while the greatest number in Hospital in each of these last fortnights was 103 and 485, and, in contrast to both, 67.5 of the cases occurring in the fortnight ending 16th June, 1900, occurred at a time when the number in the wards was 67.

Again, in the following comparison, we find that in Districts 7 and 8 about one-third of the total cases occurring sickened in the four weeks ending 2nd February, while the proportion occurring in the four weeks ending 2nd March was little over a-fourth, although during the weeks of both periods the numbers under treatment in Hospital were rapidly increasing. In March again only 16 per cent. occurred.

PERCENTAGE OF CASES OCCURRING DURING SEVERAL PERIODS OF FOUR WEEKS EACH TO TOTAL CASES SICKENING IN DISTRICTS 5, 7, AND 8 DURING EPIDEMIC PERIOD.

Four Weeks ending					Districts		
					V.	VII.	VIII.
2nd February,	...	...	...	...	28	34	32
2nd March, ...	...	...	...	...	24	26	26
30th ,, ...	...	...	...	...	14	16	15

These comparisons have been undertaken with the double object of ascertaining whether Smallpox Hospitals radiate infection in a degree proportioned to the mass of infection within them, and whether any principles might be deduced which could guide further policy with regard to Hospital provision.

In the 1870-74 epidemic the disease was propagated in the neighbourhood of Parliamentary Road Hospital, where Smallpox was then treated.

During the limited outbreaks which occurred from 1892 onwards, we have found a preponderating proportion of cases invariably contributed by the Eastern

Districts. In the maps which are appended illustrating the present outbreak, there is no aggregation of cases beyond the mile and a-quarter radius from the Hospital which at all corresponds with the evidence of persistent recurrence of the disease within it.

We have seen that towards the end of May, 1900, cases began to occur in the immediate neighbourhood of Belvidere, which indicated exposure to infection at a date when the cases under treatment barely exceeded 30 daily.

At a later period, increasing numbers in Hospital were associated with increasing prevalence in its neighbourhood, yet their proportion to the total volume on each occasion varied only by a few per cent., while the numbers in Hospital were multiplied from six to sixteen times.

There is, however, a general correspondence between the proportion of cases occurring in the neighbourhood of the hospital and the numbers dealt with, but this is lost during the epidemic period, and the first wave of epidemic prevalence, early in January, 1901, cannot be brought into any definite relationship with the numbers in Hospital when it began. It is to be explained rather by widespread distribution of infection occurring earlier, while with regard to the subsequent and more restricted increases towards the end of February the conditions had altered, because in the Eastern District re-vaccination was being largely resorted to with every recurring wave of prevalence, and the March increase had, in consequence, a more restricted field for activity. It was, moreover, felt elsewhere, as we may see by a comparison of the cases in the Southern District, during this phase.

It would appear, therefore, to be a not unwarrantable deduction that the risk of aggregation begins at a very early period, and tends to foster a prevalence of the disease in the neighbourhood of Smallpox Hospitals; but that when epidemic virulence is established, the precise influence exerted by the Hospital cannot be dissociated from that caused by the independent centres, which it has in part established.

The investigation throws no light on the channels through which influence is exercised, except what is of a negative character. The Eastern cases began when there was no pressure on ward space; they reappeared at a period of the recrudescence when this was being specially guarded against; and but few of the cases in this period recurred in formerly infected tenements. The topographical relationship of the Hospital to the surrounding population outside the quarter of a mile radius does not admit of any discrimination between the effect of aggregation and the precedent volume of traffic, both in patients and infected clothing, through the main thoroughfares of the infected district. But a survey of the whole circumstances leads inevitably to the conclusion that the excessive prevalence in the Eastern District has established the unsuitability of Belvidere for the continued treatment of Smallpox.

In respect to this element of risk to the neighbourhood, Smallpox Hospitals differ from those for the other infectious diseases. They also differ in another important particular. Since the last epidemic prevalence, in 1870-74, the provision of smallpox accommodation has not been completely taxed until the present outbreak.

In the present outbreak an interesting feature bearing on this was disclosed. The incidence of the disease at ages 25-35 was much in excess of that at any other age period, and indicates that in communities relying solely on infantile vaccination



the conditions on which epidemic prevalence depends are re-established by this period.

In these circumstances, how to meet both contingencies—a recurring epidemic prevalence at long intervals, and the added risk of concentration present at all times, but felt most when the pressure is greatest—is the problem which attends all effort to map out a policy of Smallpox Hospital provision. To maintain several Hospitals constantly equipped for a remote contingency, however certain may be its recurrence, would mean waste. A certain minimum accommodation must always be provided to meet the minor fluctuations of prevalence which occur between epidemic periods, but to establish this as the sole centre of aggregation in epidemic periods results in producing a surrounding mass of infection, which may be dealt with, but cannot be controlled. To escape the greater risk we should avoid the concentration, and though, as our experience indicates, a certain degree attends all aggregations, we might still be able to accomplish in detail what the combined volume renders impossible.

#### RELATION OF SMALLPOX INCIDENCE TO DISTRICTS GENERALLY PRESENTING A HIGH DEATH-RATE.

Insanitary conditions are so frequently cited as explaining the excessive increase of Smallpox in any particular locality that we may enquire whether the recorded death-rates for the districts chiefly affected afford any support to this.

In the following Table the average general death-rates for six districts presenting the highest rates during 1898-1900 are stated, together with corresponding rates for Districts 5, 7, and 8, which form the Eastern Division, and the smallpox attack-rate for each:—

SMALLPOX ATTACK-RATE AND GENERAL DEATH-RATE, 1898-1900, COMPARED.

DISTRICT.	Deaths per 1,000 from all causes.	Smallpox Attack- rate per 1,000.
13. Brownfield, - - -	33·06	2·5
16. Cowcaddens, - - - -	32·79	1·0
6. High Street and Cloves East, -	30·43	2·9
2. Port-Dundas, - - - -	29·55	·3
22. Gorbals, - - - - -	28·89	1·8
3. High Street and Cloves West, -	28·62	·3
Glasgow, - - - - -	20·6	2·3
EASTERN DIVISION.		
7. Greenhead and London Road, -	22·0	9·9
8. Barrowfield, - - - -	25·7	6·4
5. Bellgrove and Dennistoun, - -	19·0	2·8

There is no suggestion here that the prevalence of insanitary conditions, as indicated by a continuously high general death-rate, explains the excessive incidence of Smallpox in Districts 5, 7, and 8.

Again, if we select for further comparison the infantile death-rate, the Zymotics (excluding Smallpox) and that from Pulmonary Diseases (excluding Phthisis), in no case is there a parallel to the contrast presented by the death-rate from Smallpox in these districts.

DISTRICT.	Death-rate under 1 year per 1,000 born.	DEATH-RATE PER MILLION.		
		Zymotic Diseases.	Respiratory Diseases (not Phthisis).	Smallpox.
13. Brownfield, - - - -	207	5,303	8,934	...
16. Cowcaddens, - - - -	218	5,033	9,379	220
6. High Street and Closes East,	198	3,839	5,394	282
2. Port-Dundas, - - - -	224	4,288	8,150	...
22. Gorbals, - - - -	209	4,768	7,487	153
3. High Street and Closes West,	177	3,262	6,597	103
City, - - - -	153	3,153	4,617	307
7. Greenhead and London Road,	152	4,319	4,826	1,103
8. Barrowfield, - - - -	180	4,813	6,510	939
5. Bellgrove and Dennistoun, -	142	3,185	4,104	442





## AGE INCIDENCE OF ATTACKS.

In the following Table the proportion of the population living at several age periods, together with the proportion of cases and the attack-rate per million living at each, is stated. No discrimination is here made between vaccinated and unvaccinated, but the Table shows that at each age period under 20 the proportion of attacks is smaller than the proportion of population—that 22 per cent. of the population living under 10 years of age contribute only 5·8 per cent. of the total cases, while 21 per cent. of the population living between the ages of 15-25 contribute 22·5 per cent., and that 18 per cent. of the population living at ages 25-35 contribute twice that proportion of the cases. There were almost 5 attacks per 1,000 living between 25-35, so that the susceptibility to Smallpox at this period of life is considerable.

TABLE V.—GLASGOW.—PROPORTION OF POPULATION AND CASES AT CERTAIN AGE PERIODS, SHOWING THE NUMBER OF CASES AND THE ATTACK-RATE PER MILLION AT EACH.

Ages.	Proportion of Population.	Proportion of Cases.	Number of Cases.	Attack-rate per Million.
0—5	11·9	3·47	61	672
5—10	10·5	2·39	42	526
10—15	9·8	5·91	104	1,393
15—20	10·1	7·62	134	1,745
20—25	10·9	14·89	262	3,143
25—35	17·5	35·82	630	4,734
35—45	12·4	20·01	352	3,731
45—55	8·6	7·22	127	1,942
55—65	5·2	1·76	31	775
65 and up.	3·1	0·91	16	684
...	...	100·00	1,759	...

## INFANTILE VACCINATION.

This contrast in the age incidence may be viewed together with what is known of the extent to which the requirements of the law in respect to infantile vaccination are complied with in Glasgow.

In several periods the proportion of children "not accounted for" in the vaccination returns is as follows:—

RETURN OF CHILDREN "NOT ACCOUNTED FOR" IN THE VACCINATION RETURNS OF  
GLASGOW REGISTRATION DISTRICTS IN CERTAIN PERIODS.

	Births.	Removed from Districts before Vaccination, or otherwise not accounted for.	
		No.	Percentage.
Three years, 1879-81, ... ..	63,661	1,822	2·9
„ 1886-88, ... ..	64,189	1,359	2·1

GLASGOW.—RETURN AS TO VACCINATION OF CHILDREN, COMPILED FROM SUPPLEMENT TO THE  
MONTHLY AND QUARTERLY RETURNS OF THE REGISTRAR-GENERAL FOR SCOTLAND.

	1896.		1897.		1898.		1899.		1900.	
	No.	Per-centage.	No.	Per-centage.	No.	Per-centage.	No.	Per-centage.	No.	Per-centage.
Successfully vac- cinated, - -	20,348	84·7	19,932	83·5	20,080	82·8	20,191	83·3	20,512	84·2
Vaccination post- poned, - -	274	1·1	259	1·1	256	1·0	215	0·9	162	0·7
Insusceptible of Vaccination, -	214	0·9	212	0·9	184	0·8	201	0·8	196	·8
Died before vac- cination, -	2,546	10·6	2,808	11·7	2,918	12·0	2,865	11·8	2,785	11·4
Removed from the district, or otherwise not accounted for,	650	2·7	668	2·8	825	3·4	775	3·2	703	2·9
Total Births dur- ing year, -	24,032	100·0	23,879	100·0	24,263	100·0	24,247	100·0	24,358	100·0

The reduction in the second period (1886-8) here shown expresses the result of a systematic effort on the part of the Sanitary Department to reduce the portion "not accounted for" in those years. In the individual years 1896-1900 the tendency towards an increasing proportion again becomes manifest, which reached a maximum of 3·4 per cent. not accounted for in 1898. The reduction in the proportion occurring in 1900 is probably the result of the stimulus afforded by the presence of Smallpox.

We are unable to ascertain the proportion unaccounted for in the several Sanitary Districts, because no combination of these will quite represent the Registration Districts, but, in a general way, Bridgeton, Camlachie, and Dennistoun enter largely into the Eastern Sanitary Division, and Blythswood and Milton Registration Districts are respectively Central and Northern. These are selected because they represent in one case the area where Smallpox was most prevalent, and in the other where vaccination was most neglected—Blackfriars being unavailable for comparative purposes owing to the presence of the Maternity Hospital.

In the following Table details corresponding to these already given for the whole City are given for the Registration Districts for the years 1896-8:—

GLASGOW.—BIRTHS, WITH NUMBER AND PROPORTION “NOT ACCOUNTED FOR” IN VACCINATION RETURNS.

				BIRTHS, 1896-8.	NOT ACCOUNTED FOR.	
					Number.	Percentage.
Bridgeton,	...	...	...	5,497	122	2·2
Camlachie,	...	...	...	5,648	110	1·9
Dennistoun,	...	...	...	7,553	161	2·1
Calton,	...	...	...	3,495	98	2·8
Blackfriars,	...	...	...	4,179	262	6·3
St. Rollox,	...	...	...	5,386	89	1·7
Blythswood,	...	...	...	2,152	83	3·9
Milton,	...	...	...	4,735	166	3·5
Kelvin,	...	...	...	5,453	81	1·5
Anderston,	...	...	...	4,555	95	2·1
Hutchesontown,	...	...	...	8,030	270	3·4
Gorbals,	...	...	...	4,418	116	2·6
Tradeston,	...	...	...	2,398	73	3·0
Kinning Park,	...	...	...	1,465	39	2·7
Total,	...	...	...	64,964	1,765	2·7

AGE DISTRIBUTION IN RELATION TO VACCINATION AND FATALITY.

In the subjoined Table all admissions to Hospital from Smallpox are dealt with; the numbers include 61 from neighbouring Local Authorities. The vaccinated and unvaccinated are distinguished from those in whom vaccination was said to have been performed, but who presented no discoverable trace of the operation. One-half of these latter were confluent in type, 11 per cent, were hæmorrhagic. It is very doubtful whether they are entitled to separate classification. A primary vaccination scar is practically indelible, and any local reaction following the performance of the operation of vaccination which does not result in a cicatrix presenting the well-known characters is scarcely to be regarded as successful. At every age save those under 10, the fatal attacks of this class equal or exceed those recovering, but the numbers here dealt with are small, and the percentage fatality consequently liable to fluctuation. It is probable that the majority are illustrations of persons in whom the operation was unsuccessful, and that they should be included in the unvaccinated class:—



TABLE VI.—GLASGOW.—SMALLPOX, 1900-1.—RETURN AS TO VACCINATION OF ALL CASES TREATED IN BELVIDERE SMALLPOX HOSPITAL FROM 1ST APRIL, 1900, TO 30TH JUNE, 1901.

AGE.	VACCINATED.			UNVACCINATED.			VACCINATION DOUBTFUL.			TOTAL.		
	Recovered.	Died.	Mortality per cent.	Recovered.	Died.	Mortality per cent.	Recovered.	Died.	Mortality per cent.	Recovered.	Died.	Mortality per cent.
0—5 years, ...	2	1	33·3	18	36	66·6	3	...	...	23	37	61·7
5—10 „ ...	31	...	...	10	2	16·7	2	...	...	43	2	4·4
10—15 „ ...	92	1	1·1	10	4	28·6	1	1	50·0	103	6	5·5
15—20 „ ...	131	...	...	4	2	33·3	1	1	50·0	136	3	2·2
20—25 „ ...	242	12	4·7	2	4	66·6	1	2	66·6	245	18	6·8
25—35 „ ...	584	42	6·7	6	5	45·5	4	9	69·2	594	56	8·6
35—45 „ ...	291	51	14·9	8	4	33·3	5	6	54·5	304	61	16·7
45—55 „ ...	91	26	22·2	1	6	85·7	3	4	57·1	95	36	27·5
55—65 „ ...	18	13	41·9	...	...	...	1	1	50·0	19	14	42·4
65 years and over, ...	10	4	28·6	...	...	...	...	1	100·0	10	5	33·3
All Ages, ...	1,492	150	9·1	59	63	51·6	21	25	54·3	1,572	238	13·1

This Table includes Cases from beyond City Boundaries.

Summarizing this Table, the broad distinction between the fatality of the vaccinated, unvaccinated, and doubtfully vaccinated is that at all ages the death-rate in vaccinated persons was 9·1 per cent.; in unvaccinated persons, 51·6 per cent.; and in persons doubtfully vaccinated, 54·3 per cent.

Regarding the single fatal case occurring in the vaccinated column under five years of age, it is to be observed that the patient was a boy of two years, with a fairly abundant discrete rash, whose vaccination mark was '04 of a square inch in area, was glazed and not foveated, and could not therefore be regarded as evidence of satisfactory vaccination.

Beyond this, ratio of mortality in the vaccinated class increases until the age of 65 is reached, and the column of per cent. mortality generally in this class presents a striking contrast with that at the several age periods in the unvaccinated class.

*Deaths under Five Years.*—A mortality of nearly 62 per cent. of all cases occurring under five years of age in a population where the proportion of births “not accounted for” in the vaccination returns average less than 3 per cent. will arrest attention and requires some elucidation. Of these cases 30 were under one year:—

GLASGOW.—SMALLPOX, 1900-1.—CASES AND DEATHS UNDER ONE YEAR.

	Recovered.	Died.	Total.
Under 1 Month, ...	2	8	10
„ 2 Months. ...	2	1	3
„ 3 „ ...	—	1	1
„ 4 „ ...	2	4	6
„ 5 „ ...	—	1	1
„ 6 „ ...	—	1	1
„ 12 „ ...	1	7	8
	7	23	30

All these were unvaccinated prior to contracting the disease, and we shall clearly appreciate the significance of this by considering the age incidence more in detail. For this purpose I have selected two periods with which to compare the present age incidence of smallpox deaths, viz., 1855-57, being the early years of death registration (and during two of which Smallpox was prevalent), and 1870-72, when it was also present in epidemic form.

TABLE VII.—GLASGOW.—SMALLPOX.—DEATHS AT CERTAIN AGE PERIODS IN 1855-57, 1870-72, AND 1900-01, SHOWING THE PROPORTION OF TOTAL DEATHS AT EACH AGE.

AGES.	DEATHS.			PERCENTAGE OF TOTAL DEATHS.		
	1855-7.	1870-2.	1900-01.	1855-57.	1870-72.	1900-01.
Under 3 months, ...	47	24	10	6.4	6.7	4.2
„ 6 „ ...	40	32	6	5.5	8.9	2.5
„ 1 year, ...	161	16	7	22.1	4.5	3.0
„ 2 years, ...	172	5	14	23.6	1.4	5.9
„ 3 „ ...	104	5		14.3	1.4	
„ 4 „ ...	53	4		7.3	1.1	
„ 5 „ ...	39	9		5.3	2.5	
„ 10 „ ...	31	43	2	4.3	12.0	0.8
„ 15 „ ...	10	31	6	1.4	8.7	2.5
„ 20 „ ...	15	27	3	2.0	7.6	1.3
„ 25 „ ...	31	59	18	4.3	16.5	7.6
„ 35 „ ...	17	66	56	2.3	18.4	23.5
„ 45 „ ...	6	23	61	0.8	6.4	25.6
„ 55 „ ...	3	8	36	0.4	2.2	15.1
„ 65 „ ...	—	5	14	0.0	1.4	5.9
65 years and over, ...	—	1	5	0.0	0.3	2.1
All Ages, ...	729	358	238*	100.0	100.0	100.0

\* Includes Deaths in Hospital of Patients from beyond City Boundaries.

The broad distinction presented in these Tables has often been pointed out, and may thus be summarised for the three periods:—

Proportion of Deaths.	1855-57.	1870-72.	1900-1.
Under 10, ...	88.8	38.5	16.4
Over 10, ...	11.2	61.5	83.4

In the two periods of life here contrasted the proportion of deaths under and over 10 years of age becomes almost exactly reversed. But the Tables are

interesting from another aspect. In the first two periods compared, a notable reduction occurs in the proportion of deaths occurring under 5 years of age, but between 5 and 10 the proportion in the 1870-72 outbreak increases just as do those at later ages. Indeed the contrast presented is rather as between ages under and over 5 years, and no less than 12 per cent. of the deaths in 1870-72 were at ages 5-10. At this period of life during the present outbreak less than 1 per cent. of the deaths occurred, and the increase which is so marked in 1870-72 is obviously the result of a large number of susceptible children existing in the population from among those born in the years preceding the commencement of the Vaccination Act in Scotland in 1864. Along with this, it will be noted that the six months which elapse between the birth and vaccination of a child in Scotland is reflected in the still large proportion of deaths occurring in the early months of infancy.

#### RE-VACCINATION.

The Health Committee early recognised the necessity for special effort being made to accomplish re-vaccination of the population, and on 11th June, 1900, the following circular was issued, with their approval, to medical practitioners:—

11th June, 1900.

DEAR SIR,

#### SMALLPOX—RE-VACCINATION.

#### PUBLIC HEALTH (SCOTLAND) ACT, 1897, SEC. 77.

In view of the present distribution of Smallpox in Glasgow, the Corporation (Police Department), as Local Authority, desire to impress on the community the extreme desirability of each of its members acquiring the complete protection from the disease which recent successful re-vaccination affords. They are also desirous of affording to every inhabitant who may wish to be re-vaccinated, but who cannot afford to pay for the operation, facilities for having it done. They have resolved to exercise the power conferred upon them by the 77th Section of the Public Health (Scotland) Act, and are prepared to pay to practitioners who re-vaccinate such persons a fee of 1s. 6d. for each successful vaccination. The Corporation believe that if by any means they could obtain the re-vaccination of every individual in Glasgow above ten years of age, and the primary vaccination of all who had never been vaccinated, an epidemic prevalence of Smallpox would be impossible within their jurisdiction.

The conditions of payment of this fee are these—

1. It is not in addition to, but in place of, any private fee.
2. The name, age, address in full, and result in each case must be returned to me every Saturday, on forms to be supplied, the postage of which will be repaid.
3. The sums due will be made up from these lists, and paid at the same time and in the same way as fees under the Infectious Diseases (Notification) Act, viz., in June and December.

The Corporation rely upon your active co-operation in urging all persons within the scope of these conditions over whom you have influence to take advantage of this opportunity of putting themselves beyond the reach of Smallpox.

I am,

Yours truly,

A. K. CHALMERS,  
*Medical Officer of Health.*



Special representation was also made to every employer of labour among whose workers any case of the disease was recognised, and the Tramways Committee, through their General Manager, set an excellent example during this month in procuring the re-vaccination of all their employees. But with the diminishing number of fresh cases as the summer advanced, interest in the question was practically confined to the immediate neighbourhood of the cases, and to the factories where they were employed. This is best illustrated by contrasting the number of persons re-vaccinated at their own residences—in and around infected tenements—with the number of those availing themselves of the offer through medical practitioners, as given in the following Table:—

SUMMARY OF THE VACCINATIONS AND RE-VACCINATIONS DONE BY THE OFFICERS OF THE SANITARY DEPARTMENT AND BY PRACTITIONERS DURING 1900.

	Primary.	Secondary.
At Office, ... ..	550	264
At Hospitals, ... ..	7	205
At Residence, by Staff of Department, ... ..	5	6,372
By Practitioners, in terms of circular of 11th June,	8	964
In Prisons, ... ..	—	196
Total, ... ..	<u>570</u>	<u>8,001</u>

When the rapid increase in the number of admissions to Hospital during January, 1902, gave ample evidence that the outbreak was assuming proportions quite unknown locally in recent years, a second circular to practitioners was issued, which differed in two important particulars from the earlier one. It reduced the age limit for re-vaccinations to five years because of the number of children admitted with trifling vaccination cicatrices, and withdrew the stipulation regarding the inability of the person desiring re-vaccination to pay a fee for the operation. This circular was in the following terms:—

Sanitary Department, 23 Montrose Street,  
Glasgow, 24th January, 1901.

#### CIRCULAR LETTER TO PRACTITIONERS.

##### SMALLPOX—RE-VACCINATION.

DEAR SIR,

In June last the Health Committee issued a circular to practitioners inviting them to urge the desirability of re-vaccination on all with whom they had influence. The response to this was extremely disappointing, largely because of indifference to re-vaccination, resulting probably from the limited number of the cases of Smallpox occurring at that time. The circumstances are now much altered.

Smallpox has assumed alarming proportions. Already the number of cases occurring daily exceeds anything which the City has experienced since 1873, and although at the present moment the greatest prevalence is in Parkhead, Bridgeton, Dalmarnock, and the Eastern Districts of the City generally, there are indications that other districts, notably Gorbals, Govanhill, and Anderston, are on the eve of a similar expansion of the disease. *Nothing, save a general recourse to re-vaccination, will prevent its spread throughout the City generally.*

In the circumstances the Health Committee would again invite your active co-operation in urging re-vaccination. They are thoroughly convinced that *if every consulting room became an active re-vaccinating centre* many lives would be saved, the virulence of the present outbreak would rapidly become moderated, and an invaluable service be rendered alike to the Corporation and the community.

The Committee are therefore prepared to pay for the successful re-vaccination of any person over five years of age a sum of 1s. 6d., under the following conditions:—

1. The name, age, address in full, and result in each case must be returned to me every Saturday, on forms to be supplied, the postage of which will be repaid.
2. The sums due will be made up from these lists, and paid at the same time and in the same way as fees under the Infectious Diseases (Notification) Act, viz., in June and December.
3. Lymph will be supplied on application (personally or by messenger) at the Sanitary Office.

As many of the cases occurring among imperfectly vaccinated persons are of a mild and modified type, the recognition of Smallpox is apt to be extremely difficult, and this is enhanced by the fact that it is in these cases that the various prodromal eruptions are apt to appear. These eruptions bear no resemblance to the true variolar eruption, but, on the contrary, may closely simulate typhus fever, scarlet fever, or measles.

With the object of facilitating the recognition of such cases, I append the following note.

I am, DEAR SIR,

Yours truly,

A. K. CHALMERS.

*N.B.*—Efficient vaccination is only to be obtained when the total area of vesiculation produced is not less than half a square inch in size on the eighth day, and a similar result should be aimed at in re-vaccination.

A. K. C.

#### APPENDIX.

Prodromal eruptions, which are apt to be very puzzling, may assume the following forms:—

1. The most common is general erythema, closely resembling the rash of scarlet fever, affecting chiefly the trunk, but passing later to the extremities. This eruption may persist after the true papular eruption has been out for a day or two.
2. A coarsely punctate erythema, sometimes becoming petechial, appears on the groin and sides of the abdomen. It is generally confined to a triangular area, bounded above by an imaginary line crossing the abdomen transversely a little below the umbilicus, and bounded laterally by lines passing from the iliac crests to an imaginary point about four inches below the pubes.
3. A dusky brown tint, not very obvious, and fading on pressure, generally over lower part of trunk, especially in lumbar and sacral regions.
4. A morbilliform eruption, closely resembling a measles or typhus rash, appears in ill-defined patches on the trunk.

#### HÆMORRHAGIC SMALLPOX.

In this form the symptoms of invasion are very severe. The face and limbs may remain perfectly normal in appearance. There is, in the complete form, no papular eruption at all; in less marked forms, the papular eruption is very scanty and irregularly developed. It begins with a well-marked erythema on the trunk, especially over the lower part of abdomen. This rapidly extends and becomes livid in tint, and may finally involve the whole trunk. Petechiæ, of variable size, soon make their appearance, in addition to the general staining.

Blood may be voided by all the mucous surfaces, and the ocular conjunctiva may become black owing to hæmorrhage.

Early in the disease the eruption may be mistaken for that of typhus.

*N.B.*—It is of the greatest importance that every anomalous rash or suspicious cases of illness should be at once intimated to the Medical Officer of Health.

The immediate result of these was to convert the consulting rooms of practitioners in infected districts into vaccination stations, where the work of re-vaccination went on frequently for hours daily. This activity continued until the second wave of prevalence in the beginning of February had subsided; but in the report for the fortnight ending 23rd February I had occasion to observe "that, while the re-vaccinations reported during the fortnight numbered 77,652, as against 36,812 in the previous one, the quantity of lymph issued during the past week by the Department to practitioners has shrunk to such an extent that the amount of active re-vaccination now going on in the community must be very far short of that done during previous weeks. This is much to be regretted, because the seasonal conditions which favour the spread of Smallpox reach their acme in the spring months, and the approach of this period must be regarded with some apprehension if the apathy regarding vaccination, which is again becoming manifest, continues." It is possible that the resolution of the Special Committee appointed to deal with the epidemic, to cease publishing the number of fresh cases occurring daily at this time, helped, in part, to confirm the impression created by the diminishing numbers; but it has been a frequently repeated experience of the Department that the number of re-vaccinations which it is possible to obtain rise and fall with the number of cases of Smallpox occurring, and that prudential motives are apt to remain in abeyance unless stimulated by present risk.

The recurring increase in the number of admissions to Hospital early in March led to the adoption of a system of house-to-house visitation in certain districts, on the lines indicated in the annexed circular:—

Sanitary Chambers, 23 Montrose Street,  
Glasgow, 7th March, 1901.

#### CIRCULAR LETTER TO MEDICAL PRACTITIONERS.

DEAR SIR,

##### SMALLPOX—RE-VACCINATION.

The Executive Committee gratefully recognise the response recently made by practitioners to my circular of 28th January last inviting them to perform re-vaccination on any who chose to avail themselves of the offer then made. They feel, however, that further effort is required *to reach those who are indifferent to the present risk*, and that this can best be secured by a systematic visitation from house to house in certain districts of the City, and they desire me to invite your co-operation in this work.

Such a scheme would be based on the Census Enumeration Districts. These districts vary in size, but on an average each contains about 150 houses, distributed over from 12 to 15 tenements. This number might readily be covered within a week by taking two tenements each evening, which is the only time when the majority of the inmates are likely to be found at home.

The Committee feel assured that they can with confidence rely on the co-operation of the medical profession in this further effort to secure the re-vaccination of the remaining portion of the population, and a post-card is enclosed, which I have to ask you to be good enough to forward me by return post, stating whether you can find time to devote to the work. For each vaccination so obtained a fee of 2s. 6d. will be allowed.

Yours truly,

A. K. CHALMERS.



While the medical practitioners were thus invited to take up district visitation on these lines, the officers of the Department were aided in the work of vaccination by a special corps, ultimately numbering 484, and composed of 254 students of medicine, and 230 others, chiefly drawn from other departments of the Corporation service, and working under the direction of Dr. Carmichael, Vaccinator to the Department. The energies of this corps were directed, in the first place, to the neighbourhood of those streets where Smallpox was occurring, but as soon as possible they were distributed over the Census enumeration areas. It also became possible to take a census of the condition of these districts in respect to vaccination, the returns, however, being based wholly on the verbal statement of the person in charge of the household at the time of the visit.

It is, unfortunately, impossible to state with any degree of accuracy the extent to which re-vaccination had been carried at this period in the community generally, because information on this point would supply the answer to the question whether any considerable section of a community exposed to a known risk, and with every facility offered of protection against it, are so completely indifferent to both that the means of protection must be brought to them before they will avail themselves of it. When the house-to-house visitation began in March, the census appeared to indicate that 53 per cent. of the population over five years had been recently re-vaccinated. This would represent 355,570 persons on whom the operation had already been performed, which, however, is in excess of the total for which payment was made by the Corporation during the whole outbreak, and is only 49,695 less than is shown by the completed returns of the year. Together with those obtained in 1900, this gives a total of 405,265, and would appear to indicate that house-to-house visitation, directly and indirectly, resulted in procuring an addition of over 49,000 from those who had previously proved indifferent.

Till the close of the fortnight ending March 9th, over 157,000 re-vaccinations had been recorded, as shown in the following Table, but this represents only 23 per cent. of the population over five years of age. Of these, 146,000 had been done by practitioners, but the dates on which the returns were received were not closely related to the fortnights in which the vaccinations had been performed, and, even when all had been returned, the information afforded did not readily lend itself to a detailed tabulation of the numbers performed in successive weeks.

It is probable, therefore, that the estimate of 53 per cent. is in excess of the proportion already re-vaccinated by the beginning of March, and the annexed Table, showing the number of tubes of calf lymph issued by the Department to medical practitioners fairly reflects the ebb and flow of the demand for re-vaccination in the various districts :—

TABLE OF TUBES OF GLYCERINATED CALF LYMPH ISSUED TO PRACTITIONERS.

Date.	January.	February.	March.	April.
1	...	4,557	440	232
2	...	670	755	120
3	...	170	...	130
4	...	3,104	1,664	140
5	...	3,849	2,295	145
6	...	3,006	2,319	120
7	...	3,009	3,359	...
8	...	3,799	4,047	80
9	...	2,789	1,925	130
10	...	...	100	70
11	...	2,007	2,499	105
12	...	2,204	3,066	155
13	...	1,292	1,860	40
14	...	895	2,489	5
15	...	998	2,600	35
16	...	594	2,255	10
17	...	...	...	30
18	...	436	1,516	10
19	...	609	1,962	...
20	...	439	1,064	30
21	...	383	880	...
22	...	164	...	45
23	...	280	847	11
24	...	...	80	...
25	...	400	550	...
26	...	355	330	...
27	2,776	599	220	...
28	2,240	535	275	20
29	4,055	...	140	15
30	4,707	...	200	28
31	4,363	...	...	...
	18,141	37,143	39,737	1,706

Average Daily Issue—February, 1,326 ; March, 1,281.

SUMMARY OF THE VACCINATIONS AND RE-VACCINATIONS DONE BY THE OFFICERS OF THE  
SANITARY DEPARTMENT AND BY PRACTITIONERS DURING 1901.

	Primary.	Secondary.
At Office, ... ..	433	486
In Hospitals, ... ..	11	556
At Residence, by Staff of Department, ... ..	—	14,763
In Prisons and Poorhouses, ... ..	24	11,293
By Practitioners, in terms of circular letter of 24th January, 1901, ... ..	—	283,423
By Special Vaccinators working in Enumeration Districts, ... ..	—	29,081
By Practitioners in Enumeration Districts, in terms of circular letter of 7th March, 1901, ... ..	—	12,424
	<hr/> 468	<hr/> 352,026
In reply to a circular letter, 447 Practitioners intimated that, in addition to those done for the Corporation, they had done private re-vaccina- tions numbering ... ..		45,238
		<hr/> 397,264
Total re-vaccinations, ... ..		8,001
Add for 1900, ... ..		7,972
Add for 1902 to 3rd May,		<hr/> 413,237

RE-VACCINATION IN RELATION TO ATTACK.

In 126 cases admitted it was found that re-vaccination had recently been performed, and the following figures, taken from a Table compiled by Professor R. S. Thomson, Visiting Physician to the Smallpox Hospital, and Dr. Fullarton, Resident Physician, show the number of days intervening between the successful performance of the operation and the development of symptoms of Smallpox :—

Number of Days before Sickening—

0    1    2    3    4    5    6    7    8    9    10    11    12    13

Number of Cases—

6    11    3    7    20    17    6    11    13    4    1    —    1    1

If we assume that twelve days represents the average period of incubation, then the chances of escape are still very considerable, although the re-vaccination may be postponed until the third day after exposure. In a small number of cases re-vaccination had been performed successfully before the attack occurred, but these are at intervals of years, and the following Table, also prepared by Drs. Thomson and Fullarton, shows the interval between re-vaccination and attack, and the character of the latter:—



TABLE SHOWING, IN CASES SUCCESSFULLY RE-VACCINATED BEFORE INFECTION, THE PERIOD BETWEEN RE-VACCINATION AND ATTACK AND THE INFLUENCE OF RE-VACCINATION ON SEVERITY OF ATTACK.\*

Case.		Primary Vaccination.	Date of Re-vaccination.	Character of Attack.
H. B.	aged 25	1 mark—poor	6 years ago	Very sparse.
Mrs. M'L.	„ 43	1 „ fair	11 „	Sparse.
G. C.	„ 44	1 „ poor	21 „	Very sparse.
W. W.	„ 37	1 „ poor	27 „	Fairly abundant.
J. K.	„ 48	1 „ poor	28 „	Very sparse.
J. R.	„ 43	3 „ poor	31 „	Sparse.
P. M'L.	„ 42	2 „ fair	32 „	Very sparse.
A. S.	„ 28	1 „ fair	(?) 4 „	Fairly abundant.

STATEMENT AS TO VACCINATION OF CASES ADMITTED TO HOSPITAL DURING PERIOD OF RECRUDESCENCE, 1901-1902.

AGE.	TOTAL.		
	Vaccinated.	Unvaccinated.	Doubtful.
Under 5 years, ... ..	6	15	3
5—10 „ ... ..	4	2	2
10—15 „ ... ..	8	2	1
15—20 „ ... ..	22	...	...
20—25 „ ... ..	60	3	2
25—35 „ ... ..	155	3	2
35—45 „ ... ..	124	1	1
45—55 „ ... ..	32	1	3
55—65 „ ... ..	9	...	1
65 and upwards, ... ..	4	...	...
All ages, ... ..	424	27	15

The widespread distribution of the infection, and the extent to which re-vaccination was resorted to, afforded an opportunity of observing the behaviour of the disease in one section of the population which, in the course of the outbreak, gradually increased until it comprised almost 60 per cent. of the whole. This section comprised those persons who were successfully re-vaccinated before they were exposed to infection between January, 1901, and May, 1902. It may be represented as increasing by fortnightly drafts obtained from the section who were not re-vaccinated, as is shown in the following Table (p. 46).

In respect of susceptibility and the opportunities of exposure to infection, there is nothing to distinguish between these two sections here shown save the solitary circumstance of successful re-vaccination, and the contrast presented by the uniform absence of cases from the re-vaccinated section requires no elaboration.

\* During the period of recrudescence 11 cases were admitted with a history of successful re-vaccination before infection, and in 10 of these the statement of the patient was supported by the presence of distinguishable marks. The intervals elapsing between re-vaccination and attack were respectively 3, 3, 4, 7, 8, 9, 12, 26, 32, 40, and 55 years.

TABLE VIII.—GLASGOW.—SMALLPOX, 1901-1902.—UN-REVACCINATED AND RE-VACCINATED  
POPULATION IN EACH FORTNIGHT, WITH THE CASES OF SMALLPOX OCCURRING IN  
EACH CLASS.

1901.			NOT RECENTLY RE-VACCINATED.		RECENTLY RE-VACCINATED.	
			Population.	Cases Registered.*	Population.	Cases Registered.
January	12th, ...	...	675,887	23	...	...
"	26th, ...	...	674,816	350	1,071	...
February	9th, ...	...	671,025	202	4,862	...
"	23rd, ...	...	634,213	127	41,674	...
March	9th, ...	...	556,561	299	119,326	...
"	23rd, ...	...	518,426	161	157,461	...
April	6th, ...	...	474,694	92	201,193	...
"	20th, ...	...	429,056	67	246,831	...
May	4th, ...	...	384,371	28	291,516	...
"	18th, ...	...	366,125	18	309,762	...
June	1st, ...	...	352,633	11	323,254	...
"	15th, ...	...	347,777	2	328,110	...
"	29th, ...	...	345,293	8	330,594	...
July	13th, ...	...	281,867	1	394,020	...
November	16th, ...	...	279,452	1	396,435	...
"	30th, ...	...	279,232	5	396,655	...
December	14th, ...	...	279,020	4	396,867	...
"	28th, ...	...	278,796	...	397,091	...
1902.						
January	11th, ...	...	278,623	28	397,264	...
"	25th, ...	...	278,152	23	397,735	...
February	8th, ...	...	277,653	23	398,234	...
"	22nd, ...	...	277,134	147	398,753	...
March	8th, ...	...	276,033	92	399,854	...
"	22nd, ...	...	274,611	85	401,276	...
April	5th, ...	...	272,694	36	403,193	...
"	19th, ...	...	271,619	15	404,268	...
May	3rd, ...	...	271,032	10	404,855	...

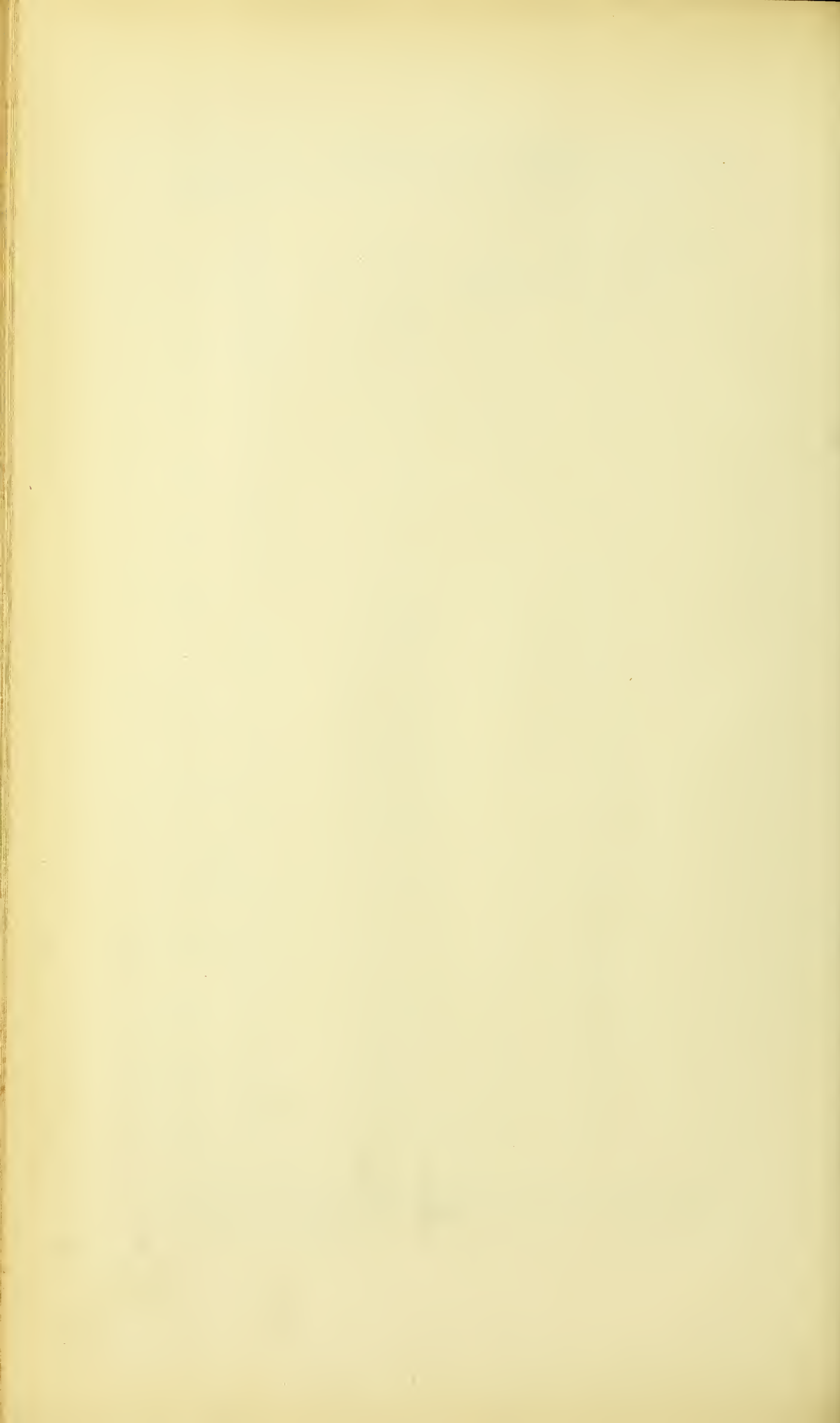
\* The Cases under five years have not been excluded from these figures, because their allocation through the various fortnights would have been difficult, and their inclusion is unimportant. In the 1900-1901 part of the outbreak these numbered 60, 54 of whom (including 30 cases occurring under one year) were unvaccinated primarily.

## EXPENDITURE ON RE-VACCINATION.

From 1st June, 1900, till 1st March, 1902, the amount expended in connection with re-vaccination was as follows :—

Calf Lymph,	...	...	...	...	...	£4,570
Fees to Practitioners,	...	...	...	...	...	22,776
Do. Extra Vaccination Staff, &c.,	...	...	...	...	...	4,177
Do. Prison and Parish Surgeons,	...	...	...	...	...	713
Total,	...	...	...	...	...	<u>£32,236</u>





## CHARTS OF SICKENING.

These charts have been constructed after careful enquiry into the dates of sickening of the cases occurring during the epidemic period and during the whole period of recrudescence. The interval of declining prevalence which occurred in the middle of the epidemic period is shown by a depression beginning on the 1st and extending to 19th February.

The secondary wave of prevalence, which reached its acme on 1st February, is obviously definitely related to the earlier prevalence of 17th January, but the recurring increases, which began on 19th February, and reached their maximum on 2nd March, have a less tangible relationship with the amount of infection which was distributed by the cases sickening about 1st February.

The rapid recurrence, also, of the elevations of 26th February and 2nd March are in striking contrast with the uniform rise and fall of the waves of 17th January and 1st February. They suggest the difference between a source of infection in somewhat continuous operation and one in which the discharge is periodic. The distribution in these later prevalences was pretty general, and the following contrast between the proportions in corresponding fortnights in the Eastern and Southern Districts is important in this respect that the Southern District is beyond Hospital influence, and yet a recurring prevalence late in February was also apparent there:—

PROPORTION OF TOTAL ATTACKS IN EASTERN AND SOUTHERN DISTRICTS OCCURRING  
IN SEVERAL FORTNIGHTS OF THE EPIDEMIC PERIOD.

		Eastern Cases, 863.		Southern Cases, 200.
26th January,	=	29·7 per cent.	=	26·0 per cent.
9th February,	=	12·1 „	=	18·5 „
23rd „	=	7·8 „	=	8·5 „
9th March,	=	25·4 „	=	13·0 „
23rd „	=	12·6 „	=	8·0 „

## MAPS.

Little need be added by way of a special description of the accompanying maps, I. to VII. In them the administrative divisions of the City are contained within the thick, and the sub-districts within the thin red lines. The former are referred to in the text as Eastern, Central, Western, Northern, North-Western, Southern, and South-Suburban; while the sub-districts are numbered consecutively, a few being distinguished by letters. Save where otherwise stated, the maps are constructed on the number of cases registered fortnightly, but some exceptions occur where the arrangement is according to periods of sickening. Where it was wished to distinguish between the areas involved in successive fortnights a distinguishing colour has been used. The situation of the Hospital is indicated by a red cross, and the circles surrounding it are drawn with radii respectively of  $\frac{1}{4}$  mile,  $\frac{1}{2}$  mile, 1 mile, and  $1\frac{1}{4}$  miles.

In Map I. it will be seen that during the early weeks of the invasion of the disease the direction in which dissociated cases tended to spread was northerly, whereas in the fortnights ending 2nd, 16th, and 30th June there was a quite definite distribution of cases in the Eastern Division (see Map II.).

In the several fortnights shown on this map the sicknesses occurred on the following dates, and it may be observed regarding the sicknesses occurring towards the end of May that the wind was continuously from the east between the 7th and 13th of the month, south-east on the 6th, and north-east on the 14th.

On all the other days, save the last two, the direction varied to the north or south of west. From 30th May to 4th June the wind was east.

RECORD OF DAILY SICKENINGS IN EASTERN DISTRICT—MAY AND JUNE, 1900.

Fortnight ending 2nd June.	Number Sickening.	Fortnight ending 16th June.	Number Sickening.	Fortnight ending 30th June.	Number Sickening.
24th May, -	2	3rd June, -	...	17th June, -	3
25th „ -	...	4th „ -	2	18th „ -	2
26th „ -	...	5th „ -	...	19th „ -	1
27th „ -	1	6th „ -	1	20th „ -	3
28th „ -	...	7th „ -	...	21st „ -	2
29th „ -	2	8th „ -	4	22nd „ -	2
30th „ -	3	9th „ -	2	23rd „ -	4
31st „ -	4	10th „ -	4	24th „ -	1
1st June, -	2	11th „ -	3	25th „ -	4
2nd „ -	2	12th „ -	3	26th „ -	...
		13th „ -	5	27th „ -	...
		14th „ -	3	28th „ -	...
		15th „ -	2	29th „ -	...
		16th „ -	...	30th „ -	...
	<hr/> 16 <hr/>		<hr/> 29 <hr/>		<hr/> 22 <hr/>

During the weeks of July and August cases were recorded in the situations already indicated in Map II., but also extending eastwards from Parkhead Cross along Westmuir Street and Great Eastern Road.

Map III. shows the cases recorded in the fortnights ending 1st, 15th, and 29th December, 1900, and 12th January, 1901, and in respect of numbers affords a striking contrast with those occurring in the following fortnight, shown in Map IV.

In Map V. the distribution of the cases forming the major part of the second rise, culminating on March 2nd, are shown; and if any distinction is to be drawn between this and that shown on Map IV., it might be said that, while in the earlier period the cases in the Eastern District tend to aggregation along main lines of traffic, the distribution in the second fortnight is more uniformly spread over the intervals between these lines.

Map VI. covers the whole period of recrudescence until 1st May, 1902. The distribution of the earlier cases between November and February is indicated by blue dots, and one of the most striking episodes in the recurrence is shown on Map VII., when in the fortnight ending 22nd February the whole character of the recrudescence became altered, and we had repeated, on lines very similar to those of the major outbreak, an epidemic activity which in numbers amounted to quite one-third of the volume occurring in corresponding months of 1901.

Some reference has already been made to the prevailing meteorological conditions in May, 1900, and more complete details will be found in Appendices. The annexed summaries of the conditions prevailing during several months when the disease was most active are also by Professor Becker. It may be observed with regard to the increased prevalence late in February, 1901, that on the 2nd and 13th only was the wind easterly, while the increase began on the 19th.

A. K. CHALMERS, M.D.

SANITARY CHAMBERS,  
GLASGOW, May, 1902.



## APPENDICES.

METEOROLOGICAL OBSERVATIONS TAKEN AT GLASGOW OBSERVATORY  
DURING MAY, 1900.

Day of the Month.	Humidity per cent.		MIDNIGHT TO MIDNIGHT.			REMARKS.
			Wind.	Rain.		
	9 a.m.	9 p.m.	General Direction.	Inches.	Hours.	
1	60	71	W.	·01	1	Slight rain in morning. Solar halo at 7 p.m. Cloudy and dull.
2	84	75	S.W.	·08	5	Heavy rain in morning. Cloudy and fine.
3	76	80	S.W.	·21	14	Cloudy and heavy showers.
4	83	74	S.	·20	5	Heavy rain in morning. Overcast and squally.
5	88	70	S.	·07	6	Rain in morning. Cloudy and fine.
6	63	93	S.E.	·20	7	Morning cloudy. Rain afternoon and evening.
7	93	86	E.	·18	10	Rain in morning. Dull. Evening cloudy.
8	73	81	E.	·02	2	Cloudy. Slight rain in evening.
9	69	79	E.	·13	5	Heavy rain in morning. Cloudy. Evening dull.
10	72	74	E.	...	...	Cloudy and dull.
11	74	74	E.	...	...	Generally overcast.
12	76	72	E.	·09	8	Rain in morning. Cloudy and dull.
13	62	74	E.	...	...	Cloudy and dull.
14	58	75	N.E.	...	...	Cloudy and fine.
15	60	69	W.	...	...	Clear and fine.
16	49	70	N.W.	...	...	Clear and fine.
17	63	69	N.W.	...	...	Cloudy and fine.
18	64	52	N.	...	...	Cloudy and dull.
19	65	74	W.	...	...	Cloudy and fine.
20	62	75	W.	...	...	Cloudy and dull.
21	83	94	S.	·42	10	Overcast and rain.
22	77	83	S.W.	·17	12	Cloudy and heavy showers.
23	85	89	S.W.	·07	3	Rain morning and afternoon. Cloudy.
24	59	78	W.	...	...	Cloudy and fine.
25	68	87	W.	·01	1	Slight rain in morning. Cloudy.
26	72	79	S.W.	·03	4	Cloudy and dull. Rain in evening.
27	81	92	S.W.	·25	13	Overcast and rain.
28	84	80	W.	·02	3	Rain in morning. Squally. Dull and cloudy.
29	66	73	N.W.	...	...	Clear and fine.
30	66	74	E.	...	...	Clear and fine. Evening dull.
31	77	80	E.	...	...	Dull and overcast.

METEOROLOGICAL OBSERVATIONS TAKEN AT GLASGOW OBSERVATORY  
DURING JUNE, 1900.

Day of the Month.	Humidity per cent.		MIDNIGHT TO MIDNIGHT.			REMARKS.
			Wind.	Rain.		
	9 a.m.	9 p.m.	General Direction.	Inches.	Hours.	
1	79	83	E.	...	...	Morning and evening dull. Afternoon clear.
2	80	73	E.	...	...	Morning dull. Clear and fine.
3	68	63	E.	...	...	Clear and fine.
4	72	87	E.	...	...	Clear and fine. Evening cloudy.
5	88	79	N.E.	...	...	Cloudy and dull.
6	79	87	N.E.	...	...	Cloudy and dull.
7	86	91	E.	·18	6	Rain morning and afternoon. Cloudy, thunder and lightning at 3.30 p.m.
8	85	81	E.	·01	2	Dull, and evening cloudy.
9	94	86	S.	·14	6	Overcast. Drizzling rain.
10	66	74	S.	...	...	Cloudy and dull.
11	71	83	W.	·02	1	Cloudy. Shower about 7.20 p.m. Thunder at 8 p.m.
12	80	92	E.	·14	7	Thunderstorm and rain morning and evening. Dull.
13	86	90	E.	·51	12	Cloudy. Thunderstorm morning and afternoon. Heavy rain.
14	77	75	S.W.	...	...	Cloudy and fine.
15	63	87	S.E.	...	...	Cloudy and dull.
16	74	89	W.	·18	3	Cloudy. Rain at night.
17	75	76	W.	·08	9	Rain in morning. Clear and fine.
18	69	78	S.W.	...	...	Cloudy. Evening dull.
19	87	77	S.	·29	8	Rain morning and afternoon. Overcast.
20	86	85	S.W.	·40	9	Heavy rain in morning. Thunder in afternoon. Slight rain at 10 p.m.
21	71	91	W.	·39	6	Cloudy and dull. Heavy rain and thunder in afternoon.
22	69	82	W.	·23	4	Rain in morning. Thunder at noon. Cloudy.
23	65	73	W.	...	...	Clear and fine.
24	81	95	E.	1·36	16	Overcast and heavy rain.
25	68	81 <sup>#</sup>	N.E.	·04	3	Rain in morning. Cloudy and dull.
26	68	84	N.W.	...	...	Overcast. Evening cloudy.
27	71	77	W.	...	...	Cloudy and fine.
28	59	74	S.W.	·01	1	Morning fine. Dull. Slight rain at night.
29	73	95	S.W.	·16	10	Rain morning and evening. Overcast.
30	85	94	W.	·20	8	Cloudy. Rain at night.

METEOROLOGICAL OBSERVATIONS TAKEN AT GLASGOW OBSERVATORY FROM  
26TH DECEMBER, 1900, TO 31ST JANUARY, 1901.

Day of the Month.	Humidity per cent.		MIDNIGHT TO MIDNIGHT.			REMARKS.
			Wind.	Rain.		
	9 a.m.	9 p.m.	General Direction.	Inches.	Hours.	
Dec.						
26	84	88	S.W.	·01	1	Dull and cloudy.
27	95	85	E.	·36	13	Overcast and rain.
28	92	65	N.W.	·13	7	Rain morning and afternoon. Squally.
29	85	88	W.	·06	2	Slight showers in morning. Fine. Haze and sleet at night.
30	96	82	E.	·51	17	Overcast and rain. Cloudy at night.
31	86	81	N.E.	...	...	Dull and overcast.
Jan.						
1	86	90	S.W.	·13	7	Cloudy and showery.
2	92	94	S.W.	·03	4	Rain in morning. Cloudy. Fog at night.
3	92	86	S.W.	...	...	Dull and hazy.
4	95	79	S.W.	...	...	Dull and overcast.
5	86	82	S.E.	...	...	Cloudy and dull. Hazy at night.
6	73	69	E.	...	...	Hoar frost in morning. Cloudy and dull.
7	82	84	E.	...	...	Dull and overcast.
8	89	85	E.	·07*	5	Dull and overcast. Snow in forenoon.
9	83	82	E.	...	...	Cloudy and misty. Hoar frost at night.
10	96	93	E.	·05	3	Overcast. Rain in afternoon.
11	96	91	E.	·12	6	Dull and hazy. Rain afternoon and evening.
12	92	89	E.	...	...	Cloudy and hazy.
13	85	79	E.	...	...	Dull and overcast.
14	81	66	N.E.	...	...	Cloudy and hazy.
15	74	68	N.E.	...	...	Cloudy and hazy in morning. After- noon and evening clear.
16	79	91	N.E.	...	...	Cloudy and dull.
17	91	85	S.W.	·01	5	Slight rain in morning. Cloudy.
18	92	93	S.W.	·13	5	Rain morning and afternoon. Cloudy.
19	96	92	N.E.	·39	11	Overcast and rain. Evening cloudy.
20	81	82	W.	·13	10	Overcast, squally and showery.
21	87	84	W.	·02	3	Overcast and rain in forenoon. Cloudy and squally in evening.
22	95	81	W.	·13	10	Squally and rain morning and after- noon. Evening cloudy.
23	83	77	S.W.	...	...	Dull.
24	93	91	S.W.	·10	8	Dull and showery. Squally in evening.
25	83	77	W.	·41*	12	Rain in morning. Squally and cloudy. Showers of snow.
26	78	98	W.	·26*	12	Snow, 2½ inches deep, in morning. Dull. Rain in afternoon and evening.
27	67	93	N.W.	·30	18	Squally, cloudy, showers of hail, rain, and snow.
28	100	86	W.	·17†	5	Cloudy, and snow showers, 2¾ inches deep. Lunar corona at 6 p.m.
29	90	75	N.W.	·01†	5	Cloudy and dull.
30	73	73	N.W.	...	...	Cloudy and dull. Lunar halo and corona at 7.30 p.m.
31	72	72	N.W.	...	...	Clear and fine. Lunar corona at 9.15 p.m., and halo at 10.30 p.m.

\* Rain and Melted Snow.

† Melted Snow.



METEOROLOGICAL OBSERVATIONS TAKEN AT GLASGOW OBSERVATORY  
DURING FEBRUARY, 1901.

Day of the Month.	Humidity per cent.		MIDNIGHT TO MIDNIGHT.			REMARKS.
			Wind.	Rain.		
	9 a.m.	9 p.m.	General Direction.	Inches.	Hours.	
1	78	96	W.	·05	5	Dull. Rain in afternoon.
2	81	80	N.E.	...	...	Cloudy and dull.
3	89	74	N.W.	...	...	Clear and fine.
4	90	73	N.W.	·14*	4	Snow, 1 inch deep, in forenoon. Dull. Evening cloudy.
5	73	72	N.	...	...	Clear and fine.
6	62	68	N.	...	...	Clear and fine. Evening overcast.
7	96	95	W.	·05	2	Rain in morning. Cloudy and dull.
8	86	88	W.	...	...	Dull and overcast. Evening clear.
9	91	86	W.	...	...	Clear and fine. Evening hazy.
10	93	88	W.	...	...	Morning misty. Cloudy. Evening dull.
11	53	79	N.	...	...	Clear and fine.
12	88	77	W.	...	...	Cloudy and fine.
13	75	79	E.	·04*	4	Snow in morning. Cloudy. Evening clear.
14	...	72	N.W.	...	...	Hoar frost and fog in morning. Clear. Evening hazy.
15	79	89	W.	...	...	Hoar frost and haze in morning. Clear and fine.
16	91	59	N.W.	...	...	Clear and fine.
17	70	79	N.	...	...	Cloudy and dull.
18	91	92	W.	...	...	Cloudy and dull.
19	99	85	E.	...	...	Morning foggy. Cloudy and misty.
20	91	87	W.	...	...	Cloudy and misty. Thick fog at intervals. Hoar frost at night.
21	...	88	W.	...	...	Hoar frost and haze morning and evening. Cloudy. Evening clear.
22	92	86	W.	...	...	Cloudy and dull.
23	82	90	W.	...	...	Dull and overcast
24	90	99	W.	·53	17	Overcast and rain.
25	96	90	E.	·13	20	Overcast and rain.
26	91	89	S.E.	·50	18	Overcast and rain.
27	95	74	E.	·11	8	Rain in morning. Cloudy and dull.
28	85	88	E.	...	...	Dull and overcast.

\* Melted Snow.

METEOROLOGICAL OBSERVATIONS TAKEN AT GLASGOW OBSERVATORY FROM  
16TH JANUARY TILL 28TH FEBRUARY, 1902.

Day of the Month.	Humidity per cent.		MIDNIGHT TO MIDNIGHT.			REMARKS.
			Wind.	Rain.		
	9 a.m.	9 p.m.	General Direction.	Inches.	Hours.	
Jan.						
16	84	92	W.	...	...	Dull.
17	85	88	W.	...	...	Overcast. Cloudy at night.
18	97	80	S.W.	...	...	Fog in morning. Dull.
19	95	87	S.W.	·01	2	Dull. Squally and rain at night.
20	94	93	W.	·49	17	Heavy rain in morning. Dull. Slight rain at night.
21	96	95	S.W.	·39	22	Overcast and rain.
22	91	97	S.W.	·01	4	Dull. Slight drizzle morning and night.
23	86	78	S.W.	·04	5	Drizzle in morning. Dull. Rain after 11.20 p.m.
24	94	80	W.	·47	15	Overcast and rain. Showers of snow afternoon and night.
25	84	...	W.	·02	1	Slight snow in morning. Cloudy. Evening clear.
26	56	74	N.W.	...	...	Clear and fine. Evening dull.
27	61	93	E.	...	...	Dull. Snow after 2 p.m.
28	83	53	N.	·15	12	Snow in morning. Cloudy. Evening clear. Snow lying 2½ inches deep.
29	98	58	N.W.	·09	5	Snow in morning. Clear and fine. Snow lying 5½ inches deep.
30	100	92	W.	...	...	Hoar frost and fog.
31	...	83	E.	...	...	Hoar frost and fog in morning. Evening clear. Aurora about 11 p.m.
Feb.						
1	84	85	E.	...	...	Hoar frost and snow lying in morning. Fine. Evening dull.
2	85	89	E.	·01	3	Dull. Slight rain at night.
3	83	75	E.	...	...	Slight rain in morning. Cloudy and dull.
4	85	78	E.	...	...	Morning hazy. Dull and overcast.
5	76	79	S.W.	...	...	Hoar frost in morning. Dull and hazy.
6	80	98	S.W.	·05	2	Overcast. Rain between 5 and 7 p.m. Evening cloudy.
7	...	62	N.E.	...	...	Hoar frost. Cloudy and hazy. Evening dull.
8	78	61	E.	·04*	3	Slight snow morning and night. Cloudy.
9	85	56	W.	...	...	Snow lying ½ inch deep. Fine. Evening clear. Aurora about 8 p.m.
10	76	74	W.	...	...	Morning hazy. Clear and fine.
11	68	68	N.W.	...	...	Hoar frost and haze in morning. Clear and fine.
12	82	74	W.	·07*	3	Snow in morning, 1 inch deep. Clear and fine.
13	100	72	S.	...	...	Hoar frost in morning. Foggy. Snow lying.
14	86	76	W.	...	...	Morning dull and snow lying. Cloudy. Lunar halo and corona at 7 p.m.
15	85	85	S.W.	...	...	Hoar frost and fog in morning. Fine. Evening dull.
16	80	62	S.	...	...	Dull and overcast.
17	53	70	E.	...	...	Dull and hazy.
18	68	95	E.	...	...	Morning hazy. Fine. Evening dull.
19	85	85	E.	...	...	Dull and overcast.
20	86	96	S.E.	...	...	Dull and overcast.
21	87	87	S.	...	...	Dull and overcast.
22	88	89	S.E.	·16	5	Overcast. Rain after 8 p.m.
23	98	93	E.	·39	11	Morning showery. Overcast. Heavy rain at night.
24	84	91	E.	·34	13	Overcast and rain.
25	94	90	N.E.	·05	5	Rain in morning. Cloudy and dull.
26	80	77	E.	...	...	Cloudy. Breezy.
27	90	87	E.	·07†	6	Snow in morning. Afternoon showery. Dull.
28	91	97	N.E.	·30	12	Overcast and rain. Evening cloudy.

\* Melted Snow.

† Rain and Melted Snow.

## MAY, 1900.

TEMPERATURE, &amp;C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun- shine.	Average Daily Sun- shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North, ... ..	1	47·8	55	42	4	4·0	0·00	0·00	8·0
North-East, ... ..	1	46·4	56	38	9	9·0	0·00	0·00	7·0
East, ... ..	9	47·8	54	42	33	3·7	0·42	0·05	9·7
South-East, ... ..	1	48·9	58	42	4	4·0	0·20	0·20	10·0
South, ... ..	3	50·7	55	46	8	2·7	0·61	0·23	17·3
South-West, ... ..	6	51·2	57	46	18	3·0	0·81	0·14	13·8
West, ... ..	7	50·2	58	44	44	6·3	0·04	0·01	11·3
North-West, ... ..	3	54·0	64	45	33	11·0	0·00	0·00	9·3

## JUNE, 1900.

TEMPERATURE, &amp;C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun- shine.	Average Daily Sun- shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North, ... ..	0	...	...	...	...	...	...	...	...
North-East, ... ..	3	54·5	66	47	9	3·0	0·04	0·01	8·7
East, ... ..	9	54·8	65	49	50	5·6	2·20	0·24	9·9
South-East, ... ..	1	58·8	66	48	1	1·0	0·00	0·00	6·0
South, ... ..	3	57·5	65	52	5	1·7	0·43	0·14	11·0
South-West, ... ..	5	56·9	64	51	25	5·0	0·57	0·11	8·8
West, ... ..	8	57·4	65	52	56	7·0	1·10	0·14	8·4
North-West, ... ..	1	55·4	60	50	4	4·0	0·00	0·00	9·0



## DECEMBER, 1900.

TEMPERATURE, &amp;C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun- shine.	Average Daily Sun- shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North, ... ..	0	...	...	...	...	...	...	...	...
North-East, ... ..	3	39·9	42	38	0	0·0	1·45	0·48	8·0
East, ... ..	4	40·7	43	39	0	0·0	1·16	0·29	8·8
South-East, ... ..	2	42·4	44	41	0	0·0	0·40	0·20	7·5
South, ... ..	1	41·7	49	39	0	0·0	0·06	0·06	7·0
South-West, ... ..	18	46·7	49	43	5	0·3	3·71	0·21	20·0
West, ... ..	2	39·8	44	37	5	2·5	0·43	0·22	16·0
North-West, ... ..	1	42·5	45	41	0	0·0	0·13	0·13	19·0

## JANUARY, 1901.

TEMPERATURE &amp;C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun- shine.	Average Daily Sun- shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North, ... ..	0	...	...	...	...	...	...	...	...
North-East, ... ..	4	38·6	43	35	0	0·0	0·39	0·10	10·3
East, ... ..	8	37·0	39	34	2	0·3	0·24	0·03	10·1
South-East, ... ..	1	38·6	43	34	0	0·0	0·00	0·00	9·0
South, ... ..	0	...	...	...	...	...	...	...	...
South-West, ... ..	8	42·1	45	39	5	0·6	0·40	0·05	11·1
West, ... ..	6	39·1	45	35	2	0·3	1·12	0·19	18·2
North-West, ... ..	4	36·6	41	32	10	2·5	0·31	0·08	15·8

## FEBRUARY, 1901.

TEMPERATURE, &amp;C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun-shine.	Average Daily Sun-shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North, ... ..	4	34·3	38	30	20	5·0	0·00	0·00	7·3
North-East, ... ..	1	38·4	42	35	3	3·0	0·00	0·00	8·0
East, ... ..	5	38·2	42	35	4	0·8	0·28	0·06	7·0
South-East, ... ..	1	42·3	44	39	0	0·0	0·50	0·50	9·0
South, ... ..	0	...	...	...	...	...	...	...	...
South-West, ... ..	0	...	...	...	...	...	...	...	...
West, ... ..	13	37·9	43	33	21	1·6	0·63	0·05	7·2
North-West, ... ..	4	34·8	40	30	14	3·5	0·14	0·04	6·5

## JANUARY, 1902.

TEMPERATURE, &amp;C., AS DEPENDING ON THE DIRECTION OF THE WIND.

Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun-shine.	Average Daily Sun-shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North, ... ..	1	30·6	37	27	1	1·0	0·15	0·15	7·0
North-East, ... ..	0	...	...	...	...	...	...	...	...
East, ... ..	3	26·9	32	21	0	0·0	0·00	0·00	5·3
South-East, ... ..	0	...	...	...	...	...	...	...	...
South, ... ..	2	33·6	37	30	0	0·0	0·21	0·11	7·0
South-West, ... ..	9	44·8	47	42	0	0·0	1·28	0·14	16·2
West, ... ..	14	40·3	44	36	8	0·6	1·26	0·09	14·6
North-West, ... ..	2	28·5	33	24	10	5·0	0·09	0·05	10·5

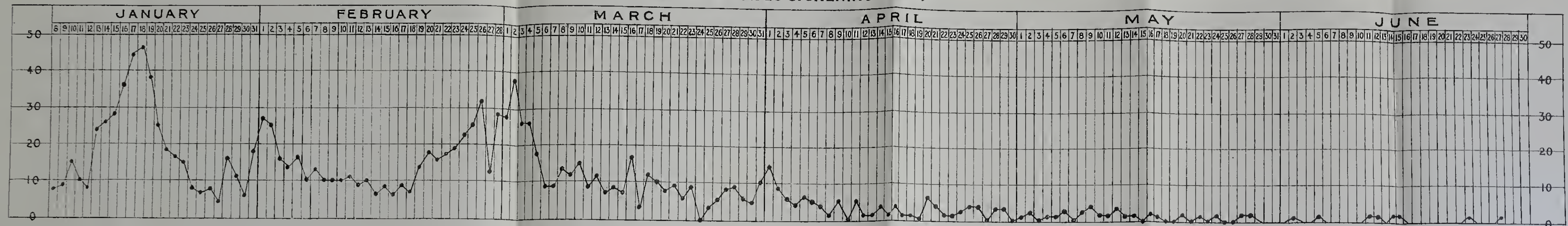
## FEBRUARY, 1902.

TEMPERATURE, &amp;C., AS DEPENDING ON THE DIRECTION OF THE WIND.

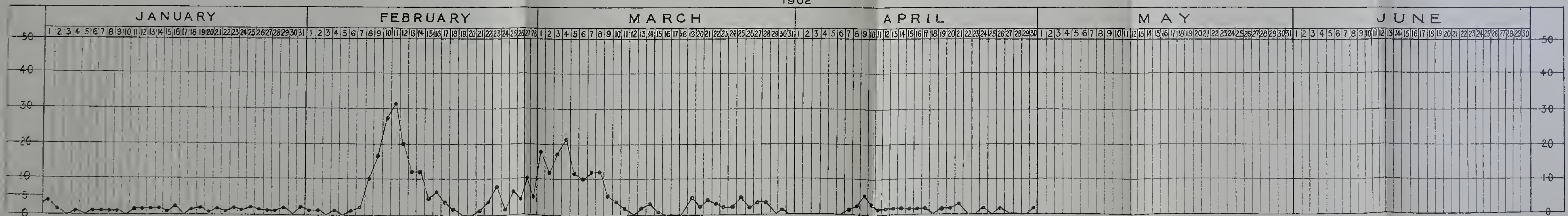
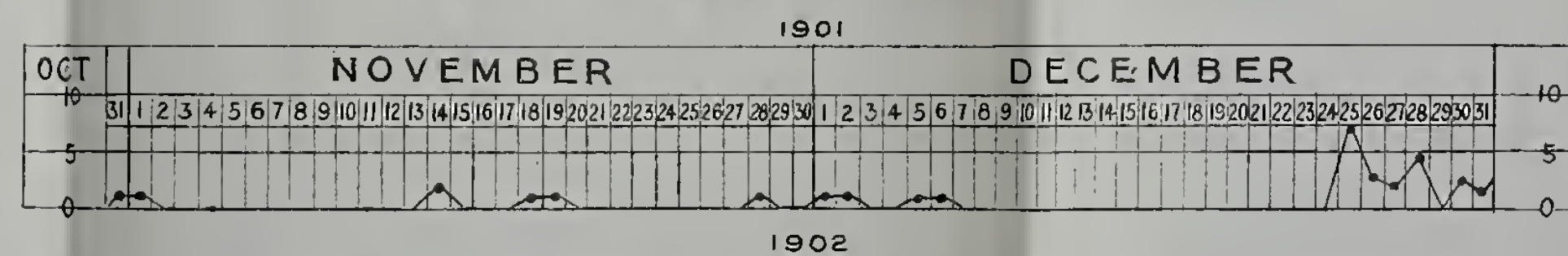
Direction.	Days.	Mean Temp.	Mean Max. Temp.	Mean Min. Temp.	Total Sun-shine.	Average Daily Sun-shine.	Total Rain.	Average Daily Rain.	Average Hourly Velocity of Wind.
		Deg.	Deg.	Deg.	Hours.	Hours.	Inches.	Inches.	Miles.
North, ... ..	0	...	...	...	...	...	...	...	...
North-East, ... ..	3	37·3	40	35	0	0·0	0·35	0·12	10·0
East, ... ..	12	37·1	40	34	8	0·7	0·85	0·07	10·9
South-East, ... ..	2	38·3	40	37	0	0·0	0·16	0·08	7·5
South, ... ..	3	33·3	37	30	0	0·0	0·00	0·00	9·3
South-West, ... ..	3	34·2	38	30	3	1·0	0·05	0·02	8·3
West, ... ..	4	31·2	37	25	15	3·8	0·07	0·02	7·0
North-West, ... ..	1	29·0	33	27	7	7·0	0·00	0·00	7·0



**CHART, A**  
**SMALLPOX 1901. (*Epidemic Period.*)**  
**NUMBER OF CASES SICKENING DAILY.**



**CHART, B**  
**SMALLPOX 1901-2 (*Recrudescence*)**  
**NUMBER OF CASES SICKENING DAILY.**










ROAD MAP  
OF THE  
COUNTY OF THE CITY OF GLASGOW  
AND THE VICINITY  
*Compiled from Aerial Surveys*



CASES REGISTERED

Fortnight ending 21st April, 1900, shown thus   
 " " 5th May, " " in black dots.  
 " " 19th " " " green "  
 " " 2nd June, " " " blue "

In this and following maps the hospital is represented by a Red Cross.







ROAD MAP  
OF THE  
COUNTY OF THE CITY OF GLASGOW  
AND THE VICINITY  
Compiled from various sources  
1900



EASTERN CASES SICKENING.

Fortnight ending 2nd June, 1900, shown in black dots.

16th	17th	18th	19th	20th	21st	22nd	23rd	24th	25th	26th	27th	28th	29th	30th	31st	32nd	33rd	34th	35th	36th	37th	38th	39th	40th	41st	42nd	43rd	44th	45th	46th	47th	48th	49th	50th	51st	52nd	53rd	54th	55th	56th	57th	58th	59th	60th	61st	62nd	63rd	64th	65th	66th	67th	68th	69th	70th	71st	72nd	73rd	74th	75th	76th	77th	78th	79th	80th	81st	82nd	83rd	84th	85th	86th	87th	88th	89th	90th	91st	92nd	93rd	94th	95th	96th	97th	98th	99th	100th	101st	102nd	103rd	104th	105th	106th	107th	108th	109th	110th	111st	112nd	113rd	114th	115th	116th	117th	118th	119th	120th	121st	122nd	123rd	124th	125th	126th	127th	128th	129th	130th	131st	132nd	133rd	134th	135th	136th	137th	138th	139th	140th	141st	142nd	143rd	144th	145th	146th	147th	148th	149th	150th	151st	152nd	153rd	154th	155th	156th	157th	158th	159th	160th	161st	162nd	163rd	164th	165th	166th	167th	168th	169th	170th	171st	172nd	173rd	174th	175th	176th	177th	178th	179th	180th	181st	182nd	183rd	184th	185th	186th	187th	188th	189th	190th	191st	192nd	193rd	194th	195th	196th	197th	198th	199th	200th	201st	202nd	203rd	204th	205th	206th	207th	208th	209th	210th	211st	212nd	213rd	214th	215th	216th	217th	218th	219th	220th	221st	222nd	223rd	224th	225th	226th	227th	228th	229th	230th	231st	232nd	233rd	234th	235th	236th	237th	238th	239th	240th	241st	242nd	243rd	244th	245th	246th	247th	248th	249th	250th	251st	252nd	253rd	254th	255th	256th	257th	258th	259th	260th	261st	262nd	263rd	264th	265th	266th	267th	268th	269th	270th	271st	272nd	273rd	274th	275th	276th	277th	278th	279th	280th	281st	282nd	283rd	284th	285th	286th	287th	288th	289th	290th	291st	292nd	293rd	294th	295th	296th	297th	298th	299th	300th	301st	302nd	303rd	304th	305th	306th	307th	308th	309th	310th	311st	312nd	313rd	314th	315th	316th	317th	318th	319th	320th	321st	322nd	323rd	324th	325th	326th	327th	328th	329th	330th	331st	332nd	333rd	334th	335th	336th	337th	338th	339th	340th	341st	342nd	343rd	344th	345th	346th	347th	348th	349th	350th	351st	352nd	353rd	354th	355th	356th	357th	358th	359th	360th	361st	362nd	363rd	364th	365th	366th	367th	368th	369th	370th	371st	372nd	373rd	374th	375th	376th	377th	378th	379th	380th	381st	382nd	383rd	384th	385th	386th	387th	388th	389th	390th	391st	392nd	393rd	394th	395th	396th	397th	398th	399th	400th	401st	402nd	403rd	404th	405th	406th	407th	408th	409th	410th	411st	412nd	413rd	414th	415th	416th	417th	418th	419th	420th	421st	422nd	423rd	424th	425th	426th	427th	428th	429th	430th	431st	432nd	433rd	434th	435th	436th	437th	438th	439th	440th	441st	442nd	443rd	444th	445th	446th	447th	448th	449th	450th	451st	452nd	453rd	454th	455th	456th	457th	458th	459th	460th	461st	462nd	463rd	464th	465th	466th	467th	468th	469th	470th	471st	472nd	473rd	474th	475th	476th	477th	478th	479th	480th	481st	482nd	483rd	484th	485th	486th	487th	488th	489th	490th	491st	492nd	493rd	494th	495th	496th	497th	498th	499th	500th	501st	502nd	503rd	504th	505th	506th	507th	508th	509th	510th	511st	512nd	513rd	514th	515th	516th	517th	518th	519th	520th	521st	522nd	523rd	524th	525th	526th	527th	528th	529th	530th	531st	532nd	533rd	534th	535th	536th	537th	538th	539th	540th	541st	542nd	543rd	544th	545th	546th	547th	548th	549th	550th	551st	552nd	553rd	554th	555th	556th	557th	558th	559th	560th	561st	562nd	563rd	564th	565th	566th	567th	568th	569th	570th	571st	572nd	573rd	574th	575th	576th	577th	578th	579th	580th	581st	582nd	583rd	584th	585th	586th	587th	588th	589th	590th	591st	592nd	593rd	594th	595th	596th	597th	598th	599th	600th	601st	602nd	603rd	604th	605th	606th	607th	608th	609th	610th	611st	612nd	613rd	614th	615th	616th	617th	618th	619th	620th	621st	622nd	623rd	624th	625th	626th	627th	628th	629th	630th	631st	632nd	633rd	634th	635th	636th	637th	638th	639th	640th	641st	642nd	643rd	644th	645th	646th	647th	648th	649th	650th	651st	652nd	653rd	654th	655th	656th	657th	658th	659th	660th	661st	662nd	663rd	664th	665th	666th	667th	668th	669th	670th	671st	672nd	673rd	674th	675th	676th	677th	678th	679th	680th	681st	682nd	683rd	684th	685th	686th	687th	688th	689th	690th	691st	692nd	693rd	694th	695th	696th	697th	698th	699th	700th	701st	702nd	703rd	704th	705th	706th	707th	708th	709th	710th	711st	712nd	713rd	714th	715th	716th	717th	718th	719th	720th	721st	722nd	723rd	724th	725th	726th	727th	728th	729th	730th	731st	732nd	733rd	734th	735th	736th	737th	738th	739th	740th	741st	742nd	743rd	744th	745th	746th	747th	748th	749th	750th	751st	752nd	753rd	754th	755th	756th	757th	758th	759th	760th	761st	762nd	763rd	764th	765th	766th	767th	768th	769th	770th	771st	772nd	773rd	774th	775th	776th	777th	778th	779th	780th	781st	782nd	783rd	784th	785th	786th	787th	788th	789th	790th	791st	792nd	793rd	794th	795th	796th	797th	798th	799th	800th	801st	802nd	803rd	804th	805th	806th	807th	808th	809th	810th	811st	812nd	813rd	814th	815th	816th	817th	818th	819th	820th	821st	822nd	823rd	824th	825th	826th	827th	828th	829th	830th	831st	832nd	833rd	834th	835th	836th	837th	838th	839th	840th	841st	842nd	843rd	844th	845th	846th	847th	848th	849th	850th	851st	852nd	853rd	854th	855th	856th	857th	858th	859th	860th	861st	862nd	863rd	864th	865th	866th	867th	868th	869th	870th	871st	872nd	873rd	874th	875th	876th	877th	878th	879th	880th	881st	882nd	883rd	884th	885th	886th	887th	888th	889th	890th	891st	892nd	893rd	894th	895th	896th	897th	898th	899th	900th	901st	902nd	903rd	904th	905th	906th	907th	908th	909th	910th	911st	912nd	913rd	914th	915th	916th	917th	918th	919th	920th	921st	922nd	923rd	924th	925th	926th	927th	928th	929th	930th	931st	932nd	933rd	934th	935th	936th	937th	938th	939th	940th	941st	942nd	943rd	944th	945th	946th	947th	948th	949th	950th	951st	952nd	953rd	954th	955th	956th	957th	958th	959th	960th	961st	962nd	963rd	964th	965th	966th	967th	968th	969th	970th	971st	972nd	973rd	974th	975th	976th	977th	978th	979th	980th	981st	982nd	983rd	984th	985th	986th	987th	988th	989th	990th	991st	992nd	993rd	994th	995th	996th	997th	998th	999th	1000th
16th	17th	18th	19th	20th	21st	22nd	23rd	24th	25th	26th	27th	28th	29th	30th	31st	32nd	33rd	34th	35th	36th	37th	38th	39th	40th	41st	42nd	43rd	44th	45th	46th	47th	48th	49th	50th	51st	52nd	53rd	54th	55th	56th	57th	58th	59th	60th	61st	62nd	63rd	64th	65th	66th	67th	68th	69th	70th	71st	72nd	73rd	74th	75th	76th	77th	78th	79th	80th	81st	82nd	83rd	84th	85th	86th	87th	88th	89th	90th	91st	92nd	93rd	94th	95th	96th	97th	98th	99th	100th	101st	102nd	103rd	104th	105th	106th	107th	108th	109th	110th	111st	112nd	113rd	114th	115th	116th	117th	118th	119th	120th	121st	122nd	123rd	124th	125th	126th	127th	128th	129th	130th	131st	132nd	133rd	134th	135th	136th	137th	138th	139th	140th	141st	142nd	143rd	144th	145th	146th	147th	148th	149th	150th	151st	152nd	153rd	154th	155th	156th	157th	158th	159th	160th	161st	162nd	163rd	164th	165th	166th	167th	168th	169th	170th	171st	172nd	173rd	174th	175th	176th	177th	178th	179th	180th	181st	182nd	183rd	184th	185th	186th	187th	188th	189th	190th	191st	192nd	193rd	194th	195th	196th	197th	198th	199th	200th	201st	202nd	203rd	204th	205th	206th	207th	208th	209th	210th	211st	212nd	213rd	214th	215th	216th	217th	218th	219th	220th	221st	222nd	223rd	224th	225th	226th	227th	228th	229th	230th	231st	232nd	233rd	234th	235th	236th	237th	238th	239th	240th	241st	242nd	243rd	244th	245th	246th	247th	248th	249th	250th	251st	252nd	253rd	254th	255th	256th	257th	258th	259th	260th	261st	262nd	263rd	264th	265th	266th	267th	268th	269th	270th	271st	272nd	273rd	274th	275th	276th	277th	278th	279th	280th	281st	282nd	283rd	284th	285th	286th	287th	288th	289th	290th	291st	292nd	293rd	294th	295th	296th	297th	298th	299th	300th	301st	302nd	303rd	304th	305th	306th	307th	308th	309th	310th	311st	312nd	313rd	314th	315th	316th	317th	318th	319th	320th	321st	322nd	323rd	324th	325th	326th	327th	328th	329th	330th	331st	332nd	333rd	334th	335th	336th	337th	338th	339th	340th	341st	342nd	343rd	344th	345th	346th	347th	348th	349th	350th	351st	352nd	353rd	354th	355th	356th	357th	358th	359th	360th	361st	362nd	363rd	364th	365th	366th	367th	368th	369th	370th	371st	372nd	373rd	374th	375th	376th	377th	378th	379th	380th	381st	382nd	383rd	384th	385th	386th	387th	388th	389th	390th	391st	392nd	393rd	394th	395th	396th	397th	398th	399th	400th	401st	402nd	403rd	404th	405th	406th	407th	408th	409th	410th	411st	412nd	413rd	414th	415th	416th	417th	418th	419th	420th	421st	422nd	423rd	424th																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																







ROAD MAP  
OF THE  
COUNTY OF THE CITY OF GLASGOW  
AND THE VICINITY



EASTERN CASES REGISTERED.

Fortnight ending 1st December, 1900, shown in black dots.

"	"	15th	"	"	blue	"
"	"	29th	"	"	green	"
"	"	12th January, 1901,	"	"	orange	"







ROAD MAP  
OF THE  
COUNTY OF THE CITY OF GLASGOW  
AND THE VICINITY  
Compiled from A.D. 1890  
1:50,000 Scale



ALL CASES REGISTERED.  
Fortnight ending 26th January, 1901.

MAP IV.

Geoin. Watson Litho. Glasgow







ROAD MAP  
OF THE  
COUNTY OF THE CITY OF GLASGOW  
AND THE VICINITY  
(compiled from Aerial Survey)



ALL CASES REGISTERED.  
Fortnight ending 9th March, 1901.

MAP V.







ROAD MAP  
OF THE  
COUNTY OF THE CITY OF GLASGOW  
AND THE VICINITY  
*Compiled from 1881 Survey*



RECRUDESCENCE—

November, 1901, to 1st May, 1902.

Prior to 14th February shown in blue;  
others shown in black.







ROAD MAP  
OF THE  
COUNTY OF THE CITY OF GLASGOW  
AND THE VICINITY  
Compiled from Actual Survey  
in 1901 and 1902  
1:50,000



EASTERN CASES ONLY.  
Fortnight ending 22nd February, 1902.







CORPORATION OF GLASGOW.

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THIRTY-SIXTH ANNUAL REPORT

ON THE

OPERATIONS OF THE

SANITARY DEPARTMENT

OF THE CITY OF GLASGOW,

*For the Year ending 31st December, 1905.*

BY

PETER FYFE,

CHIEF SANITARY INSPECTOR.



PRINTED FOR THE CORPORATION OF GLASGOW BY  
ROBERT ANDERSON, 142 WEST NILE STREET, GLASGOW.





# SANITARY ADMINISTRATION.

## THE CORPORATION OF THE CITY OF GLASGOW,

BEING

*The Local Authority of said City under the Public Health  
(Scotland) Act, 1897.*

THE HONOURABLE WILLIAM BILSLAND,  
*Lord Provost.*

The Committee on Health administers all portions of said Act relating to  
"General Nuisances."

*Convener*—COUNCILLOR W. FLEMING ANDERSON.

### MEMBERS OF COMMITTEE ON HEALTH.

DEAN OF GUILD (Robert King).  
Bailie BURRELL.  
Bailie RODERICK SCOTT.

Councillor MICHAEL J. CONNELL,  
and  
Councillor JAMES HENDERSON.

And the following Members forming the

#### SUB-COMMITTEE ON HOSPITALS.

The LORD PROVOST.  
Bailie E. WATSON.  
Bailie D. WILLOX.  
Councillor W. F. ANDERSON.  
Councillor JOHN BATTERSBY.  
Councillor HUGH BRECHIN.  
Councillor JAMES COUTTS.  
Councillor JAMES DICK.  
Councillor GAREY.  
Councillor GUEST.  
Councillor C. R. McLEAN.  
Councillor THOMAS PAXTON.  
Councillor W. F. RUSSELL.  
Councillor ROBERT SLOAN.  
Councillor JAMES WILLOCK.  
Councillor JAMES STEELE, *Convener.*

#### SUB-COMMITTEE ON SANITARY OFFICES, OPEN SPACES, &c.

Bailie D. WILLOX.  
Treasurer D. M. STEVENSON.  
Councillor W. F. ANDERSON.  
Councillor JOHN BATTERSBY.  
Councillor HUGH BRECHIN.  
Councillor CHARLES J. CLELAND.  
Councillor ROBERT KIRKLAND.  
Councillor ALEX. B. KIRKPATRICK.  
Councillor THOMAS PAXTON.  
Councillor JAMES STEELE.  
Councillor JAMES W. STEWART.  
Councillor SUTHERLAND.  
Councillor WM. MACLAY, *Convener.*

*Medical Officer of Health*—  
A. K. CHALMERS, M.D.

*Sanitary Inspector*—  
MR. PETER FYFE.

*Bacteriologist*—  
R. M. BUCHANAN, M.B., C.M.

*Corporation Chemist and Analyst*—  
MR. F. W. HARRIS, F.C.S.

*Physician Superintendents*—  
*Belvidere Hospital*—JOHN BROWNLEE, M.D.  
*Ruchill Hospital*—ALEXANDER JOHNSTON, M.D.

*Clerk to Local Authority under the Public Health Act*—  
MR. A. W. MYLES, Town-Clerk.

*Public Vaccinator*—NEIL CARMICHAEL, M.D.  
*Procurator-Fiscal*—GEORGE NEILSON, LL.D.

*Treasurer (Police Department)*—MR. JAMES D. BORTHWICK.

# STAFF OF SANITARY INSPECTOR'S DEPARTMENT.

## INDOOR STAFF.

<i>Public Enquiry Room,</i>	...	...	...	...	...	P. B. Mackintosh, with 3 Assistants.
<i>Chief Inspector's Room.</i>	...	...	...	...	...	George Anderson, „ 3 „
<i>Central District,</i>	...	...	...	...	...	James Neil, „ 2 „
<i>Northern „</i>	...	...	...	...	...	William M'Keith.
<i>Eastern „</i>	...	...	...	...	...	Hugh P. Dempster.
<i>Southern „</i>	...	...	...	...	...	D. M'Callum.
<i>Western „</i>	...	...	...	...	...	Wm. J. Allen.
<i>Suburban Districts,</i>	...	...	...	...	...	William M'Neil, with 2 Assistants.
<i>Typists,</i>	...	...	...	...	...	Miss J. Barr and Miss E. R. Walker.
<i>Draughtsman,</i>	...	...	...	...	...	John Burnside.
<i>Joiner,</i>	...	...	...	...	...	John MacAdie.
<i>Engineer and Caretaker of Chambers,</i>	...	...	...	...	...	Thos. Boyd, with 6 Cleaners.

## OUTDOOR STAFF.

### 8 District Inspectors—

Henry Watt (Central).	Christopher Fletcher (Western).	Jas. L. Dobson (North-West).
James Paterson (Southern).	John P. Hart (South-Suburban).	Hugh Wood (Kinning Park).
Robt. N. Crawford (Eastern).	William Miller (Northern).	

### 27 Nuisance Inspectors—

Robert Allan (Northern).	John Hillis (Western).	Peter M'Killop (Eastern).
Robert Allan (Southern).	William Latto (Central).	John Purcell (South-Suburban).
Wm. Brymer (Central).	Joseph Martin (Eastern).	William Ramsay (Northern).
Arch. Chalmers (Eastern).	Jas. S. Murray (North-West).	John Robertson (South-Sub.).
John Donaldson (Northern).	A. M'Callum (Western).	Thos. D. Seton (Northern).
J. O. Ferguson (South-Sub.).	Alex. Macdougall (North-West).	Jas. Wedderspoon (Southern).
William Fraser (Northern).	William M'Ghie (Central).	Alex. Young do.
Joseph Hepburn (Western).	Charles M'Jarrow (Eastern).	

Jas. Algie (Northern). John Boyd (Eastern). David Porter (Southern). Wm. Roy (Central).  
(These four are Special Drain and Plumber Work Inspectors, with 7 Junior Assistants.)

### 8 Female Inspectors—

Miss Dewar (Central).	Miss Crawford (Eastern).	Miss Scott (Northern).
Miss Jamieson (Southern).	Mrs. Stewart do.	Mrs. Crabb (North-West).
Miss Cameron (Western).	Miss Allan (Northern).	

### 6 Night Inspectors of Ticketed Houses—

David Gellatly.	David Myles.	James M'Grath.
James Hutchison.	Andrew Logan.	John Stuart.

*Inspector of Common Lodging-Houses and Boarding-Houses,* ... D. Macpherson.  
*Do. Shipping in Harbour (Port Local Authority),* ... Geo. Maconnachie.

### 6 Factory and Workshop Inspectors—

R. L. Ashford (Central).	Alex. M'Gilvray (Central).	A. M'Cowan (Northern).
T. S. Logie do.	J. Hannah (Eastern).	J. Patterson (Southern).

### 4 Food and Drugs Inspectors—

Wm. Denovan.	A. B. Findlay.	M. Kerr.	Allan Miller.
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*Shop Hours Inspector,* ... Wm. T. Armstrong.

*Fish Inspector,* ... Geo. B. Harvey.

*4 Inspectors of Smoke,* ... Colin B. Park, Henry J. Mackay, Alex. Gunn, and John Young.

15 Caretakers of Open Spaces and Children's Playgrounds.

## INDOOR DISINFECTING STAFF.

Thomas B. Watson and 4 Whitewashing Assistants.

## OUTDOOR DISINFECTING STAFF.

### Belvidere Wash-House—

Robert Easton (Superintendent), John Mackay (Engineer), and 9 Male and 10 Female Employees.

### Ruchill Wash-House—

Fred N. Banks (Superintendent), Jas. Clarkson (Engineer), and 9 Male and 10 Female Employees.



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THE  
**SANITARY CONDITION OF GLASGOW**  
**In 1905.**

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TO THE HONOURABLE THE LORD PROVOST AND MEMBERS  
OF THE CORPORATION.

MY LORD PROVOST AND GENTLEMEN,

Judged by the rough-and-ready standard of the death-rate, Glasgow may be considered a healthier city in 1905 than it has ever been before. In his summary for the year, Dr. Chalmers shows that the number of persons who died during 1905 was 953 less than died in 1904, and 642 less than died in 1903. The actual death-rate for 1905 was 18·0, in place of 18·8 in the previous year.

On the other hand, infectious diseases appear to have been more numerous. Eliminating Phthisis, Diarrhœal Diseases, Chickenpox, and Anthrax, there were 3,099 more known cases in 1905 than in 1904. This increase is more than accounted for by the prevalence of Measles, of which there were 4,197 cases more than in the previous year.

The greatest diminution occurs in the cases of Smallpox, only 4 being recorded last year, against 870 in 1904. Scarlet Fever and Enteric also show a considerable reduction—589 cases in the former and 177 cases in the latter. It is satisfactory to note that as many as 1,858 cases of infectious diseases were discovered and reported by the officers of the epidemic staff.

What are known as zymotic diseases caused 1,998 deaths, or 104 fewer than in 1904—a happy result, when one takes into account the large increase in known cases last year.

Owing to the successful struggle of the Health Department against Smallpox, re-vaccinations have enormously declined, only 1,003 persons having been operated on, in place of 11,164 in 1904. 306 primary vaccinations were done in the Office and the Hospitals during the year.

#### DISINFECTION.

11,608 apartments, lobbies, and closets were disinfected by spraying or fumigation during the year, and 660 over and above this were whitewashed. 11,487 beds and pillows were treated at the two Sanitary Wash-houses in the steam disinfectors; 694 carpets were dealt with, and 492,812 articles of clothing were washed; while 4,622 bundles of clothing were of such a nature that they had to be specially treated under steam pressure. The number of infected beds destroyed by fire was 2,175.

In the washing process, 16,829 lbs. of soap and soap powder were used, or about  $5\frac{1}{2}$  ounces per article treated.

During the year a high-pressure “Decoudun” ironing machine was erected at the Ruchill Sanitary Wash-house, which has expedited the work of drying, besides enabling the Department to send home many of the larger linen and cotton articles in a much more workmanlike condition than formerly. So successful has this addition been, that I propose this year preparing plans for a similar addition to the plant at Belvidere Wash-house.

## NUISANCES.

414,722 separate inspections for the discovery of nuisances were made by the male staff and 57,981 by the female staff during 1905, resulting in the discovery of 44,979 nuisances by the former and 1,625 by the latter.

The female staff, in addition, visited on 1,848 occasions the Board schools in quest of dirty and verminous children, under Section 15 of the Glasgow Corporation (Police) Order, 1904. 4,221 children were submitted by the School Board officials for inspection, and, out of these, 2,636 were found to be in a dirty or verminous state. The homes of the affected children were carefully inspected—165 of which were found in an unclean state, and in 161 cases the bedding was found in a filthy condition. Only in five cases was it found needful to put into operation the full powers of the Act, and take the children from their parents in order to have them cleansed by the officials of the Corporation. In these cases this was done in the Reception-houses by the Matrons and their staff. With two exceptions, the cleansing of the filthy bedding and houses was done in every case by the occupiers on receipt of the statutory notice.

The Act is a summary one, and it is working excellently in the public interest, but, notwithstanding this, when a recalcitrant person is met with, a large amount of valuable time is spent before he can be compelled to conform to the law. An illustration will best exhibit this.

On the 21st of March, 1905, three children of a man, A. G., were brought before the attention of one of the female inspectors in a school on the south side of the river. Two of them were found verminous and dirty, and the third one dirty only. Notice was sent, and for a time some improvement was made. On re-examination, however, on the 18th of April, all three were again found in the same filthy state. Proceedings were taken, under Section 9 (2) of the Order, against the father on the 21st of April, when he was convicted in the Police Court, and ordered to cleanse the bed and body clothing in the house forthwith. On 25th April I sent two of the female inspectors to ascertain what progress had been made, but admission to the house was refused. An application, accordingly, was made to the Magistrate next day for a warrant for forcible entry. Armed with this, the two inspectors on the following day gained access to the house, and found that the clothing of the children had been cleansed.

On the 2nd of May the school was again visited, and the same three children were found as bad as before. Arrangements were there and then made for their removal from the school to the Reception-house in South York Street on the 3rd of May at 11 a.m., where they were thoroughly cleansed, and detained until their clothing had been treated at the Sanitary Wash-house. They were then sent back to their parents at 8.20 p.m.

Fully twenty-eight hours were spent in this duty by each of the inspectors engaged, apart from the time and trouble taken with the children at the Reception-house and with their clothing at the wash-house. Even yet neither the house nor the children are in a cleanly condition, as I found on a personal visit recently. The family are of the alien tribe—one of whose chief characteristics appears to be, like that of the saints and hermits of early Christian times, a desire to live amid filth and disorder.

In September, additional work in connection with the visitation of newly-born infants was put upon the female inspectors, particularly in homes where the services of the maternity nurses were required. Doubtless much good and useful work has been and is done by them in this direction, but, as this class of work grows, it unavoidably retards the progress of their operations in the domain of house-to-house visitation and inspection. I find, from a recent return of their inspections of the lower-class dwellings, that, whereas from January and February, 1904, they had inspected 16,240 houses, only 7,670 visits had been paid to similar houses during the same months in 1906.

The regular inspection of children in the schools, and the consequent visitation in the homes of those found in a filthy or verminous state, have contributed to this great reduction in their regular house-to-house visitations; still, the continual visitation, for statistical and advisory purposes, of houses



in which infants are born, has largely caused the reduction specified. As time proceeds, I fear, on this account, it will be advisable to consider the expediency of appointing a special staff of trained visitors for infant-mortality work alone.

With regard to the ordinary nuisance-inspection work, the following seven Sanitary Districts head the list as nuisance producers, viz.:—

Ward	XVI. (Cowcaddens),	...	3,307	nuisances, or 19·11 per acre.
„	XIV. (Sandyford),	...	2,141	„ or 15·52 „
„	IX. (Blackfriars),	...	2,022	„ or 14·00 „
„	XVIII. (Hutchesontown),		2,866	„ or 12·80 „
„	XIX. (Gorbals),	...	2,231	„ or 9·19 „
„	XII. (Broomielaw),	...	950	„ or 9·13 „
„	II. (Calton),	...	2,578	„ or 8·00 „

The average for the City was 3·35 nuisances per acre for the year, or slightly under the figure for 1904, which was 3·50.

The relative position of the other wards in the City in this respect and other information of interest therein will be found detailed in Appendix I.

It may be noted here that the ordinary nuisance staff were specially engaged, for the purposes of the Provisional Order of 1905, in an organised inspection of the 2,573 stables within the City boundaries, which will be referred to in detail under a special heading. The number of these found in each ward is given in Appendix I.

#### MOVEMENT OF POPULATION.

A few words may be added here as a probable explanation of the figures showing the increase or decrease of houses and population in some of the wards since last year and since the Census year, 1901.

*Ward I. (Dalmarnock).*—No tenements in this ward have been removed, but, since the erection of the new Corporation Gas-works at Provanmill, large numbers of the workers have left to take up house nearer the new works; others have removed to Ward III. (Mile-end), to be nearer the Parkhead Forge; and in other cases it has been ascertained that a number of families in this ward have emigrated to Canada. Consequently several streets here have, from being well populated, become greatly denuded of their population, and there are many empty houses.

*Ward III. (Mile-end).*—A large number of new tenements have in recent years been erected in this ward round about Parkhead Cross and the Forge, which, as indicated above, have attracted a considerable number of families from adjacent wards.

*Ward IV. (Whitevale).*—A number of low-class tenements have been condemned in this ward, and taken down. There are also many houses remaining presently unlet, the people having migrated to newer dwellings in other wards.

*Ward V. (Dennistoun).*—Much new building has in recent years been done in this ward, particularly about Alexandra Park and its immediate neighbourhood, which accounts for the increase shown in the table.

*Ward VI. (Springburn).*—Around Petershill Road and Springburn Road, and in Bedlay Street, a large number of new tenements have been erected, the increase of population consequently being almost as great as that in Ward V.

*Ward VII. (Cowlairst).*—The same remark applies to this ward, in which, on the north and south sides of Keppochhill Road and vicinity, much building of new tenements has been proceeding.

*Ward VIII. (Townhead).*—It is not possible to explain the specific reasons which have led to a reduction of 1,636 persons in this ward since 1901. Many houses are reported to be empty and “to let.” Probably it is due to families flitting to newer tenements in the adjacent ward of Springburn. A few tenements in Garnkirk Street and Coatbridge Street have been removed, but these were not sufficient in number to account for the reduction specified.

*Ward IX. (Blackfriars).*—The diminution in population of this ward is serious—1,956 since last year, making a total of 9,284 since the Census year (1901). It is in a great measure due to the destruction of many old tenements. Eight or nine tenements lying on the west side of High Street, and extending north to Rottenrow, have been removed by the Improvement Trust, and replaced by buildings of modern construction. In Stockwell Street also, from Bridgegate to Goosedubbs and Aird's Lane, four tenements have been taken down, and reconstruction is proceeding. The old tenements in Bridgegate, from St. Margaret's Place eastwards to Saltmarket Street and southward to Jail Square, have been demolished, and new buildings are being erected. In this ward on the south side of the river, the demolition of insanitary back lands behind Rose Street and Crown Street has occurred, whereby much-needed light and air have been let in to what were previously dismal and evil-smelling courts, where nuisance of every description was constantly present. These, of course, cannot be reconstructed.

*Ward XI. (Blythswood).*—In this ward, house demolition has been going on in Renfield Street, from Renfrew Lane up to Renfrew Street, in order to make room for the new "Pavilion Theatre of Varieties." A large tenement at the corner of Sauchiehall Street and Cambridge Street, and also one at 90 Sauchiehall Street, have been removed and replaced by warehouse premises.

*Ward XII. (Broomielaw).*—Representations and demolitions under the Housing of the Working Classes Act, 1890, have mainly been the cause of the reduction of the population here. It was much needed. The sanitary district formerly known as "Brownfield" was for long the sorest spot in Glasgow. It is now getting comparatively respectable. At 29 Brown Street, 67 Brown Street, 9 Carrick Street, 20 Carrick Street, 29 West College Street, 14 M'Alpine Street, and 53 M'Alpine Street, many back-land dwellings have now disappeared, and can never be replaced. The tenements at the corner of West Campbell Street and Cadogan Street, and also at the corner of Argyle Street and Pitt Street, have been entirely removed and reconstructed. Other undesirable buildings still remain, but in time means may be found to accomplish their demolition also. In no district has more satisfactory work been accomplished in recent years.

*Ward XVI. (Cowcaddens).*—The marked decrease here is accounted for by the closure and destruction of insanitary property in M'Adam Lane, Maitland Street, Maitland Lane, Muse Lane, Stirling Street, Water Street, Milton Street, Dobbie's Loan, Renfrew Street, and Ann Street, while many damp underground dwellings in Grove Street, Abercorn Street, and vicinity have been closed under the Public Health Act. Further work of this nature still remains to be accomplished before this ward can be said to be in a reasonably healthy state.

*Ward XVIII. (Hutchesontown).*—A large increase of population has occurred here since 1901. It is one of the expanding wards of the City, much building of new tenements having been done during the past four years. The temporary set-back since 1904 is probably due to migration to other districts or to parts outwith the City.

*Ward XIX. (Gorbals).*—New tenements have recently been erected in this ward in Cuthbertson Street, Langside Road, Victoria Road, Coplaw Street, and Cromwell Road, which accounts for the increase of houses and population recorded.

There is little worthy of special note in the remaining wards. Govanhill, Langside, Pollokshields, Kelvinside, and Maryhill—lying, as they do, on the fringes of the City—all naturally show a great expansion, due to the overflow of the population to the suburbs. The whole movement exhibits a displacement of population to the extent of some 40,000 persons. This is the general tendency at the present time, and, doubtless, is a natural one, facilitated by cheap transit by tram-car and a vast amount of house building on the outskirts.



## UNINHABITABLE AND TICKETED HOUSES.

As a very full report was issued in the first month of this year showing the operations of the "Back Lands Committee," it is unnecessary here to dwell upon the good work which has been done during 1905 with regard to uninhabitable dwellings. The operations were carried out under the Housing of the Working Classes Act, 1890, Part II., and, to allow of the free play of this Act, no work has been carried out under Section 32 of the Local Police Act, which gives power to close, but not to demolish, uninhabitable dwellings.

Regarding ticketed houses, our operations have been extended by the additional powers of ticketing given by the Provisional Order of 1904. The following statement in tabular form exhibits the state of matters at the present time:—

Ward.	Total No.	Giving Accommodation (at 400 cubic feet per Adult) for										
		1½ Adults.	2 Adults.	2½ Adults.	3 Adults.	3½ Adults.	4 Adults.	4½ Adults.	5 Adults.	5½ Adults.	6 Adults.	6½ Adults.
1	1,389	19	110	189	214	235	244	92	128	110	8	40
2	1,601	29	201	290	238	203	150	147	277	18	16	32
3	2,203	20	151	372	384	304	266	332	334	17	6	17
4	953	13	71	145	203	154	76	51	142	13	39	46
5	201	5	31	55	27	25	19	20	16	3	...	...
6	1,409	12	45	140	287	259	271	160	216	9	5	5
7	409	2	21	33	75	83	46	59	69	11	6	4
8	1,333	21	118	210	186	112	103	124	279	78	71	31
9	756	16	69	78	106	70	158	153	82	17	6	1
10	8	...	...	...	...	...	...	6	2	...	...	...
11	5	...	1	...	...	...	...	...	4	...	...	...
12	484	8	24	48	30	62	57	86	76	26	27	40
13	1,650	17	121	217	216	222	130	154	259	166	87	61
14	817	25	95	162	168	83	57	85	80	37	19	6
15	...	...	...	...	...	...	...	...	...	...	...	...
16	2,843	29	227	413	452	361	263	342	396	176	105	79
17	723	4	30	75	206	105	70	79	49	33	36	36
18	969	2	61	170	184	148	120	118	142	12	10	2
19	997	19	131	190	188	108	102	117	112	8	15	7
20	939	14	72	196	207	91	72	105	136	28	18	...
21	227	1	5	...	20	59	36	16	87	..	1	2
22	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	..	...
25	302	1	9	25	48	37	57	78	46	1	...	...
26	329	...	3	20	67	76	52	34	16	31	16	14
Total,	20,547	257	1,596	3,028	3,506	2,797	2,349	2,358	2,948	794	491	423

The work accomplished by the night staff is shown in the following abstract Table, which has been prepared from their weekly returns. For convenience, the figures are given as applicable to the seven Police Divisions of the City:—

Police Division.	No. of Inspections.	Houses Overcrowded.		Prosecutions.					No. of One-Apartment Houses Inspected.	No. of Two-Apartment Houses Inspected.
		No.	Percentage on Inspections.	No.	Percentage on Cases found.	Number of Convictions.	No. Fined.	Amount of Fines.		
	1	2	3	4	5	6	7	8	9	10
Central, - - -	1,547	95	6·14	40	42·10	29	10	£ 1 12 6	1,085	462
Northern, - - -	7,426	643	8·65	334	51·94	261	153	28 13 0	4,200	3,157
Western, - - -	6,560	509	7·75	236	53·75	201	108	23 0 6	3,255	2,629
Southern, - - -	8,614	636	7·38	277	43·55	205	94	22 6 0	5,573	3,010
Eastern, - - -	14,229	1,029	7·08	426	41·39	277	113	21 9 0	10,329	3,900
Maryhill, - - -	614	31	5·04	16	51·61	12	6	1 2 6	537	75
St. Rollox, -	7,485	404	6·01	192	47·52	132	41	9 18 6	4,641	2,003
Total, - - -	46,475	3,347	7·20	1,521	46·41	1,117	525	108 2 0	29,620	15,236

Cases of Overcrowding in One Apartments.		Cases of Overcrowding in Two Apartments.		Nature of Overcrowding.		Extent of Overcrowding.			No. of Houses Empty.	Average Monthly Rents.	
No.	Percentage.	No.	Percentage.	Wholly by Lodgers.	By Families only.	No. with $\frac{1}{2}$ Excess.	No. with 1 Excess.	No. with over 1 Excess.		One Apartments.	Two Apartments.
11	12	13	14	15	16	17	18	19	20	21	22
65	5·99	29	6·27	38	44	12	33	50	18	9/4	10/11
381	9·07	256	8·10	235	322	66	255	322	192	9/1	12/
266	8·17	167	6·35	154	222	55	177	277	70	10/2	11/2
430	7·71	198	6·57	239	309	15	280	341	122	11/11	15/10
747	7·23	272	6·98	353	552	18	463	548	462	8/5	9/10
23	4·28	8	10·66	17	14	3	11	17	12	8/1	14/2
309	6·65	85	4·24	99	238	12	159	233	138	8/11	9/5
2,221	7·49	1,015	6·66	1,135	1,701	181	1,378	1,788	1,014	9/5	11/11



That the nuisance of overcrowding is gradually being abated is shown by the fourth column (the percentage last year being 8·48), while under the sixteenth and seventeenth headings the nature of the overcrowding is exhibited; the next three columns give its extent; and the last two show the average monthly rent charged for a one and a two-roomed ticketed house. It will be noted that the rents charged for single-apartment houses in the Southern and Western Divisions are considerably in excess of those in the other districts.

The unoccupied ticketed houses number 1,014, which is almost 5 per cent. of the total, 20,547.

### FARMED-OUT HOUSES.

The following Table gives the figures for farmed-out houses in Glasgow during 1905:—

There is nothing of a special nature to report regarding them. Some of them (in about a dozen properties) are houses of a suspicious character morally, and strict supervision is constantly required in these, in order to keep down nuisance.

#### FARMED-OUT HOUSES IN THE CITY AS AT 30TH DECEMBER, 1905.

Ward.	Total No. of Houses.	One Apartment.					Two Apartments.					Total Inmates.	
		Total No.	No. Occupied.	No. Empty.	Inmates.		Total No.	No. Occupied.	No. Empty.	Inmates.		Adults.	Children.
					Adults.	Children.				Adults.	Children.		
2	293	172	155	17	327	80	121	110	11	344	135	671	215
3	25	25	21	4	43	10	...	...	...	...	...	43	10
4	67	27	25	2	46	8	40	36	4	115	38	161	46
5	33	16	16	...	34	7	17	17	...	67	6	101	13
6	16	13	12	1	24	8	3	3	...	6	3	30	11
8	83	75	71	4	147	32	8	6	2	23	5	170	37
9	148	54	53	1	112	37	94	94	...	321	74	433	111
10	16	1	1	...	2	1	15	15	...	54	6	56	7
12	85	23	22	1	44	18	62	62	...	203	96	247	114
13	112	75	69	6	130	45	37	34	3	93	42	223	87
14	65	65	38	27	82	26	...	...	...	...	...	82	26
16	11	11	10	1	20	3	...	...	...	...	...	20	3
18	49	31	30	1	56	25	18	16	2	46	11	102	36
19	48	23	20	3	45	10	25	21	4	74	12	119	22
20	63	38	38	...	142	34	25	23	2	30	14	172	48
Total,	1,114	649	581	68	1,254	344	465	437	28	1,376	442	2,630	786

NOTE—27 of the 2-apartment houses in Ward 2 have only 1 room occupied.

6 do. do. do. 9 do. do.  
10 do. do. do. 12 do. do.

## COMMON LODGING-HOUSES AND SEAMEN'S BOARDING-HOUSES.

There were at the end of 1905, 63 Common Lodging-houses on the Register, with 9,768 beds, as against 56, with 9,346 beds, at the end of 1904. The Seamen's Boarding-houses number 35, with 623 beds. No prosecutions were instituted against keepers during the year.

The following Table will show the present position at a glance:—

Class of House.	Ward.	Inspections.	Complaints Notified.	Complaints Removed.	Houses Measured and Registered.	Houses Removed from Register.
COMMON LODGING- HOUSES,	2	1,288	71	68	4	...
	3	19	1	1	1	...
	4	316	14	14	...	...
	5	43	1	1	...	...
	8	47	2	2	...	1
	9	1,013	51	48	5	3
	12	514	13	14	1	1
	13	88	15	16	1	...
	16	282	10	9	...	...
	19	308	13	14	...	...
	20	79	2	2	...	...
	25	44	1	1	...	...
Total, ...	...	4,041	194	190	12	5
SEAMEN'S AND EMIGRANTS' BOARDING- HOUSES,	12	1,837	27	25	5	8
	13	61	...	...	...	...
	18	2	...	...	1	...
	20	572	8	8	1	2
Total, ...	...	2,472	35	33	7	10

NOTE.—7 Lodging-houses and 4 Boarding-houses were transferred during the year to other keepers.

During the year further improvements of a structural nature have been carried out in many of the houses, and in five of them we got the existing beds removed and replaced, and the bedding replenished.

A special detailed report has now been made on each common lodging-house in the City, in view of re-registration in May, 1906. These reports deal, *inter alia*, with the important subject of suitable exits in case of fire. The deplorable disaster which occurred in the lodging-house at 39 Watson Street, by which 39 sleepers were suffocated or burned to death, brought up sharply the question of the powers given in the Public Health Act to deal with such structural matters as double stairs for each dormitory, provision of hydrants and hose attachments, composition of bunk beds, regular patrols during the night, &c., all of which will doubtless engage the serious attention of the Local Authority when the special committee appointed to enquire into the causes of the disaster have formulated and issued their report. Meantime,



my report is before the Committee on Health for their consideration. Nineteen lodging-houses have been found with sanitary defects of one kind or another, and 20 are specially reported on to the Committee as to the present state of exits for the sleepers in case of fire breaking out during the night.

With regard to Seamen's and Emigrants' Boarding-houses, there has been a decrease since last year. There are 35 of such houses on the Register at the present time, with bed accommodation for 623 persons. Four of them are exclusively used by foreign emigrants. In the others both classes may be housed promiscuously.

2,472 inspections were made during the year in these lodging-houses, and 35 complaints were notified to the keepers, but in no case was it necessary to resort to prosecution in the Police Courts. Improvements of a structural nature were carried out, at the instance of the Department, in several cases, consisting chiefly of the abolition of filthy trough privies, the refitting of wash-down water-closets, and the provision of sufficient urinal accommodation.

The number of foreign emigrants who passed through the City during the year was 8,335—an increase of 3,936 over the number in 1904, and considerably more than has passed during any year since 1894. The following Statement shows the number and nationality of these emigrants. It will be observed that those of Jewish extraction are much in excess of the others:—

<i>"Donaldson" Line.</i>					
Norwegians, ... ..					10
<i>"Allan" Line.</i>					
Scandinavians (Norwegians, Swedes, and Danes),				271	
Continental (Russians, Austrians, Hungarians,					
Poles, &c., principally Jews), ... ..				774	
Finlanders, ... ..				297	
Icelanders, ... ..				155	
				—	1,497
<i>"Anchor" Line.</i>					
Russians, Poles, and Jews,	{	Antwerp, ... ..		2,209	
		Rotterdam, ... ..		2,316	
Finlanders, ... ..		Hango, ... ..		851	
Scandinavians, ... ..	{	Sweden, ... ..		321	
		Esbjerg, ... ..		461	
		Norway, ... ..		599	
Russians, ... ..		Hamburg, ... ..		71	
				—	6,828
Total,					8,335

Probably the late war, and the consequent upheaval in Russia, accounts to a great extent for the increase this year, but we may look forward in the future to a continuous stream of these aliens coming temporarily, if not permanently, among us, and it behoves us to carefully consider as to some suitable means of so housing them that they may be kept more easily and more strictly under the watchful care of the Health and Sanitary Authorities. Meantime, they are too apt to be scattered among our population, and, to some extent, lost sight of.

The Aliens Act was intended to prevent the "dumping" of undesirables into this country, but it appears, if they come in in numbers not exceeding twenty, they are allowed to pass the Immigration Officer without enquiry either as to their circumstances or as to their health, and so the Act may be evaded. Glasgow and the districts surrounding it have had a goodly number of this class added to their population in recent years. America is very strict as to the examination of such persons, and if any sign of disease of an infectious or contagious nature is detected upon them, they are at once returned here at the expense of the Shipping Companies. Consequently, we have begun here to be much more careful than hitherto in our examination of intending emigrants, and the Medical Officers of the Board of Trade and the Shipping Companies are most assiduous in the performance of their duty in this respect.

It will be noted that the Donaldson Line have now become caterers for this class of trade for the first time, and have fitted up one of their steamers to carry passengers.

#### PORT LOCAL AUTHORITY.

Two Boarding Medical Officers and two Nuisance Inspectors at Greenock, and one Nuisance and one Epidemic Inspector, with an Assistant, in Glasgow, constitute, as previously, the daily working staff connected with the port and shipping.

The area in the City comprises Glasgow Harbour, the Docks in Govan, Shieldhall, Yorkhill, Partick, and Bowling. When the docks in course of erection on the lower reaches of the river are completed, the area of inspection will be correspondingly extended.

1,870 inspections and 287 re-inspections of steamers were made, while 95 inspections and 75 re-inspections were made in sailing vessels. 268 written intimations and 10 final notices under the Public Health Act were served on masters as to nuisances discovered, and 238 verbal warnings were given to masters as to the defective state of their vessels.

The outstanding feature of the year has been the large number of French sailing vessels which came to this port with cargoes of nickel ore from the penal settlement of New Caledonia. This trade seems to be practically monopolised by French "wind-jammers," as these ships are called, as not a British vessel came to the Clyde from this French colony during the year. The inspector reported that these ships are well appointed, the crews' quarters being "roomy and comfortable, and in marked contrast to the forecastles of similar British-owned ships."

Undernoted will be found details of the inspections, re-inspections, &c., undertaken by my Inspector detailed for duty within the Glasgow area, as also a record of the various nuisances discovered:—

##### Inspections—

Steamers, ... ..	1,870
Sailing vessels, ... ..	95
	— 1,965

##### Re-inspections—

Steamers, ... ..	287
Sailing vessels, ... ..	75
	— 362

Warnings given, ... ..	238
Intimations issued, ... ..	268
Final Notices served, ... ..	10

#### NUISANCES DISCOVERED.

##### Filth—

Floors, wood work, &c., of cabins, officers' rooms, forecastles, and stewards' and cattlemen's quarters dirty, ...	237
Old beds within forecastles destroyed, ... ..	172
Accumulations of gear and rubbish within forecastles, ...	23
Forecastle infested with vermin, ... ..	1
Live fowl kept in crews' quarters, ... ..	1
Cooking galleys dirty, ... ..	7
Bath rooms or wash-houses dirty, ... ..	15
Fresh water tanks or barrels to be cleansed, ... ..	15
Bilges in need of draining, ... ..	6
Scuppers choked, ... ..	7
Walls and ceilings of water-closets dirty, ... ..	75
Water-closet troughs fouled or corroded, ... ..	62
Accumulation of gear within closets, ... ..	3
Total, ... ..	<u>624</u>

(Number remedied, 506.)



## Structural defects—

Officers' rooms defective in ventilation, ... ..	7
Forecastles defective in ventilation, or ventilators plugged,	91
Forecastles inadequately lighted, ... ..	5
Forecastles damp, ... ..	4
Bunks in forecastle defective in construction, ... ..	1
Bogies or funnels defective, and new stoves or pipes required,	61
Ports, port glasses, &c., leaking, broken, or otherwise defective,	109
Hatches, bulkheads, skylights, hawse pipes, casings, &c., defective,	9
Overhead decks leaking, ... ..	32
Steam pipes defective, ... ..	2
Forecastle doors, tables, &c., dilapidated, ... ..	5
Forecastle without scuppers, ... ..	1
Better accommodation for food stuffs required, ... ..	38
Water-closets without locks or keys (to prevent a nuisance),	121
No water-closet accommodation, or additional water-closets required, ... ..	7
Wood work of closets worn out or broken, ... ..	9
New pans, flush tanks, or service pipes, &c., required, ...	6
Water-closets deficient in light, ... ..	2
Water-closets defective in ventilation, ... ..	5
Ventilators of water-closets plugged, ... ..	2
Lamp room exposed to men's quarters, ... ..	1
Total, ... ..	518

(Number. remedied, 407.)

The "filth" nuisances numbered 624, and structural defects were discovered in 518 cases. Of the filth nuisances, 172 consisted of old beds, which were either burned or taken ashore for removal by the Cleansing Department.

An improvement of much value has been effected in the majority of ships carrying native crews, by the removal from the forecastles or sleeping places of perishable food stuffs and drinking-water tanks to suitable positions on the main decks, so that these are now free from contamination. In one Chinese forecastle a number of live fowls were discovered living in common with the men. Orders were at once given to have them removed to a proper coop on deck.

One case occurred on a foreign-owned vessel of a master disputing the right of the Inspector to interfere in the matter of nuisance inspection, as he thought his ship was outwith Scottish supervision. It was explained that the Port Local Authority's power in this respect was stronger than even the Merchant Shipping Act, which only embraces in its sections the right to deal with "*any British ship*," while the Public Health (Scotland) Act gives powers to inspect *any ships* except war vessels. The nuisances found on board were, however, removed.

Intimation was sent to other Local Authorities in 25 cases, advising them of filth nuisances and structural defects found here which could not be remedied before the vessels sailed for their respective ports.

The following return shows the nationality of the ships which arrived within the Glasgow district during the year 1905 as compared with 1904:—

Nationality.	Number of Vessels.	
	1904.	1905.
Austrian, ... ..	20	20
British, ... ..	1,554	1,569
Belgian, ... ..	1	4
Danish, ... ..	21	15
Dutch, ... ..	2	5
Egyptian, ... ..	...	1
Finnish, ... ..	1	1
French, ... ..	29	41
German, ... ..	34	27
Greek, ... ..	7	4
Hungarian, ... ..	1	1
Italian, ... ..	34	26
Norwegian, ... ..	213	175
Roumanian, ... ..	...	1
Russian, ... ..	7	2
Spanish, ... ..	62	61
Swedish, ... ..	52	61
Total, ... ..	2,038	2,014

At the Boarding Station at Greenock, 2,014 vessels were either hailed or boarded, and partially or carefully inspected. Of the incoming ships, 1,569 were British and 445 foreign. 410 vessels (of which 315 were British and 95 foreign) were notified for my attention at the various harbours on arrival.

Accumulations of manure on cattle-carrying steamers were reported to the number of 137. Almost immediately after such vessels were docked, shore gangs of men are set to work to have the manure removed to barges, thence to railway trucks, which convey it to the country; the decks and cattle stalls are then thoroughly flushed, after which the compartments for the cattle are re-limewashed—a process which is efficiently carried out in every instance.

20 tons 1 cwt. of oranges, *ex s.s.* "Iberia," from Valencia, which were landed at Prince's Dock, were found to be unsound, and were sent to the destructors in Glasgow.



Seven samples of drinking water were taken from the tanks of vessels during 1905 by a special pump, which has been designed for the purpose of drawing from the *bottom* of the tanks. These were submitted to the City Analyst, Mr. F. W. Harris. The results of his analyses are given in the Table annexed:—

# ANALYTICAL REPORT ON SAMPLES OF DRINKING WATER COLLECTED FROM SHIPS.

(All results expressed in grains per gallon.)

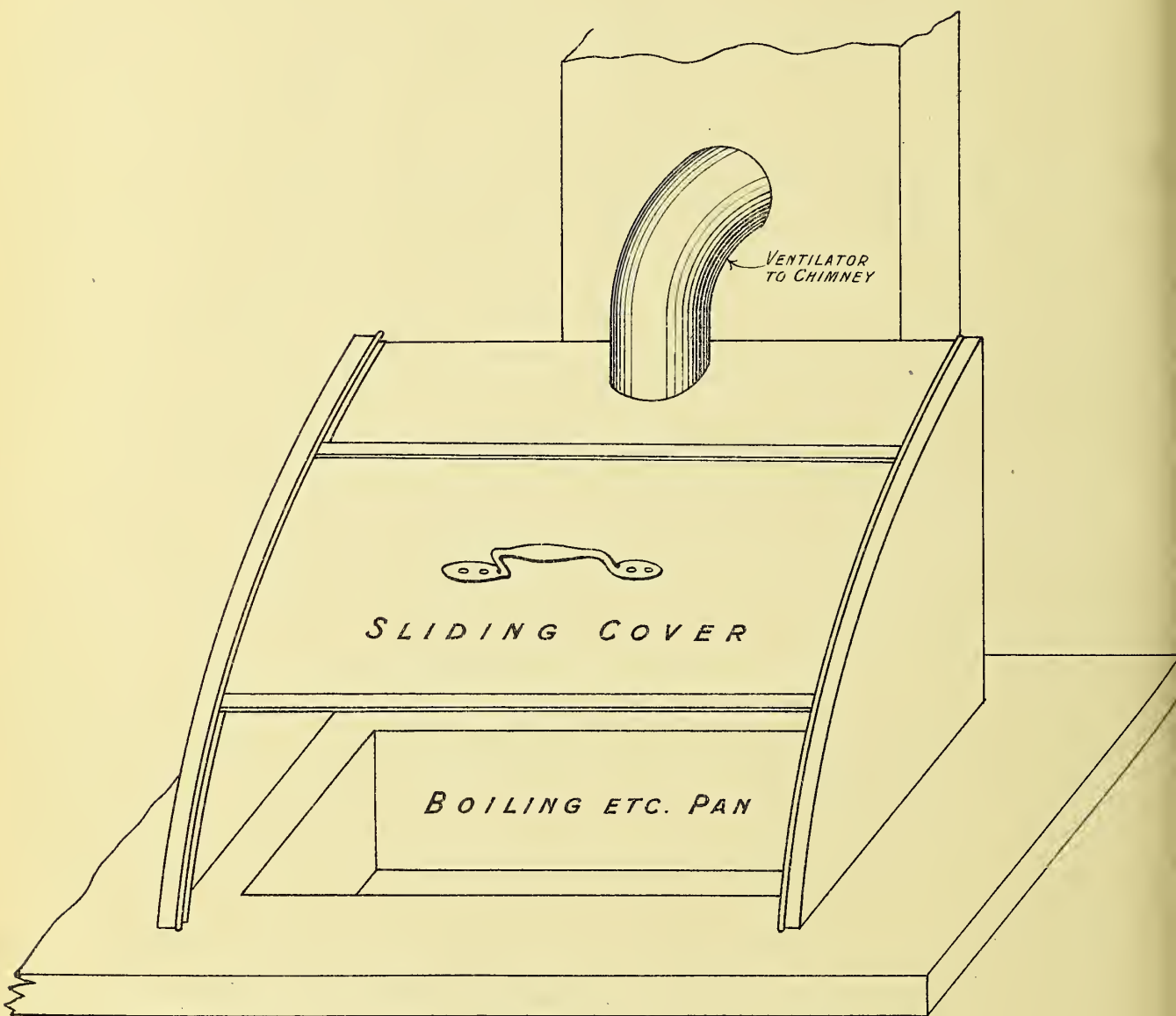
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.
Appearance, - - -	Turbid.	Slightly Turbid.	Slightly Turbid.	Clear.	Slightly Turbid.	Turbid.	Turbid.
Odour at 212° F., - -	Slight.	None.	None.	None.	None.	None.	None.
Free and Saline Ammonia,	Not Estimated.	Not Estimated.	Not Estimated.	0·003	0·002	Free.	Free.
Albuminoid Ammonia, -	Do.	Do.	Do.	0·008	0·005	0·014	0·005
Oxygen absorbed in 15 minutes, at 27° C.,	Do.	Do.	Do.	Not Estimated.	Not Estimated.	0·005	0·005
Oxygen absorbed in 4 hours, at 27° C.,	Do.	Do.	Do.	0·104	0·040	0·076	0·035
Chlorine, - - - -	75·6	2·1	13·3	1·0	1·2	6·5	6·5
Suspended Solids—							
Volatile or Organic, -	3·64	4·51	4·00	None.	1·45	Small Quantity.	Small Quantity.
Mineral, - - - -	5·88	3·99	2·44	Do.	1·05		
Total, - - - -	9·52	8·50	6·44	Do.	2·45	...	...
Solids in Solution—							
Volatile or Organic, - {	Not Estimated.	Not Estimated.	Not Estimated.	5·18	4·34	15·9	14·0
Mineral, - - - - {	Estimated.	Estimated.	Estimated.	5·39	4·62	41·7	39·9
Total, - - - -	...	...	...	10·57	8·96	57·6	53·9
Poisonous Metals, - -	None.	None.	None.	None.	None.	None.	None.

From these data Mr. Harris arrived at the following conclusions:—

“SAMPLE No. 1.—This sample was labelled—*Drinking Water from ship ‘Emile Siegfried’ (French). Tank filled at Porro, N.C.* The quantity of the sample submitted was totally inequ岸 for a complete analysis. However, the fact that the sample contained 75·6 grains of chlorine per gallon (which is equivalent to 124·7 grains of sodium chloride) is sufficient to indicate that this water, as represented by the sample, is unfit for potable purposes.

“SAMPLE No. 2.—This sample was labelled—*Sample of Water from s.s. ‘Crown of Navarre.’ Filled at Cape Breton, N.S., 20 days ago (October 17th, 1905).* Owing to the quantity of the sample supplied being relatively small, the scope of the analysis was restricted, and, except that the chlorine figure was within the limit usually found in drinking water, no further comment can be made.

*HOOD SUGGESTED FOR USE  
WITH CHIP POTATO BOILING RANGES.*



SANITARY CHAMBERS,  
GLASGOW 7<sup>TH</sup> MARCH, 1906.



## FACTORIES AND WORKSHOPS.

There are now on our Registers 4,697 workshops in full operation, or 404 in excess of the number at 31st December, 1904. The number of workshops measured and registered during 1905, along with other information regarding them, will be found in Appendix VI., and in the immediately succeeding Appendix are given the details respecting all the registered workshops now in the City.

From the latter it will be seen that the total number of employees in these premises under the constant supervision of the Department is 33,215. 12,905 are men, 14,950 are women, 5,350 are young persons between 14 and 18 years of age, while only 10 are under the age of 14.

The work accomplished in the workshops and in the homes of outworkers, with respect to the suppression of nuisances, structural and otherwise, will be found under Heading XI. of Appendix II., and need not be reviewed in detail here. Suffice it to record that the total number of inspections in such premises was 31,654.

I received 19 complaint notices under Section 5 of the Factory and Workshop Act, 1901, from His Majesty's Inspector of Factories—9 in the Central District, 3 in the Eastern, 1 in the Southern, 4 in the Western, and 2 in the North-Western. All received careful attention.

Under "Notice No. 35," I received from the same Inspector 266 notices with regard to the measuring and registration of workshops, and under Section 9 of the same Act he forwarded me 140 notices with respect to the requirements of the Sanitary Accommodation Order, 1903. In 91 cases out of the 140 the needful work was completed in terms of the above Order.

Details as to these will be found in Appendix VIII. attached to this Report.

## RESTAURANTS.

In addition to the above, 92 restaurants were measured and registered during 1905. We have now 271 restaurants on the Register and under supervision, employing 218 men, 742 women, and 71 young persons under 18 years of age.

A considerable number of complaints continue to be made with reference to the offensive odours which come from the kitchens of the restaurants known as "Fried Fish Shops." Investigation has shown that, for the most part, the odours complained of are due to the occupiers (mostly foreigners) frying their fish in such a manner that the oily vapours have free access to the atmosphere of the kitchen and shop, wherefrom they escape to the adjacent staircase or to the dwellings above through crevices or small openings in the ceiling or behind the wall linings. In order to prevent this form of nuisance, I have caused a sliding hood to be designed over the pan in which the boiling oil or fat is contained. (See sketch on opposite page.)

The new Bye-laws now being prepared under the Glasgow Building Regulations Act, 1900, contain a clause dealing with this matter, which will render compulsory the fitting of some such apparatus over the boiling or frying stoves in restaurants of this kind.

## SALE OF FOOD AND DRUGS ACTS.

During 1905, 885 samples of food and drugs were procured by the four Inspectors set apart for this duty. 682 of these were taken under the Acts, and submitted to Mr. W. F. Harris, the City Analyst. The following tabular Statement exhibits the results of their operations in detail:—

Article.	Number of Samples Procured.	Number Certified Genuine.	Number Certified Adulterated.	Number in which Proceedings were instituted.	Amount Recovered in Fines and Expenses.	Non-Convictions.
					£ s. d.	
Sweet Milk, ... ..	178	115	63	48	101 5 4	2
Skimmed Milk, ... ..	16	12	4	4	8 0 0	—
Cream, ... ..	4	2	2	—	—	—
Butter, ... ..	149	140	9	7	22 14 0	—
Margarine, ... ..	18	18	—	18	32 8 6	1
Cheese, ... ..	12	12	—	—	—	—
Lard, ... ..	22	22	—	—	—	—
Coffee, ... ..	42	42	—	—	—	—
Coffee and Chicory, ... ..	4	4	—	—	—	—
Pepper, ... ..	22	22	—	—	—	—
Mustard, ... ..	7	7	—	—	—	—
Cream of Tartar, ... ..	27	26	1	—	—	—
Tartaric Acid, ... ..	16	13	3	1	1 1 0	—
Ground Ginger, ... ..	22	22	—	—	—	—
Crushed Linseed, ... ..	13	13	—	—	—	—
Oatmeal, ... ..	9	9	—	—	—	—
Tapioca, ... ..	10	10	—	—	—	—
Arrowroot, ... ..	2	2	—	—	—	—
Barley, ... ..	5	5	—	—	—	—
Preserves, ... ..	4	3	1	1	—	1
Camphorated Oil, ... ..	15	14	1	1	1 12 0	—
Olive Oil, ... ..	9	9	—	—	—	—
Cascara Sagrada, ... ..	17	17	—	—	—	—
Milk of Sulphur, ... ..	9	9	—	—	—	—
Lime Water, ... ..	9	8	1	1	1 12 0	—
Extract of Malt, ... ..	1	1	—	—	—	—
Brandy, ... ..	20	13	7	4	12 12 0	—
Whisky, ... ..	12	*12	—	—	—	—
Rum, ... ..	8	*7	1	—	—	—
Obstructing Officer, ... ..	—	—	—	1	3 3 0	—
Totals, ... ..	682	589	93	86	184 7 10	4

\* Certified genuine in respect to alcoholic strength only.

Samples procured under above Acts, ... ..	682
„ „ for Private Test purposes, ... ..	203
Total Samples procured, ... ..	885

Twenty-two samples of so-called Ciders were procured and submitted for analysis on behalf of the National Fruit and Cider Institute, Long Ashton, Bristol. In 10 of these salicylic acid was found, and in 1 the estimated quantity was equal to 45·62 grains per gallon. The full details of analysis have not yet been furnished.

It is to be regretted that the Adulterated Butter Bill—in a somewhat amended form—has not yet found a place on the Statute Book, which would make provision for dealing with the makers and vendors of the water-logged and impoverished commodities presently being sold with impunity as butters.

In October, I caused, under the instructions of the Committee, a prosecution to be taken against a firm of grocers for selling “Apple Black Currant Jam,” which was certified by the Public Analyst to contain 17·4 per cent. of



starch glucose, which is extraneous to sugar and fruit. The starch glucose syrup used by certain manufacturers is made, for the most part, in the United States, and is prepared by treating maize in a dilute solution of sulphuric acid. It has only one-third of the sweetening power of true sugar, and costs, on the average, 11s. 6d. per cwt., as against 19s. 6d. per cwt., the price of sugar.

After trial, the Sheriff-Substitute dismissed the case, stating that he was not able to hold, on the evidence before him, that such a percentage as 17·4 of glucose was inadmissible. I look upon this decision as important, as I am convinced several manufacturers use starch glucose as an adulterant. I therefore make no apology for giving the Sheriff's decision and note in full.

In giving judgment, his Lordship said—

“This is a complaint by the Inspector for the City and Burgh of Glasgow against grocers for selling a pot of jam which was stated not to be of the nature, substance, and quality of the article demanded, which was apple black currant jam, and it is stated not to be of that substance and quality in respect that it contained 17·4 per cent. of glucose. I do not think it is necessary for me to go into detail as to the chemical constitution of glucose, but I may say it is admitted that it is a harmless ingredient and a nutritious article of diet; and, speaking roughly, it is formed, to the extent of from 50 to 70 per cent., of dextrose and maltose, which are sugar, and to the remaining extent of dextrine and water—dextrine not being a sugar, but, as I understand it, a gummy, starchy substance, which is without sweetening qualities.

“Now, in order to establish this complaint, it is, of course, necessary for the complainer to satisfy me that glucose is extraneous to jam, and his averment which he undertook to prove was that jam, when genuine, consisted altogether of fruit and sugars derived from cane or beet. To establish this (what I may call a standard of jam), the complainer produced two classes of witnesses—the evidence of skilled witnesses, such as Mr. Harris and Dr. Clark, and the evidence of manufacturers in the jam trade. As regards the first class of evidence (that of the chemists), it would, of course, have been of very great value if it had been directed upon the point of what actually constitutes jam, when one regards jam as the article sold in the market.

“After careful consideration of the evidence of these gentlemen, however, I am unable to see that it is directed to that point at all. It seems to me that these gentlemen, in giving their evidence, had been giving it very much as to what jam ought to be—not, as matter of fact, what it is. Now, it seems to me that the question I have to consider in dealing with this complaint of contravening the Sale of Food and Drugs Act is—What is jam, as sold in the market and commonly manufactured for that purpose? I think one must have regard to the facts as they are, and, as there is no legal standard, one must arrive at an idea of what jam is by finding what has, as a matter of fact, been sold for a considerable period under that name. In other words, the question is, what a purchaser has a reasonable right to expect to get when he asks for jam in a shop.

“The question cannot be answered by considering the opinion of eminent analytical chemists as to what they think jam ought to consist of, but by regard to the practice of those who manufacture and sell jam. Now, as to the evidence of manufacturers, there were three manufacturers examined for the prosecution, and the result of their evidence may be said to be that they admit that the use of glucose is extremely common in the manufacture of jam, and, further, they could not say there was any standard of jam, or that the addition of a percentage of glucose rendered the article not jam. Now, it seems to me that, even on that evidence, apart from the evidence for the defence, it is impossible to find that the complainers have established what is essential to the success of the complaint—that jam, when genuine, consists of fruit and sugars derived from cane or beet. The evidence of the manufacturers for the defence was to the effect that the use of glucose was so common in the making of jam as to be almost universal, and that it has been in use for a number of years past, one of the witnesses putting it down at twenty-five or thirty years, and that, as to the amount, the recipes of various manufacturers varied. In some cases, as appears from the evidence, glucose is not used at all, the fruits not requiring it, but in other cases glucose is said to be very useful, not only because it is cheaper, but because it was admitted that it made it easier to manufacture the jam, while at the same time the jam would not granulate or crystallise so readily. If these are the facts—that for a great number of years, amounting to twenty-five or thirty, jam made with glucose along with sugars from





							Lbs.
						<i>Brought forward,</i>	30,918
Bream,	...	...	...	...	...		620
Berglot,	...	...	...	...	...		400
Sparling,	...	...	...	...	...		10
Grilse,	...	...	...	...	...		30
Shark,	...	...	...	...	...		500
Halibut,	...	...	...	...	...		156
Whitches,	...	...	...	...	...		320
Black Soles,	...	...	...	...	...		36
Lemon Soles,	...	...	...	...	...		14
Roes,	...	...	...	...	...		28
Various,	...	...	...	...	...		160
Cray,	...	...	...	...	...		200
Crabs,	...	...	...	...	...		130
Shrimps,	...	...	...	...	...		112
Eschallops,	...	...	...	...	...		210
Cockles,	...	...	...	...	...		726
Mussels,	...	...	...	...	...		448
Total,	...	...	...	...	...		35,018

## CURED FISH DESTROYED.

							Lbs.
Herring,	...	...	...	...	...		270
Haddock,	...	...	...	...	...		1,596
Whiting,	...	...	...	...	...		546
Saithe,	...	...	...	...	...		560
Fillets,	...	...	...	...	...		854
Prawn,	...	...	...	...	...		28
Total,	...	...	...	...	...		3,854

## GAME, POULTRY, AND RABBITS DESTROYED.

							Head.
Black Cock,	...	...	...	...	...		66
Hazel Hen,	...	...	...	...	...		260
Partridge,	...	...	...	...	...		2
Pigeon (Wood),	...	...	...	...	...		23
Turkey,	...	...	...	...	...		55
Fowl,	...	...	...	...	...		82
Duck,	...	...	...	...	...		6
Rabbit,	...	...	...	...	...		507
Total,	...	...	...	...	...		1,001

This shows a decrease of 11,118 lbs. of fresh fish and 9,742 lbs. of cured fish destroyed, as compared with last year, and an increase of 493 head of game, poultry, and rabbits. In all, 897,518 parcels were inspected, a decrease of 73,120 as compared with 1904.

1,988 visits were also paid to the fish restaurants and 565 to the retail fish shops throughout the City, and 1,159 inspections were made of fish hawkers' carts and barrows. 31 fish restaurants, 1 retail fish shop, and 1 poulterer's shop were found to be in a filthy condition, and the owners notified. In each case the necessary cleansing was duly carried out.

Eight cases of illegal trafficking in poached salmon were reported to the Fishmongers' Company of London, resulting in seven convictions being obtained. One case was found not proven.

Many complaints were received with regard to fish of the salmon kind, coming from the Clyde and Leven Rivers (Dumbartonshire), being tainted with pollution, and unfit for food.

A small office has been erected in the Fish Market gallery for the use of the Fish Inspector.

## DAIRY ORDERS AND CATTLE-SHEDS ACT.

At December 31st there were 1,254 milk purveyors and 499 ice-cream dealers in Glasgow, as compared with 1,229 and 449 respectively in 1904. No breach of the Regulations was of such a character as to necessitate a prosecution in Court.

There was a reduction of two City byres during the year, there being now 81, in which 842 cows are stalled. As time goes on, the number of City-stalled cows steadily diminishes. In 1902 there were 967; in 1903, 939; and in 1904, 865.

Model Regulations anent Dairies, Cow-sheds, and Milk-shops were issued by the Local Government Board during 1905, which contain several new provisions. It is my intention, when time permits, in conjunction with the Medical Officer and the Veterinary Surgeon, to present to the Health Committee several recommendations with a view to the amendment of our present Regulations, so as to bring them into line with the Local Government Board's proposals. Some steps should also be taken soon to give practical effect to the powers contained in Sections 24 and 25 of the Glasgow Police (Amendment) Act, by which milk suspected to be conveying disease to the public may be stopped at the source of supply, wherever situated, and the affected cow or cows so dealt with as to prevent their milk being sold within the City.

In the recently annexed burgh of Kinning Park there are 15 milk purveyors and 2 ice-cream vendors. In the premises of five of them it was needful to have structural alterations carried out. In one byre for 12 cows extensive alterations were made so as to improve the drainage, ventilation, and lighting, and a milk scullery was added to secure the proper washing of the milk utensils.

## SHOP HOURS ACTS, 1892-1895.

4,396 primary inspections were made in shops by the special officer under the above Acts. In one case a firm of bakers was found employing young persons in six of their shops in contravention of Sections 3 and 4 of the Act. They pled guilty when brought before the Sheriff, and were fined 10s. for each offence, with 17s. 6d. in addition for Court expenses. Three other shopkeepers were found contravening the Acts. Two of them were prosecuted—one being fined in 20s., with 19s. 6d. for expenses, and the other got off on the girl denying in Court what she had previously told the Inspector with regard to her working hours.

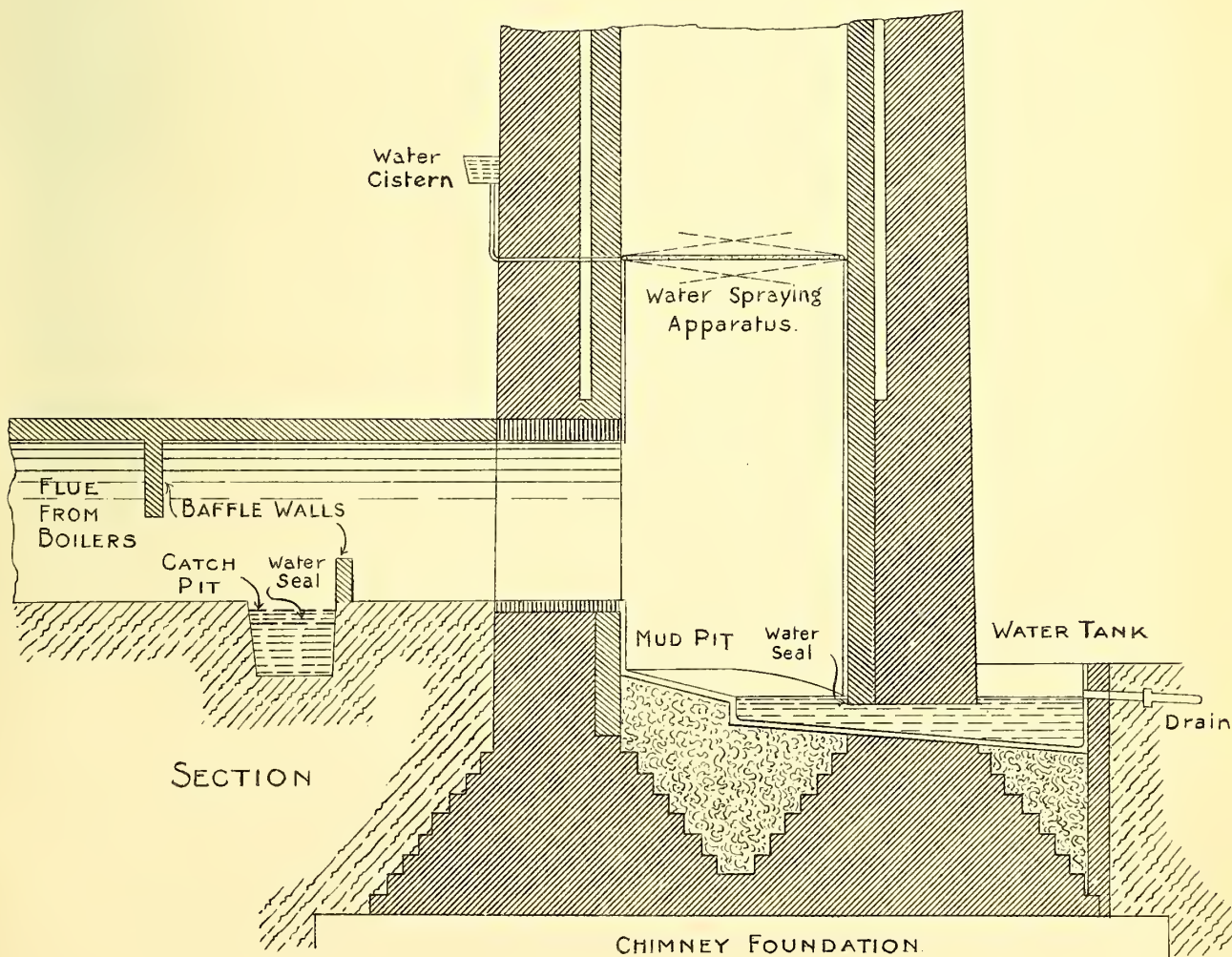
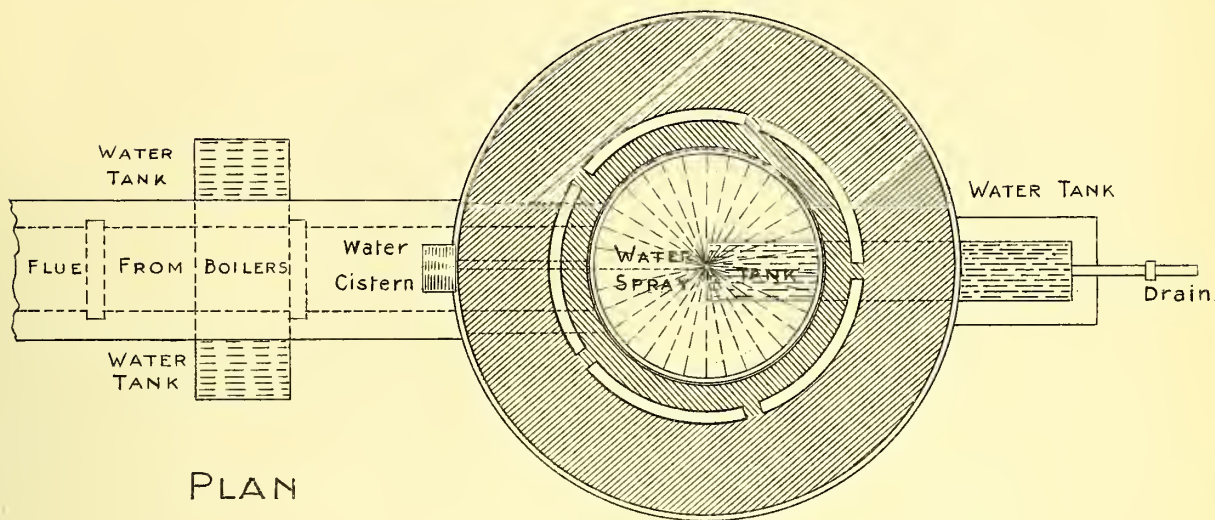
522 Shop Hours Notice Cards were issued from the office to shopkeepers, 39 of these being charged threepence for them, in respect that cards had been previously supplied, and lost through carelessness.

The following short statement shows the details of the work done under these Acts:—

<i>First Inspections,</i>	...	...	...	...	...	4,396
Offenders found contravening Section 3,	...	...	...	...	...	1
"                    "                    "                    4,	...	...	...	...	...	5
Prosecutions (against one firm),	...	...	...	...	...	6
<i>Secondary Inspections,</i>	...	...	...	...	...	8,005
Offenders found contravening Section 3,	...	...	...	...	...	2
"                    "                    "                    4,	...	...	...	...	...	1
Prosecutions,	...	...	...	...	...	2
<i>Reinspections to former Offenders,</i>	...	...	...	...	...	85
Found complying,	...	...	...	...	...	All
<i>Shop Hours Cards given out,</i>	...	...	...	...	...	522
"                    "                    paid for (3d. each),	...	...	...	...	...	39
<i>Fines imposed and recovered (£4, with £1 17s. costs),</i>	...	...	...	...	...	£5 17s.



DRAWING SHOWING CATCH-PIT AND BAFFLE WALLS IN BOILER  
FLUE, WITH WATER-SPRAY IN CHIMNEY, FOR THE RETENTION  
OF SMALL PARTICLES OF ASH AND SMUTS FROM FORCED  
DRAUGHT FURNACES.



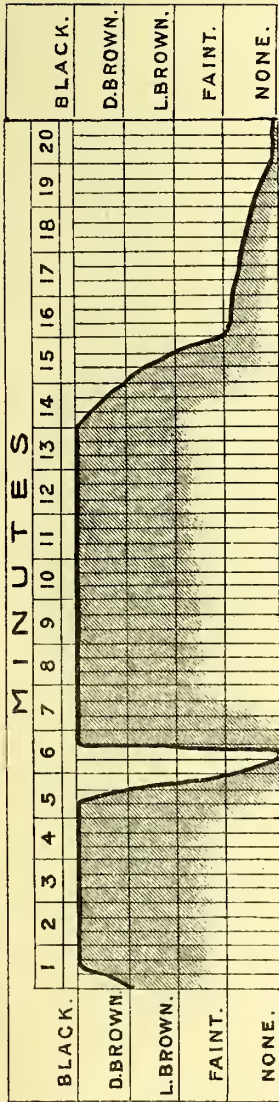
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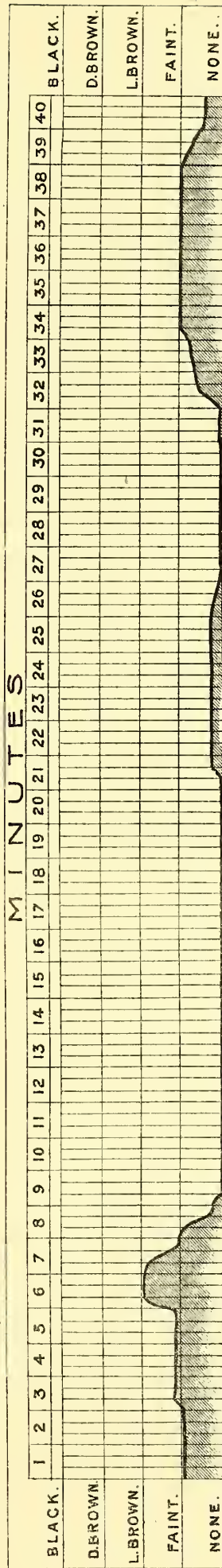
From 4.50 till 5.10.p.m.

11<sup>th</sup> March, 1904.



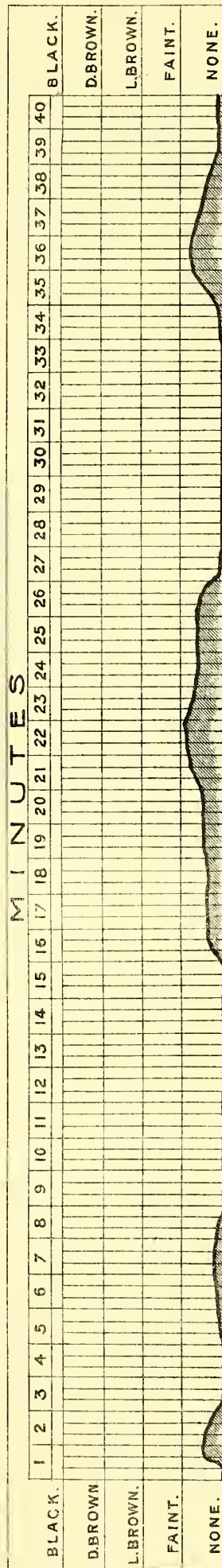
From. 4.30. till 5.10.p.m.

8<sup>th</sup> March, 1906.



From 11.0. till 11.40.a.m.

9<sup>th</sup> March, 1906.



MESSRS. WATSON LAIDLAW & CO., LTD.

Improved by application of chain grate mechanical stokers  
to water-tube boiler.

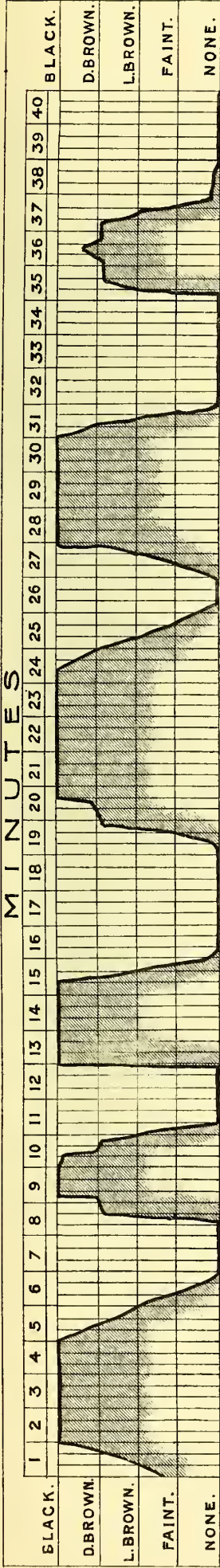
SANTARY CHAMBERS,  
GLASGOW, MARCH, 1906.





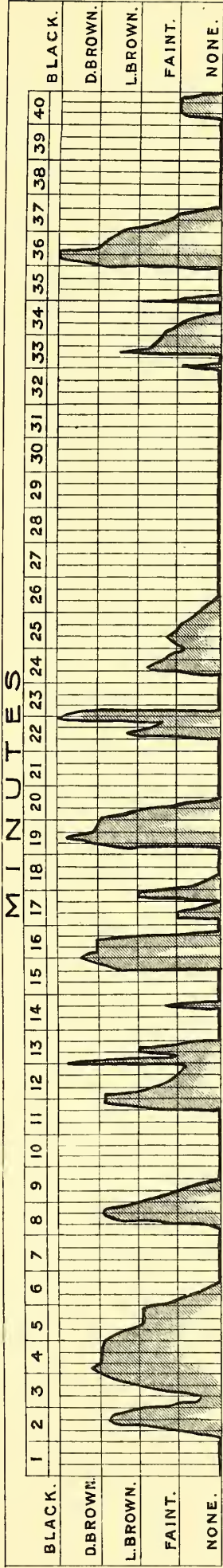
From. 10.20 till 11.0 a.m.

8<sup>th</sup> October, 1904.



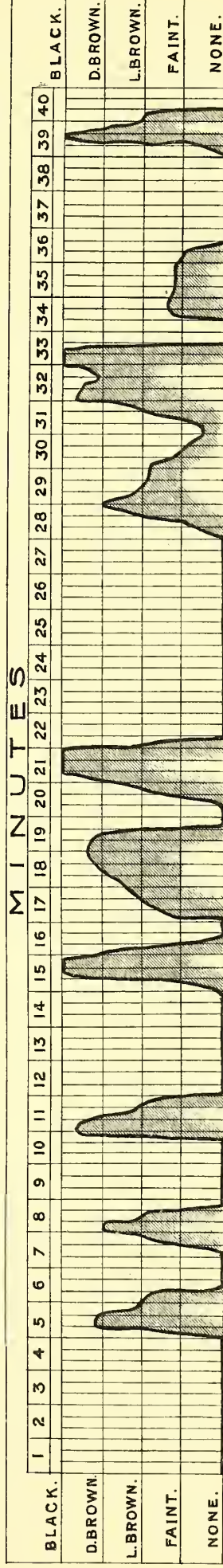
From 3.10. till 3.50.p.m.

8<sup>th</sup> March, 1906.



From 10.30. till 11.10. p.m.

9<sup>th</sup> March, 1906.



MESSRS. J. & R. TENNANT, LTD.

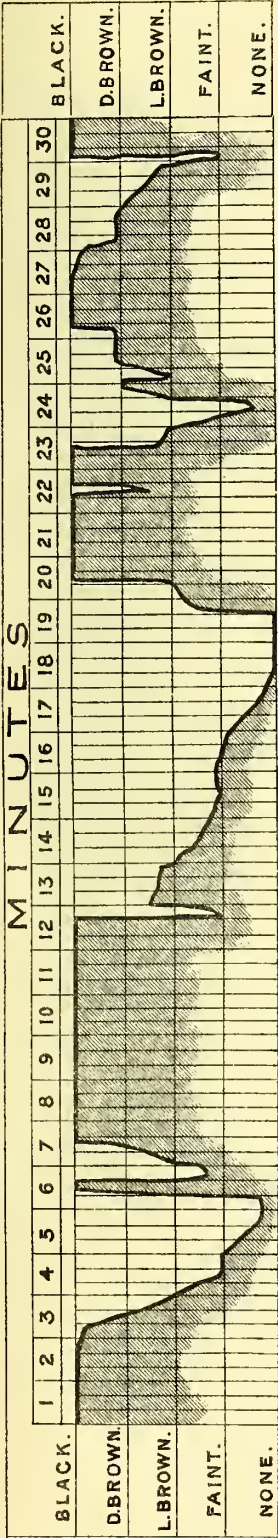
Improved by increase of boiler power, and application of steam jet.  
smoke preventer, to Lancashire boiler furnaces.





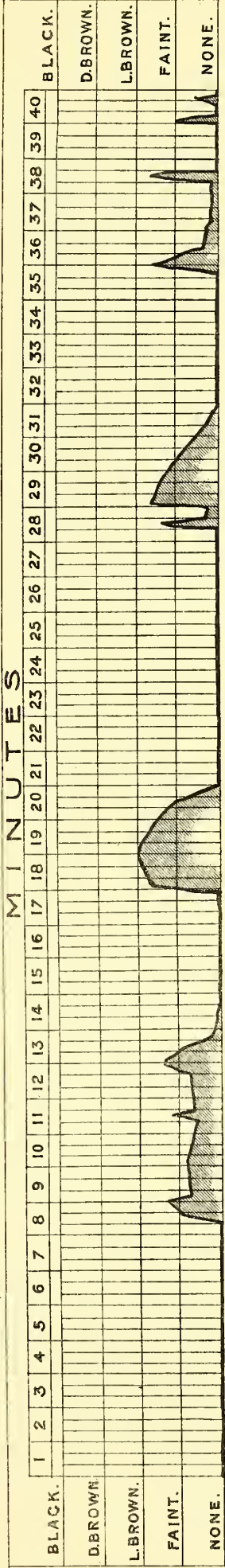
From 12.20 Hill 12.50.p.m.

14<sup>th</sup> March, 1904.



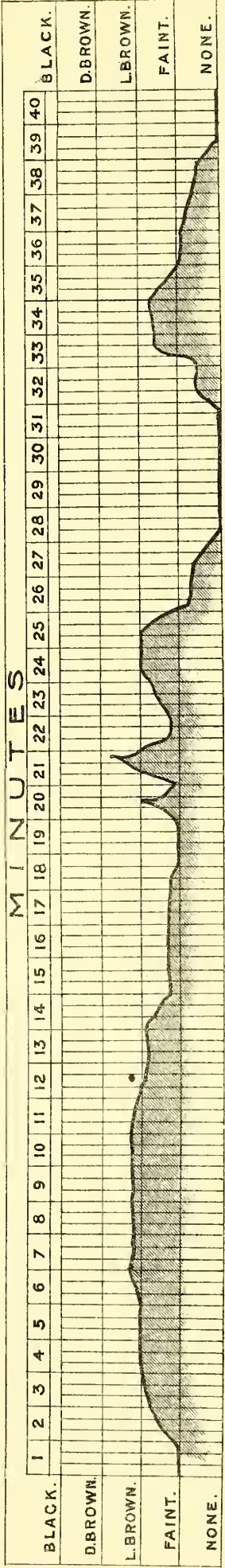
From 12.5 Hill 12.45 p.m.

8<sup>th</sup> March, 1906.



From 3.30 Hill. 4.10 p.m.

9<sup>th</sup> March, 1906.



MESRS. WM. STEVENSON & CO. .  
Improved by change of fireman and slight reduction of  
load on vertical tubular steam boiler.





## SEATS FOR SHOP ASSISTANTS ACT, 1899.

The following was the work done under the above Act:—

First Inspections,	...	...	...	...	...	1,974
Found complying,	...	...	...	...	...	1,957
„ without Seats,	...	...	...	...	...	17
Provided Seats, ...	...	...	...	...	...	17
Prosecuted,	...	...	...	...	...	0

No prosecutions were necessary, as shopkeepers, on being warned, at once provided the seats required; but the Inspector reports that in several instances the mere provision of seats does not give any real easement to the girls, as they are not permitted to use them, except at the risk of dismissal, such masters alleging that they “have no use for girls who have time to sit.”

## SMOKE ABATEMENT.

Steady progress continues to be made in the work of reducing the daily issue of smoke from factory chimneys. 14,406 observations of such chimneys were made during the year by the four Smoke Inspectors, who also made 1,395 careful inspections of boiler and other furnaces which were recognised as regular smoke producers. As will be seen, on referring to Part XII. of Appendix II., 127 prosecutions were taken against offenders, resulting in 124 convictions, and fines were imposed amounting to £111 11s. 6d.

In 98 of these cases the excessive smoke production was due to carelessness or want of skill on the part of the firemen, while in the remaining 26 cases, although the element of careless firing played a certain part, want of chimney draught, insufficient boiler power, defective flues, or other structural causes were mainly responsible for the nuisance produced. 15 cases which were departed from were so dealt with after hearing representations on the part of the various offenders to the effect that the excessive smoke made was caused by some accident to the furnace or boilers, or to the unavoidable absence of the regular fireman.

As indicated above, improvements on furnaces continue to be made at our instance, details of which will be found in the Appendix referred to.

A special complaint came to me, through a member of the Committee, of two chimney stalks in the City from which an abnormal discharge was continually being made of small particles of ashes, which descended like black hail all round the immediate neighbourhood of the chimneys. As this peculiar discharge was not of the nature of smoke, I had to take special means to combat it. Five dust gauges were set down on the roofs of adjacent buildings all round the chimneys in question, where they were left for fourteen days. The contents were then placed in the hands of the Corporation Chemist, who reported on the 28th of August that on each square foot of surface there had fallen from 5 to 94 grains of the grit and dust complained of. On a second test being made, during fifteen days in October, the amount which had fallen into the five boxes was found to have increased in two of them to 182 and 254 grains per square foot.

As this discharge was being caused by the firm in question burning a low-class fuel under forced draught in closed ashpits, representations were made to the firm, who at once set about making certain structural alterations in their flues and chimneys, which have had the effect of greatly mitigating the nuisance. The plan and section given on the opposite page show more clearly than can be explained in writing what was done in each chimney. A study of these, it is hoped, may assist other Authorities in similar circumstances.

As formerly, there are also given three sets of typical diagrams to illustrate the results of improvements which have been made by manufacturers at our instigation. The first exhibits the result of installing chain-grate stokers in water-tube boilers, which, as I have pointed out in previous reports, are the least susceptible of improvement in the matter of smoke production. It will

be noted that these stokers have been most successful when they are carefully worked, as they are in this factory. The second diagram shows the result obtained in the furnaces of two heavily fired Lancashire boilers, working under a fluctuating load, by the application of steam jets; and the third one—perhaps the most interesting—marks the effect of intelligent and careful stoking, as compared with the reverse on the part of the fireman who was previously employed.

From the date on which Kinning Park was annexed until the end of the year, 29 Warning Notices were issued and served on offenders in that ward, and four firms were successfully prosecuted in the Police Court. Many improvements have already been effected there since the Smoke Inspectors began operations.

### STABLING OF HORSES IN GLASGOW.

In view of the Parliamentary Inquiry into the Glasgow Corporation Provisional Order, 1905, I was requested by the Town-Clerk in January to inspect the stables in the City, in order to give evidence before the Commission. The report handed in contained information which may prove interesting. The Map of the City attached to this Report exhibits, as mere figures could not do, the number of stables in each ward. The total number of stables was found to be 2,357, in which there were 17,654 horse stalls. 289 of the total were private stables, for the accommodation of 570 horses. 233 stables were found unoccupied at the date of inspection. 2,541 horses died or were slaughtered as useless during 1904, giving a horse death-rate per annum of 182 per 1,000, or ten times the human death-rate.

The sanitary state of a large number of the stables was found to be exceedingly defective. In 211 of them the walls were in a broken and dilapidated condition, and 463 were discovered to be filthy. The floors of 48 of them had no paving of any kind, the horses having to sleep on the earth. In 412 of them the floors were holed and very uneven on the surface, and in such cases, as in those with no paving, the smell of ammonia from the urine was most perceptible. In 734 cases there were no windows for ventilation and light, 147 were without any water supply, 250 had no drainage, 358 were unprovided with any dungstead, and 225 were found under dwelling-houses or occupied apartments.

Enough has been said to show that the time was ripe for such an inquiry, and that, to put an end to this state of matters, it was most desirable that special Regulations should be framed and passed by the Corporation. The Order was passed, and Regulations have now been framed, and await the approval of the Board of Agriculture and Fisheries.

During the necessary inspection several photographs were taken, in order to exhibit, so far as photographs can, what some of the stables were like. I have caused some of them to be reproduced here for the information of the Corporation.

*No. 1* is a plan of stables under a railway arch, the inner one, on the right, having neither light nor means of ventilation;

*No. 2* is a view within the above stable, taken by flash-light;

*No. 3* shows a dilapidated wooden structure on the South-Side, used as a stable, but since the inquiry it has been demolished;

*No. 4* is the interior of a stable in the west of the City, exhibiting a defective floor;

*No. 5* is also a stable in one of the Western Districts, of the common wooden bothy type, with no opening in it but the door;

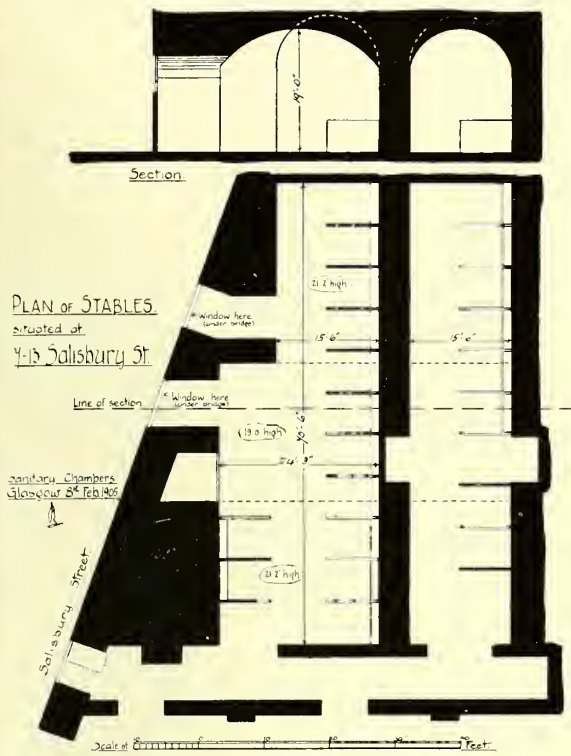
*No. 6* is the front of stables, of the *cul-de-sac* order, in the Central District; and

*No. 7* shows cellar-like stables, in the Northern District, of a very unsatisfactory character.

It seems impossible that horses can be housed in such places under any conditions which would preserve them in health for long.



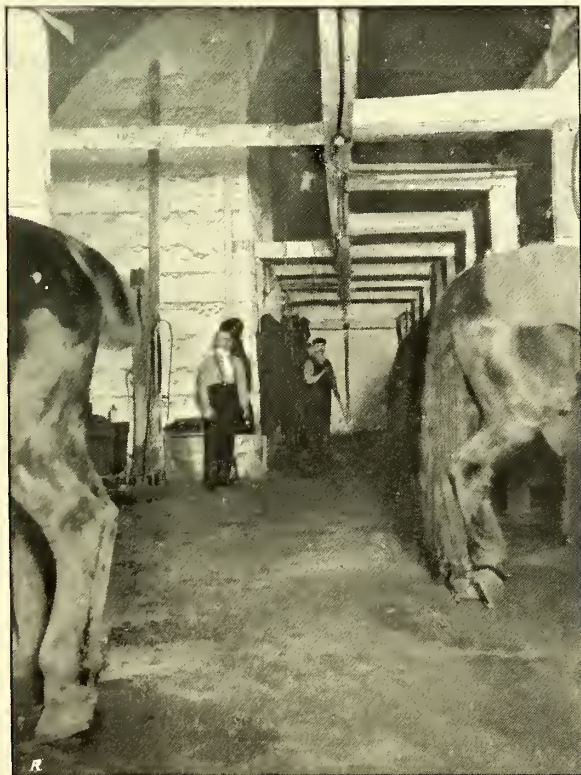
No. 1.



No. 3.



No. 2.



No. 4.

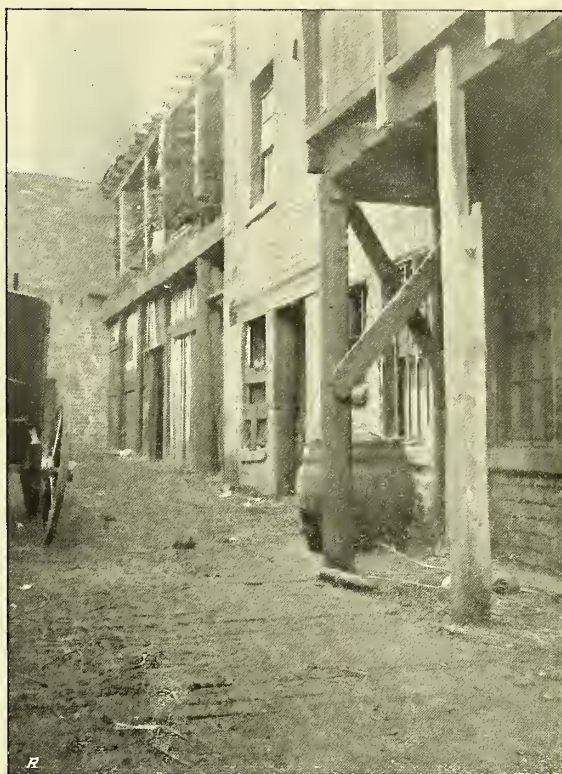




No. 5.



No. 6.



No. 7.





## KINNING PARK.

In view of the annexation of this burgh in November, I deemed it would be of interest to the members of the Corporation to know something of its health and sanitary condition for 1905, up to the date of its being transferred. I accordingly requested Mr. Hugh Wood, Sanitary Inspector for the Burgh, to furnish me with his Report up to the 6th November. It will be found in Appendix IX. attached to this Report.

I am,

MY LORD PROVOST AND GENTLEMEN,

Your most obedient Servant,

PETER FYFE.

Sanitary Chambers,  
Glasgow, 9th May, 1906.







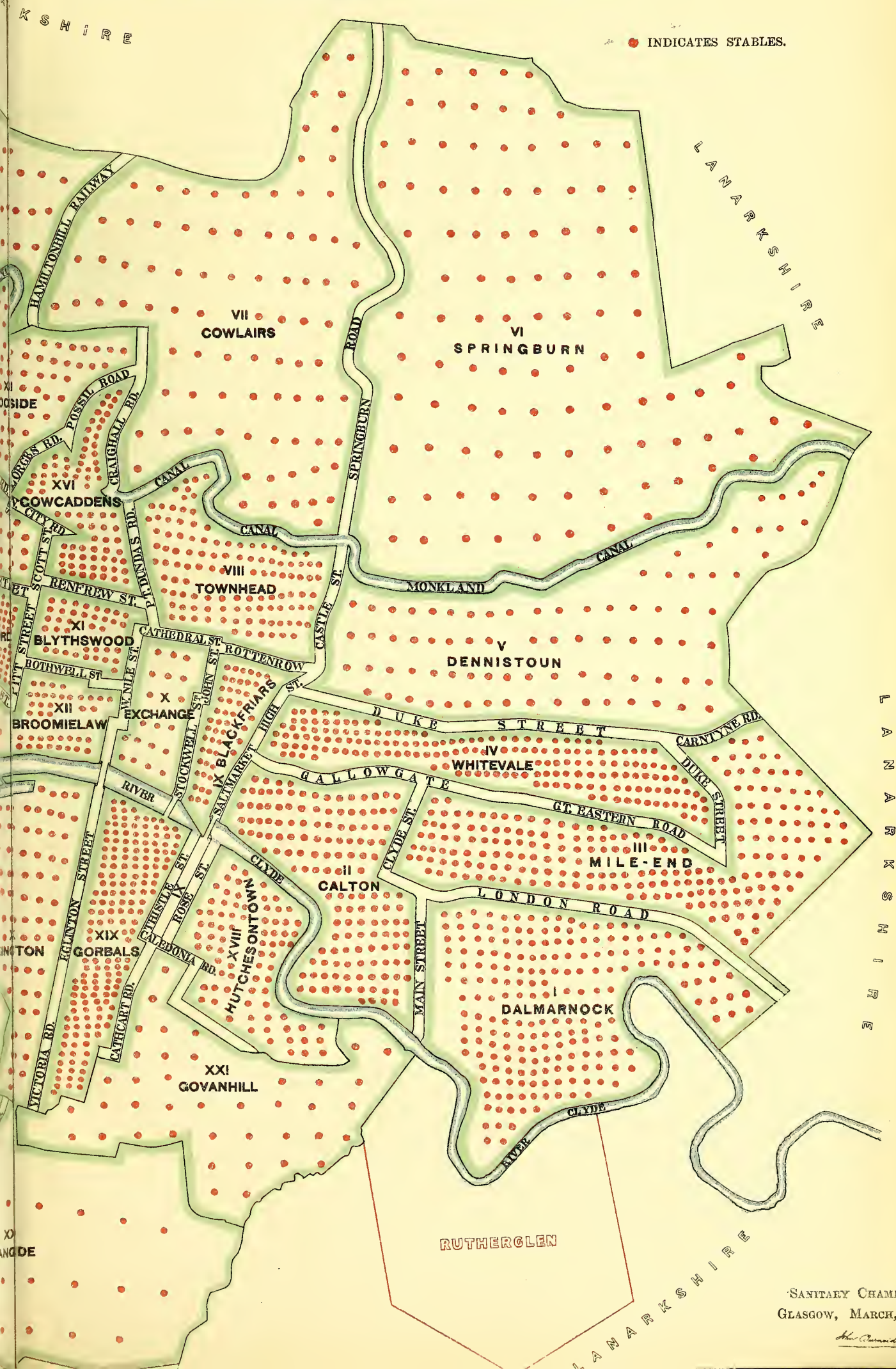




# SKELETON MAP OF GLASGOW.

(TO ILLUSTRATE APPENDIX II).

Skeleton Map of Glasgow, showing the relative position and boundaries of the 26 Municipal Wards, and also the Number of Stables for Horses in each Ward within the City.



W

I  
I  
I  
V  
V  
V  
I  
I  
X  
X  
X  
X  
X  
X



## APPENDIXES.

## NUISANCE INSPECTORS'

RETURN showing the Area in Acres; Persons per Acre; Houses inhabited; and the Total Estimated Population houses, Seamen's Boarding-houses, and Farmed-out Houses, on the Registers; the Number of Nuisances Glasgow for 1905; with a Skeleton Map attached, showing the Boundaries and relative position of each

MUNICIPAL WARDS.	Number of Acres.	Persons per Acre.	Total Houses Inhabited 1905.	Compared with Year, 1904.		Compared with Census, 1901.		Total Estimated Population, excluding Institutions and Shipping, 1903.	Compared with Year, 1904.		Compared with Census, 1901.		Houses Ticketed for Night Inspection
				Decrease.	Increase.	Decrease.	Increase.		Decrease.	Increase.	Decrease.	Increase.	
1. DALMARNOCK, ...	562	87.9	10,901	275	...	578	...	49,408	1,247	...	3,379	...	1,389
3. MILE-END, ...	512	84.5	9,497	...	24	...	398	43,292	...	112	...	1,182	2,203
4. WHITEVALE, ...	321	102.4	6,961	45	...	520	...	32,877	210	...	2,828	...	953
5. DENNISTOUN, ...	718	49.2	7,747	...	235	...	1,162	35,321	...	1,074	...	4,839	201
2. CALTON, ...	337	109.4	8,077	238	...	...	440	36,881	1,085	...	...	1,413	1,601
9. BLACKFRIARS, ...	146	151.5	4,542	77	...	1,956	...	22,122	376	...	9,284	...	856
10. EXCHANGE, ...	123	17.2	391	22	...	32	...	2,117	121	...	209	...	8
11. BLYTHSWOOD, ..	90	37.0	609	29	...	237	...	3,329	156	...	1,280	...	5
12. BROOMIELAW, ...	104	74.3	1,477	70	...	337	...	7,726	365	...	1,907	...	484
13. ANDERSTON, ...	462	64.0	6,278	...	94	...	22	29,588	...	446	346	...	1,650
14. SANDYFORD, ...	138	186.0	5,376	58	...	80	...	25,668	276	...	781	...	837
15. PARK, ...	346	72.3	5,102	41	...	...	100	25,017	205	...	...	114	...
6. SPRINGBURN, ...	1,531	27.5	8,828	41	...	...	1,031	42,094	193	...	...	4,350	1,409
7. COWLAIRS, ...	865	35.8	6,328	...	123	...	970	30,939	...	602	...	4,342	409
8. TOWNHEAD, ...	261	148.9	8,227	106	...	218	...	38,856	498	...	1,636	...	1,333
16. COWCADDENS, ...	173	215.8	7,965	181	...	411	...	37,344	847	...	2,528	...	2,843
17. WOODSIDE, ...	283	156.2	9,671	187	...	121	...	44,207	853	...	1,240	...	723
18. HUTCHESONTOWN,	224	180.7	9,043	218	...	...	1,731	40,488	977	...	...	7,085	969
19. GORBALS, ...	243	148.4	7,423	101	...	...	178	36,074	489	...	...	324	997
20. KINGSTON, ...	412	83.9	7,269	82	...	...	147	34,566	391	...	...	180	939
21. GOVANHILL, ...	449	75.2	7,414	28	...	...	588	33,760	124	...	...	2,196	227
22. LANGSIDE, ...	840	42.9	7,891	...	737	...	2,407	36,026	...	3,366	...	10,614	..
23. POLLOKSHIELDS,	1,353	13.2	3,469	...	21	...	536	17,843	...	111	...	2,526	...
24. KELVINSIDE, .	917	22.5	4,008	...	147	...	1,023	20,647	...	759	...	5,036	...
25. MARYHILL, ...	1,278	30.5	8,394	...	304	...	1,241	38,972	...	1,409	...	5,255	302
26. KINNING PARK,	109	128.0	...	...	...	...	...	13,946	...	...	...	...	329
WHOLE CITY, ...	12,797 Acres.	62.47	162,888	Net Decrease last year, 114 Houses.		Net Increase in four years, 7,484 Houses.		779,108	Net Decrease last year, 534 Persons.		Net Increase in four years of 24,038 Persons.		20,667
INSTITUTIONS AND SHIPPING, ...	...	...	...	...		...		20,312, and 543	Increase of Persons.		...		...

Total Population within the City Boundaries.

799,420



I.

## WORK.

(compared with last Year, and the Census of 1901); also, Houses Ticketed for Night Inspection; Common Lodging-recorded per Acre, per 100 Houses inhabited, and per 100 Workshops—in each of the 26 Wards of the City of Ward; and the Number of Stables for Horses in each Ward therein.

Farmed-out Houses on the Registers, 1905.			Total Nuisances Recorded.			Workshops and Restaurants on the Register in each Ward.	Nuisances per 100 Workshops.	Common Lodging-houses and Seamen's Boarding-houses.	Stables.	Offensive Trade Premises.	NUISANCE INSPECTORS.
1 Apt.	2 Apts.	Total Number.	In Each Ward.	Per Acre.	Per 100 Houses.						
...	...	...	2,607	4.65	23.91	174	35.05	...	201	7	EASTERN DISTRICT. (Houses, 35,106. Population, 160,893.) ——— 1 District Superintendent. 4 Inspectors for Nuisances (1 each Ward). 1 " " Drains and Plumber Work. 1 " " Workshops. 2 Female Inspectors.
25	...	25	2,090	4.08	22.0	172	30.23	c1	208	4	
27	40	67	1,598	5.0	22.95	165	26.66	c4	171	11	
16	17	33	1,867	2.60	24.09	86	19.77	c1	82	5	
172	121	293	2,578	8.00	31.91	434	33.87	c18	144	5	CENTRAL DISTRICT. (Houses, 15,096. Population, 72,175.) ——— 1 District Superintendent. 3 Inspectors for Nuisances. { 1, Ward 2. 1, Wards 9, 10. 1, " 11, 12. 1 " " Drains and Plumber Work. 3 " " Workshops. 1 Female Inspector.
54	94	148	2,022	14.00	44.51	407	37.83	c20	49	...	
1	15	16	256	2.09	65.47	480	33.33	...	19	1	
...	...	...	277	3.07	45.48	356	35.40	...	37	...	
23	62	85	950	9.13	64.32	350	33.43	c5 s24	38	...	
75	37	112	2,013	4.35	32.06	118	31.35	c3 s1	89	2	WESTERN DISTRICT. (Houses, 16,756. Population, 80,273.) ——— 1 District Superintendent. 3 Inspectors for Nuisances (1 each Ward). 1 Female Inspector.
65	...	65	2,141	15.52	39.82	162	25.91	...	124	...	
...	...	...	875	2.53	17.15	144	12.50	...	98	...	
13	3	16	2,028	1.32	22.97	56	50.00	...	104	2	NORTHERN DISTRICT. (Houses, 41,091. Population, 193,440.) ——— 1 District Superintendent. 5 Inspectors for Nuisances (1 each Ward). 1 " " Drains and Plumber Work. 1 " " Workshops. 2 Female Inspectors.
...	...	...	1,249	14.44	19.73	56	56.25	...	86	2	
75	8	83	1,575	6.04	19.14	130	99.23	c1	112	4	
11	...	11	3,307	19.11	41.52	176	90.34	c5	79	2	
...	...	...	2,241	7.90	23.17	146	54.79	...	82	1	
31	18	49	2,866	12.80	31.69	119	75.63	s1	79	1	SOUTHERN DISTRICT. (Houses, 23,375. Population, 111,128.) ——— 1 District Superintendent. 3 Inspectors for Nuisances (1 each Ward). 1 " " Drains and Plumber Work. 1 " " Workshops. 1 Female Inspector.
23	25	48	2,231	9.19	30.05	396	70.96	c3	168	1	
38	25	63	2,268	5.50	31.20	255	54.11	c1 s9	103	1	
...	...	...	1,325	2.95	17.87	52	...	...	40	...	SOUTH-SUBURBAN DISTRICT. (Houses, 18,774. Population, 87,629.) ——— 1 District Superintendent. 3 Inspectors for Nuisances (1 each Ward).
...	...	...	767	0.91	9.72	53	...	...	22	...	
...	...	...	418	0.31	12.05	19	...	...	137	...	
...	...	...	1,122	1.22	27.99	80	...	...	113	...	NORTH-WESTERN DISTRICT. (Houses, 12,402. Population, 59,619.) ——— 1 District Superintendent. 2 Inspectors for Nuisances (1 each Ward). 1 Female Inspector.
...	...	...	1,786	1.39	21.27	111	4.50	c1	172	...	
...	...	...	438	4.01	...	...	...	...	16	3	
649	465	1,114	42,895	3.35	26.06	4,697	40.87	c63 s35	2,573	52	

	WARDS.								
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
<b>I. Nuisances.</b>									
TOTAL INSPECTIONS made for discovery of Nuisances, ... ..	18,433	27,642	16,112	14,007	18,579	14,656	15,599	18,207	23,041
Nuisances discovered and recorded, ... ..	2,668	2,725	2,142	1,643	1,884	2,056	1,281	1,704	2,176
Do. removed or remedied, ... ..	2,578	2,757	1,985	1,619	1,878	2,052	1,288	1,641	2,174
Consisting of accumulations of Garbage on Roofs, Courts, &c., or in Empty Houses or Cellars, or open wastage, ... ..	66	136	31	60	170	55	22	117	290
Apartment, Lobby, or W.C., with insufficient light or ventilation, ... ..	7	8	..	1	2	1	..	2	14
Animals or Poultry kept, so as to cause a nuisance, ... ..	..	1	..	..	..	2	1	..	3
Bad Smells, or Diphtheria or Enteric Fever in Dwelling, ... ..	3	38	3	7	9	43	25	37	22
Dwellings without Water Supply, ... ..	54	7	57	40	33	50	20	37	15
Dead Animal Matter under Floor, ... ..	..	..	..	..	1	12	1	13	1
Defective Window in Dwelling, ... ..	..	13	..	2	..	3	8	..	4
Domestic Water Supply from Cistern in W.C.; or Cistern in Attic, foul and uncovered, ... ..	..	..	..	..	1	2	..	..	..
Drains, Soil-pipes, Branches, &c., choked, defective, or out of repair, ... ..	986	711	758	632	592	789	408	614	371
External Walls of Dwellings, Stairs, Lobbies, or Closets, filthy, ... ..	823	493	625	296	816	408	111	254	282
Internal Walls or Floors of House, or W.C., or Lobbies, or Stairs, filthy, ... ..	118	459	216	140	31	205	116	126	276
House Damp, or otherwise rendered unfit for habitation, ... ..	6	8	..	1	1	7	2	1	9
Sink, or W.C., or Trap, choked or broken, or out of repair, ... ..	400	440	223	311	121	193	349	204	583
Nuisances in Bakehouses, ... ..	7	26	2	3	3	1	3	7	9
Roofs, Walls, or Ceilings of Dwellings broken or out of repair, ... ..	19	78	12	21	9	15	11	8	48
Rhones, Pipes, or Gutters broken or out of repair, ... ..	14	58	15	20	15	126	61	79	35
Smoky Vents, or Back Smoke, causing a nuisance, ... ..	10	10	2	1	10	11	4	1	20
Sink accommodation defective, or new required, ... ..	2	21	..	2	1	5	4	1	7
Water-Closet accommodation required, ... ..	3	2	1	3	1	9	4	14	..
Water-Closet defective in construction, ... ..	12	17	7	1	6	15	7	11	..
Water-Closet accommodation in Workshops defective, ... ..	11	40	10	11	6	3	1	12	54
Workshops filthy, ... ..	4	37	8	9	1	14	18	45	46
Workshops overcrowded, ... ..	..	..	..	..	1	..	..	..	..
Workshops defective in ventilation or light, ... ..	..	..	1	..	..	1	..	6	2
Waste of Water reported to the Engineer and remedied, ... ..	7	117	1	9	10	49	83	44	100
Complaints to Master of Works remedied, ... ..	26	37	13	49	38	33	24	8	33
Reported to Procurator-Fiscal for prosecution before the Sheriff, ... ..	1	..	1	..	..	..	..	..	2
Summoned before the Police Magistrates, ... ..	2	2	7	..	..	..	..	1	1
Number of Rotation Cards for Cleansing of Common Stairs, Lobbies, and Water-Closets, served on Tenants, ... ..	205	258	231	58	403	103	98	270	335
<b>II. Drain Testing.</b>									
Total number of Applications of the test at different times, ... ..	162	137	143	92	107	109	74	105	94
Number of new Applications for satisfaction of Dean of Guild Court, ... ..	24	14	46	13	24	20	12	1	13
Number of old Tenements or Systems to which they were applied for the first time, ... ..	67	52	45	34	34	44	22	43	34
Number of these found all right on first application of Test, ... ..	10	13	14	..	8	7	6	7	10
Number found more or less defective on first application, ... ..	57	39	31	34	26	37	16	36	24

Houses closed under Section 32, Glasgow Police Act, 1890—

Under this Act the total number closed to this date—of 1 Apartment, 585; others, 285=870 in all.

Proceedings now taken are under Section 30 of the Housing of the Working Classes Act, 1890.



WARDS.																	WHOLE CITY.
X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.	XIX.	XX.	XXI.	XXII.	XXIII.	XXIV.	XXV.	XXVI.	
5,149	7,664	14,845	18,821	22,448	13,225	20,281	17,009	21,607	21,318	21,348	12,092	11,808	7,941	12,289	13,263	5,486	414,722
416	403	1,067	2,050	2,183	893	3,466	2,321	2,956	2,512	2,406	1,325	767	418	1,122	1,786	438	44,979
444	379	1,038	2,078	2,159	878	3,497	2,279	2,877	2,499	2,318	1,349	769	378	1,075	1,972	488	44,573
86	37	99	122	242	96	301	47	197	185	182	14	13	16	71	42	43	2,751
3	2	4	3	9	11	1	3	4	11	6	...	...	2	...	...	...	94
1	1	...	...	...	...	...	1	1	...	...	...	1	...	...	...	...	12
1	12	11	34	38	33	48	51	64	26	59	28	33	15	28	59	...	727
4	1	10	29	58	13	263	74	142	205	266	99	24	35	24	51	5	1,620
...	...	...	1	...	...	4	3	...	...	...	...	...	...	...	...	...	36
6	...	1	4	1	1	2	...	...	...	...	...	...	1	...	...	...	46
...	...	...	...	...	...	2	6	...	...	...	...	...	...	...	...	...	11
46	40	95	480	489	307	670	931	984	694	795	617	493	200	562	985	148	14,428
71	47	133	518	394	145	650	434	476	478	345	348	134	47	...	58	130	8,526
18	31	129	269	250	105	453	125	218	342	216	66	33	44	313	394	49	4,782
...	1	9	4	1	1	3	4	23	7	13	2	3	...	1	10	...	117
52	80	302	387	450	51	725	364	522	257	210	150	29	15	45	274	99	6,817
3	5	9	...	...	...	12	...	1	5	2	...	...	...	...	...	...	98
14	6	21	13	30	6	13	9	10	12	13	4	3	2	1	30	5	415
4	14	29	73	102	62	108	59	66	50	70	1	...	...	16	8	...	1,085
...	...	2	2	...	3	3	5	3	2	5	1	1	...	...	12	2	112
2	1	2	1	...	...	...	4	2	...	8	...	...	...	...	...	2	65
...	...	...	1	1	...	13	5	6	...	4	1	...	...	3	6	...	77
...	8	11	2	1	...	21	19	...	5	2	...	2	...	4	5	...	156
53	23	33	5	3	1	2	2	4	22	17	...	...	1	1	...	...	315
59	48	50	18	18	11	82	38	30	95	52	...	...	...	2	5	...	690
...	1	...	...	...	...	...	2	...	2	...	...	...	...	...	...	...	6
5	1	2	10	6	1	...	4	2	3	2	...	...	...	2	...	...	48
9	15	68	65	42	24	72	77	67	37	14	3	...	...	1	15	2	933
7	5	13	37	22	7	49	12	55	61	37	15	...	...	1	18	3	606
...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	6
...	...	1	...	4	1	16	3	8	12	10	...	...	...	...	...	...	68
14	148	236	187	513	333	338	164	283	793	694	169	59	94	324	350	30	6,690
17	42	58	82	103	117	138	132	200	126	148	77	181	139	99	184	14	2,880
13	10	12	7	3	5	6	1	1	2	1	6	57	40	43	43	...	417
1	14	21	35	48	53	47	60	87	63	66	34	62	35	53	51	14	1,119
...	1	1	14	18	23	12	10	6	9	12	12	24	14	15	19	...	265
1	13	20	21	30	30	35	50	81	54	54	22	38	21	38	32	14	854

	WARDS.								
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
<b>III. Common Lodging-houses and Boarding-houses for Emigrants and Seamen.</b>									
Common Lodging-houses Inspected, Measured, and Registered, ...	...	4	1	...	...	...	...	...	5
Number of Re-inspections by Day, ...	...	1,288	19	316	43	...	...	47	1,013
Do. do. by Night, ...	...	22	...	10	21	...	...	3	26
Do. Structural Defects found and remedied, ...	...	3	...	1	...	...	...	...	4
Do. Intimations of Irregularities to Keepers, ...	...	71	1	14	1	...	...	2	51
Do. Keepers summoned for contravening Regulations, ...	...	...	...	...	...	...	...	...	...
Number of Keepers fined for contravening Regulations, ...	...	...	...	...	...	...	...	...	...
„ Removed from the Register, ..	...	...	...	...	...	...	...	1	3
Total number of Common Lodging-houses now on Register, ...	...	18	1	4	1	...	...	1	20
With Accommodation for ...	...	2,126	396	1,116	379	...	...	90	965
Number of Boarding-houses, ...	...	...	...	...	...	...	...	...	...
With Accommodation for ...	...	...	...	...	...	...	...	...	...
Number of Re-inspections, ...	...	...	...	...	...	...	...	...	...
Do. Intimations of Irregularities to Keepers, ...	...	...	...	...	...	...	...	...	...
<b>IV. Ship Inspections under the Port Local Authority.</b>									
Number of Visits to Emigrants' Boarding-houses, ...	...	...	...	...	...	...	...	...	...
Do. Steamers inspected, ...	...	...	...	...	...	...	...	...	...
Do. Sailing Vessels inspected, ...	...	...	...	...	...	...	...	...	...
Do. Revisits to Steamers, ...	...	...	...	...	...	...	...	...	...
Do. do. Sailing Vessels, ...	...	...	...	...	...	...	...	...	...
Do. Verbal Warnings given, ...	...	...	...	...	...	...	...	...	...
Do. Intimations served on Masters, ...	...	...	...	...	...	...	...	...	...
Do. Public Health Notices served, ...	...	...	...	...	...	...	...	...	...
Do. Nuisances found, ...	...	...	...	...	...	...	...	...	...
Do. do. removed, ...	...	...	...	...	...	...	...	...	...
Do. Structural Defects found, 518, ...	...	...	...	...	...	...	...	...	...
Do. „ „ remedied, 407, ...	...	...	...	...	...	...	...	...	...
Do. Communications to other Port Local Authorities, ...	...	...	...	...	...	...	...	...	...
<b>V. Houses Let in Lodgings and Farmed-out Houses.</b>									
Number Inspected, Measured, and Registered, ...	5	113	5	12	8	16	1	6	60
Do. now on Register, ... { Houses Let in Lodgings, Farmed-out Houses, ...	10	42	9	21	...	17	5	22	24
	...	293	25	67	33	16	...	83	148
Number of Re-inspections by Day, ...	102	736	190	150	192	214	17	191	894
Do. do. by Night, ...	...	1,029	378	165	28	62	16	246	213
Do. of Keepers Summoned for Contravening Regulations, ...	...	4	...	2	...	1	...	1	8
Do. do. Fined for same, ...	...	...	...	...	...	1	...	...	6
Amount of Fines, ...	...	...	...	...	...	10/6	...	...	40/
<b>VI. Night Inspections.</b>									
Of HOUSES TICKETED under Secs. 376 to 379 of GLASGOW POLICE ACTS, 1866 to 1890.									
Total Number of Houses ticketed for first time during 1905, ..	14	21	45	12	...	4	...	54	...
Total Number of Houses ticketed, ...	1,389	1,601	2,203	953	201	1,409	409	1,333	756
Total number of Inspections for Detection of Overcrowding, ...	2,555	6,709	4,135	1,517	450	4,114	829	3,371	1,791
Total number of Cases of Overcrowding, ...	204	429	320	89	30	232	30	249	116
Total number warned by Inspectors, ...	149	316	252	78	25	149	18	172	80
Do. admonished by Magistrates in Police Courts, ...	32	72	41	7	1	58	9	41	16
Total number fined by Magistrates in Police Courts, ...	23	41	27	4	4	25	3	36	20
Cubic feet of space in worst case of overcrowding, instead of 400, only	128	114	148	150	102	160	207	101	180
Number of Cases of Overcrowding in houses under 900 cubic feet of space, ...	22	41	28	6	7	9	1	34	6



## WARDS.

X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.	XIX.	XX.	XXI.	XXII.	XXIII.	XXIV.	XXV.	XXVI.	WHOLE CITY.
...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	12
...	...	514	88	...	...	282	...	...	308	79	...	...	...	...	44	...	4,041
...	...	38	2	...	...	5	...	...	6	12	...	...	...	...	1	...	127
...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11
...	...	13	15	...	...	10	...	...	13	2	...	...	...	...	1	...	194
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5
...	...	5	3	...	...	5	...	...	3	1	...	...	...	...	1	...	63
...	...	978	546	...	...	1,602	...	...	962	450	...	...	...	...	158	...	9,768
...	...	24	1	...	...	...	...	1	...	9	...	...	...	...	...	...	35
...	...	458	13	...	...	...	...	6	...	146	...	...	...	...	...	...	623
...	...	1,837	61	...	...	...	...	2	...	572	...	...	...	...	...	...	2,472
...	...	27	...	...	...	...	...	...	...	8	...	...	...	...	...	...	35
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	467
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,870
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	95
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	287
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	75
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	238
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	268
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,142
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	913
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	518
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	407
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	25
3	3	20	6	9	...	25	2	18	25	17	...	...	...	...	62	125	541
1	3	19	19	11	3	13	4	17	19	11	...	...	...	...	124	125	519
16	...	85	112	65	...	11	...	49	48	63	...	...	...	...	...	...	1,114
277	3	1,193	144	116	108	288	30	156	174	201	...	...	...	...	1,137	39	6,552
36	...	218	278	93	...	18	...	24	90	167	...	...	...	...	28	...	3,089
...	...	28	15	4	...	1	...	...	9	7	...	...	...	...	4	...	84
...	...	9	8	3	...	1	...	...	4	4	...	...	...	...	3	...	39
...	...	£2 14/6	£2 5/	£2 17/	...	10/6	...	...	£2 11/6	£1 8/6	...	...	...	...	10/	...	£15 7/6
...	...	5	516	29	...	441	169	...	1	21	35	...	...	...	17	329	1,713
8	5	484	1,650	817	...	2,843	723	969	997	939	227	...	...	...	302	329	20,547
60	5	1,181	3,203	2,176	...	5,048	1,175	1,773	2,410	3,558	307	...	...	...	327	...	46,754
3	1	96	242	171	...	457	89	140	188	233	12	...	...	...	21	...	3,352
3	...	56	154	101	...	260	66	103	123	150	3	...	...	...	11	...	2,269
...	1	13	41	38	...	76	12	25	34	47	6	...	...	...	2	...	572
...	...	27	47	32	...	121	11	12	31	36	3	...	...	...	8	...	511
280	257	250	142	166	...	111	116	128	157	154	254	...	...	...	180	...	101 cub. ft. instead of 400.
...	...	7	29	44	...	34	1	9	26	21	1	...	...	...	3	...	32

		Institu- tions and Shipping.	WARDS.								
			I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
VII. Female Visitations.											
Number of Houses visited, first time, ... ..		...	2,654	4,403	3,499	7,848	1,618	2,299	788	1,515	2,921
Do. in which Lodgers were found, ... ..		...	148	263	149	1,055	216	206	83	106	349
Do. found dirty, ... ..		...	69	200	163	115	16	59	12	57	139
Do. revisited, ... ..		...	103	228	272	131	29	191	34	127	188
Do. found improved, ... ..		...	62	208	159	120	15	59	11	54	143
Number of Nuisances reported by Female Inspectors, ...		...	11	17	18	21	4	8	3	5	7
Number of Infectious Disease Cases reported, ... ..		...	4	1	7	2	...	3	1	...	2
Under the Glasgow Corporation (Police) Order, 1904, dealing with Filthy Houses and Dirty or Verminous Children :—											
Number of Schools visited, ... ..		...	131	111	226	72	86	82	58	134	...
Do. Children submitted for inspection, ... ..		...	700	365	411	68	35	214	81	648	...
Do. Children found Verminous or dirty, ... ..		...	506	171	357	22	17	78	31	253	...
Do. Homes inspected, ... ..		...	589	404	496	108	39	435	101	287	144
Do. Homes found dirty, ... ..		...	20	21	27	4	...	11	4	11	7
Do. Bedding found dirty, ... ..		...	20	24	13	4	1	16	1	5	7
Do. Notices served, ... ..		...	546	216	397	30	18	105	36	269	14
Do. Houses Cleaned in consequence, ... ..		...	10	23	16	4	...	7	4	9	7
Do. Bedding Cleaned in consequence, ... ..		...	14	14	9	4	1	16	1	5	5
Do. Bedding Cleaned at Wash-house, ... ..		...	...	...	...	...	...	...	...	...	...
Do. Children Cleaned by Guardians, ... ..		...	465	183	354	22	17	67	31	250	...
Do. Children Cleaned by Officers, ... ..		...	...	...	...	...	...	...	...	2	...
Do. Prosecutions, ... ..		...	...	...	...	...	...	...	...	...	1
Do. Pints of Germoeene supplied, ... ..		...	74	28	51	10	6	68	16	69	10
VIII. Infectious Diseases.											
Total Inspections made by the Epidemic Inspectors, ...		1,909	9,743	6,477	6,788	4,055	9,083	9,731	7,188	6,135	5,625
Number of Cases of Infectious Disease found by Inspectors,		1	35	53	210	82	139	56	32	78	35
Number of Cases of Infectious Disease reported at the Office,		399	1,582	908	1,276	697	611	1,046	759	771	641
Total number of Cases Registered, ... ..		400	1,617	961	1,486	779	741	1,102	791	849	676
Viz. :—Typhus Fever, ... ..		2	17	5	9	...	1	1	2	1	1
Enteric do., ... ..		32	37	28	34	20	18	21	16	25	9
Undefined do. and Continued do., ... ..		12	3	4	1	...	...	1	...	...	1
Smallpox, ... ..		...	...	...	2	...	...	...	...	...	...
Puerperal Fever, ... ..		3	12	4	6	4	4	5	5	3	4
Erysipelas, ... ..		105	57	57	52	46	28	36	37	33	44
Scarlet Fever, ... ..		26	54	45	66	40	44	33	21	55	21
Measles, ... ..		161	1,169	607	993	437	495	742	488	534	424
Whooping-Cough, ... ..		11	160	95	162	126	55	128	129	82	86
Croup and Diphtheria, ... ..		11	47	37	37	29	34	45	34	27	12
Diarrhoeal Diseases, ... ..		...	...	...	...	...	...	...	...	...	...
Chickenpox, ... ..		23	9	12	27	5	12	14	6	9	23
Phthisis, ... ..		14	52	67	97	72	50	76	53	80	51
Anthrax, ... ..		...	...	...	...	...	...	...	...	...	...
Number of Cases removed to Hospitals, ... ..		389	425	383	423	240	141	237	125	237	203
Number of Cases treated at Home, .. ..		11	1,192	578	1,063	539	600	865	666	612	473
											1 {Convicted, no Fine.

{Convicted,  
no Fine.



## WARDS.

X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.	XIX.	XX.	XXI.	XXII.	XXIII.	XXIV.	XXV.	XXVI.	WHOLE CITY.
42	18	339	4,240	2,944	35	4,673	968	2,560	2,326	2,184	...	...	...	101	10,006	...	57,981
6	1	20	291	156	3	200	33	140	251	147	...	...	...	...	817	...	4,640
4	...	9	94	46	3	111	13	41	46	26	...	...	...	1	75	...	1,299
7	...	6	202	125	5	273	37	60	94	39	...	...	...	1	81	...	2,233
4	...	7	78	46	2	103	12	37	42	18	...	...	...	1	60	...	1,241
...	...	1	27	24	...	29	2	10	24	22	...	...	...	...	21	...	234
...	...	...	3	5	...	1	2	5	...	...	...	...	...	...	2	...	38
20	...	...	111	75	17	112	70	175	117	44	72	58	19	1	57	...	1,848
28	...	...	265	154	...	443	120	292	286	29	1	...	...	...	81	...	4,221
24	...	...	230	133	...	252	68	189	227	18	1	...	...	...	59	...	2,636
8	1	105	252	115	2	421	141	145	106	59	6	...	...	...	50	...	4,014
1	...	8	15	7	...	6	4	8	7	1	...	...	...	...	3	...	165
...	...	6	7	1	...	15	5	4	...	...	...	...	...	...	32	...	161
25	...	14	252	141	...	273	77	201	234	19	1	...	...	...	94	...	2,962
1	...	8	15	7	...	8	8	8	7	1	...	...	...	...	3	...	146
...	...	6	7	1	...	15	6	4	...	...	...	...	...	...	32	...	140
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	230	133	...	254	70	177	218	18	1	...	...	...	59	...	2,568
...	...	...	...	...	...	1	...	...	2	...	...	...	...	...	...	...	5
...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	2
4	...	2	17	7	...	53	36	3	3	1	...	...	...	...	26	...	484 pints.
333	260	2,361	6,287	5,882	1,611	10,407	7,215	9,029	7,355	7,271	7,702	5,476	4,616	1,737	9,657	2,054	155,987
2	1	36	151	133	13	38	38	147	64	52	119	1	8	28	224	91	1,858
40	31	107	587	524	190	787	1,162	1,352	743	1,080	873	389	104	201	1,020	196	18,076
42	32	143	738	657	203	825	1,200	1,497	807	1,132	992	390	112	229	1,244	287	19,934
...	...	...	2	...	...	1	...	...	...	11	...	...	...	...	...	...	53
...	1	2	7	12	2	37	30	36	11	17	10	11	10	5	16	4	451
...	...	...	1	...	...	2	...	1	2	...	1	...	...	...	...	...	29
...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	4
...	...	3	5	2	1	8	3	6	8	5	7	4	...	1	5	4	112
3	2	8	34	36	31	62	34	80	55	46	45	30	8	11	44	12	1,036
...	2	11	26	26	24	35	39	60	27	85	49	85	24	28	44	14	984
25	25	64	494	365	100	388	817	1,032	557	770	691	161	14	117	659	216	12,545
8	...	23	65	130	8	127	169	149	63	64	109	36	19	13	292	8	2,317
1	1	9	28	32	15	29	36	48	30	31	28	35	18	22	50	22	748
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	6	29	4	...	15	2	16	2	35	6	3	7	13	66	2	346
5	1	17	47	50	22	121	70	70	51	68	46	25	12	19	67	5	1,308
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
17	12	48	148	177	53	292	193	315	132	279	202	72	45	39	149	98	5,074
25	20	95	590	480	150	533	1,007	1,184	675	853	790	318	67	190	1,095	189	14,860

	WARDS.								
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
<b>Infectious Diseases—continued.</b>									
Number of Apartments, Lobbies, and Closets fumigated, ...	...	...	...	...	...	...	...	...	...
Number of Apartments, Lobbies, and Closets sprayed with Formalin, ...	...	...	...	...	...	...	...	...	...
Number of Apartments, &c., whitewashed, ...	...	...	...	...	...	...	...	...	...
Number of Articles of Clothing washed, ...	...	...	...	...	...	...	...	...	...
Number of Carpets beaten, ...	...	...	...	...	...	...	...	...	...
Number of Beds disinfected under steam pressure, ...	...	...	...	...	...	...	...	...	...
Number of Pillows disinfected under steam pressure, ...	...	...	...	...	...	...	...	...	...
Number of Bundles of Clothing disinfected under steam pressure, ...	...	...	...	...	...	...	...	...	...
Number of Beds destroyed, ...	...	...	...	...	...	...	...	...	...
Number of Beds replaced Straw or Chaff, ...	...	...	...	...	...	...	...	...	...
<b>IX. Vaccinations.</b>									
Number Vaccinated in H.M.'s Prisons at the cost of the Local Authority—849 Secondary, ...	...	...	...	...	...	...	...	...	...
Number Vaccinated at this Office and Hospitals, ...	...	...	...	...	...	...	...	...	...
Number Re-vaccinated at this Office do., ...	...	...	...	...	...	...	...	...	...
Number Re-vaccinated at their own dwellings, ...	...	...	...	...	...	...	...	...	...
Number Vaccinated by Medical Practitioners in terms of Circular Letter from Medical Officer of Health, ...	...	...	...	...	...	...	...	...	...
<b>X. Bakehouses.</b>									
Number of Inspections for Cleanliness, &c., ...	26	45	33	27	14	14	9	35	20
Number of Warnings issued for neglect of Cleanliness, ...	7	27	2	3	3	1	3	7	9
<b>XI. Factories, Workshops, and Home-workers' Dwellings.</b>									
Total number of Workshops on the Registers at 31st December, ...	174	434	172	165	86	56	56	130	407
Total Inspections made, ...	1,386	3,886	1,642	1,661	801	489	406	1,466	2,684
Apartments Measured and Registered during this Year, ...	23	137	25	23	12	25	22	31	81
Number of Workshops found defective in Light or Ventilation, ...	...	...	1	...	...	1	...	6	2
Number found defective in Water-closet Accommodation, ...	14	36	12	11	6	3	1	11	43
Number requiring Limewashing, ...	4	48	8	7	1	15	17	50	50
Number of other Defects, ...	43	63	31	26	10	9	14	65	59
Number who carried out Improvements suggested by Inspector, ...	61	138	49	48	16	28	36	124	149
Prosecutions, ...	...	...	...	...	...	...	...	...	...
Convictions, ...	...	...	...	...	...	...	...	...	...
Number found Overcrowded, ...	...	...	...	...	1	...	...	...	...
Cubic feet of space per adult in worst case of Overcrowding, ...	...	...	...	...	...	...	...	...	...
Number of Visits to Home-workers, ...	72	68	75	95	71	75	32	162	267
Number of Dwellings found dirty and Intimations issued, ...	...	...	1	...	...	...	...	2	8



WARDS.																WHOLE CITY.
X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.	XIX.	XX.	XXI.	XXII.	XXIII.	XXIV.	XXV.	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9,058
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2,550
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	660
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	492,812
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	694
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2,813
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7,674
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4,622
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2,175
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	98
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	849
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	306
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	61
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	81
7	14	16	1	13	...	58	59	5	25	14	...	...	6	1	1	443
3	5	9	1	1	...	12	2	1	5	2	...	...	...	1	1	105
480	356	350	118	162	144	176	146	119	396	255	52	53	19	80	111	4,697
2,159	2,667	2,891	286	495	257	2,046	980	906	2,501	1,438	17	18	18	179	375	31,654
93	68	65	108	110	103	66	39	41	111	41	9	5	5	9	14	1,266
5	1	2	10	6	1	...	4	2	3	2	...	...	...	2	...	48
45	23	26	5	3	1	2	2	3	25	15	...	...	...	...	1	288
58	63	57	17	27	13	83	42	28	107	50	...	...	...	1	2	748
54	37	30	4	5	3	74	32	57	145	72	...	...	...	...	2	835
169	113	111	33	27	13	159	83	80	257	124	...	...	1	7	12	1,835
...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
...	1	...	...	...	...	...	2	...	2	...	...	...	...	...	...	6
...	177	...	...	...	...	...	217	...	188	...	...	...	...	...	...	177 c.ft. instead of 250.
140	12	87	96	42	38	208	37	257	220	108	70	55	25	19	41	
7	1	3	...	...	...	6	...	6	2	2	...	...	...	...	...	38











## WARDS.

WHOLE  
CITY.

X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.	XIX.	XX.	XXI.	XXII.	XXIII.	XXIV.	XXV.	XXVI.	WHOLE CITY.
3	15	115	182	164	145	225	299	122	212	247	116	57	29	52	242	31	3,543
2	...	...	7	...	...	1	3	2	3	2	2	1	...	...	1	...	72
...	...	...	...	...	...	...	20	...	...	...	...	...	...	...	...	...	20
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12
214	...	...	35,866	...	...	...	...	14	18	40	7	...	...	...	...	...	36,211
...	...	...	...	...	...	...	...	...	14	...	...	...	...	...	...	...	498
100	...	...	17,216	...	...	14	45,776	...	...	...	...	28	...	...	3,920	...	70,200
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	312
...	...	...	350	...	...	...	...	200	50	50	50	...	...	...	...	...	8,050
10	3	14	28	26	21	53	27	32	34	36	32	31	9	8	29	25	695
3	2	11	28	24	21	48	24	27	27	34	29	29	8	8	26	19	600
7	1	3	...	2	...	5	3	5	6	3	3	2	1	...	3	6	95
6	...	3	...	1	...	5	3	3	6	3	...	1	1	...	2	1	67
6	...	1	...	1	...	4	3	3	6	3	...	1	1	...	2	1	64
...	...	2	...	...	...	1	...	...	...	...	...	...	...	...	...	...	3
£6 10/	...	£2	...	£2	...	£13	£7 5/	£7 12/	£13 5/4	£6	...	£5	£4	...	£2 13/	£2 2/	£148 16/4
...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	£3 3/	...	...	...	...	...	...	£3 3/
...	...	1	4	3	...	1	...	2	...	1	1	...	...	...	1	...	18
...	...	1	4	3	...	1	...	2	...	1	...	...	...	...	1	...	17
...	...	£3 3/	£8 13/	£3 9/6	...	£2 2/	...	£5 3/	...	£2 2/	...	...	...	...	£1 12/	...	£32 8/6

## XVII. Fish and Game Inspection.—(Under the Glasgow Police Amendment Act, 1890.)

[illegible]

### XVIII. Limewashing of Privies and Wet Ashpits.—(As Special Cholera Precautions.)

Total number Limewashed from 13th May till 9th September, 1905,	...	...	...	...	...	..	...	...	...	...	...	...	...
Total Outlay for Wages, Plant, and Material,	...	...	...	...	...	...	...	...	...	...	...	...	...
							Wages, £88 11s. :	Brushes, £3 9s. :	Bags, 8s.				

**XIX. Reception Houses.**—Public Health (Scotland) Act, 1897, Sec. 66.

Number of Inmates admitted from Infected Dwellings, and boarded in Weaver Street,	...	...	Adults, 82;	...	...	...	...	...	...
Do. do., in South York Street,	...	...	...	...	...	...	...	...	...
			„ 104;	...	...	...	...	...	...

**XX. Interments.**—For Year ending 31st May, 1904.

[illegible]

									£	s.	D.
Payment of Costs Recovered,	...	...	Cancer Hospital, ... .. Interments,	1	Cash Collected, ... ..	1	1	0			
			Maternity Hospital, ... ..	74	" "	2	5	6			
			Belvidere " including Smallpox, "	29	" "	1	4	6			
			Sick Children's Hospital, ... ..	4	" "	0	0	0			
			Lock " " " " "	2	" "	0	0	0			
			Ruchill " " " " "	43	" "	5	17	0			

**XXI. Under "The Shop Hours Acts, 1892 to 1895."**

[illegible]

XXII. Under "The Seats for Shop Assistants Act, 1901."

[illegible]





## APPENDIX III.

## WASH-HOUSE—BELVIDERE.

RETURN of Work done, Materials used, &amp;c., Year ending 31st December, 1905.

Belvidere Wash-house. 1905.	No. of Washings.	Daily Average.	Total Articles Washed and Disinfected.	Dross used.			Rate of Dross per Article.	Gallons of Water used.	Cotton Oil Soap used.	Rate of Soap per Article.	Granulated Powder used.	Rate of Granulated Powder per Article.	Average Pressure on Boilers.	Average Temperature in Stove.	Hours Wrought inside.
				Tons.	Cwts.	Qrs.									
January, ...	342	13·68	15,591	37	13	3	Lbs. 5·41	210,000	Lbs. 231	Oz. ·23	Lbs. 356	Oz. ·36	Lbs. 30	Fahr. 140°	189
February, ...	387	16·12	16,985	36	5	1	4·78	206,000	233	·21	370	·34	30	140°	189
March, ...	457	16·92	20,040	40	7	1	4·51	243,000	287	·22	451	·36	30	140°	212
April, ...	594	23·76	23,198	41	10	3	4·01	254,000	295	·20	490	·33	30	140°	199
May, ...	798	30·69	35,500	42	13	2	2·69	285,000	398	·17	627	·28	30	140°	227
June, ...	683	26·26	28,075	40	10	2	3·23	383,000	301	·17	478	·27	30	140°	220
July, ...	379	15·79	15,616	28	19	3	4·15	197,000	166	·17	263	·26	30	140°	181
August, ...	389	14·40	17,209	32	18	3	4·28	228,000	182	·16	284	·26	30	140°	207
September, ...	373	14·92	15,632	31	17	1	4·56	205,000	176	·18	272	·28	30	140°	191
October, ...	504	19·38	21,183	40	9	2	4·28	250,000	207	·15	307	·23	30	140°	204
November, ...	726	27·92	29,732	55	18	2	4·21	308,000	336	·18	394	·21	30	140°	210
December, ...	943	36·26	37,239	64	12	2	3·88	392,000	425	·18	481	·20	30	140°	248
Totals, ...	6,575	...	276,000	493	17	1	...	3,161,000	3,237	...	4,773	...	...	...	2,477
Average per Month, ...	548·0	21·33	23,000	41	3	0	4·16	263,416	269·33	·18	397·1	·28	30	140°	206·41
Do. 1904, ...	531·0	20·45	34,582	59	1	0	4·04	393,650	474·5	·22	615·33	·29	30	140°	266·5

## APPENDIX IV.

## WASH-HOUSE—RUCHILL.

RETURN of Work done, Materials used, &amp;c., Year ending 31st December, 1905.

Ruchill Wash-house. 1905.	No. of Washings.	Daily Average.	Total Articles Washed and Disinfected.	Dross and Washed Singles used.			Average Fuel per Article.	Gallons of Water used.	Cotton Oil Soap used.	Granulated Soap Powder used.	Rate of Soap and Powder per Article.	Average Pressure on Boiler.	Average Temperature in Drying Stoves.	Hours Wrought inside.
				Tons.	Cwts.	Qrs.								
January, ...	348	14·50	12,964	36	16	0	Lbs. 6·35	222,100	Lbs. 128	Lbs. 353	Oz. ·61	Lbs. 60	Fahr. 130°	209·5
February, ...	391	16·25	17,472	38	9	2	4·93	253,500	167	478	·62	60	130°	211·0
March, ...	440	16·29	16,542	40	4	2	5·44	267,300	180	516	·69	60	130°	231·0
April, ...	597	24·87	22,614	46	1	2	4·56	297,000	293	513	·58	60	130°	211·5
May, ...	743	27·40	28,475	43	17	3	3·45	303,300	759	114	·50	60	130°	252·5
June, ...	594	22·84	22,889	36	15	2	3·59	292,800	430	252	·48	60	130°	235·5
July, ...	336	14·00	11,195	31	8	2	6·28	254,000	119	327	·66	60	130°	197·5
August, ...	307	11·37	10,189	33	13	1	6·42	212,200	131	377	·83	60	130°	224·5
September, ...	329	13·20	11,115	32	16	0	5·71	203,000	132	396	·79	60	130°	210·5
October, ...	483	18·57	17,481	44	0	1	5·63	273,300	184	541	·69	60	130°	228·0
November, ...	769	29·57	26,858	55	3	0	4·59	343,200	233	757	·59	60	130°	258·5
December, ...	1,040	41·60	34,821	59	15	1	3·84	328,500	318	1,121	·67	60	130°	280·5
Totals, ...	6,377	...	232,615	499	1	0	...	3,250,200	3,074	5,745	...	...	...	2750·5
Average per Month, ...	531·41	20·87	19,383	41	11	3	5·06	270,850	256·16	478·75	·64	60	130°	229·2
Do. 1904, ...	497·	19·12	17,049	39	5	3	5·50	285,116	152·16	508·0	·65	60	130°	223·65



## APPENDIX V.

STATEMENT of Repairs, Painting Work, &c., including Time and Material used at the undernoted Washing-houses, Reception-houses, City Rests, and Open Spaces throughout the City, and at the Sanitary Chambers, 23 Montrose Street, for the year ending 31st December, 1905.

## ABSTRACT.

	ACTUAL COST.		
	Time.	Material.	Total.
	£ s. d.	£ s. d.	£ s. d.
Bacteriological Department, - - -	0 19 2	0 8 8	1 7 10
Bain Square Open Space, - - -	2 15 5	0 9 9	3 5 2
Baltic Street Open Space, - - -	5 4 5	0 17 10	6 2 3
Belvidere Wash-house, - - - -	50 1 8	41 19 0	92 0 8
Braid Street Open Space, - - -	...	0 2 1	0 2 1
Camlachie Open Space, - - - -	1 10 0	0 2 5	1 12 5
Chambers, Montrose Street, - - -	62 12 4	11 1 6	73 13 10
„ Checkers' Department, - - -	...	16 5 3	16 5 3
„ Smoke Testing Department, -	...	26 5 3	26 5 3
„ North-Western Office, - - -	...	3 7 0	3 7 0
„ South-Suburban Office, - - -	...	4 3 8	4 3 8
Cholera Precautions, - - - -	...	17 8 2	17 8 2
City Rests on the Streets, - - -	20 16 11	22 7 9	43 4 8
Fish Market, - - - - - - -	6 9 6	6 7 0	12 16 6
Garngad Open Space, - - - -	6 8 9	2 1 8	8 10 5
Gorbals Open Space, - - - -	2 5 0	0 19 6	3 4 6
Howard Street Open Space, - - -	0 6 5	0 6 3	0 12 8
Kelvin Street Open Space, - - -	...	0 17 7	0 17 7
Kennedy Street Reception-house, - -	...	16 8 9	16 8 9
Milk Depot, Osborne Street, - - -	1 3 9	0 10 9	1 14 6
Oatlands Open Space, - - - -	10 19 6	1 16 8	12 16 2
Overnewton Open Space, - - - -	6 18 9	1 9 1	8 7 10
Paterson Street Open Space, - - -	2 16 11	0 13 7	3 10 6
Phoenix Open Space, - - - - -	19 16 9	3 9 10	23 6 7
Queen's Park Open Space, - - -	6 8 9	1 7 2	7 15 11
Ruchill Wash-house, - - - -	24 8 11	19 6 10	43 15 9
Society Row Open Space, - - - -	0 3 9	0 16 2	0 19 11
South York Street Reception-house, -	0 11 0	2 17 5	3 8 5
Washington Street Playground, - -	0 3 2	0 4 4	0 7 6
Weaver Street Reception-house, - -	2 3 2	0 0 6	2 3 8
Disinfection and General, - - - -	3 14 9	62 16 7	66 11 4
Totals, - - - -	238 18 9	267 8 0	506 6 9

## APPENDIX VI.

## ABSTRACT OF WORKSHOPS MEASURED AND REGISTERED DURING 1905.

Nature of Workshop.	Number of Workshops.	Total Number of Rooms.	Total Number of Men.	Total Number of Women.	Total Young Persons, 14 to 18 Years.	Total Number of Children under 14 Years.	Average Cubic Feet of Space in each Room.	Average Cubic Feet of Space for each Person.
Artificial Limb Maker, ...	1	2	3	3	...	...	1,620	540
Artistic Florist, ...	1	1	...	2	1	...	2,639	879·6
Aerated Water Manufacturer, ...	1	1	20	3	...	...	103,424	4,496·6
Boot, Shoe, and Slipper Makers, ...	103	110	217	12	13	...	1,949·5	886·1
Bag Makers, ...	5	7	8	45	1	...	6,697·7	868·2
Bamboo Furniture Makers, ...	2	2	7	...	...	...	3,182·5	909·2
Billiard Table Maker, ...	1	1	2	...	...	...	2,585	1,292·5
Bristle Dressing, ...	1	1	4	...	...	...	4,662	1,165·5
Basket and Mail-cart Makers, ...	3	6	9	...	2	...	1,754·1	956·8
Button Maker, ...	1	2	2	2	2	...	2,727	909
Bottlers, ...	3	5	15	31	3	...	12,383·4	1,263·6
Blacksmiths, ...	6	6	14	...	1	...	4,428·8	1,771·8
Buttermaking, ...	1	2	...	1	...	...	824	824
Boot Polish and Blacking Makers, ...	2	3	2	3	...	...	2,190·3	1,314·2
Birds'-cage Maker, ...	1	1	3	1	1	...	2,353	470·6
Blouse Maker, ...	1	1	...	2	...	...	1,408	704
Black and White Artist, ...	1	3	3	...	...	...	1,857·6	1,857·6
Brassfinisher, ...	1	1	3	...	...	...	3,927	1,309
Boiler-covering Manufacturer, ...	1	1	3	...	...	...	79,289	26,429·6
Cabinetmakers and French Polishers, ...	64	97	222	79	27	...	6,630·4	1,930·3
Chair Makers, ...	2	2	7	...	...	...	2,969·5	848·4
Cartwrights, ...	7	17	75	...	8	...	13,788·8	2,824·2
Carvers and Gilders, ...	3	3	9	...	2	...	7,898	2,154
Cork Cutter, ...	1	1	3	...	1	...	23,760	5,940
Cycle Makers and Repairers, ...	9	11	13	2	2	...	5,018·8	3,246·7
Cigarette Maker, ...	1	1	1	4	2	...	2,528	361·1
Cap Maker, ...	1	1	1	1	...	...	1,830	915
Cutler, ...	1	1	2	...	...	...	3,786	1,893
Confectioners, ...	4	7	4	5	4	...	3,061·7	1,648·6
Coopers, ...	6	6	20	...	1	...	8,170·8	2,334·5
Carriage Builders, ...	2	10	38	...	8	...	16,183·4	3 518·1
Dressmakers, ...	133	177	9	970	222	...	2,951·5	435·1
Dentist, ...	1	1	1	...	...	...	1,155	1,155
Draper, ...	1	1	...	1	...	...	1,303	1,303
Electrical Engineers, ...	4	6	25	...	1	...	5,694·5	1,314·1
Engraver, ...	1	2	6	...	2	...	2,613	653·2
Embroiderer, ...	1	2	4	8	4	...	14,809	1,851·1
Enamellers, ...	2	2	4	3	...	...	13,518	3,862·2
Furriers, ...	3	3	4	9	...	...	3,696·6	853
Feather Dresser, ...	1	2	...	3	...	...	2,510·5	1,673·6
Fancy-box Makers, ...	4	6	5	29	11	...	10,403·8	1,387·1
Fishing-tackle Maker, ...	1	1	...	79	13	...	38,780	421·5



ABSTRACT OF WORKSHOPS MEASURED AND REGISTERED DURING 1905.—*Continued.*

Nature of Workshop.	Number of Workshops.	Total Number of Rooms.	Total Number of Men.	Total Number of Women.	Total Young Persons, 14 to 18 Years.	Total Number of Children under 14 Years.	Average Cubic Feet of Space in each Room.	Average Cubic Feet of Space for each Person.
Fishcurers, ... ..	3	3	10	5	...	...	2,986·3	597·2
Firewood Manufacturer,	1	1	4	...	...	...	2,272	568
Farriers, ... ..	4	4	17	...	1	...	11,220·7	2,493·5
Flag Manufacturer, ...	1	4	2	8	...	...	5,446	2,178·4
Fine Art Needlework, ...	1	1	...	2	...	...	2,700	1,350
Golf-club Maker, ... ..	1	1	2	...	...	...	1,100	550
Glass Stainers and Embossers, ... ..	6	13	21	...	5	...	5,804·3	2,902·1
Glaziers, ... ..	3	3	5	...	2	...	6,714·3	2,877·5
Galvanizers, ... ..	2	2	19	...	...	...	21,439	2,256·7
Gas-stove Maker, ... ..	1	1	1	...	1	...	6,335	3,167·3
Hosiery Manufacturers, ...	2	2	...	11	...	...	4,155	755·4
Ham Curers, ... ..	3	4	8	...	...	...	4,882·2	2,441·1
Hat-box Maker, ... ..	1	2	...	2	1	...	1,436	957·3
Hassock Maker, ... ..	1	1	2	1	3	...	5,719	953·1
Ironmonger and Mill Furnisher, ... ..	1	1	4	...	...	...	7,934	1,983·5
Joiners, ... ..	37	41	120	...	21	...	7,931·5	2,306·3
Jewellers, Goldsmiths, Watch and Clock Makers, ...	16	20	48	2	13	...	2,518·2	799·4
Laundries, ... ..	24	50	1	93	11	...	2,468·9	1,175·6
Lathsplitter, ... ..	1	1	6	...	...	...	9,975	1,662·5
Lead-worker and Embosser,	1	8	18	3	2	...	6,458·7	2,246·5
Mantle and Costume Makers, ... ..	3	4	...	26	2	...	3,483	409·7
Milliners, ... ..	32	37	1	106	35	...	2,217·8	577·8
Model Makers, ... ..	3	3	6	...	...	...	3,908	1,954
Metal Dealer, ... ..	1	1	2	...	...	...	6,337	3,168·5
Machine Makers and Repairers, ... ..	3	3	7	...	1	...	3,493·3	1,310
Millwright, ... ..	1	3	1	1	...	...	1,500	2,250
Motor Car Repairer, ...	1	1	3	...	...	...	2,160	720
Manufacturing Stationers and Printers, ... ..	2	2	6	1	5	...	7,281·5	1,213·5
Manufacturing Chemists,	4	9	7	3	2	...	12,023·7	9,017·8
Millstone Builder, ... ..	1	1	6	...	...	...	10,498	1,749·6
Metal Refiner, ... ..	1	1	6	...	...	...	25,486	4,249·1
Metal-plate Worker, ...	1	1	4	...	...	...	6,607	1,651·7
Marine Stores, ... ..	3	4	3	...	2	...	9,899·5	7,919·6
Optician, ... ..	1	2	2	...	...	...	3,057·5	3,057·5
Onion Buncher, ... ..	1	1	5	...	...	...	2,053	410·6
Pattern Weaver, ... ..	1	2	12	6	3	...	11,271·5	1,073·4
Packing-case Makers, ...	3	4	9	...	...	...	5,848·2	2,599·2
Picture-frame Makers, ...	8	12	22	3	5	...	3,039·5	1,215·8
Photographers, ... ..	11	20	5	32	2	...	2,251·2	1,154·4
Piano Makers and Repairers,	4	6	6	5	...	...	3,573·3	1,949
Plumbers, ... ..	17	18	40	9	14	...	4,247·9	1,213·6
Pattern-book Maker, ...	1	1	3	6	3	...	8,090	674·1
Paper-bag Makers, ... ..	2	2	1	13	6	...	4,764	476·4
Poulterer, ... ..	1	1	1	...	1	...	7,901	3,450·5
Paint, Oil, and Varnish Manufacturers, ... ..	5	7	11	2	2	...	71,769·2	33,492·3





## APPENDIX VII.

TOTAL NUMBER OF WORKSHOPS AND EMPLOYEES, ON THE REGISTERS,  
AS AT 31st DECEMBER, 1905.

Nature of Workshop.	Number of Workshops.	Total Number of Men.	Total Number of Women.	Total Young Persons 14 to 18 Years.	Total Number of Children under 14 Years.
Aerated Water Manufacturers, ...	3	22	4	1	..
Artificial Limb Makers, ...	2	7	3	...	...
Artificial Teeth Makers, ...	22	52	2	9	...
Artists and Decorators, ...	2	4	...	1	...
Bakers' Utensil Makers, ...	2	7	...	...	...
Bamboo Furniture Makers, ...	2	7	...	...	...
Basket Makers, ...	7	19	...	3	...
Bedding Manufacturers, ...	16	60	55	10	...
Bellows Makers, ...	2	8	...	...	...
Belt, Brace, and Necklet Makers, ...	2	2	25	13	...
Billiard Table Makers, ...	5	26	29	3	...
Birds'-cage Makers, ...	2	9	2	1	...
Blacksmiths, ...	60	187	...	10	...
Blouse Makers, ...	4	1	39	13	...
Button and Stud Makers, ...	2	2	3	3	...
Boot, Shoe, and Slipper Makers, ...	463	1,226	105	67	...
Bottling and Labelling, ...	20	82	90	37	...
Brassfinishers, ...	5	15	...	5	...
Brush Makers, ...	16	127	39	23	...
Cabinetmakers and French Polishers, ...	194	768	245	107	...
Calenderers, ...	9	84	76	12	...
Card Cutters, ...	5	17	9	...	...
Carvers and Gilders, ...	27	88	1	13	...
Carriage Builders, ...	7	103	...	1	...
Cartwrights, ...	15	127	...	16	...
Children's Outfitters, ...	2	...	29	10	...
China Painting, ...	1	1	6	2	...
Chemical Manufacturers, ...	2	6	1	...	...
Clog Makers, ...	4	13	...	...	...
Coffee Essence Makers, ...	2	21	33	48	...
Coopers, ...	19	92	...	15	...
Confectioners and Preserve Makers, ...	17	31	57	125	...
Coffin Mounting and Shroud Making, ...	10	30	2	6	...
Cork Cutters, ...	12	54	18	22	...
Cutlers, ...	3	5	...	...	...
Curriers and Tanners, ...	5	87	1	2	...
Cycle and Motor Makers and Repairers, ...	44	91	4	14	...
Die Sinkers, ...	2	12	...	...	...
Drapers, ...	15	14	35	19	...
Dressmakers, ...	533	81	3,030	755	4
Drysalters, ...	2	1	9	5	...
Electrical Engineers, ...	17	84	...	20	...
Electro-platers and Enamellers, ...	4	8	3	1	...
Engravers, ...	26	71	3	44	...
<i>Carry forward, ...</i>	1,614	3,752	3,958	1,436	4

TOTAL NUMBER OF WORKSHOPS AND EMPLOYEES, ON THE REGISTERS,  
AS AT 31st DECEMBER, 1905.—*Continued.*

Nature of Workshop.	Number of Workshops.	Total Number of Men.	Total Number of Women.	Total Young Persons 14 to 18 Years.	Total Number of Children under 14 Years.
<i>Brought forward,</i> ... ..	1,614	3,752	3,958	1,436	4
Envelope Maker, ... ..	1	4	29	16	...
Embroiderers, ... ..	9	27	48	25	...
Fancy-box Makers, ... ..	31	112	473	240	...
Farriers, ... ..	23	81	...	...	...
Feather Dressers ... ..	3	...	7	1	...
File Makers, ... ..	4	19	1	2	...
Fine Art and Fancy Goods Dealers, ...	4	12	31	10	...
Fishing-tackle Makers, ... ..	5	4	89	18	...
Fish-bass Makers, ... ..	2	...	10	4	...
Fish Curers, ... ..	13	47	27	6	...
Firelight Manufacturers, ... ..	6	31	9	3	...
Flag Makers, ... ..	2	2	10	...	...
Fringers, ... ..	4	2	33	10	...
Furriers, ... ..	14	30	57	11	...
Galvanizer, ... ..	1	19	...	...	...
Glass Stainers and Embossers, ... ..	15	96	18	41	...
Glaziers, ... ..	25	113	2	21	...
Glass and Emery Paper Makers, ... ..	2	6	1	7	...
Gold Beaters, ... ..	2	17	1	...	...
Golf-club Makers, ... ..	5	13	...	...	...
Gunsmiths, ... ..	3	8	...	1	...
Hairdressers and Wig Makers, ... ..	10	27	3	11	...
Ham Curers, ... ..	8	49	...	2	...
Handkerchief Hemmers, ... ..	7	13	298	89	...
Hat and Cap Manufacturers, ... ..	21	32	226	130	...
Heating and Ventilating Engineers, ...	7	47	...	4	...
Horse-shoe Pad Maker, ... ..	1	6	...	4	...
Hosiery Manufacturers, ... ..	24	12	153	86	...
India-rubber Stamp Makers, ... ..	3	5	...	1	...
Indicator Makers, ... ..	2	19	...	2	...
Ink Manufacturers, ... ..	2	5	6	6	...
Ironmongers and Mill Furnishers, ...	9	26	...	6	...
Ivory Turners, ... ..	2	10	...	3	...
Japanners, ... ..	6	14	10	1	...
Jewel-case Makers, ... ..	2	16	8	7	...
Jewellers, Goldsmiths, Watch and Clock Makers, ... ..	140	388	31	89	...
Joiners and Wrights, ... ..	178	620	...	81	...
Lace Manufacturers, ... ..	2	1	33	9	...
Last and Boot-tree Makers, ... ..	2	5	...	1	...
Lathsplitters, ... ..	3	22	...	5	...
Laundries, .. ..	220	22	938	199	2
Leather Belt Makers, ... ..	8	46	1	1	...
Lead Worker and Embosser, ... ..	1	18	3	2	...
<i>Carry forward,</i> ... ..	2,446	5,798	6,514	2,591	6



TOTAL NUMBER OF WORKSHOPS AND EMPLOYEES, ON THE REGISTERS  
AS AT 31st DECEMBER, 1905.—*Continued.*

Nature of Workshop.	Number of Workshops.	Total Number of Men.	Total Number of Women. <sup>a</sup>	Total Young Persons 14 to 18 Years.	Total Number of Children under 14 Years.
<i>Brought forward,</i> ... ..	2,446	5,798	6,514	2,591	6
Lithographers, ... ..	16	45	19	21	...
Locksmiths, ... ..	5	8	...	4	...
Machinists, ... ..	6	5	41	14	...
Machine Repairers, ... ..	11	24	1	5	...
Mail-cart Makers, ... ..	3	11	3	4	...
Mantle and Costume Makers, ... ..	50	65	900	179	4
Manufacturing Chemists, ... ..	11	61	24	25	...
Manufacturers and Warehousemen, ... ..	15	173	435	75	...
Marble Cutters, ... ..	6	44	...	3	...
Milliners, ... ..	169	3	574	195	...
Metal Merchants and Refiners, ... ..	7	22	1	2	...
Meter Fitting and Repairing, ... ..	2	430	...	...	...
Modellers, ... ..	2	4	...	...	...
Musical Instrument Makers, ... ..	16	28	14	8	...
Nail Maker, ... ..	1	4	...	...	...
Napery Hemming, ... ..	3	...	16	2	...
Nautical and Scientific Instrument Makers, ... ..	3	10	...	3	...
Oil, Paint, and Varnish Manufacturers,	8	19	6	4	...
Opticians, ... ..	9	19	1	5	...
Packing-case Makers, ... ..	7	51	...	7	...
Packers, ... ..	4	5	7	6	...
Painters and Decorators, ... ..	29	128	3	39	...
Pattern Makers, ... ..	2	10	...	2	...
Pattern-book Makers, ... ..	10	30	76	53	...
Pattern Weaving and Darning, ... ..	9	68	28	13	...
Paper-bag Makers, ... ..	10	13	130	57	...
Pavement-light Maker, ... ..	1	10	...	2	...
Photographers, ... ..	39	51	103	35	...
Photo Engravers, ... ..	2	9	...	2	...
Picture-frame Makers, ... ..	32	87	12	15	...
Pinafore Makers, ... ..	3	4	139	70	...
Pickle and Sauce Makers, ... ..	4	6	10	12	...
Plasterers and Modellers, ... ..	11	52	10	21	...
Plumbers and Gasfitters, ... ..	158	458	11	163	...
Polish Manufacturers, ... ..	4	5	1	1	...
Portmanteau Makers, ... ..	6	46	10	13	...
Poulterers, ... ..	5	27	...	4	...
Printers, Bookbinders, and Stationers,	72	435	546	291	...
Preserved Meat Makers, ... ..	14	16	14	4	...
Rag Sorting and Cleaning, ... ..	54	55	405	37	...
Rope Makers, ... ..	2	8	...	...	...
Rubber Manufacturers, ... ..	2	6	...	...	...
Sack Makers and Repairers, ... ..	16	22	102	3	...
<i>Carry forward,</i> ... ..	3,285	8,375	10,156	3,990	10

TOTAL NUMBER OF WORKSHOPS AND EMPLOYEES, ON THE REGISTERS,  
AS AT 31st DECEMBER, 1905.—*Continued.*

Nature of Workshop.	Number of Workshops.	Total Number of Men.	Total Number of Women.	Total Young Persons 14 to 18 Years.	Total Number of Children under 14 Years.
<i>Brought forward,</i> ... ..	3,285	8,375	10,156	3,990	10
Saddlers, ... ..	50	224	18	37	...
Sail Maker, ... ..	1	17	...	...	...
Sausage-skin and Spice Makers, ...	14	56	62	35	...
Saw Makers, ... ..	6	9	...	2	...
Sculptors, ... ..	5	18	...	5	...
Shirt Makers, ... ..	34	98	1,014	78	...
Shop Fitters and Show-case Makers, ...	8	46	4	6	...
Ship-model Makers, ... ..	2	8	...	2	...
Shawl and Scarf Manufacturers, ...	4	3	45	10	...
Sheet-metal Workers, ... ..	6	20	...	12	...
Slaters, ... ..	5	56	...	2	...
Stair Railers, ... ..	3	18	...	4	...
Straw-board Lining Maker, ... ..	1	5	6	8	...
Stay Makers, ... ..	13	7	127	32	...
Stucco Ornament Makers, ... ..	5	27	3	3	...
Surgical Instrument Makers, ... ..	3	8	2	3	...
Tailors, ... ..	655	3,150	1,913	594	...
Tape-line Maker, ... ..	1	2	3	1	...
Taxidermists, ... ..	2	3	...	1	...
Ticket Writers, ... ..	4	17	1	6	...
Tie Makers, ... ..	2	1	8	7	...
Tile Layers, ... ..	2	4	...	1	...
Tinsmiths and Coppersmiths, ... ..	44	54	47	15	...
Tea Blenders and Packers, ... ..	9	14	16	10	...
Thread Manufacturer, ... ..	1	6	79	...	...
Tobacco and Cigarette Makers, ... ..	16	54	153	85	...
Tobacco-pipe Makers, ... ..	8	46	13	13	...
Trimming and Curtain Frilling, ...	1	1	8	3	...
Trunk Maker, ... ..	1	10	...	1	...
Umbrella Makers, ... ..	30	86	247	75	...
Underclothing Manufacturers, ... ..	59	14	652	150	...
Upholsterers, ... ..	50	163	160	67	...
Upholstery Trimming Makers, ... ..	4	8	49	14	...
Waterproof Manufacturers, ... ..	9	32	50	7	...
Warpers, ... ..	4	27	35	2	...
Weavers, ... ..	15	45	21	8	...
Weighing Machine and Scale Makers, ...	5	18	...	4	...
Window Blind Makers, ... ..	4	6	5	2	...
Wire Workers, ... ..	10	58	1	14	...
Yarn Winders, ... ..	2	3	17	...	...
Smaller Trades, ... ..	43	88	35	41	...
Totals, ... ..	4,426	12,905	14,950	5,350	10
Restaurants, ... ..	271	218	742	71	...
Grand Totals, ... ..	4,697	13,123	15,692	5,421	10



## APPENDIX VIII.

COMPLAINTS RECEIVED FROM H.M. INSPECTOR OF FACTORIES  
UNDER SECTION 5 OF FACTORY AND WORKSHOP ACT, 1901.

District.	Number of Complaints.	Nature of Complaints.	
Central, ...	9	{ Dirty water-closets, ... ..	4
		{ Water-closet out of repair, ... ..	1
		{ Dirty workshops, ... ..	2
		{ Ceiling of workshop broken and dangerous,...	1
		{ No suitable sanitary accommodation, ...	1
Eastern, ...	3	{ Insufficient drainage of floor (laundry), ...	1
		{ Workroom overcrowded, ... ..	1
		{ Roof out of repair, ... ..	1
Southern, ...	1	Water-closet dark and ventilated into kitchen,	1
Western, ...	4	{ Inadequate ventilation of large workroom, ..	1
		{ Attic used as a workroom unsuitable for the purpose, ... ..	1
		{ Walls and ceilings dirty, ... ..	2
North-Western,	2	{ Water-closet dirty, ... ..	1
		{ Light inadequate, ... ..	1
		Total, ... ..	19

## FACTORY AND WORKSHOP NOTICES, No. 35, RECEIVED.

District.	Number of Notices received.
Central, ... ..	126
Eastern, ... ..	36
Western, ... ..	21
Southern, ... ..	30
Northern, ... ..	32
South-Suburban, ... ..	18
North-Western, ... ..	3
Total, ... ..	266

## UNDER SECTION 9 OF FACTORY AND WORKSHOP ACT, 1901.

DISTRICT.	No. of Notices received.	No. attended to and work completed.
Central, ... ..	60	39
Eastern, ... ..	25	16
Western, ... ..	14	8
Southern, ... ..	16	9
Northern, ... ..	20	19
South-Suburban, ... ..	3	...
North-Western, ... ..	2	...
Total, ... ..	140	91

## APPENDIX IX.

## BURGH OF KINNING PARK.

STATEMENT BY SANITARY INSPECTOR OF PROCEEDINGS UNDER  
THE PUBLIC HEALTH AND OTHER ACTS DURING THE TEN  
MONTHS ENDING 6TH NOVEMBER, 1905.

## WATER SUPPLY.

I am pleased to say that the improvement reported in my last Annual Report was fairly well maintained during this period.

A number of complaints were received by me from tenants residing on the third and fourth flats of tenement dwellings in the south-west of the burgh with reference to a scarcity of the water supply during certain hours of the day. These complaints were forwarded to the Glasgow Engineer, who caused inspections to be made, when defects were discovered in the owners' supply pipes, which were remedied, and the cause for complaint removed.

## DRAINAGE.

The public sewers under the charge of the Burgh Surveyor were frequently cleansed and flushed out with the hose pipe, and kept in good working order.

As to the drainage systems of tenement buildings, the smoke test was applied wherever I had reasonable grounds to suspect anything wrong, and defects then discovered were made good, and the drains left in a satisfactory condition. In three of the tenements the whole systems were gutted out and renewed with modern wash-down water-closets in substitution of those of the old pan type.

## SCAVENGING.

The work under this branch of the service was carried through successfully on the same lines as in the previous year. Owing to a temporary dulness of trade in the beginning of the year, application was made to the Town Council to provide work for the unemployed men resident within the burgh, and this resulted in an arrangement to employ as many as possible in the Statute Labour and Cleansing Departments, which gave us the opportunity of paying special attention to the streets and lanes. As trade improved, these men were gradually reduced from time to time, but, on the recommendation of the Convener of the Health Committee, the services of two of the extra men were continued as a permanent arrangement.

The ash-pits were regularly emptied once a week, and some of the smaller ones twice. The amount of refuse removed from ash-pits was 2,720 tons 16 cwts., and from the streets (including Shields Road), 871 tons 6 cwts., making a total of 3,592 tons 2 cwts. of refuse removed from the burgh to Crawford Street Destructor, where it was disposed of at a cost of £404 2s. 5d., paid to the Glasgow Corporation.

The water cart was out on 73 days, when 314,700 gallons of water were sprayed on the streets; and on 38 nights the water cart went before the street-sweeping machine, and sprayed 50,400 gallons of water to keep down the dust which might have been raised by the machine.



As mentioned in my last year's Report, the Town Council of Kinning Park again received permission from the Manager of the Clyde Trust to tip clean snow into the Harbour, but the weather was such that we did not require to take advantage of this privilege.

As in previous years, the extinguishing of fires in ashpits caused considerable trouble. 59 were reported on fire. The majority of these occurred during the night, when the man who was delegated for that duty was called out and extinguished them.

There were also 41 street gully gratings reported as having been removed by some unknown persons. These had to be at once put on so as to prevent accidents.

### NUISANCES.

The total inspections made in connection with nuisances numbered 3,639, besides 471 house-to-house visits in connection with infectious diseases.

265 nuisances were found and entered in the Register. 114 intimations were served upon the authors in terms of Section 19 of the Public Health (Scotland) Act, 1897. In none of the cases was it found necessary to take action under Section 20. These nuisances consisted of—

Choked drains, ... ..	117
Water-closets choked or out of repair, ... ..	54
Garbage or stagnant water in empty cellars, ... ..	16
Sink conductors choked or broken, ... ..	5
Ashpits out of repair, ... ..	7
Internal walls of dwelling-houses dirty, ... ..	9
Paving of courts broken up, ... ..	5
Broken plaster in dwelling-houses, ... ..	3
Common passages dirty, ... ..	17
Water-supply pipe burst, ... ..	1
Chimneys defective, ... ..	2
Drain unventilated, ... ..	1
Gratings off ventilating traps replaced, ... ..	4
Wash-houses repaired, ... ..	3
Applications of smoke-test, ... ..	12

### SLAUGHTER-HOUSES AND OTHER OFFENSIVE TRADES.

As reported in my previous Reports, there are no slaughter-houses within this burgh.

The trades classed as "offensive," under Section 32 of the Public Health (Scotland) Act, 1897, are two Soap Boilers and one Tallow Melter. These works were periodically examined, and always found in a satisfactory condition.

### SCHOOLS.

There are three Elementary Public Schools within the burgh, under the control of the Govan Parish School Board, and one under the jurisdiction of the Roman Catholic Church. The lavatory accommodation is good, and the playgrounds (with the exception of that attached to the Roman Catholic School) are spacious, paved with granolithic, and kept thoroughly clean.

When the teachers in any of the schools suspected any infectious disease or contact therewith, information was at once sent to the Sanitary Department.

Within the past year a large addition has been made to the Roman Catholic School, which will accommodate 300 more children.

### FACTORIES AND WORKSHOPS.

Five notices were received from H.M. Inspector of Factories calling my attention to contraventions of the Act. These were in due course attended to. Four of them have been remedied, and one still lay over at the period of our annexation. 36 inspections were made by me in terms of this Act, but no notices were served under Section 2, Sub-section (3).

There were also 20 visits made, in terms of Section 107, with reference to home work.

### COMMON LODGING-HOUSES.

There are no common lodging-houses within this burgh.

### DAIRIES, COW-SHEDS, and MILK-SHOPS.

The number of dairies registered within the burgh still stands at 15, and one cow-shed, which contains twelve milch cows. These were periodically examined by the Veterinary Surgeon, and found free from Tuberculosis. I made 48 inspections of the dairies, when they were always found clean and well kept.

### FOOD AND DRUGS ACTS.

Nine samples of Sweet Milk, three samples of Skim Milk, and one sample of Brandy were purchased and submitted to the Public Analyst for analysis. Of these, eleven were certified genuine and two adulterated. These two cases were dealt with by the Town Council, in terms of Regulations of the Board of Agriculture.

### MARGARINE ACT.

Ten inspections were made for the detection of contraventions of this Act.

### UN SOUND FOOD.

There were 25 inspections made under Section 43 of the Public Health (Scotland) Act, 1897, and no seizures required to be made.

### PROCEEDINGS UNDER THE BURGH POLICE (SCOTLAND) ACT, 1892.

Notices were served on 17 occupiers to clean their common passages, stairs, and water-closets, in terms of Section 115; and on 135 owners, in terms of Section 117, to whitewash or paint the walls of common passages, staircases, &c.; also on 9 householders to clean their dwelling-houses, in terms of Section 119. All these Notices were in due course attended to.

### BURIAL GROUNDS.

There is no burial ground within this burgh.

### INFECTIOUS DISEASES (NOTIFICATION) ACT.

There were 50 cases of infectious diseases notified during this ten-month period. These consisted of 4 cases of Enteric, 3 cases of Puerperal, 13 cases of Scarlet, 19 cases of Diphtheria, 1 case of Membranous Croup, and 10 cases of Erysipelas. Of these, 45 were treated in Shieldhall Fever Hospital, and 5 were treated at home.



## OTHER INFECTIOUS DISEASES.

There were 162 cases of Measles, 4 cases of Whooping-cough, and 2 cases of Chickenpox discovered and registered. Of these, 37 were removed to Hospital, and 131 treated at home.

Washings sent to Hospital to be disinfected and washed numbered 185; beds, bedding, and body clothing sent to the Hospital to be destroyed, by request of owners, 6; houses disinfected, 175; and intimations to School Boards and teachers, 59.

## DEATH-RATE.

The total number of deaths registered as occurring within the burgh during the ten months was 185, giving a death-rate of 15·86 per 1,000 per annum, as compared with 16·42 for the year 1904.

The number of children who died under five years of age was 96, equal to an infantile mortality of 51·90 per cent. of the total deaths, as compared with 53·33 in 1904.

## BURIALS OF UNCLAIMED BODIES.

In terms of Section 69 of the Public Health (Scotland) Act, 1897, the burials of two children and one man were undertaken by this Department, at a cost of £2 14s.

HUGH WOOD,  
*Sanitary Inspector.*

60 Stanley Street,  
Kinning Park, March, 1906.





