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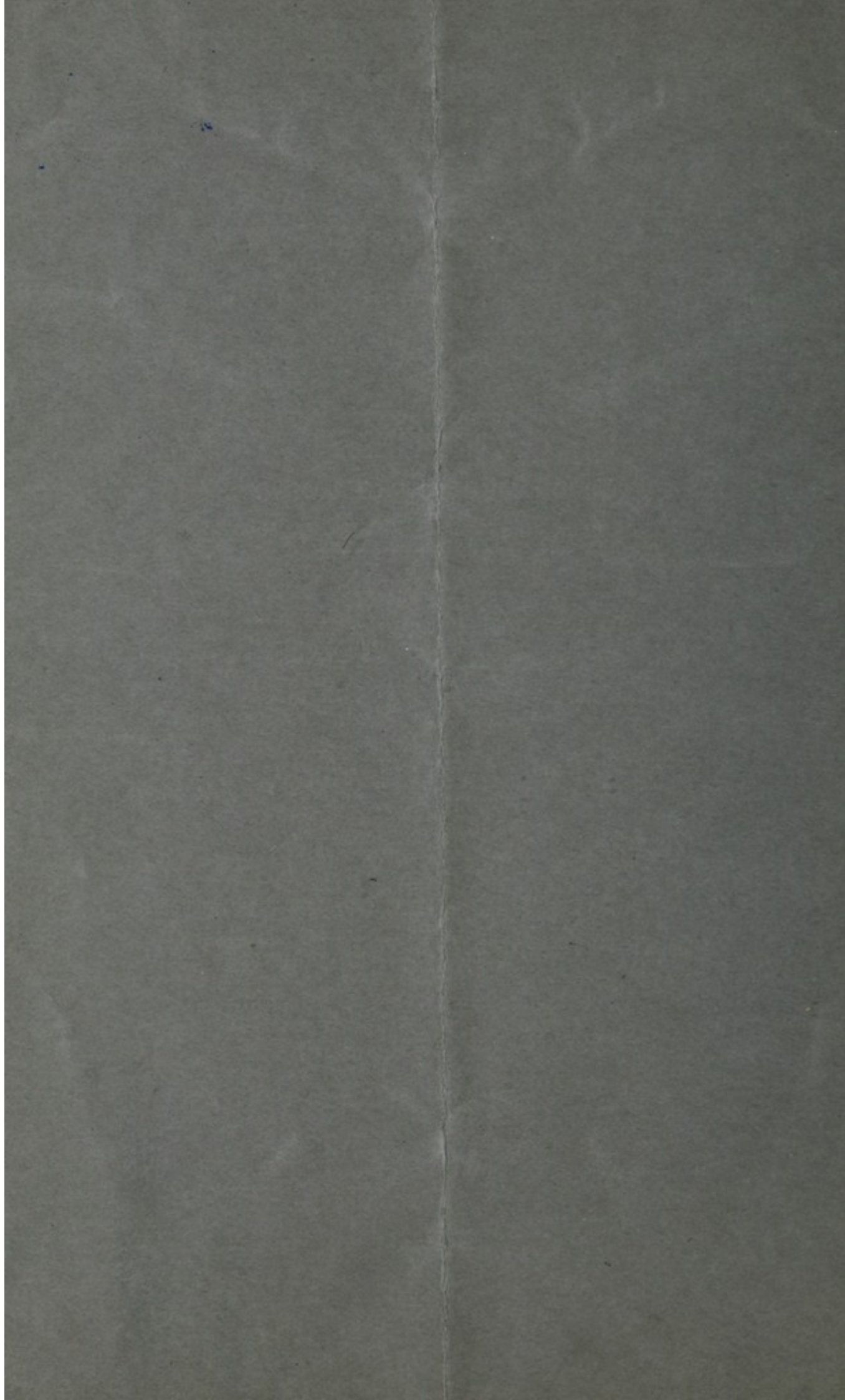
REPORT

BY

NEIL CARMICHAEL, M.D.,

RE

RE-VACCINATION IN CONNECTION WITH THE
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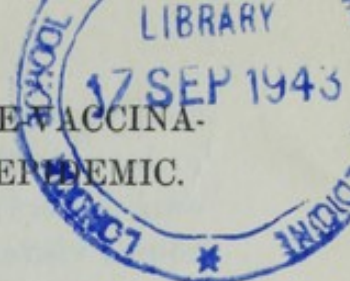


REPORT BY DR. NEIL CARMICHAEL *RE* RE-VACCINATION IN CONNECTION WITH SMALLPOX EPIDEMIC.

ON Monday, 4th March, on the appointment of the Smallpox Executive Committee, I undertook to organise and carry out a systematic re-vaccination of the City. The staff of vaccinators then available consisted of thirty Sanitary Inspectors, who had been already trained in vaccination. To these were added Senior Medical Students, most of whom held certificates of proficiency in vaccination. The vaccinators were sent out in pairs—an Inspector and a Student—to do house-to-house visitation and vaccination in districts allotted to them. As this staff was found too small to overtake the work, the services were obtained of Police Constables in plain clothes, Water Inspectors, Gas Inspectors, and others—one to accompany each vaccinator, acting as clerk and otherwise assisting. On Thursday, 7th March, 92 instructed vaccinators were at work. The number of vaccinators and clerks was rapidly increased till it reached 484, being composed of 254 Students, 94 Police Constables, 54 Gas and Water Inspectors, 7 Members of Ambulance Corps, and 75 others.

For the first few days the work was directed wholly from the Sanitary Chambers, but, as the staff increased, it was found necessary to meet and direct the vaccinators in more suitable premises. The City Hall Saloon in Candleriggs was used every evening from a little before 5 o'clock till about 7. The vaccinators here met, gave in their reports of the previous night's work, and received their fresh instructions. Their difficulties were considered, advice was given to them, and suitable arguments were placed before them, that they might be made as efficient as possible for their duties. In this hall were four tables on the platform, amongst which the districts of the City were divided. Each table was in charge of a doctor and a clerk, so that as little time as possible should be taken from the vaccinators before these were sent out to work. A due record was kept of vaccinators sent out, of districts visited, and of results. The vaccinators were sent out as soon as possible after 5 p.m.

The vaccinators were supplied with lymph, and, where necessary, with lancets; they were instructed to vaccinate as many as possible, using argument and persuasion to the best of their



ability; they were instructed to urge those who would not submit to be vaccinated by them to promise to be vaccinated by their own doctors; and they were required to make a census of the houses visited, noting—

1st.—The total number found over five years of age;

2nd.—The number of those already re-vaccinated; and

3rd.—The number re-vaccinated by them.

At first the staff was directed to infected spots, to work in and around these, in order to produce as far as possible round each an area of insusceptibility. So soon as a sufficient staff had been obtained, a systematic house-to-house visitation of the City was commenced. For this purpose the census enumeration districts were taken as a basis of work. The City is divided into over 1,100 districts, each containing about 150 houses. The vaccinators commenced work in Bridgeton and Camlachie, and afterwards proceeded to other districts of the City—special attention being always given to the infected areas. The Epidemic Sanitary Inspectors gave their attention to the houses in lands in which fresh cases of Smallpox sprung up.

In directing district work, the districts containing small houses were first taken up, and these districts, or portions of districts, composed of villas and better-class terraces, were left to their own doctors. The student vaccinators have completely visited 947 districts, some of these which were badly infected being visited six or seven times.

Special attention was devoted to model lodging-houses, because the inmates of these are nomadic and are of the class most likely to distribute infection, and because some of those houses had become centres of infection. These places were visited every evening for a considerable period by a staff of Students and Sanitary Inspectors, who succeeded in re-vaccinating large numbers of the inmates. A week's free lodging was offered to those who were successfully re-vaccinated, and in one of those establishments the proprietor refused admittance to those not re-vaccinated to the satisfaction of our staff. The police offices were visited every forenoon, and discharged persons were, as far as possible, re-vaccinated.

On 14th March, in response to a circular issued by the Lord Provost, a meeting of medical men willing to assist in district vaccination work was held in the Council Chambers. As a result of this meeting, 288 enumeration districts were taken up

by medical practitioners for house-to-house visitation. When the medical practitioners having these districts were slow in sending in returns, a medical member of our staff visited the doctors to obtain information, and, if necessary, to urge greater energy. These districts were all at a later date visited once, or more frequently if required, by the student staff.

The results obtained varied greatly with the circumstances and character of the districts. In working-class districts the direct results were much better than in more well-to-do districts. In infected districts many more vaccinations were secured than in those in which no cases of Smallpox had occurred—the incidence of a case of Smallpox in the near neighbourhood furnished for the vaccinators the most potent argument. Very large numbers who refused to be vaccinated by our staff promised to go to their own doctors, and immediately following the visits of our staff crowds flocked to the neighbouring surgeries for re-vaccination. The amount of re-vaccination done in surgeries in March delayed many of the medical men in carrying out the district visitation which they had undertaken.

Census returns were obtained from time to time (*a*) of the numbers over five years of age found in the houses visited, (*b*) of those already re-vaccinated, and (*c*) of those vaccinated by our staff. As to those already re-vaccinated, the results are not entirely reliable, because in many cases an examination of the arm could not be obtained, and the statement of the individual was the only evidence.

Taking the City as a whole, it was found by our staff that 52 per cent. appeared to have been then re-vaccinated. Then student vaccinators raised this to 63 per cent. Of the 52 per cent. a large number had been quite recently re-vaccinated, in consequence of the public notice made of the fact that a vaccinating staff was about to visit each house. Re-vaccination was greatly talked of, and many went to their own doctors before our staff could visit their houses. After the visits of the vaccinators great numbers went to their own doctors to be re-vaccinated. This is shown by the statements and returns of medical men, and is proved by vaccination census returns made up for certain districts. For the purpose of ascertaining the amount of vaccination done subsequent to the visits of our vaccinators, Sanitary Inspectors were sent out to make complete returns for 10 enumeration districts (consisting on an average of 150 houses each) of Bridgeton, 10 of Camlachie, 10 of Dennis-

toun, 9 of Calton, and 1 of Milton. The percentages of re-vaccinated persons over five years of age were found as follows:—

Bridgeton,	90 per cent.
Camlachie,	84 „
Calton,	80 „
Dennistoun,	74 „
Milton,	89 „

The mean percentage for these districts was 82. Of the people found in those districts, our staff had vaccinated 10 per cent., and practically had driven to the doctors in those districts all who were amenable to reason or pressure.

Other contributions towards obtaining statistical results are the census returns made by the Epidemic Inspectors as to actually infected lands in all parts of the City. It was found that 67 per cent. of the population over five years in these lands had already been re-vaccinated. This would indicate that 67 per cent. at least of the population of the City over five years of age have been re-vaccinated. But, as these figures apply only to the industrial districts, and do not include the better-class districts, in which re-vaccination has been more thoroughly carried out—such as Hillhead, in which a partial census showed from 92 per cent. to 95 per cent. to have been re-vaccinated—the percentage of the protected must be considerably over 67 per cent. In the districts in which a later census was taken, the percentage of re-vaccinated had risen in the interval from 73 per cent. to 82 per cent. In all the other districts persistent efforts have raised the percentage much above the figures obtained by our vaccinators through vaccinations done by doctors. So that, while the percentage of vaccinations for the whole City, including the well vaccinated districts, of which we have no complete returns (as many of the vaccinations were done at the charge of the individuals and paid for at the time, and not noted by the medical man, and therefore not notified to us), the percentage of re-vaccinations must be considerably higher than 67 per cent. The vaccinations done by medical men at the charge of their patients, and not notified to us, must be very large, as no medical man will willingly vaccinate at the rate of 1s. 6d. in those cases in which the patient is prepared to pay a larger fee; and as the percentages reached by our vaccinators were founded on an early enumeration of the district, the results obtained by the later census return must be considered as

qualifying the percentage figures, so that probably considerably over 70 per cent. of the total population of the City over five years of age has been re-vaccinated.

By the end of March the first round of district visitation and vaccination had been done. The staff was now reduced by dispensing with the services of the Police, the Water Inspectors, the Gas Inspectors, and some of the Students, and the work was continued by Senior Students and Sanitary Inspectors. The attendance at the City Hall Saloon was discontinued, and the work was directed from the Sanitary Chambers. From this period the work done consisted in re-vaccinating round every infected spot, and in again going over such districts or portions of districts as had not in the first round been well re-vaccinated. Daily, as cases of Smallpox were recorded in the office, vaccinators were sent out to press for re-vaccination in the neighbourhood in which the cases had occurred. Under these conditions considerable numbers were re-vaccinated in the areas in greatest danger, and the proportion of those remaining susceptible to the disease greatly reduced. Where census returns showed certain districts to have been very imperfectly re-vaccinated, a fresh visitation was started. The numbers re-vaccinated at this stage do not represent a large percentage of the population, but they represent a large percentage of those at that time unprotected by re-vaccination, who had been already repeatedly approached on the subject, and who yielded only after prolonged and repeated argument and persuasion by our vaccinators. A very large portion of the work of our staff consisted in striving to impress on the people the wisdom of protecting themselves by re-vaccination. The vaccinators had to overcome, so far as in their power, the inertia of the indifferent, who, as a rule, only yielded under pressure of the fear induced by the close proximity of Smallpox. They had to meet arguments and to correct mis-statements very numerous and widely circulated, which sought to show the danger and inefficiency of re-vaccination. Great patience, considerable tact, and a thorough acquaintance with the facts were displayed in this work.

In January, 1901, a great amount of vaccination had been done throughout the City. This continued intermittently up to the middle of February, when it greatly diminished. It increased with every rise in the number of Smallpox cases, and it lessened with every fall in the number. Those who were re-vaccinated at this period were the thoughtful and provident, who

willingly took steps to protect themselves. At the end of February re-vaccination had almost ceased. From 27th January till 13th February the average daily issue of lymph to practitioners was 2,699 tubes. After this period vaccination greatly declined, as practically all those willing to be re-vaccinated had already been done. From 13th February till 3rd March the average daily issue of lymph to practitioners was 438 tubes. At this point the student staff began, and, by direct personal contact and by the use of argument and persuasion, sent large numbers of those previously unwilling to the doctors. From 4th March till 24th March the daily average issues of lymph to practitioners was 1,837 tubes. This, of course, was in addition to the vaccinations actually done by the student staffs, which amounted to 29,081, and to those done by medical practitioners in enumeration districts, amounting to 12,424. From 4th March, at which date the student vaccinators began their work, till 1st June, we have records of 170,000 re-vaccinations. Many more have been done, of which we have not yet any record. The work of our vaccinating staff constituted the prevailing influence which caused so large a mass of the people to go to the doctors for re-vaccination.

On 26th April the staff employed daily ranged from 30 to 60 students, in addition to the Sanitary Inspectors, varying according to the number of cases daily reported. In carrying out this work the Sanitary Staff—Epidemic and Nuisance Inspectors—has rendered the greatest possible service, most of the special census work in the selected districts having been done by the Nuisance Inspectors.

The general re-vaccination of the City, and especially the immediate and extensive re-vaccination carried out in the infected spots, greatly reduced the possible area of infection. The links of connection by which infection might have been conveyed in many cases were broken by the intervention amongst the population of so large a percentage of protected persons. In this way the spread of the disease was reduced and the epidemic practically overcome.

As to the protection which has been afforded by re-vaccination, the following facts may be stated:—

On 23rd March there were in Hospital 375 cases of Smallpox. At that date the City had been re-vaccinated to the extent of about 60 per cent., as ascertained by returns of our vaccinators. Census returns, taken specially for the purpose of ascertaining

the precise condition as to re-vaccination of the various districts of the City, showed a much higher percentage. Accepting the lower figure, 60 per cent. of the 375 cases should have occurred in persons who had been re-vaccinated if the vaccination did not afford protection. 375 cases should have yielded 225 cases in re-vaccinated persons. As a matter of fact, there were 39 cases in which it was asserted that the patient had been re-vaccinated. Of these 39 cases, 36 sickened with Smallpox within 12 days after the performance of the vaccination.

Days of vaccination—

1 2 3 4 5 6 7 8 9 10 11 12.

Days of sickening with Smallpox—

2 3 3 5 7 5 3 4 1 2 0 1 = 36.

As the period of incubation of Smallpox (*i.e.*, the period intervening between catching the infection and sickening with the disease) is usually 12 days, it is evident that the whole of the 36 had contracted the disease before the vaccination had been performed. Not one of them had become infected with Smallpox after the re-vaccination.

Of the three remaining cases the facts are as follows:—

First Case.—Female, 49 years of age, said to have been re-vaccinated 10 years before. Mild attack.

Second Case.—Male, 44 years of age. Re-vaccinated 8 days before, said to have been re-vaccinated 20 years before; five marks on arm. Very mild case; some doubt as to diagnosis.

Third Case.—Male, 36 years of age, said to have been re-vaccinated 28 years before; two marks found. Very mild attack, So that, instead of 225 cases amongst the re-vaccinated, there were only three, and these three after intervals of 10, 20 and 28 years—all three, cases of the mildest type.

Another series of cases, consisting of all the Smallpox cases for the four weeks following the previous account, has been similarly examined—

The number of cases is	...	...	...	148
Vaccinated in infancy only,	...	...	...	119
Doubtful if ever vaccinated,	...	...	...	4
Asserted to have been re-vaccinated,	...	...	...	19
Unvaccinated,	...	...	...	6

Of the 19 asserted to have been re-vaccinated, the relation of the vaccination to the Smallpox infection is as follows:—

Days of vaccination—

1 2 3 4 5 6 7 8 9 10 11.

Days of eruption of Smallpox—

1 0 2 0 0 3 0 0 4 4 2 = 16

Those sixteen, therefore, had contracted Smallpox before they were re-vaccinated. Of the remaining three cases the facts are as follows:—

First Case.—Female, 81 years of age. Said to have been re-vaccinated 12 years before. No vaccination marks were found. Fatal.

Second Case.—Female, 49 years of age. Revaccinated 28 years before (1873). Infantile mark on one arm; two vaccination marks on other arm. Very mild case.

Third Case.—Female, 38 years of age. Said to have been re-vaccinated in India 12 years before. No marks were found. Fatal.

At the date of this series of cases the City had been re-vaccinated to the extent of 63 per cent. There should, therefore, have occurred amongst the 148 cases 93 amongst re-vaccinated persons. Instead of this, there were only the three. Of these three, two were doubtful, as no marks of vaccination were found on them; and the one case in which evidence of re-vaccination was found was very mild, notwithstanding the fact that the re-vaccination had been performed 28 years before.

Notwithstanding the fact that Smallpox has been epidemic in a population which has been recently re-vaccinated to the extent of over 67 per cent., *no recently re-vaccinated person has contracted Smallpox.* The cases of Smallpox have occurred wholly in the percentage of people not wise enough to protect themselves by re-vaccination, and in Bridgeton the whole of the cases since 1st April have occurred in the remnant of 10 per cent. not re-vaccinated. The 90 per cent., being protected, has escaped absolutely.

Another point of interest to note is that amongst the 523 cases referred to, 56 had been re-vaccinated within 12 days after contracting Smallpox. That is to say, over 10 per cent. of the population susceptible to Smallpox was actually at the time undergoing vaccination. This shows how actively re-vaccination was being pushed through the community in infected areas at this period.

NEIL CARMICHAEL, M.D.



