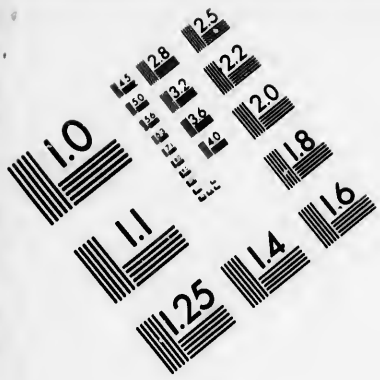


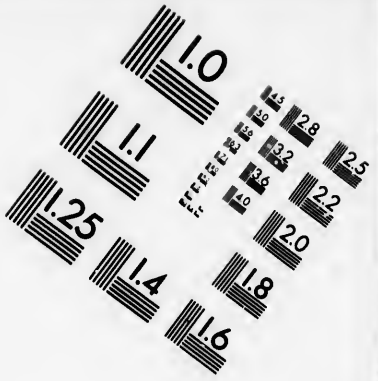
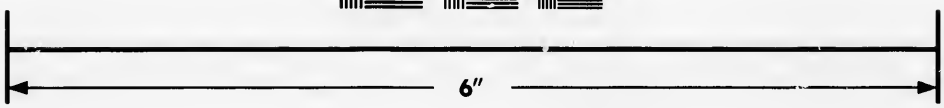
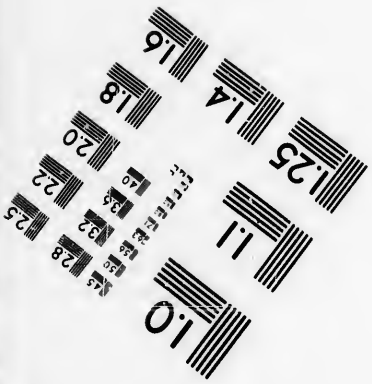
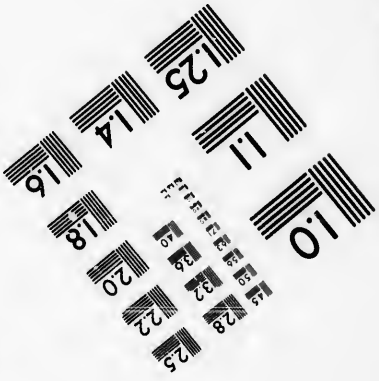


IMAGE EVALUATION TEST TARGET (MT-3)







Photographic Sciences Corporation

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

Technical and Bibliographic Notes/Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

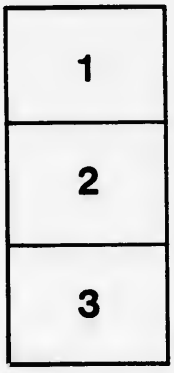
- ☐ Coloured covers/ Couverture de couleur
- ☐ Covers demaged/ Couverture endommegée
- ☐ Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- ☐ Cover title missing/ Le titre de couverture manque
- ☐ Coloured maps/ Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- ☐ Bound with other material/ Relié avec d'autres documents
- ☐ Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- ☐ Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- ☐ Additional comments:/ Commentaires supplémentaires:

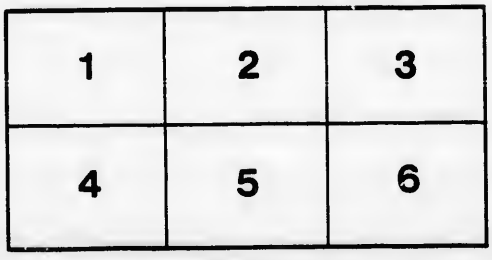
L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured pages/ Pages de couleur
- ☐ Pages damaged/ Pages endommagées
- ☐ Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- ☑ Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- ☐ Pages detached/ Pages détachées
- ☑ Showthrough/ Transparence
- ☐ Quality of print veries/ Qualité inégale de l'impression
- ☐ Includes supplementary material/ Comprend du matériel supplémentaire
- ☐ Only edition available/ Seule édition disponible
- ☐ Pages wholly or partially obscured by errata slips, tissues, etc., have been refilmed to ensure the best possible image/ Les pages totalement ou partiellement obscurcies par un feuillet d'errata, une pelure, etc., ont été filmées à nouveau de façon à obtenir la meilleure image possible.

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
						✓					





Cen

Adami, J. G.

THE CENTENARY OF VACCINATION.

MAY 14, 1796.

BY

J. G. ADAMI, M.D., M.R.C.S.,

Professor of Pathology, McGill University; Pathologist to the Royal Victoria Hospital.

(*Reprinted from the Montreal Medical Journal, August*, 1896.)

THE CENTENARY OF VACCINATION.[1]

MAY 14TH, 1796.

BY

J. G. ADAMI, M.D., M.R.C.S.

Professor of Pathology, McGill University; Pathologist to the Royal Victoria Hospital.

On May the 14th, 1796, Dr. Edward Jenner, of Berkeley, in the County of Gloucester, first inoculated a human being with matter taken from a vesicle of cow-pox. The inoculation so made developed into a well-marked pustule, the pustule with which now-a-days we are so well acquainted, and the inoculated individual was later found to be absolutely refractory to the inoculation of matter taken from a case of well-developed small-pox.

This successful experiment it was which inaugurated the practice now spread throughout the world, of vaccination against small-pox and led to the arrest of a foul disease so common during the last century that almost every other individual in Europe showed signs of its ravages, so rare now-a-days as to be extinct wherever vaccination and re-vaccination is rigorously enforced.

To-day, therefore, we celebrate the centenary of vaccination, and it is fitting that we, whose life-work is devoted to the combat with disease, should consecrate, even if it be but a few minutes, to calling into remembrance the great deeds which were of old, and should employ this occasion to look before and after, considering what has already been accomplished and what the future holds in store. For

[1] Lecture delivered before the post-graduate students, McGill University, May 14th, 1896.

only now, one hundred years after Jenner's first vaccination, are we beginning to apply successfully the principles underlying Jenner's method of arresting infectious diseases, principles which Jenner himself appreciated, but could not satisfactorily establish—and now with a fuller knowledge of those principles, a future dawns upon us, rich in hope.

Mindful of the day, and as a pious duty, let me first briefly recite the main facts that led up to the discovery of vaccination, recalling matters that are historical and, I doubt not, well-known to you.

Our knowledge of small-pox goes back to remote times. The earliest sure reference to it is of its appearing in the Abyssinian army at the siege of Mecca, in what was known as the Elephant War, of about the year 570. The earliest references to small-pox in England, if we leave out a possibly correct reference by Gaddesden early in the fourteenth century, occurs in letters of the years 1514 and 1518. The disease gradually rose to prominence about the end of Elizabeth's reign. In the autumn of 1641 we hear of 118 people dying with small-pox in London in one week, at a time when the population was between 300,000 and 400,000, or roughly about the same as that of Montreal. The experiences in England were similar to those on the European continent generally. Towards the close of the seventeenth century the disease became more and more general and more and more feared. In Iceland, in 1707 to 1709, after an absence of nearly 40 years, it killed 18,000 in a total population of 50,000. In England, in 1723, Dr. Jurin calculated that upwards of 7 per cent., or somewhat more than 1-14th part of mankind, died of small-pox.

In 1775 it would seem that in Chester, only 1,060, or 1 out of every 14, had not contracted small-pox.

I have seen it stated as an explanation of the lack of beauty revealed by the pictures by Sir Peter Lely, Sir Godfrey Kneller and others, of the Court beauties of the 17th and 18th centuries, that so common was the disfigurement by pock-marks that complexion was taken as the test of beauty, that the woman whose face was not disfigured by small-pox became of necessity the beauty of her neighbourhood, if only her features were not absolutely commonplace.

To arrest the ravages of small-pox it would seem that from a very early period, in various parts of the world, it had been the custom to inoculate young and healthy individuals with matter from those suffering from mild attacks of the disease, founded upon the common knowledge that one attack of small-pox protects against a second. It would appear to have been a most ancient custom in India, and at the

beginning of the eighteenth century the custom was spread through the Mahomedan world, Tripoli, Algeria, Turkey in Asia, Arabia and Circass ia The well-known Dr. Richard Mead explained the beauty of the Circassian women, or more truly the preservation of the same, as being due to the fact that by inoculation by the mild disease in their youth the effects upon the skin were practically nil, and thus they were protected from future ravages of the disease.

It was in Constantinople that that most advanced new woman of her period, the Lady Mary Wortley Montagu, wife of the ambassador to the Sublime Porte, was so much impressed with the value of the method that she obtained an old Greek woman, a professional inoculator, who with Mr. Maitland, the surgeon of the embassy, inoculated her son, and so successful was the procedure that on her return to England she subjected her infant daughter to the same operation.

Lady Mary was well known; the daughter of the fifth Earl of Kingston, she had at the age of eight been named a toast at the Kitcat Club and elected a member by acclamation. She married her husband against the consent of her father, and by special license—a distinctly advanced procedure in those days, both as regards the special license and the paternal consent. She was the friend of Mary Astell, the defender of woman's rights in her day. I mention these facts because perchance I am deterring some of you from attending the debates at the Woman's Congress, and I would not seem to forget the claims of that Congress upon our consideration. The great little poet, Pope, was enamoured of her and then of a sudden developed into a venomous foe. Why he did so has become one of the puzzles of literature. Two rival theories have gained strong support, one that she had borrowed a pair of sheets from him (he had induced the Wortley Montagu family to become his neighbours at Chittenham) and Lady Mary returned the sheets unwashed; second, that she had by her witty and engaging manner led him to the point of solemnly avowing his love to her, whereat she laughed at him loudly and scornfully. Whichever be correct, there is no doubt that he wrote bitter, not to say brutal, things about her, and she managed to circulate abroad stories and lampoons of almost equal strength. She was a great woman in her day, and her advocacy of small-pox inoculation did much to ensure the popularity of the process.

The successful results excited widespread interest, and the method gradually became extensively employed. It is calculated that in England alone up to the year 1758 there had been at least 200,000 inoculations or variolations, while in the latter half of the century the

Suttons, Dimsdale, and others would seem to have variolated thousands of individuals. Dimsdale indeed was invited over to Russia to inoculate the Empress, the great Catherine, and he did this with such success that he was made a baron of the Russian Empire, appointed Councillor of State, physician to her Imperial Majesty, and, in addition to an annuity of £500, was presented with the not inconsiderable douceur of £10,000—truly an imperial gift. But while this process of variolation spread, small-pox at the same time became increasingly frequent. The process, indeed, was essentially dangerous; while it is true that those who were variolated very rarely died, not unfrequently the same could not be said concerning their friends and neighbours, for those who were variolated suffered from the true disease, and were as much liable to be carriers of infection as were the victims of pox by natural means—indeed more so, because the mildness of the induced disease led to a lack of care. Thus it was that towards the end of the eighteenth century small-pox, instead of being stamped out, was more prevalent than ever. It would not seem to be an exaggeration to say that almost every second man was pock-marked.

While this was the case, it had also been recognised among the farming classes, not in Great Britain alone, but elsewhere—sporadically—that milkmaids were specially exempt from the disease; and it was further noted that there was a relationship between this exemption and the fact that these milkmaids had at one time or another been affected with cow-pox, a disease of a vesiculo-pustular nature, appearing in an epizootic form, and showing itself more especially upon the teats of milch cattle. And it is evident that even before Jenner's great experiment there had been occasional inoculations with cow-pox, so as to protect against small-pox. The best authenticated of these cases was that of Benjamin Jesty, a Dorsetshire farmer, who in 1774 inoculated his wife and two sons with virus taken on the spot from the cows of Farmer Elford, of Chittenhall, whither Mr. Jesty carried his family for that purpose; and in 1791 a schoolmaster in Holstein, Peter Plett by name, did similarly. Holstein then as now was a great dairy district, and there, as in the south and west of England, the tradition existed that milkmaids who had been infected with cow-pox were unaffected by small-pox. Thus, having seen a physician practise variolation, Schoolmaster Plett came to the conclusion that he would employ cow-pox lymph, and in the year above mentioned, there being an epizootic of cow-pox in the neighbourhood, he inoculated three children with the virus from a cow. His method was rather crude, he used a pocket-knife and made cuts upon the back of the

hand between the thumb and first finger The operation had the desired effect. Three years later when all the other children of the school sickened with small-pox the three remained quite healthy; but unfortunately the choice of region for inoculation had led to so severe an inflammation that Plett never again ventured to repeat the process. These and yet other observers, it may be, had vaccinated prior to Jenner, but with this difference, that they made no attempt to repeat the process, to establish the correctness of the process by later inoculation with variolous matter, or to spread abroad the beneficial results accruing therefrom. Only after the publication of Jenner's famous "Inquiry" was any attempt made to publish the results obtained. Jenner, on the other hand, having once succeeded, was not satisfied until after repeated attempts he felt assured that he had determined that an attack of induced cow-pox protected from the small-pox. Then, two years after this first experiment, he published the inquiry into the causes and effects of the variolæ vaccinæ, and thereby inaugurated or led to the inauguration of the process of vaccination. That motion can be brought about by the boiling of water may have been known for centuries, but it is not to Hero, of Alexandria, or even to the Marquis of Worcester that we are to ascribe the honour in connection with the discovery of the steam engine, it is to James Watt, to him who applied a knowledge of the properties of steam to the production of the steam engine the honour is due. Hundreds of patriotic Germans may have dreamt of and sighed for the unification of Germany, but the honour and the glory of having brought about that unification is now and must always be Bismarck's. And so in connection with vaccination, while we are ready freely to acknowledge that there were others who inoculated before Jenner, yet it is to his labours and his researches, and to him alone, that the honour and glory must be ascribed, if now-a-days small-pox has almost vanished from our midst, not to mention the further honour of having inaugurated the method of protective inoculation.

So now for a brief sketch of Jenner. He was born in the year 1749, a younger son of the Rev. Stephen Jenner, vicar of Berkeley. He was apparently not very strong as a boy, and his education was conducted partly at home, partly at Cirencester, which is not very far distant; and being intended for the medical profession was, after the good old fashion, bound apprentice to a surgeon at Sudbury. Completing his apprenticeship he went to London, and there became a pupil to him whom we may truly call the father of British pathology, the great John Hunter. And he would seem to have been a

favourite pupil, for Hunter recommended him to Sir Joseph Banks to aid him in arranging the collections which he had made during Captain Cook's first celebrated voyage of discovery. One biographer, indeed, states that Hunter solicited Jenner to become his partner; but the old life in Gloucestershire was more to his liking, and he returned to Berkeley, where he soon became the leading practitioner. But at the same time, he did not lose his love for observation, and his publications, more especially a paper upon the habits of the young cuckoo, gained him his F.R.S. It was here at home in Gloucestershire that he learnt the tradition concerning the effects of cow-pox, and set himself to work to collect together what cases he could find of cow-pox having rendered those affected thereby refractory to small-pox. He collected together a considerable number of very clear cases, some of which he tested by variolation, and he found that inoculation of matter taken from small-pox patients constantly was without effect in those antecedently affected with the genuine cow-pox. And the conclusion was forced upon him that it might be possible to propagate the cow-pox by inoculation, not only from the cow to the human subject, but also from man to man. And as the complaint when transferred from the cow to the milker possessed the quality of preventing the small-pox, it seemed probable that this quality might be retained even by propagation of the virus in succession from one human being to another. At length, in the spring of the year 1796, the cow-pox having broken out in a dairy near Berkeley, Sarah Nelmes, a milk-maid, became infected in one hand which had accidentally been scratched by a thorn. Here was an example of the genuine disease, and Jenner selected a healthy boy named Edmund Phipps, a boy who had not suffered from small-pox, and on him on the historic May the 14th he made his first trial. On the seventh day the boy complained of uneasiness in the armpit and had a slight headache. On the following day he was perfectly well, and by now the incision of the arm had assumed nearly the appearance of a part inoculated with variolous lymph. The inflammation subsided, the crust formed and dropped off, leaving a permanent eschar, and six weeks later, on the 1st of July, Jenner inoculated the boy with variolous matter, making numerous punctures and slight incisions on both arms. No effect was produced other than such a slight and transient inflammation as usually ensues after the inoculation of persons who had already suffered from small-pox. Several months later the inoculation was repeated, but without effect. At this period Jenner did not essay to carry on the vaccination from arm to arm, and the epizootic of cow-pox having died out, he had to wait two years for an opportunity to

continue his observations. On the 16th of March, 1798, he vaccinated his second case, a boy named Summers, with virus from the teat of an infected cow, and the vaccine lymph was transferred from Summers to William Pead, while from William Pead several children and adults were likewise vaccinated, and from one of this third of the series the lymph was transferred to several others. Several of these persons were next inoculated with variolous pus without effect, and Jenner ascertained that the vaccine lymph in passing through a series of five individuals retained the property of rendering the vaccinated insusceptible to the contagion of small-pox.

These were the cases which were published in the Inquiry, which appearing in the latter part of 1798 created immediately a most profound impression. It is unnecessary for me here to state in detail how Cline, Pearson, Woodville and others immediately took up the process, or how, long before Jenner's death, the process of vaccination had spread all over the world, and he had been the recipient of grants of £30,000 from Parliament, and had been given honorary degrees at Oxford and elsewhere. Already, before his death, the diminution in the small-pox mortality in the leading countries of Europe was very remarkable. Dr. Parr, the greatest of English vital statisticians, has made the following calculations as to the London death rate in periods previous to the introduction of the Registration Act, and Dr. McVail has continued the series up to 1882. No words of mine can be more eloquent than these figures.

With the process of time we have become better acquainted with what constitutes satisfactory and successful vaccination. Jenner held, and his own observations upon those who had accidentally taken cow-pox strongly supported the opinion that a single attack of cow-pox, and consequently a single vaccination, conferred immunity for the rest of life. Before his death this had already become seriously doubted, but it was long before re-vaccination was generally adopted; it was long, indeed, before the first serious attempt was made to enforce vaccination of the whole population in Great Britain; up to 1853 vaccination was optional, and only in 1872 was it made obligatory. Even now at the present day re-vaccination is not enforced for the whole population, save in Prussia. But how effective this is is shown by the following table, or better still by the diagram here copied from the report of the German Vaccination Commission of 1884 in the *British Medical Journal* (for diagram see page 89), showing the good effects in a class of population which is efficiently looked after, namely, the army. For comparison the accompanying diagram shows the small-pox cases and deaths per 100,000 in an

army and among a people in which vaccination and re-vaccination are not so rigorously enforced.

Terms of Years for which Data are Given.	Region.	Approximate Average Annual Death Rate from Small-pox per Million of Living.	
		Before Introduction of Vaccination.	After Introduction of Vaccination.
1777-1806 and 1807-1850.	Lower Austria	2,484	340
" "	Upper Austria and Salzburg	1,421	501
" "	Styria	1,052	446
" "	Illyria	518	244
" "	Trieste	14,046	182
" "	Tyrol	911	170
" "	Bohemia	2,174	215
1776-1780 and 1810-1850.	Prussia (East)	321	56
" "	Prussia (West)	2,272	356
" "	Westphalia	2,643	114
" "	Rhine Provinces	908	90
1774-1801 and 1810-1850.	Sweden	2,050	158
1751-1800 and 1801-1850.	Copenhagen	3,128	286

DEATH-RATE PER MILLION IN LONDON AT SUCCESSIVE PERIODS.

Years.	Average Annual Deaths from all Causes.	Average Annual Deaths from Small-pox.	
1660-79.	80,000	4,170	
1728-57.	52,000	4,260	Optional Variolation.
1771-80.	50,000	5,020	"
1801-10.	29,200	2,040	Optional Vaccination.
1831-35.	32,000	830	"
1838-53.	24,900	513	"
1854-71.	24,200	388	Obligatory; badly enforced.
1872-82.	22,100	262	Obligatory Vaccination; more efficient.

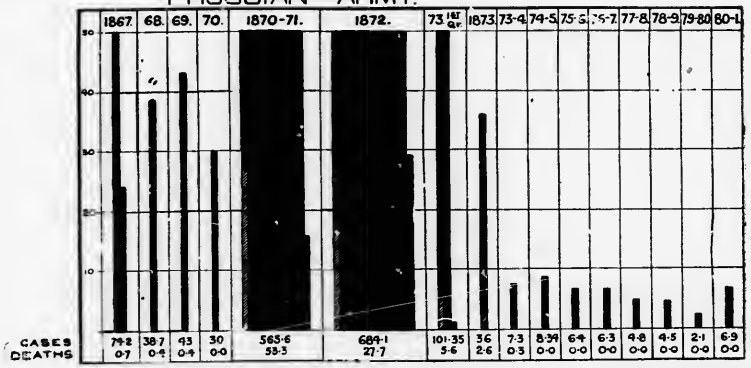
I have not, gentlemen, given you this evening many statistics, but these diagrams, if they were the solitary records we possess concerning the results accruing from proper vaccination, would be sufficient to prove absolutely the enormous benefit to the nation of vaccination and re-vaccination. While upon statistics, I may here, thanks to the great kindness of Dr. Wyatt Johnston in permitting me to use observations and statistics compiled by him and not yet published, say a few words showing the other side of the picture, namely, showing the fatality from small-pox in an imperfectly vaccinated community, to-wit, in this city of Montreal. I might perchance have selected more

DIAGRAM

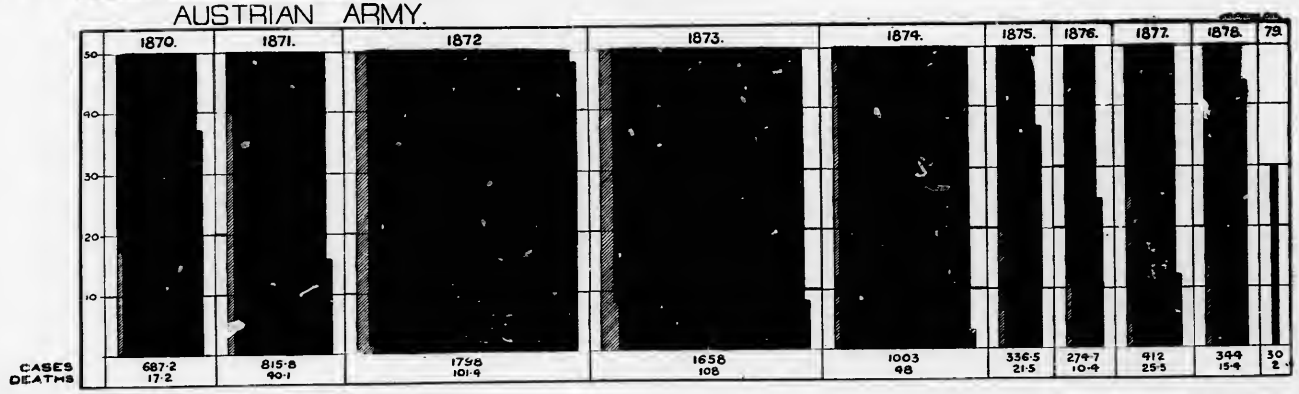
SHOWING

CASES & DEATHS PER 100,000

PRUSSIAN ARMY.



AUSTRIAN ARMY.



convincing, or rather more satisfactory tables, for it is a matter of notoriety that, thanks to the condition under which we live in this Province of Quebec, it is a matter of peculiar difficulty to arrive at even approximately correct vital statistics. The fact that the records of births and deaths are compiled from returns sent in by religious denominations, and that the duty of recording is in the hands of priests and ministers, who, I believe, receive no adequate remuneration for the work,—this fact alone makes the compilation of vital statistics a matter of peculiar difficulty. I might have chosen fuller statistics from such reports as those of Dr. Barry on the Sheffield epidemic, but the facts here given come close home. I refer to what happened in the epidemic of 1885, which was started by cases which came from Chicago in the beginning of that year; whereas in 1881 there had been five deaths from small-pox, none in 1882, one in 1883 and none again in 1884, in 1885 there were no less than 3,164, the average number of small-pox deaths per 1,000, being 18.9, the percentage of small-pox deaths to deaths from all causes being 40.6. Taking now the analysis by religion and race, we arrive at the following very suggestive table:

MONTREAL.

		French Catholics.	Other Catholics.	Protestants.	Total.
	Population	93,641	29,627	44,223	167,491
1885..	Deaths from all causes.	6,061	877	887	7,825
	Deaths per 1,000.....	64.7	29.6	20.05	46.71
	Deaths from small-pox..	2,887	181	96	3,164
	Deaths per 1,000.....	31.0	6 2	2.1	18.9

We may therefore state that even if now, a century after Jenner's first vaccination, small-pox is not eradicated, the fault does not lie in the incapacity of the process to prevent the disease, but in the incapacity of legislators and peoples to recognize its beneficent effects. It may to enthusiasts appear to be a serious assault upon the liberties of the subject to compel him and his offspring to undergo inoculation with vaccine lymph. But when his neglect to be vaccinated leads surely to the continuance of the disease and to the possibility of disease and death or disfigurement being propagated sooner or later in his neighbourhood, then assuredly the government as representing the nation has a full right to legislate for the safety of the nation as against the personal predilections of the individual. We, here in

Canada, and more especially in this Province of Quebec, cannot but be warned by the grim history that comes to us recently from the county which gave birth to Jenner.

We have learnt other things also during this last century which Jenner at first did not recognise, and first and foremost that there is a possibility, remote it is true, but nevertheless existent, that in inoculating from man to man the diseases to which man is liable may be conveyed and inoculated along with the lymph. We now know that as a precaution against such an untoward event there should be constant return of the virus to the cow, and that calf lymph, and calf lymph only, should be employed. And only within this last year or two the researches of Copeman and Straus have shown that the admixture of such lymph with glycerine leads to the gradual destruction of the microbes in general harmless which constantly contaminate fresh lymph, while at the same time the glycerinated lymph appears not to have decreased but to have increased in activity, thus employing glycerinated lymph that is two months old we can be absolutely sure that we are using a pure and aseptic material.

Despite all efforts a century of vaccination and of study of vaccine lymph has not as yet disclosed to us the specific organism of vaccinia, or, as I have recently shown elsewhere, of the more virulent modification of the disease, namely, variola. We cannot, therefore, state that we have fully mastered, or even that we have begun to master the bacteriology of vaccinia; we cannot cultivate its germ or supply to the public pure attenuated cultures for purposes of inoculation. But this we can say with certainty, first, that a single vaccination protects against small-pox for at least four years and for a longer period in the majority of individuals; secondly, that re-vaccination reduces the likelihood of infection with small-pox almost to nil; thirdly, that the vaccinated and *à fortiori* the re-vaccinated individual, if attacked by small-pox, suffers from a mild and modified form of the disease; fourthly, that the employment of matured glycerinated calf lymph is a means whereby the uncontaminated virus is introduced into the system, so that erysipelatoid and other disturbances can be reduced to a minimum, and when present are due to want of cleanliness on the part of the individual and not to the lymph inoculated.

But, now, what is the essential nature of the process of vaccination and of the immunity conferred thereby?

To answer this question adequately in the few minues remaining is practically impossible; to deal with the subject as it deserves would require a series of lectures. It would imply showing how nearly a century after Jenner made his first vaccination the principles which

he laid down were applied to other diseases. It would involve, too, a description of much of the life-work of that French chemist, Pasteur, who with his earliest experiments was to enlighten the world by creating a new science, the science of bacteriology, and through whose influence a new era was to begin in the treatment of disease; for it was Pasteur who first showed in this century that from a study of bacteriology we could learn to combat infectious disease in the most rational manner. His earliest experiments were made on a disease of fowls called chicken cholera, whose germ he discovered and isolated in pure culture. Rapidly following upon this discovery it was found that such cultures when kept for a long time in the laboratory lost their pathogenic power and that fowl inoculated therewith, not only survived the injections, but were apparently thereby rendered immune to the action of his most virulent cultures of the same kind of germ. Here, then, was the beginning for experiments of all kinds in the various infectious diseases. Just so soon as the germ of any disease was discovered the same efforts were made as in chicken cholera to produce immunity along the same lines. It was thus that Pasteur saved millions upon millions of francs to his country by producing immunity in cattle and sheep against that dread and fatal disease of anthrax which had up to that time proved a veritable scourge to farmers in the richest and most fertile territories of the land. The story, however, is doubtless familiar to you all, as are probably also the general features of similar experiments performed on other diseases. It need merely be said here that subsequent to the discovery by Pasteur that cultures of germs might be attenuated with age, other means were soon found of producing the same results and more rapidly. And thus by artificial heat, by compressed air, by exposure to light, by chemical re-agents, etc., the necessary attenuation of germs was easily produced and the subsequent immunity. It was but a step from this to the discovery of the toxines, that is to say, of the fact that bacteria in their growth develop chemical poisons which by a process of careful filtration may be separated in solution from the bacteria whence they have been derived. When later it was found that not only could immunity be induced by inoculation of attenuated germs or of their toxines similarly treated, but that the blood serum of animals so immunised could likewise act both as a preventative and a curative agent, the climax of rational therapeutics was reached. These facts which concern the subject of serumtherapy are too much of the nature of current events to require details of description here to-night. What is, however, of some interest concerns the mode of action of these vital therapeutic agents, and I will conclude with but the briefest reference to this most interesting topic.

Formerly it was thought that an attack of most infectious diseases created an immunity against subsequent invasion of the same germs, by reason of the fact that all the pabulum necessary for these germs had been consumed already ; or that perhaps the germs when once they gained a foothold in the body, produced self-destructive chemical poisons, thus preventing a further development at a subsequent exposure.

The experiments which have proved these theories in all respects untenable, and which have shown that other factors come into play, represent some of the most spirited and prolonged discussions which the medical world has ever been called upon to witness. With characteristic animosity the German and French schools upholding diverse opinions, have found it difficult to agree, though their combined theories have given to most observers all the essential explanations of this acquired immunity. Through the researches of Metchnikoff, of Massart and Bordet, of Nuttall, Pfeiffer and a host of others, we now know that the invasion of the body by micro-organisms is followed by a chemical attraction of certain cells of the host, inducing thus a battle royal between the invaders and the invaded. That not only can the cells destroy bacteria by intracellular digestion, but that where the leucocytes themselves break down or are destroyed, they may give off to the bodily humors in which they lie, certain secretions or excretions which render these humors bactericidal.

It is impossible here in these few moments to make more than a passing reference to this interesting topic ; though as a valuable sign of the times and as an indication of the valuable work which has been done within recent years it cannot be omitted ; and it is but a fitting tribute to the great originator of this valuable means of curing disease, namely Edward Jenner, that this day, the 14th day of May, 1896, 100 years from his celebrated inoculation, should be duly noted in the medical world.