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I submit the following Thesis for the approval of the Senatus Academicus, with the request that the Degree of Doctor od Medicine may be conferred on me.

The management of an outbreak of Small-pox in a British Colony where the disease is not endemic with remarks on cases, and influence of Vaccination together with an act of Parliament I introduced and passed through Parliament to regulate the Public Health of the State.

As a minister of the Crown in the island colony of Tasmania which is now a State in the Commonwealth of Australia, I became in 1903, ex officio, President of the Central Board of Health, and in that position, with the nominal assistance of a mixed Board, I was called upon to administer the Public Health Act of the State.

Almost immediately after assuming office I had to deal with an outbreak of Small-pox in Launceston, the second City in the State. This city is the centre of the railway system and to it the fast Mail steamers from Melbourne sail, carrying the visitors, who throng to Hobart, the Capital, every Summer, to avoid the great heat experienced on the Continent of Australia.

My staff at head quarters consisted of two Junior clerks whose sole duty had been to record vaccination certificates, and notification of diseases sent in by Medical men.

The President of the Board previous to my accession to Office was not a Medical Man and everything was in a chaotic state.

There had been an outbreak of Small-pox in the same town in 1886, but when it was suppressed the Authorities seem to have forgotten the risk of further outbreak and were totally unprepared for a second epidemic.

On the 22nd June 1903 when passing through Launceston on the way from my home to Hobart, I was informed of a rumour that a case of Small-pox was in the Infectious Diseases Ward of the General Hospital.

I immediately telephoned the House Surgeon and learned that in this case rumour had spoken the truth. As I was leaving by the night train, I instructed the House Surgeon to communicate with the Government Port Officer for me, so that he might have the isolation hospital put in readiness at once for the reception of patients; and to inform the Mayor who is ex officio Chairman of the Local Board of health that this had been done. I should explain here, that the cost of dealing with an outbreak of dangerous infectious disease is borne by the State, and the management in the past has been by the two boards (central and local), a dual control which was found to be so unsatisfactory, that I had the law amended so as to place the responsibility on the Chief Medical Officer, a position which was created under the Act already referred to, which will be found attached to this Thesis.

The early history of the epidemic proved almost conclusively, that the disease had been introduced into the State by a travelling Comedian (Mr. Marion), who had arrived in Melbourne (Victoria) on the S.S. Gracchus, and travelled on to Tasmania in the S.S. Coogee. The Gracchus had been given pratique in Melbourne: but on May 19th there appeared a notification in the daily papers that two cases of Small-pox had been found on the Gracchus in Hyttleton, New Zealand, whither she had gone in the interval.

On May 20th two cases were reported in Victoria, the nearest adjoining State to Tasmania, and the one where the Gracchus, first called, both having been passengers, in the Gracchus, the husband of one was found to still have traces of the disease, and it transpired he had developed Small-pox on Board shortly after leaving Sourabaya in Java on April 17th

On May 23rd it was discovered that two passengers from the Gracchus had passed over to Tasmania; they were both discovered: one in Hobart was examined by Gregory Sprott M.D. (Glasgow) and certified as free from disease, he was vaccinated at once by Dr. Sprott; the other, Marion, in Launceston was examined by L.S. Holmes L.R.C.P etc. Edin, and his report states that there were no traces of Small-pox, that the man refused vaccination, but that he had "good marks". Marion performed at the Empire Music Hall and shortly after left for New Zealand, where he was examined and quarantined. Dr. Mason the Chief Health Officer of New Zealand informed us that he had a Macular rash when he examined him in New Zealand, closely resembling that of a previous case of Small-pox dealt with in New Zealand.

It is probable this was the last remnant of a mild attack gone through before reaching Tasmania. Dr. Mason further stated that the only vaccination cicatrices discernable were very faint and dated back to infancy. This exposure of Mr. Holmes' carelessness, together with further unsatisfactory conduct during the outbreak, led me to ask for his removal, and a Medical gentleman of high standing has been appointed as Port Officer in Launceston. So far as can be ascertained, the first case was a child named Mary Faulds

who fell ill on the 23rd May. She is said to have attended the Empire Music Hall where Marion was appearing on May 9th.

The second case in order of development was that of Vernon Cox who fell ill on May 26th. He also attended the Music Hall 12 or 14 days before.

The third case was Francis Duggan who became ill on May 29th. He attended the Music hall on May 26th. This man was taken to the Launceston Hospital on June 3rd.

From these cases the subsequent course of the outbreak can be readily traced.

Duggan's case was the first severe one, On admission to the Infectious Diseases ward, he had a general infiltrated condition of the head, face, and neck, with bruised looking patches in the skin, and a number of scattered limited hoemorrhages into and under the skin of the trunk and limbs. No definite eruption of the nature of papules, vesicles, or pustules is stated to have been present; his mental condition remained clear, but the oedema and purpuric manifestation increased together with an evident intoxication of the system generally. Two days after admission he suddenly collapsed and died. The case was reported as one of purpuric Scarlet fever. I have obtained and append herewith a photograph of Duggan taken two days before he died. The House Surgeon had never seen a case of Small-pox, and the marked difference between this and an ordinary coherent eruption accounts for the failure to diagnose. So far as he knew there were no cases of small-pox in Australasia at the time.

One nurse who attended him contracted the disease in an

even more virulent type than Duggan himself; she died in three days. The Honorary staff had not seen Duggan, but met over the Nurse's case. They made a doubtful diagnosis of Purpuric Scarlet Fever and recommended that the City Health Officer be called in to see the case; but though called, he delayed his visit until next morning, and in the meantime she died.

On the 20th June, the porter who had removed Duggan's body to the mortuary developed a papular eruption on the face and wrists; next day they were more pronounced, and had extended over the body. He had fever, headache, backache, and vomiting. This case was seen by the City Health Officer and reported as Small-pox. On the same day, Dr. Bernard the Junior Medical officer developed a mild eruption, and the laundress who had washed Duggan's Linen also showed a varioloid eruption..

Of three patients discharged after Duggan had been admitted one returned on the 23rd June with a discrete Small-pox eruption 3 or 4 days old. So far as we could learn there had been some eight mild cases unreported outside the hospital. Six cases were immediately reported when it was known a case had been diagnosed at the Hospital. Next day eleven cases were known to exist, and others rapidly developed.

The knowledge that the disease had been so long in the city and had not been recognised led to an alarming scare being established all over the State, but more particularly was it made manifest in Hobart where a demand was made that the Government should have the whole city of Launceston isolated. Hobart, as I have said before, is a Summer resort, and, in addition, during half the year is a port of

call for all the large British Steamers trading between "Home" and Australasia. They hoped if Launceston were isolated that the other States would not impose the restrictive regulations between Hobart and their ports.

I insisted on my Colleagues resisting this demand, and proceeded to Launceston where I took charge, some members of the Local Board rendering valuable assistance, while one or two seemed to think that the scare was got up for the benefit of the Medical men. I resented this imputation very strongly, but must admit that my experience gained during the epidemic satisfied me that some of the men did run their profession on "Strict business lines."

The position was a difficult one; we had practically no Vaccine Lymph to be relied on, a very poorly vaccinated community, no proper provision for isolation of cases or home for contacts, and the City Health Officer having been isolated by the Local Board so that he might attend the city cases who were isolated in their own homes, I was without his assistance. As we have no vaccine station, I cabled immediately to all the other States for Lymph, and reserved what was on hand for contacts. I visited the isolation hospital, which is situated some four miles out of the city, and found it unsuitable and quite inadequate, so that it was necessary to order alterations and additions to be put in hand at once. For the contacts, I resumed possession of a large Government building known as Glen Dhu, where we had all contacts medically inspected, bathed outside the main building, dressed in clothes supplied, and their discarded clothing destroyed, as we had no proper disinfecting apparatus.

Of the 156 active contacts removed to Glen Dhu, only two developed

the disease.

The increasing number of cases, made it clear that the additional accommodation ordered would not serve to allow of all cases being isolated. When the first addition was completed, I intended to remove the City cases out at once, and informed the City Health Officer through the telephone of my intention, He replied that they were satisfied to be attended in their own homes and he was sure they would not agree to go. I said I felt sure they would act on his advice, to this he replied "he would not advise them one way or the other," I pointed out that he was taking a course that could not be justified; with the knowledge that the disease was air borne, we should not keep the cases in the city and endanger the lives of others, and further that it would prolong the outbreak, and seriously affect the trade of the State. To abstain from advising would be to the people like advising them not to go. He would not move from the position he had taken up, and I felt (as I had not the power under the then existing law to secure his dismissal) that he was going to spoil our chances of suppressing the outbreak promptly.

On the following morning before meeting the Local Board, I telephoned the Health Officer again, with a view to inducing him to alter his mind and to secure his loyal assistance. I told him that if he would induce those under his care to go to the isolation hospital, he could say it had been arranged that he would continue to attend them there, and further I informed him he would be appointed Consulting Physician to the Hospital during the outbreak. He promised to go round and do the best he could, later

on in the day, he advised me only one had consented to go; believing he had withdrawn from his original position and had really tried his best, I did not ask the Board to remove him. I further allowed Resident Medical Officer mentioned.

Dr. Barnard who had had Small-pox at the General Hospital was Resident Medical Officer at the Isolation Hospital, The fact that he was young, and one of those who failed to diagnose the obscure cases of Duggan and the nurse, was constantly pointed out by friends of the City Health Officer; They claimed that it was not fair to compel people to send their relatives to what they were pleased to call a death trap, when those who remained in their own homes were all recovering.

This was practically put before the public in a Roman Catholic Paper, but hardly was the ink dry before two patients who were being treated in their homes succumbed to the disease; after this the way was made a little smoother.

While all this was going on, I had the cases removed from the general Hospital, and all new cases it was possible to induce to go were taken straight to the isolation hospital, and then some of the existing cases were removed, their friends consenting on the advice of their fellow workmen and employers who were beginning to feel the effect of the outbreak on trade.

More accommodation was required, and new wards were started outside the wall which surrounded the isolation hospital and grounds.

I had given instructions that all workmen engaged on the new wards were to be vaccinated, but through the negligence of the Contractor this was not done.

This neglect led directly and indirectly to five more cases occurring.

Five cases were caused by contact with the case that I mentioned as having returned to the hospital. These were about thirty seven miles from the City, and the road being in such a bad state I decided to isolate them in their own home, as the whole family were affected; a capable nursing staff was engaged, and though they had a very trying time, all the patients recovered.

Vaccination stations were established as soon as lymph came to hand, and large numbers availed themselves of the opportunity thus afforded them of being vaccinated. A large amount of anti-vaccination literature was of course distributed, but it has not the same influence on the public mind when Small-pox is present, as it has in the absence of the "enemy"

Very strict regulations were made in the adjoining States against possible contacts passing over from Tasmania; all every passenger had to satisfy the authorities that they had not been in contact, and that they had been successfully vaccinated (with four marks) within the past two years.

The country customers ceased to buy their stones from Launceston. .

From all this it will be seen how an outbreak of Small-pox in such a State affects the trade, and how keenly alive the various States are to the danger of letting this disease get a footing in the Commonwealth.

We were constantly receiving complaints. It was declared that we were going too far in forcing people into the Isolation

Hospital, but from there the disease could not be conveyed through the air to the others. We were told in Britain it was not found necessary. Since arriving in Glasgow, I have ascertained from Dr Chalmers that every known case in Glasgow was removed.

In Britain, of course, this disease is endemic, and does not lead to trade disturbance, as it does in the Australian States, where it always exotic, and where I regret to say a large proportion of the people are not properly protected by vaccination.

The small towns, of which there are quite a large number, desired the Government to provide Reception Houses in their towns, in case patients should turn up in their midst. As this was asking too much, I had a railway carriage properly prepared with Stretcher, disinfectants, etc. This was always in readiness, to send along the line traversing the districts, and to bring in any case that might occur, to the established Isolation Hospital; fortunately it has so far not been required.

Fifty one persons in all were admitted to the Isolation Hospital as suffering or convalescent from Small-pox; of these fourteen died.

The number of evidently-vaccinated admitted was sixteen, of whom four had severe attacks, and two died. Those who had never been vaccinated numbered twenty, of whom seventeen had severe attacks, and six died. Ten persons had been vaccinated for the first time at varying periods after exposure to infection, and among these were nine severe cases and three deaths, the similarity of these figures to the preceding (never vaccinated) group showing that the operation was too late to affect the course of the disease. Four persons stated on admission that they had been vaccinated in infancy, but no

no marks were discernable by the Resident Surgeon after careful examination. Of these, all had severe attacks, and three died.

Dr. Barnard states that in none of these could the marks have been concealed if present by the eruption, and that in other cases where the eruption was even more extensive and advanced, he was easily able to make out the scars..

One case (F.C.) has been excluded from the tables for the following reasons:-

On Admission on 16th July, the Resident Surgeon did not agree with the diagnosis of varioloid upon which the case had been sent in, and vaccinated however soon afterwards. The eruption did not show any of the characteristics of Small-pox, and faded rapidly away. The re-vaccination was successful and ran a typical course. The patient bore four good vaccination marks from infancy. Owing to the difference of Medical opinion, it cannot justifiably be included as a confirmed case, and has, therefore, been [redacted].

Another case (E.B.) was admitted on July 29 as mild variola. The eruption faded after a few days. Re-vaccination was not performed, the Resident Surgeon agreeing with the diagnosis; eleven days after admission, a typical variolous eruption appeared, after the usual period of invasionsymptons, and ran the ordinary course of vesiculation and pustulation , the patient dying on the eighth day.

Stringent precautions were taken to avoid the possibility of "return cases". When thoroughly convalescent, each patient was carefully examined by the Resident Surgeon, special attention being paid to the hairy surfaces, soles, palms, and nails. The hair was

cut short, and any remaining evidences of the eruption were removed by rubbing with pumice-stone, the patients themselves being directed how to carry this out. A hot bath containing soda, accompanied by a liberal use of Carbolic Soap, was given morning and evening for a week at least after all obvious eruption-remains had disappeared. Before the Discharge order was issued, a final examination was made by the Resident Surgeon and the visiting surgeon, the result being reported by telephone. If the result of this was favourable to release, clean clothes were placed from without in the uninfected room of the Discharging-house, the candidates for release were given a final bath in the inner room, and their infected clothes removed. They then passed through the covered passage between the rooms, assumed the clean clothes there, and passed out direct to the outside. A cab was in attendance to remove them to their houses, no loitering or communication being permitted.

VACCINATION.

The following tables will support the acknowledged connection of scars and multiplicity of scars with the type of disease.

The figures given show a close approximation to those found in Clifford Albutt's system of Medicine, Vol. 2. Having reference to outbreaks in Sheffield, Leicester, Warrington, and Dewsbury.

It will be noticed that even a single vaccination seems to be able to avert the disease for many years, and it is a significant fact that while no case of Small-pox occurred in a vaccinated person under twenty years of age, twenty eight cases with five deaths, were

met with amongst the unvaccinated.

Total Confirmed Cases - Age Incidence (all classes)

Age.	Vaccinated Once. Cases.	Deaths.	Twice. Cases.	Deaths.	Total for Vaccinated. Cases.	Deaths.	States Vaccinated but without cicatrices. Cases.	Death s.	Unvaccinated. Cases.	Deaths.
0 to 5									2	1
5 to 10									6	2
10 to 15									11	1
15 to 20							1	1	9	1
20 to 30	5	2	1	—	6	2			5	3
30 to 40	5	—	2	—	7	—	3	2	—	—
40 to 50	9	2			9	2			2	1
50 and over	2	—			2	—			3	3
All ages.	21	4	3		24	4	4	3	38	12

Isolation Hospital Admissions.....50 Cases.

Number of Cicatrices.	Severe i.e. Confluent Hæmorrhagic and coherent.	Mild i.e. Di screte and variaoloid.	Case mortality per centum.
One (Good	nil	1	33.3
(Poor.	2	-	
Two (Good	nil	2	nil.
(Poor.	nil	nil.	
Three (Good	nil	4	16.6
(Poor.	2	nil	
Four (Good	nil	5	nil.
(Poor.	nil	nil	
Stated vaccinated but no traces discernable.	4	nil	75
Unvaccinated.	26	4	30
Total all classes admitted to Hospital with exception of case (F.C.)	34	16	28

Total confirmed cases of Smallpox.

CLASS.	Total cases.	Severe cases coherent & confluent.	Deaths.	Percentage of severe cases.	Case Mortality per cent.	Remarks.
Evidently vaccinated before exposure.) once.	21	6	4	28.6	19	Combined percentages evidently vaccinated- 24 cases. Severe cases - 25 per cent. Deaths. 16.6 per cent.
) twice.	3	nil	nil	nil	nil	
Stated to have been vaccinated but no marks apparent	4	4	3	100	75	Even if "stated vaccinated" "are added to "Evidently vaccinated" as they have no right to be, the totals give only 35.7% of severe cases, and 25% of deaths, i.e. still below unvaccinated cases.
Unvaccinated, including those vaccinated only after exposure to infection.	38	31	12	81.5	31.5	Including "Stated vaccinated" (as should be done) with "Unvaccinated" - 42 cases severe cases.- 83.3% deaths.- 35.7%
Totals and percentages for whole outbreak.	66	41	19	62.1	28.8	

Again the cases seen in this outbreak gave further evidence of the protean nature of small-pox.

The symptoms as given in Text Books were in many cases absent, and to the atypical nature of the early cases, together with the absence of reported cases in the Commonwealth, is due the failure of the House Surgeons to recognise the disease. Had they done so, we would have been spared the heavy cost and unnecessary loss of life in connection with the later cases.

The experience obtained in this outbreak leads me to say that in any case where a practitioner has to do with a skin manifestation that <u>might</u> possibly be the result of an attack of small-pox, he would act wisely in obtaining a second opinion, and ~~for~~ by preference that of the Health Officer, instead of waiting for the development of classical symptoms. It is the duty of the practitioner in charge of a suspicious case, to give the Health Authorities the earliest warning, so that they may be ready to bring the machinery to bear to prevent any spreading of the disease.

During the epidemic it was shown that mild cases were contracted from those with the hemorrhagic form, and vice versa.

I should insist on the Health Officer personally visiting first cases reported as "Virulent Chicken-Pox", "Purpura haemorrhagica", "black measles", or "purpuric scarlet fever", any of which, if reported by a medical practitioner, who has never seen a case of small-pox, and in a country where none is supposed to exist, may turn out to be the starting point of an epidemic. After the outbreak had been suppressed, I immediately prepared and introduced into Parliament a Public Health Bill, and though I did not

get all I wished, eventually it passed and received the Royal assent in the form of the Act appended hereto.- It will, I feel sure, prove a very satisfactory and useful measure.

I recommended (1) the appointment of a specially qualified professional head for the Public Health Department to administer the Act, with full power to act in cases of dangerous infectious diseases, independent of the local authorities; (2) systematic vaccination in infancy and re-vaccination at school age; (3) provision being made for proper disinfection of clothes, etc., the absence of which had cost a large amount of money, even in our small outbreak; (4) the notification by all medical practitioners in the State of any dangerous infectious disease in the Commonwealth; (5) the payment of a fee to all practitioners for each case of infectious or contagious disease reported by them to the department; and (6) the establishment of proper isolation hospitals at suitable centres, and that arrangements should be made for their speedy equipment in cases of emergency, by officers of the General Hospital.

All these suggestions are being acted upon, except the re-vaccination at School age; indeed, I had great difficulty in inducing Parliament to retain the Act under which we secure compulsory vaccination of infants.

John W. Lall M.B (1881).