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Some observations regarding Vaccination and Small-pox marks; being the results of an examination of 11,365 persons, belonging chiefly to the Scotch, Irish, and German nations.

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Towards the beginning of the year 1882 an Act of Congress of the United States of America came into operation whereby it became the duty of Surgeons on board emigrant vessels, sailing to the United States, to vaccinate all emigrants under their charge who were unable to show vaccination marks, or who, in the opinion of the medical officer of the ship, were unprotected from small-pox. In other words, they were required to vaccinate all those emigrants who were unable to show by their marks that they had previously, either had an attack of small-pox, or had been successfully vaccinated. The writer of this paper having chosen (chiefly owing to considerations of health) to occupy, for

the last 12 years, a position as Surgeon on board steamers sailing in the North Atlantic, was engaged as Surgeon of the steamer "Circassia", sailing between Glasgow and New York, when the above Act came into operation; and the whole of the observations recorded in this paper were made on board that steamer. It thus became my duty to examine the arms of all steerage passengers of the "Circassia" during her several passages to New York, and to vaccinate all those who had no vaccination marks. I had in this way an opportunity of making observations on the state of vaccination, among several European and other nations, as evidenced by the vaccination marks of the peasantry of these nations.

It occurred to me in the prosecution of this work that it would be interesting, and might also serve some useful purpose, if a faithful record were kept of the facts regarding vaccination that thus came under observation. I have accordingly

been engaged in this work for about  $3\frac{1}{2}$  years. In the first of these years, as I had no intention of making the observations public, no attempt was made at scientific accuracy. I have, therefore, placed the record for this year in an Appendix\*. In the last  $2\frac{1}{2}$  years the work was carried on with great care, and I think the facts may be relied on as accurate.

Such observations seem to be worthy of record not only as showing the present state of vaccination among the nations referred to, but also for purposes of comparison at some future time when vaccination shall, as I believe, be much better carried out than at present.

One great step towards improvement in vaccination, in any community, must be to show that there is need for improvement, as evidenced by the large number of those in it

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\* See Appendix A., Tables I & II.

who have no vaccination marks. Those individuals who have no vaccination marks may be considered to be in a position little better than the unvaccinated. This is proved by certain statistics given by the late Mr. Marson, of London Small-pox Hospital, regarding the comparative death-rate of those having no vaccination marks, the unvaccinated, & the vaccinated. Thus, Mr. Marson asserts that, of 5000 cases of small-pox which came under his observation from the years 1836 to 1855, the death-rate of those stated to have been vaccinated, but having no vaccination cicatrix, was 23.57 per cent.; not very much less than the death-rate of the unvaccinated which was 35.55 per cent., and very much higher than the death-rate of the vaccinated which was 6.56 per cent. Mr. Marson's statistics also proved another very important point, namely, that among the vaccinated, the death-rate, in cases of—

small-pox is proportional to the number<sup>x</sup> and good<sup>\*</sup>ness of the vaccine cicatrices. Thus, those<sup>⊗</sup> having:-

- |    |                              |                                    |
|----|------------------------------|------------------------------------|
| a. | One vaccine cicatrix,        | died at the rate of 7.73 per cent. |
| b. | Two " cicatrices " " "       | 4.70 " "                           |
| c. | Three " " " " "              | 1.95 " "                           |
| d. | Four or more vaccine " " " " | 0.55 " "                           |

x Dr. Seaton remarks in his "Handbook of Vaccination" p. 217. "It is probable that a modification of Marson's observations which should have taken into account the area as well as the number of the cicatrices would have told still more for character, as distinguished from mere number of marks."

\* Mr. Marson says:- "A good vaccine cicatrix may be described as distinct, foveated, dotted or indented, in some instances radiated, and having a well, or tolerably well, defined edge." See "Reynolds' System of Medicine vol. 1. p. 264. W. Gayton M.D. in a pamphlet entitled "Value of Vaccination" (McCorquodale & Co. 1885) p. 7. adds to Marson's definition " & further occupying a superficial area of not less than one third of a square inch." Mr. Marson says "an indifferent cicatrix is indistinct, smooth, without indentation, & with an irregular & ill defined edge". See "Reynolds' System of Medicine", vol. 1. p. 264.

⊗ See article "Vaccination" in "Quain's Dictionary of Medicine".

A. Having well marked cicatrices 2.52 per cent.

B. " badly marked " 8.82 " "

These observations of Mr Marson's have been since confirmed by many observers. Thus, Dr Gayton, in a pamphlet entitled "The value of vaccination as shown by an analysis of 10,403 cases of small-pox," published in 1885, gives the following statistics:-

of 282 males with one good mark	12 died,	equal to 4.2 per cent.
" 375 " " two " marks	15 " "	4 " "
" 302 " " three " " "	7 " "	2.3 " "
" 204 " " four or more " "	4 " "	1.9 " "
" 247 females " one good mark	10 " "	4.04 " "
" 274 " " two " marks	7 " "	2.5 " "
" 216 " " three " " "	5 " "	2.3 " "
" 185 " " four or more good marks	2 " "	1.08 " "

Combination of males & females with good marks } gave a death-rate of 2.6 " "

Combination of males & females with imperfect marks, irrespective of number of marks } gave a death-rate of 9.37 " "

Of those said to be vaccinated but without evidence Dr Gayton gives the following statistics:-

Of 692 males	204 died,	equal to	29.4 per cent.
" 603 females	148 " " "	" " "	24.5 " "

Again, of small-pox in the unvaccinated, Dr Gayton gives the following statistics:-

Of males at all ages,	the death-rate is	45.2 per cent.	
" females " " " "	" " "	40.8 " "	
" children of both sexes, from birth	until 5 years of age,	the death-rate is	56.5 " "

Without any other preliminary remarks I have to present the observations which I have made in a tabular form. In table 1. I have given the number & nationalities of the steerage passengers of the "Circassia" during ten voyages made from Glasgow to New York, from 8<sup>th</sup> May 1883 to 17<sup>th</sup> April 1884.

Table I.  
 Storage passengers of the "Leviasser" on her passages from Glasgow to New York  
 from 8<sup>th</sup> May 1883, to 17<sup>th</sup> April 1884.

1883	Scottish	Ulster	German	Austrian	Norwegian	Swedes	Russian	Irish	Danes	United States	United States	French	Belgian	Turk	British	Holland	Totals
May 8	140	357	231	34	41	38	4	5	5	2		9	1	1			868
June 12	90	338	35	24	21	37	11	1	8	7		1					573
July 16	74	82	64	1	11	5	2	15	2	2	8						264
Aug. 20	80	120	13	10	22	10	5	11	2	4	2				1		280
Sept. 24	119	169	71	12	17	9		3	17	9	7						433
Oct. 30	85	108	19	12	4	14	1	3	2	7	1						254
Nov. 5	37	53	47	0	1	6	1	5		1		3					156
1884																	
Jan. 17	27	18	21	4		1	1	1		1							74
Feb. 24	45	67	32	7	11	2		6	7							1	178
April 17	86	226	62	28	3		29	1		1							436
	783	1538	595	132	131	122	54	51	41	34	18	13	1	1	1	1	3516
		*															

\* The above are almost all from the north of Ireland.

From this table it will be seen that the great mass of the passengers are Scotch, Irish, & Germans. These, with perhaps the Austrians, Norwegians, & Swedes, are sufficiently numerous to form an opinion, from an examination of their arms, regarding the state of vaccination in these nations; on the other hand, the number of the other nationalities is so small that it is impossible to form any decided opinion regarding the state of vaccination from the observations made. The question may be asked, were the above 3516 passengers fairly representative, as regards age and sex, of the respective nations to which they belonged? In answer to this question I may say that, while a great many of them were young men & women going to push their fortune in the West, not a few consisted of men of middle age, who carried with them their wives & families, so that on the whole their age and sex was not greatly different

from that of the general population. To avoid cavil, however, I have given in table II. the number of men and women, & of children under 12 years of age, from 20<sup>th</sup> August 1883 to 17<sup>th</sup> April 1884, the statistics for the months of May, June, & July 1883 not being accessible to me. In tables VII. & XI. will be found the same statistics for the succeeding year and a half.

Table II.

Particulars regarding age and sex, of the steerage passengers of the "Circassia" from 20<sup>th</sup> August 1883 to 17<sup>th</sup> April 1884.

Males, above the age of 12 years.	Females, above the age of 12 years.	Children, under 12 years of age.	Total.
843	594	374	1811

In table III. is given the number & nationalities of the steerage passengers of the "Circassia" having no vaccination marks, from 8<sup>th</sup> May 1883 to 17<sup>th</sup> April 1884.

The first feeling that one experiences, on examining the arms of a community, is surprise at the number of those having no vaccination marks. Can it be the case that so many have never been successfully vaccinated? Or is it the case that the marks of some, who have been successfully vaccinated in infancy, gradually wear out, so that, in the course of years, not a vestige of such marks remain? To anyone who considers the efforts of nature to repair, in course of time, old injuries, the latter supposition will not appear improbable. But it is not unlikely that if the marks wear out, the protection afforded by vaccination also wears out in nearly an equal degree, so that we will not greatly err if we consider all those

Table III.

Steerage passengers of the "Circassia" having no vaccination marks from 8<sup>th</sup> May 1883 to 17<sup>th</sup> April 1884

	Scottish	Irish	Germanians	French	Austrian	Norwegian	Swedes	Russians	English	Danes	United States	Italians	French	Belgian	Turk	Brazilian	Holland	Totals	Proportions to total passengers
1883																			
May	8	17	26	2	6	4	0	0					7					94	1 in 9
June	12	0	2	4	0	4	1	1					1					52	1 in 11
July	16	5	12	1	2	0	0	0			1	1						28	1 in 9 1/2
Aug.	20	5	0	2	1	1	3	3		1	1							29	1 in 10
Sept.	24	6	6	1	2	1	0	0										35	1 in 12
Oct.	30	3	3	4	1	1	0	0			1	2						22	1 in 11 1/2
Nov.	5	3	2	0	0	2	0	0										16	1 in 10
Decr.	17	4	2	0	0	0	0	0										9	1 in 8
1884																			
Jan'y	24	4	2	2	1	1	0	0		1								19	1 in 9
Feb'y	17	4	6	3	0	0	3	3										43	1 in 10
April	17	4	6	3	0	0	0	0										347	equal to 1 in every 10 passengers
	51	159	61	19	13	14	7	7	6	2	4	3	8					347	equal to 1 in every 10 passengers
	equal to 1 in every 15	equal to 1 in every 10	equal to 1 in every 10	equal to 1 in every 7	equal to 1 in every 10	equal to 1 in every 9	equal to 1 in every 8	equal to 1 in every 8 1/2	equal to 1 in every 20 1/2	equal to 1 in every 20	equal to 1 in every 8	equal to 1 in every 6	equal to 1 in every 1 1/2	equal to 1 in every 1				347	equal to 1 in every 10 passengers

having no vaccination marks to be unvaccinated.

From table III. it appears that, ~~while~~ on an average, 1 in every 15 Scotch, 1 in every 10 Irish, Germans, and Norwegians, had no vaccination marks; while of Swedes 1 in every 9, & of Austrians 1 in every 7, had no vaccination marks. These results correspond pretty closely with the results obtained in the succeeding year and a half, except in the case of the Germans. I may explain in regard to the Germans that there are an unusually large number of this nationality among the unvaccinated, in the year 1883-84, under the age of 1 year. As will be seen from table V there were no fewer than 18 out of the 61 Germans having no vaccination marks in this year who were under the age of 1 year; many of these under the age, therefore, in which it is usual to perform vaccination in Germany. I am disposed to consider 1 in 14 as about the

usual proportion of those having no vaccination marks to those having marks among the Germans. From table III. it will be seen that the Scotch, although assuredly having nothing to boast of as regards vaccination, stand first in the list of nations examined as regards the average number of those having vaccination marks. This comparative goodness of vaccination, to the singular immunity\* which Scotland has enjoyed from Small-pox during the last 12 years, may stand in the relation of cause & effect.

Still, if we consider that 1 in every 15 of the Scotch, on an average, is practically unvaccinated, there is surely here plenty of combustible material for the spread of small-pox, should an epidemic of the disease again reach that country. It would be a wrong inference, however, to draw from the above facts that the Scotch are

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\* See account of Registrar-General's Report in Lancet for Sept. 3<sup>d</sup> 1881. See also Lancet, 29<sup>th</sup> July 1882, on "Vaccination in Scotland"

necessarily better vaccinated than the others. The facts merely prove, that, in respect of the proportional number of those able to show vaccination marks they are better vaccinated than the others. But other things have to be taken into account, namely, the comparative goodness of the marks, and the number of marks in each case. I have not been able to make any extended observations on this point, but, in table IV, I have given the number of the vaccination marks on the arms of the greater part of the emigrants in December 1883, & January & February 1884. This includes 349 passengers, and I think indicates fairly well, so far as regards the Scotch, Irish, & German nations, the general condition of these nationalities in respect of the number of their marks. From this table it will be seen that while for the Germans it is the rule to have more than 2 marks, & most frequently 4 marks & above, for nearly all the other nationalities, & notably

Table IV.

Number of marks on the arms of steerage passengers of the "Circassia" on the voyages of Decr. 1883, & Jan'y. & Feb'y. 1884.

Nationalities	1 mark	2 marks	3 marks	4 marks	5 marks	6 marks & above	Totals
Scotch	45	40	6	1	1	1	94
Irish	64	47	8	1			120
Germans	8	11	15	25	9	20	88
Austrians	2	3	2				7
Norwegians	4	4	2	1			11
Swedes	2	7	1				10
Russians			1				1
English	1	1	3				5
Danes		3	2	1		2	8
United States	1						1
French		1					1
Hollander		1				2	3
	127	118	40	29	10	25	349

the Scotch and Irish, it is quite exceptional to have more than 2 marks, indeed the larger proportion of Scotch & Irish have only 1 mark. In this respect then the Germans are far ahead of all the other nations examined. On examining the arms of Germans one is frequently astonished at the number of good marks on their arms: it is not uncommon to see from 4 to 6 marks on each arm. I may say regarding the marks of the Irish, that while it is rare to find on their arms more than 2 marks, still, their marks are usually very large, distinct, and deeply foveated. The marks of the Danes, Swedes, & Norwegians, on the other hand, are usually small & faint, & very often not foveated. It would be a subject well worthy of investigation, for any one having the time and opportunity, to inquire into the cause of these differences. Regarding

the number of marks on the arms of the Germans, it must be remembered that not only is revaccination compulsory in the army, but, by an Act of the Imperial Diet of April 1874, it is compulsory for "every pupil<sup>\*</sup> in a public or private institution to undergo revaccination within the year in which his twelfth birth day occurs" Probably, therefore, some of the marks found on the arms of Germans are revaccination marks. Still, it seems to be the practice in Germany in primary vaccination to insert the vaccine lymph in from 4 to <sup>\*</sup>6 places in each arm. Taking all things into consideration, therefore, I am disposed to believe that the Germans are better vaccinated than any of the other nations examined, & probably the Scotch come next. The Austrians are as a rule poorly

\* See Böerschmann in Ziemssen's Cyclopædia of the Practice of Medicine vol II. p. 416.

vaccinated. Although the number of the  
 Italians, French, & citizens of the United States

x In New York Dr. Tracy found that "among the  
 Italians, who dreaded vaccination, many children  
 5 or 6 years of age had never been vaccinated." See  
 Ziemssen's Cyclopædia of the Practice of Medicine  
 vol XIX. p. 518.

\* This inference regarding vaccination in France  
 may seem to have but a slender basis on fact,  
 there having been only 28 French examined during  
 the whole 3½ years, but it is at least a suspicious  
 circumstance that in these 3½ years the results in  
 the case of the French should be so uniformly bad,  
 & then we must remember that revaccination is not  
 compulsory in the French army. During the  
 Franco-German war in 1870-71 the total deaths  
 from small-pox in the French army was 23,469,  
 while in the German army for the same period  
 the total number of deaths was only 263. See Lancet, 12<sup>th</sup> May 1883.

⊙ During the 3½ years 159 natives of the United States were

were not so great that one could draw from them any certain conclusions regarding the state of examined, out of which number 34 showed no vaccination marks, so that, for the whole period 1 in every 5 were unvaccinated. A good many of the unvaccinated were children, but many of these were over 2 years of age and therefore ought to have been vaccinated. Vaccination is not compulsory in the United States. Regarding compulsory vaccination Dr. McLane of New York remarks:—"Whatever may be the advantages of such a system abroad it is certainly not suited to our own country, where cosmopolitan prejudices & a republican form of government exist. It has been found, especially in New York, that an appeal to the common sense or fears of the public is sufficient, & force is worse than useless."— See Ziemssen's Cyclopædia of the Practice of Medicine, vol XIX. p. 527.

vaccination in these nations, still, the facts, so far as they go, point to the conclusion that the lower classes of these nations are very poorly vaccinated. These conclusions I draw not merely from the observations made for the year 1883-84, (although the results for this year, as regards most of the nationalities, I think are typical of the observations made for the other years) but from the whole of the observations made, the full number of which will be found in Appendix B.

The question may be asked;—were the passengers in the foregoing table, who are stated to have had no vaccination marks, chiefly adults? or were there any considerable number of infants among them? If, in any of the nations examined, there were a considerable number of infants among those having no vaccination marks, it would be manifestly unjust to say that vaccination was poorly

carried out in that country, because these infants might be under the age in which it is usual to perform vaccination. I have therefore shown in table V. how many of the unvaccinated in each nationality were adults, how many were children under 12 years of age and above 1 year, & how many were under the age of 1 year. It may be considered that all above 1 year ought to have been vaccinated. In order however to allow for differences of practice in different countries I have, in tables IX. & XIII., allowed a wider margin, namely, 2 years. I have also shown in table V. how many there were in each case who stated that they had at some time been vaccinated, although showing no vaccination marks, & how many there were who confessed that they had never previously been vaccinated. I may say, however, that very little dependence can be placed on the affirmation made by those who stated

Table V.

Particulars regarding age &c. of steerage passengers of "Circassia" having no vaccination marks; from 8<sup>th</sup> May, 1883 to 17<sup>th</sup> April 1884.

	Adults & young persons above 12 years, who stated that they had been previously vaccinated.	Children under 1 year who were stated to have been previously vaccinated.	Children under 1 year ditto.	Adults & young persons above 12 years, who stated that they had never previously been vaccinated.	Children under 1 year who were stated to have never been vaccinated.	Children under 1 year ditto.	Children under 1 year ditto.	Adults uncertain whether they had ever been previously vaccinated.	Totals.
Scotch	36	1	2	4	1	4	3	51	
Irish	103	10		24	7		10	159	
Germans	38	3	7		2	11		61	
Austrians	9	4			1		5	19	
Norwegians	7	1	1		3			13	
Swedes	13	1			2		1	14	
Russians	2				2			7	
English	4				1		1	6	
Danes	1				1			2	
United States	1	1			1			4	
Italians					2		1	3	
French	1				4			8	
	215	21	10	33	24	24	20	347	

that they had previously been vaccinated, as they may have made the assertion from interested motives, and with the hope that they would thus escape the infliction, as they ignorantly suppose it to be, of the operation of vaccination. With regard to those who stated that they had never been vaccinated, I think, as they had no interested motives for the assertion, we can have little doubt regarding its truth. On examining table V. we must be greatly struck with the large preponderance of the Irish in the number of those who had never been vaccinated, and the same thing will be noticed in the succeeding year and a half, as will be seen from tables IX. & XIII. I cannot help remarking that I think this is largely due to the influence of certain Roman Catholic priests who oppose vaccination, and who use their influence with their people to prevent

that they had previously been vaccinated, as they may have made the assertion from interested motives, and with the hope that they would thus escape the infliction, as they ignorantly suppose it to be, of the operation of vaccination. With regard to those who stated that they had never been vaccinated, I think, as they had no interested motives for the assertion, we can have little doubt regarding its truth. On examining table V. we must be greatly struck with the large preponderance of the Irish in the number of those who had never been vaccinated, and the same thing will be noticed in the succeeding year and a half, as will be seen from tables IX. & XIII. I cannot help remarking that I think this is largely due to the influence of certain Roman Catholic priests who oppose vaccination, and who use their influence with their people to prevent

vaccination. This I found to be very frequently the reason assigned by the Irish for never having been vaccinated, namely, that the priest was against it. From table V. it will be seen that the number of children under 1 year having no vaccination marks among the several nationalities (except in the case of the Germans, which has been already referred to) is not very great; so that, with this exception, the results do not affect, in any material respect, the conclusions at which I have arrived regarding vaccination among the several nations examined.

With regard to the age usually chosen for the performance of vaccination, different nations have different customs. Thus in England, under 3 months is the rule; in Scotland, any time before 6 months is the law; in Germany, every child "must be vaccinated before the termination of the calendar year

following the <sup>x</sup> year of its birth; and in Boston, United States, Dr. Curtis informs us that "a delay\* of 2 years from birth is allowed for vaccination."

With regard to the part of the body usually chosen for the insertion of the vaccine lymph, we find different places recommended by medical authorities. Dr. Jenner<sup>⊗</sup> says "the lymph should be inserted upon the arm about midway between the shoulder and elbow." Boerchmann<sup>⊗</sup> recommends, in the case of girls, that the lymph should be inserted in "just that portion of the upper arm which will be concealed by the future evening toilet;" and then he goes on to say that "the method still much in vogue of vaccinating children in the

x See Ziemssen's Cyclopaedia of the Practice of Medicine Vol. 11., p. 416.

\* See Ziemssen's Cyclopaedia of the Practice of Medicine Vol. XI., p. 277.

⊗ See Lancet on Jenner's "Instructions for Vaccine Inoculation," 26<sup>th</sup> Feb. 1881.

⊗ See Ziemssen's Cyclopaedia of the Practice of Medicine Vol. 11., p. 414.

situation of *nævi*, upon the face or some other conspicuous part, with the purpose of simultaneously accomplishing two ends, appears to me of rather doubtful utility." Geo.<sup>x</sup> B. Wood of Philadelphia says, "the most convenient place for the insertion of the virus is the back of the fore-arm, about half way between the hand and elbow, on account of: - 1<sup>st</sup> Least likely to be interfered with in nursing; or 2<sup>d</sup> - To be injured by tight sleeves." Among the Irish I have found a good many girls having the vaccine cicatrix on the outside of the leg, a little below the knee; a good many of them also are vaccinated on the back of the fore-arm. It is well to be aware of these facts regarding the different places recommended and in use for the insertion of the vaccine virus, so that we may know where to look for the vaccine cicatrices. Practically, however,

x See Wood's Practice of Medicine Vol. I., p. 461.

I think it will be sufficient to examine very carefully both arms, from the tip of the shoulder to the elbow, for, so far as my experience goes, the number of those vaccinated in other places is not so great as to seriously affect the result. It seems to me to be very desirable that there should be only one recognised place for the insertion of the vaccine lymph, and I see no good reason why Jenner's recommendation should be departed from that it "should be inserted upon the arm about midway between the shoulder and elbow."

I have given in tables VI. VII. VIII. & IX. similar statistics to the preceding for the year, from 21<sup>st</sup> May 1884 to 30<sup>th</sup> April 1885, and in tables X. XI. XII. & XIII., similar statistics from 1<sup>st</sup> June to 19<sup>th</sup> October 1885. As these statistics, in the main, corroborate the conclusions derived from the preceding tables, I merely present them without further remarks.—

Table VI.

Steerage passengers of the "Circassia" on her passages from Glasgow to New York from 21<sup>st</sup> May 1854 to 30<sup>th</sup> April 1855.

	Swedish	German	American	Norwegian	Russian	English	Danish	United States	French	Belgian	Canadian	Swiss	Holland	Portuguese	Other	Totals.	
1854																	
May	21	93	290	57	3	55	9	23	16	2	5	2			1	556	
July	1	64	137	16	7	18	6	9	1	17	3	1				280	
Sept.	23	65	142	17	5	8	5	18	3		3				5	271	
Nov.	7	38	72	24	1	3	3	2	2		1	16				161	
Dec.	19	23	30	23	1	2		22	9		3				2	127	
1855																	
Jan'y	24	14	21	17	14	1	1	9			5					82	
Mar.	12	81	99	11	4	8	2	9	9	1	5	2				222	
April	30	139	375	7	32	28	10	1	4	7	7					603	
		517	1166	172	67	123	36	82	40	24	32	3	5	4	2	18	2302

\* The above are almost all from the north of Ireland.

Table VII.

Particulars regarding age & sex of the steerage passengers of the "Circassia" from 21<sup>st</sup> May 1884 to 30<sup>th</sup> April 1885.

Males, above the age of 12 years	Females, above the age of 12 years	Children under 12 years of age	Total
1147	768	387	2302



Table IX.

Particass regarding age &c. of steerage passengers of the "Circassia" having  
no vaccination marks; from 21<sup>st</sup> May 1884 to 30<sup>th</sup> April 1885.

	Adults & young persons above 12 years of age who stated that they had been previously inoculated.	Children under 12 years of age and above 2 years who were stated to have been previously inoculated.	Children under 2 years ditto ditto ditto	Adults & young persons above 12 years of age who stated that they had never previously been vaccinated.	Children under 12 years & above 2 years who were stated to have never previously been vaccinated.	Children under 2 years ditto ditto	Adults unvaccinated if vaccinated.	Totals.
Scotch	18			7		3	1	29
Irish	64	5		14	1	7	16	107
German	7					4	1	12
Austrians	3			1		1	2	7
Norwegians	10	1				2		13
Swedes	3							3
Russians	5			1	2	1	2	11
English	4				3		1	5
United States	2					2		11
Belgian	1					1		1
Hollander								1
	117	10		23	6	21	23	200

Table X.

Steerage passengers of the "Circassia" on her passages from Glasgow to New York; from 1<sup>st</sup> June to 19<sup>th</sup> October 1885.

	Scotch Irish,	Ger- mans.	Aust- rians.	Nor- wegians	Suedes	Russ- ians	English, Danes	United States	French, Belgians	Canadians	Totals.
1885											
June 1	89	13	60	3		88	3	6			565
July 6	68	22	2	11	1	15	3	8		1	198
August 9	58	9	9	4	7	5	10	3		1	158
Sept. 15	62	8	1	9	5	12	8	14			300
Octo. 19	43	8	5		2	1	6	9	1	1	174
	320	60	77	27	15	121	30	40	4	3	1395
	*										
* The above are almost all from the north of Ireland											

Table XI.

Particulars regarding age & sex of the steerage passengers of the "Circassia" from 1<sup>st</sup> June to 19<sup>th</sup> October 1885.

Males, above the age of 12 years	Females, above the age of 12 years	Children, under 12 years of age	Total
678	475	242	1395

Table XII.

Steerage passengers of the "Circassia" having no vaccination marks  
from 1<sup>st</sup> June to 19<sup>th</sup> October 1885.

	Scotch Irish	Ger- mans	Aust- rians	Nor- wegians	Russ- ians	Swedes	Eng- lish	United States	French	Totals
1885										
June	6	31	16		3		1	3		60
July	3	7	1				1	2		14
August	3	5	2	1			1			12
Sept.	0	12	1	2	1			6		22
Oct:	5	8	1			1		3	1	19
	17 equal to 1 in every	63 equal to 1 in every	18 equal to 1 in every	3 equal to 1 in every	4 equal to 1 in every	1 equal to 1 in every	3 equal to 1 in every	14 equal to 1 in every	1 equal to 1 in every	127 equal to 1 in every
	19	20	4	9	30	15	10	3	1	11
	pass- engers	pass- engers	pass- engers	pass- engers	pass- engers	pass- engers	pass- engers	pass- engers	pass- enger	pass- engers

Table XIII.

Particulars regarding age &c. of steerage passengers of the "Circassia" having no vaccination marks; from 1<sup>st</sup> June to 19<sup>th</sup> October 1885.

	Adults & young persons above 12 years of age who stated that they had never been previously vaccinated.	Children under 12 years of age, who were stated to have never previously been vaccinated.	Children under 2 years of age	Children & young persons about 12 years of age who stated that they had never been previously vaccinated.	Children under 12 years of age & above 2 years who were stated to have never previously been vaccinated.	Children under 2 years of age	Adults uncertain if ever vaccinated.	Totals
Scotch	10	1		1	1	2	2	17
Irish	32			11			20	63
German	3						6	3
Austrians	10	1		1			2	18
Norwegians	1							3
Swedes	1						1	1
Russians	3						1	4
English	3							3
United States	4				5	5		14
French	1				6	7	31	1
	68	2		13	6	7	31	127

Surely the statistics given in the preceding tables show a state of vaccination, in the several countries to which they refer, which is very unsatisfactory, and very dis-creditable to our modern civilization. Every person who has no vaccination marks is not only practically unprotected from small-pox himself, but he is a source of danger to the community in which he lives. It is now 88 years since Jenner made public his discovery of the remarkable protective powers against small-pox of the operation of vaccination; an operation which, if properly carried out, would, I believe, practically exterminate small-pox. It is surely very humiliating to us that we should have made so little use of this great means of saving life which Providence has put into our hands. About 1000 deaths occur, on an average, every year in London alone from small-pox. That so many deaths should

annually arise from a preventible disease seems to me to be very lamentable, and very culpable. We ought not to rest satisfied with the state of vaccination merely from the evidence of medical certificates certifying to the successful vaccination of infants. The arms of children at school ought from time to time to be examined, the results carefully noted, & those found to have no vaccination marks vaccinated. Indeed, it would be well for us in these islands if we had such a law as that of the Germans, by which revaccination at 12 years of age is compulsory.

## Small-pox marks.

I shall now proceed to give some observations of a different kind which were made during the same period as the preceding. It was necessary, in carrying out the provisions of the Act of Congress of the United States, that I should take notice of emigrants who were pitted with small-pox marks, because it was unnecessary to vaccinate those of the unvaccinated who were protected by a previous attack of small-pox. I embraced the opportunity thus afforded me to observe all emigrants who had small-pox pittings, and to note down in every such case the following particulars. - 1<sup>st</sup> Birth-place. 2<sup>d</sup> If there were any vaccination marks, & the number of vaccination marks if any. 3<sup>d</sup> The character of the small-pox pittings - whether slightly pitted, moderately pitted, or badly pitted. The results of these observations are given in the following tables.

Small-pox, unlike the other infectious diseases, is a disease which, in the majority of cases, by its scars in the face & other parts of the body, leaves indelible traces of its ravages. Most of those who have had the disease thus become living records of the fact. By examining the proportional number of those, in each nationality, who are pitted with small-pox to those not pitted, we have a means of estimating the ravages of small-pox in recent times among them, & of thus finding out, by another means, to what extent the protection afforded by vaccination has been taken advantage of by the several nations examined. We who are living in vaccination times can form little idea of the large number who were scarred in the face with small-pox pittings in prevaccination times, when probably a worse state of things existed to what may be seen among the

natives of India in the present day one in every ten of whom, on an average, in at least certain of the cities of that country, are glaringly pitted with small-pox. Knight in his "History of England" says: "We look back upon the time when many, who had escaped with life from the terrible disease that killed 92 in every 1000 of the population, bore into our public places the indelible marks of the scourge, & we rejoice now to behold the unscarred faces of the young as the best tribute to the memory of Edward Jenner".

In table XIV. I have given the observations made by me regarding the small-pox pittings of the steerage passengers of the "Circassia", from 6<sup>th</sup> April 1882 to 28<sup>th</sup> March 1883. The number of the Scotch, Irish, & German emigrants

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x See Charles Knight's "Popular History of England" New York 1880, p. 695.

in this year was sufficiently great to draw tolerably good conclusions regarding the proportional number of those pitted to those not pitted; on the other hand the number of the other nationalities was not sufficiently great to be able to draw from them any certain conclusions on this point. However, by massing together the results of observations made during the following  $2\frac{1}{2}$  years, we obtain a sufficient number of Austrians to make an estimate of the number having small-pox pittings among the peasantry of that nation.

From table XIV it appears that, on an average, 1 in every 70 Germans, 1 in every 63 Irish, 1 in every 38 Scotch, and, from table XXII, 1 in every 32 Austrians have small-pox pittings in the face. From these tables it appears, as regards freedom from small-pox pittings, that the Germans stand



first in the list of the four nations compared; the Irish come next; the Scotch next, and the Austrians last. These results correspond fairly well, except in the case of the Scotch, to what we would naturally expect from the previous tables regarding the state of vaccination in these nations. I am not prepared to give a reason for the fact that so many Scotch are pitted with small-pox, which is not what we would have expected from the comparative goodness of vaccination in that country. It shows indubitably, however, that, in the past, Scotland must have suffered severely from the ravages of small-pox, and this probably occurred when vaccination in Scotland was not so well carried out as at present.

I have given in table XV the character of the small-pox pittings in those who were pitted for the year 1882-83. In the same table I

Table XV.

Character of the small-pox marks, & number of the vaccination marks of those having small-pox marks; also number having no vaccination marks of those having small-pox marks, of the steerage passengers of the "Circassia" from 6<sup>th</sup> April 1882 to 28<sup>th</sup> March 1883.

	1882	Slightly pitted.	Moderately pitted.	Badly pitted.	No vaccination marks.	One vaccination mark.	Two vaccination marks.	Totals.
April	6	1	3	7	9	1	1	11
May	10	3	11	1	11	4		15
June	22	1	6	5	10	2		12
Aug.	2	1	3	3	4	3		7
Sept.	16	3		3	6			6
Oct.	22	6		5	10	1		11
Dec <sup>r</sup> 1882	7			1		1		1
Jan <sup>y</sup> 1883	10			1	1			1
Feb <sup>ry</sup>	19	2			1	1		2
Mar.	28	3	2	4	6	3		9
		20	25	30	58	16	1	75

have given the number of those who had small-pox pittings who had also vaccination marks, & the number of the vaccination marks when present. I have also given in this table the number of the pitted who had no vaccination marks.

From an examination of this table we must be very much struck by the number of those who had no vaccination marks. We see that out of 75 persons having small-pox pittings there were no fewer than 58 who had no vaccination marks. From this we obtain a very strong proof of the efficacy of vaccination; for, if vaccination has no effect, the proportion of those having no vaccination marks ought to be the same in those who have had small-pox, as in those who have never had the disease, namely, about 1 in every 10, as will be seen from the preceding tables. Instead, therefore, of there being 58 having no vaccination

marks there ought to be only  $\gamma$ . But it may be said that a great many of those having small-pox might have it in infancy, before the time in which it is usual to vaccinate, & having the protection of small-pox the protection of vaccination became unnecessary. In order to be able to answer this objection it became necessary to find out, in every case, the age at which each passenger who was pitted had been attacked by small-pox. I have accordingly, in the tables for the following years, given these particulars; from which it will be seen that comparatively few had the disease in infancy. Thus we have an additional proof, & a proof always at hand, that small-pox is a disease which goes about, as it were, searching for those who are unvaccinated & unprotected, & seizes them with unerring accuracy, so that enormously more are attacked by the disease

among the unprotected, than among those who are protected by vaccination.

As the results for the succeeding 2 1/2 years are, in the main, corroborative of those given in tables XIV. & XV., I present them in the following tables without further observations.

Table XVI.

Steerage passengers of the "Circassia" who were fitted with small-pox marks from 8<sup>th</sup> May 1883 to 17<sup>th</sup> April 1884.

	Slightly fitted.	Moderately fitted.	Badly fitted.	Stated to have been vaccinated	Not sure whether ever vaccinated	Stated to have never been vaccinated	No vaccination marks	One vaccination mark	Two vaccination marks	Three vaccination marks	Total fitted	Proportion fitted to total passengers
Scotch	14	7	11	12	10	10	28	3	1		32	1 in 24
Irish	12	8	3	11	1	11	15	5	2	1	23	1 in 67
Germans	4	4	4	8		4	7	2	3		12	1 in 48
Austrians	2	1	1	2		2	3		1		4	1 in 33
Norwegians												0 in 131
Swedes		2		2			2				2	1 in 61
Russians	2	4	2	6	2		7		1		8	1 in 7
English			1	1			1				1	1 in 51
Danes												0 in 41
United States		1				1	1				1	0 in 34
Italian	34	27	22	41	14	28	64	10	8	1	83	1 in 18
												1 in 42

Table XVII.

Age at which those who were pitted had an attack of small-pox, of the steerage passengers of the "Circassia" from 8<sup>th</sup> May 1883 to 17<sup>th</sup> April 1884.

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Adult Age	Totals	
	years	years	years	years	years	years	years	years	years	years	years	years	years	years	years	Age unknown		
Scotch	2	4		3	1		1	2	3	1	1	1	1	1	2	4	5	32
Irish	3		1	2	1	2	1		1			1			1	2	8	23
Germans	1			1							3	1	1	2	1	2	12	12
Austrians		2			1											1	4	4
Swedes																1	2	2
Russians	1			1				2						1		2	1	8
English																	1	1
Italians	7	6	1	3	7	3	2	2	6	1	4	3	2	2	5	10	17	83

Table XVIII.

Steerage passengers of the "Circassia" who were fitted with small-pox marks from 21<sup>st</sup> May 1884 to 30<sup>th</sup> April 1885.

	Slightly fitted	Moderately fitted	Badly fitted	Stated to have been vaccinated	Not sure whether ever vaccinated	Stated to have never been vaccinated	No vaccination marks	One vaccination mark	State of vaccination unknown *	Total fitted	Proportion fitted to total passengers
Scotch	4	1	2	2	3	2	4		3	7	1 in 74
Irish	11	6	2	5	3	11	12	2	5	19	1 in 61
Germans										0	0 in 172
Austrians		2	2		4		2		2	4	1 in 17
Norwegians										0	0 in 123
Swedes	1					1	1			1	1 in 36
Russians		2		1	1		1	1		2	1 in 41
English	1			1			1			1	1 in 40
Danes										0	0 in 24
United States	1	1		2			2			2	1 in 16
Swiss										0	0 in 18
American		1		1			1			1	1 in 1
* These declared to show their arms	18	13	6	12	10	15	24	3	10	37	1 in 62

Table XIX.

Age at which those who were fitted had an attack of small-pox of the steerage passengers of the "Circassia" from 21<sup>st</sup> May 1884 to 30<sup>th</sup> April 1885.

	Infancy	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	11 years	12 years	13 years	14 years	16 years	18 years	20 years	25 years	Above 25 years	Age unknown	Totals
Scotch	1	2	1	1	1	1	1	1							1					1	2	7
Irish	2	1	2	1	2	1	2	2	1	3					1		1	1		1	2	19
Austrians									1	1			1									4
Swedes	1																					1
Russians								1							1							2
English																						1
United States								1							1							2
Chilian	4	3	3	2	3	2	5	1		4			1		4	1		1		1	2	37

Table XX.

Steerage passengers of the "Circassia" who were fitted with small-pox marks from 1<sup>st</sup> June to 19<sup>th</sup> October 1885.

	Slightly fitted	Moderately fitted	Badly fitted	Stated to have been vaccinated	Not sure whether ever vaccinated	Stated to have never been vaccinated	No vaccination marks	One vaccination mark	Two vaccination marks	State of vaccination unknown *	Total fitted	Proportion fitted to total passengers
Scotch	10		1	8	3		5	3	3		11	1 in 29
Irish	12	2	3	6	1	10	12	3		2	17	1 in 40
Germans	1			1						1	1	1 in 60
Austrians	3		3	6			5	1			6	1 in 13
Norwegians												0 in 27
Swedes												0 in 15
Russians	4	4	2	4	3	3	6	2	1	1	10	1 in 12
English	2		1	2		1	3	3			3	1 in 10
Danes												0 in 11
United States			1			1				1	1	1 in 40
* These declared to show their arms	32	6	11	27	7	15	31	9	4	5	49	1 in 28



Table XXII.

Steerage passengers of the "Circassia" who were fitted with small-fox mats for the 3 1/2 years from 6<sup>th</sup> April 1882 to 19<sup>th</sup> October 1885.

Scottish	Irish	German Austrians	Norwegians	Swedes	Russians	English	Danes	United States	Italian	Chilian	Totals
78 in	77 in	28 in	0 in	7 in	20 in	7 in	0 in	4 in	1 in	1 in	244 in
2687	4511	666	372	360	272	145	211	159	29	1	11,365
passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passenger	passengers
equal to	equal to	equal to	*	equal to	equal to	equal to	*	equal to	passengers	passenger	equal to
1	1	1	*	1	1	1	*	1	1	1	1
in every	in every	in every	in every	in every	in every	in every	in every	in every	in every	in every	in every
34	59	67	51	14	20	40	47	40	47	47	47
passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers
* It is a remarkable circumstance that not a single one of the Norwegians or Danes, during the 3 1/2 years, should be met with having small-fox fittings, these being 372 of the former, & 211 of the latter.											

It would be interesting & instructive to obtain a record of the comparative number of individuals who are glaringly pitted in the face with small-pox, at the present time, in the cities of the different nations of the world. Travellers in foreign countries might easily make a rough estimate, by observing the proportional number of those obviously pitted, to the number not pitted, in the streets or market places of those cities which they happen to visit. I have attempted this in certain cities which I have recently visited, & with the following results:-

In New York in 1885, 1 pitted in about 100 unpitted  
 „ Kurrachee, India in 1886, 1 „ „ „ 10 „  
 „ Bombay „ „ 1886, 1 „ „ „ 10 „

Wm. Faulds

Acadia Villa Shawlands, near Glasgow  
 22<sup>d</sup> February 1886

Appendix A, Table I.

Steerage passengers of the 'Circassia' on her passages from Glasgow to New York from 6<sup>th</sup> April 1882 to 28<sup>th</sup> March 1883.

	Scotch Irish	Ger- mans	Aust- rians	Norweg- ians	Sweeds	Russ- ians	Eng- lish	Danes	United States	Italians	French	Belgians	Totals
1882													
April	6 180	155	8	10	11		4	12	1		3		384
May	10 261	259	275	35	56	4		49					1021
June	22 134	168	78	27	18		4	23	5	1			522
Aug.	2 60	70	136	3	43	4	4	1	1			1	345
Sept.	16 99	93	125	6	24		7	2	4	4	5		371
Oct.	25 56	111	141	5	22	2		16	13		1		488
Decr 1883	7 50	49	23		1			5	11				200
Jan'y	10 51	14	43			5			12	2			144
Feb'y	19 71	91	60	4	7				4				252
Mar	28 105	111	156	1	5		5	27	2	1		6	425
	1067	1121	1045	91	187	15	24	135	53	8	9	7	4152
	*												

\* The above are almost all from the north of Ireland.

Appendix A, Table II.

Steerage passengers of the "Circassia" having no vaccination marks from 6<sup>th</sup> April 1882 to 28<sup>th</sup> March 1884.

	Scottish	Irish	German	Austrian	Norwegian	Swedish	Danish	United States	Italian	French	Belgian	Totals
1882												
April	15	13	1				2					31
May	10	23	33	2	6	11	3	11				116
June	22	15	27	14	4	1	1	4				77
August	2	2	10	8	3	3	3					29
Sept.	16	8	5	21	1	9	1		1			46
Octo.	25	1	12	17	11	3		1				45
Nov.	7	7	4	6	11	1						29
Dec.	10	4	6	6	6	1	1					23
Jan'y	19	15	8	8	4	1		4				38
Feb'y	9	13	10	4	4	1						38
Mar.	28	13	10	4	4	1	3				4	47
	88	133	122	48	11	30	4	5	1	0	4	472
	equal to 1	equal to 1	equal to 1	equal to 1	equal to 1	equal to 1	equal to 1	equal to 1	equal to 1	equal to 1	equal to 1	equal to 1
	in every 100	in every 100	in every 100	in every 100	in every 100	in every 100	in every 100	in every 100	in every 100	in every 100	in every 100	in every 100
	12	8	9	8	8	6	4	3 1/2	10	8	2	9
	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers	passengers
	engines	engines	engines	engines	engines	engines	engines	engines	engines	engines	engines	engines
	engines	engines	engines	engines	engines	engines	engines	engines	engines	engines	engines	engines

\* For the season stated on page 3, the record for this year is not quite accurate, the vaccination number on some cases not being seen because not looked for with sufficient care.



Appendix C.

Particulars regarding success of vaccination of the unvaccinated steerage passengers of the "Circassia" (outward passages) from 6<sup>th</sup> April 1882 to 19<sup>th</sup> Oct. 1885

From 6 <sup>th</sup> April 1882 to 28 <sup>th</sup> March 1883	} No record kept of results of vaccination		472
From 8 <sup>th</sup> May 1883 to	} Successfully vaccinated	250	
17 <sup>th</sup> April 1884		Unsuccessfully	92
		* Uncertain success	5
From 21 <sup>st</sup> May 1884 to	} Successfully vaccinated	143	
30 <sup>th</sup> April 1885		Unsuccessfully	30
		* Uncertain success	27
From 1 <sup>st</sup> June 1885 to	} Successfully vaccinated	97	
19 <sup>th</sup> October 1885		Unsuccessfully	16
	* Uncertain success	14	127
		Total	1146

\* The above were vaccinated at a time too near the end of the voyage to be able to ascertain the results.