REPORT ON VACCINATION AS A BRANCH OF PREVENTIVE MEDICINE.

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I.

THERE is a paragraph in the last-issued report of the medical officer of the Local Government Board which deserves more than the passing notice it is likely in most instances to receive: "From the returns made by vaccination officers, it appears that of children whose births were registered in England and Wales during the year 1890, there remained 11.3 per cent. not finally accounted for as regards vaccination, the percentage for the metropolis being 13.9, and for the provinces 10.9. These figures indicate a larger amount of default in regard of vaccination than any which has been recorded since the passing of the Vaccination Act, 1871. In the metropolis the percentage of births unaccounted for has, during the ten years 1881-90, risen almost continuously from 5.7 to 13.9; and in the provinces there has, during the same period, been an altogether unbroken rise from 4.3 to 10.9. A marked increase in these rates took place as regards children whose births were registered during the year 1888, and whose vaccination became due, at the latest, during 1889. In the metropolis the amount of default indicated is now nearly two and a half times as great, and in the provinces it is nearly two and a quarter times as great as it was ten years ago. The figures are very significant, affording as they do an indication of a steadily growing increase in the younger population of persons who are altogether without protection against small-pox."

This falling off in infantile vaccination is no doubt largely due to the absence of any widespread epidemic of small-pox throughout the country within recent years, a feeling of false security having thus been created, which has led a number of parents to put off for the moment the temporary inconvenience of having their infants vaccinated. On more than one occasion there has recently been apprehension of small-pox spreading in various localities, and there has been the usual rush for vaccination amongst the unprotected whenever small-pox threatens, and which, by straining the local resources to their utmost limits, is not calculated to secure in all cases the most efficient protection. Happily, however, in only a few centres has the disease assumed alarming proportions, and, with the subsidence of the immediate danger, apathy has again set in; but although individual apathy has had much to do with the falling off in the amount of infantile vaccination, a great deal of the mischief is attributable to the baneful influence of a number of opponents of the system who by disseminating gross misrepresentations calculated to create a distrust of vaccination, have caught the attention of those who convince themselves that vaccination is useless. This is shown by the fact that the greatest neglect has grown up in those towns in which the leaders of the opposition are most active.

The growing neglect of vaccination in the early years of life is, nevertheless, a serious menace to the future health of the community, which must ere long be strongly grappled with. In this matter of life or death antivaccinators are assuming a very grave responsibility, and it is the duty of those who realise the approaching danger to do their utmost to avert its consequences. English common sense may be trusted eventually to sift the wheat from the chaff, but in the meantime every effort should be made to prevent any fatal retrograde step being taken.

Vaccination has now for nearly a century stood the test of practice, and to-day it remains one of the greatest medical prophylactics which the world has ever known. To say that it has been maintained by the medical profession for their own pecuniary benefit is so obviously absurd as scarcely to deserve notice. Only a very small proportion of doctors derive any substantial benefit from the practice of vaccination, and those who consider that the bulk of medical men are so inordinately mercenary as to lend themselves to the support of a false system for the sake of a few shillings a year should remember that it is the prevalence of disease and not its prevention which pays the doctor best, and that

a widespread outbreak of small-pox will pay far better than the eighteenpenny fees to be earned by vaccination. It seems to be too often forgotten that all measures for improving the general health of the community have emanated from and been fostered by the medical profession, and that, to take a striking example, the sanitary science of which England is to-day justly proud, and which has led during the last fifty years to a marvellous reduction in the mortality from filth diseases and an increase in the average length of life, owes its origin and development to medical men. Had vaccination not possessed the powers claimed for it the medical profession would have been the first to cast it aside as they have rejected other practices.

It has been truly said that if those who so readily neglect vaccination at the bidding of a few energetic agitators could for a moment look on the sight too common in every small-pox epidemic—of a family which has been living in the same house and under precisely the same conditions, stricken by small-pox, the unvaccinated members developing the disease in all its natural hideous loathsome virulence, whilst the recently vaccinated or re-vaccinated have escaped altogether, and those who, years previously, have been vaccinated more or less efficiently have escaped with a few spots and slight constitutional disturbance—the perverted statistics and the sophistries of the antivaccinators would for ever be brushed aside and the apathetic would hasten to secure for themselves and their offspring the protection which vaccination affords. Such a living picture would be repulsive, but it would teach a valuable lesson. It is contact with such sights that has convinced the medical profession as a body of the value of vaccination.

In its natural state small-pox is a peculiarly loathsome disease, which has always been fatal to a very large proportion of those attacked by it. It is eminently infectious from person to person; it seizes, with very few exceptions, all who for the first time come within its reach, and, when not fatal, it now, as before the introduction of vaccination, disfigures its victim for life. Looking back at its past history, we find that in 1518 it helped to complete the depopulation of St. Domingo, which fire, sword, and famine had begun; and soon afterwards, in Mexico, it even surpassed the cruelties of conquest, suddenly smiting down $3\frac{1}{2}$ millions of population. Mr. Prescott, in his *Conquest of Mexico*, describes the epidemic as "sweeping over the land like fire over the prairies, smiting down prince and peasant, and leaving its path strewn with the dead bodies of the natives, who (in the strong language of a contemporary) perished in heaps like cattle-stricken with murrain." In Brazil, in Siberia and Kamtschatka, in Greenland and Iceland, in Borneo, on the Gold Coast, in Madagascar, its devastations were similar. Striking accounts of its ravages among the North-American Indians in very recent times may be gathered from Mr. Catlin's *Lectures and Notes on the Manners, Customs, and Conditions of the North-American Indians*. In one place, Mr. Catlin observes, "30 millions of white men are now scuffling for the goods and luxuries of life, over the bones and ashes of 12 millions of red men, 6 millions of whom have fallen victims to small-pox, and the remainder to the sword, the bayonet, or whisky." More recently we have the remarkable evidence of the late Surgeon-Major Parke before the Vaccination Commission, as to the virulence of small-pox among the natives of Central Africa, when uncontrolled by vaccination. In England, according to calculations of Dr. Lettsom, about the year 1805, the average annual deaths from small-pox were about 3,000 out of every million of population, a death-rate which, with the present population in England, would give an average of nearly 90,000 deaths from small-pox a year. Nearly one tenth part of all the persons who died in London within the Bills of Mortality during the last half of last century died of this one cause. The younger part of the population were peculiarly its victims, and royal and noble families were not exempt.

The ravages of small-pox are not, however, half enumerated in the list of the myriads whom it has killed. From the earliest to the latest records of the disease there is constant mention of the tax which it has levied upon survivors. The eloquent passage in which Macaulay refers to this, when comparing the ravages made by small-pox in this country towards the close of the seventeenth century with those of the plague, is well

known. Our great historian justly assigns to small-pox the foremost place as the "most terrible of all the ministers of death." "The havoc of the plague," says he, "had been far more rapid, but the plague had visited our shores only once or twice within living memory. The small-pox was always present, filling the churchyards with corpses, leaving in those whose lives it spared the hideous traces of its power, turning the babe into a changeling at which the mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to the lover."

This description applied with at least equal force a hundred years later. Few indeed, then, were those who were not, at some time or other of their lives, attacked by this fell disease, and happy was it for anyone so attacked that he should escape with unimpaired health, or without serious disfigurement. Among those who outlive it, says De la Condamine, many either totally or partly lose their sight or hearing, many are left consumptive, weakly, or maimed, many are disfigured for life by horrid scars, and become shocking objects to those who approach them. Sir Gilbert Blane, at a later period, quoted a report of the Hospital for the Indigent Blind to the effect that two-thirds of those who applied there for relief had lost their sight by small-pox.

Such was the state of affairs when towards the middle of the eighteenth century the practice of inoculation was introduced into this country from the East, and prevailed until the discovery of vaccination by Jenner towards the close of the century. I do not here propose entering at length on a discussion of the question, What is vaccination? There is in my mind very little doubt that human small-pox and cow-pox are derived from one and the same infection, though there are differences in their effects. Which is the ancestor of the other remains a moot point, but that small-pox and cow-pox are identical was Jenner's firm belief, and the most recent scientific investigations of the subject altogether go to strengthen this view.¹

A favourite and showy argument of the antivaccinators is that vaccination has not fulfilled Jenner's first hope that it would be "an antidote capable of extirpating from the earth a disease which is every hour devouring its victims—a disease that has ever been considered the severest scourge of the human race." But this was not quite Jenner's more matured opinion. He was well aware of the fact that even an attack of natural small-pox did not invariably render a person immune from a subsequent attack of the disease, and, within a very few years of the discovery of vaccination, cases occurred in subjects who had been vaccinated. What he really claimed was, to use his own words, that vaccination "duly and efficiently performed will protect the constitution from subsequent attacks of small-pox as much as that disease itself will. I never expected it would do more," he said, "and it will not, I believe, do less."

A century's experience has fully borne out Jenner's opinion. Vaccination, "duly and efficiently performed" in infancy, and repeated at the age of puberty, has shown itself to be an almost absolute protection against small-pox, whilst in those cases in which small-pox occurs after vaccination the disease is, almost without exception, so far modified that often its identity is, in its early stages, unrecognised. Only last year in Blackburn, to take a very recent illustration, the medical officer of health met with a number of cases of small-pox in vaccinated persons, where the disease was so modified that the patients went about their work without being aware of the nature of the illness which was upon them. Cases of the same sort were also recently met with by Dr. Bruce Low when investigating an outbreak of small-pox at Hastings. It is in dealing with the statistics which prove these statements that the antivaccinators have practised the grossest perversion and misrepresentation. It is an indisputable fact, shown by the Registrar-General's returns from year to year, that small-pox has greatly decreased within the present century, and especially within the last 50 years. In his *Vital Statistics* Dr. Farr, whose position gave him exceptional facilities for obtaining accurate information, and whose integrity is unimpeachable,

¹ In the annual report for 1892-3 of the Medical Officer of the Local Government Board is contained a very interesting report by Dr. E. Klein of experiments carried out by him in London. Dr. Simpson, of Calcutta, has also recently carried out experiments on similar lines and obtained similar results, going to prove the identity in origin of small-pox and vaccinia.

has given the following instructive table with regard to the London death-rate from small-pox:

Years.	Average Annual Deaths per Million from all Causes.	Average Annual Deaths per Million from Small-Pox.
1660-79	80,000	4,170
1728-57	52,000	4,260
1771-80	50,000	5,020
1801-10	29,200	2,040
1831-35	32,000	830

Continuing these figures for subsequent periods, we get:

Years.	Average Annual Deaths per Million from all Causes.	Average Annual Deaths per Million from Small-pox.
1833-53	24,900	513
1854-71	24,200	388
1872-82	22,100	262
1883-92	19,800	73

Unfortunately, complete statistics as to last century's small-pox are not available for the whole of the country, but, as far as they go, they tell the same tale. Since 1838, when registration became compulsory, we have definite information, and it will be seen that since that date the decline has been very marked. Beginning with 1838, we find that the annual small-pox death-rates for the country for subsequent years are, in consecutive order, as follows: 1,064, 589, 661, 400, 168 (here occurs an interval of four years, 1843 to 1846, during which the figures are not available), 246, 397, 264, 262, 389, 401, 171, 151, 131, 116, 202, 329, 193, 136, 64, 78, 286, 364, 301, 139, 114, 91, 67, 113, 1,012, 821, 98, 88, 35, 99, 173, 74, 21, 25, 119, 50, 36, 83, 104, 10, 18, 36, 1, 1, 2, 15.

But the most remarkable fact disclosed by a careful examination of the small-pox statistics is the changed incidence of the disease on different age periods since the introduction of vaccination. Whereas in prevaccination times small-pox was essentially a disease of childhood, some 800 out of every 1,000 small-pox deaths being of children under 5 years of age, and 150 of the remaining 200 being of children between 5 and 10 years (even as late as 1839 88 per cent. of the small-pox deaths in England were in children under 10 years of age), it has in recent years lost that peculiarity, as will be readily seen from the following table. In reading this table it must be borne in mind, that although vaccination came into use early in the present century, no public provision for its gratuitous performance was made until 1840, it was not obligatory until 1853, and legislative arrangements for its systematic enforcement were not made until 1871.

Mean Annual Deaths from Small-pox at Successive Life Periods per Million Living at each Life Period, 1847-53, 1854-71, and 1872-91.

Period.	All Ages.	0-5	5-10	10-15	15-25	25-45	45 and Upwards.
1. Vaccination optional, 1847-53	305	1,617	337	94	109	66	22
2. Vaccination obligatory, but not efficiently enforced, 1854-71	223	817	243	88	163	131	52
3. Vaccination obligatory, but more efficiently enforced by vaccination officers, 1872-91	89	177	95	54	97	83	33

As pointed out by the Registrar-General in his 43rd Annual

Report with reference to a similar table: "The figures show conclusively that coincidently with the gradual extension of the practice of vaccination, there has been, in the first place, a gradual and notable decline in the mortality from small-pox at all ages; and, in the second place, that this decline has been exclusively among persons under ten years of age, and most of all among children under 5, and thirdly, that after the age of 10 years the mortality, so far from having declined, has actually increased; very slightly among persons of from 10 to 15 years of age, but very greatly for persons older than this; and, lastly, that the increase has been the greater the more advanced the time of life."

This changed incidence of small-pox is one of the most remarkable and convincing proofs of the efficacy of vaccination, and one which may profitably be studied by a close examination of the facts connected with each and all of the recent small-pox epidemics.

So much strength has been expended by the opponents of vaccination in disputing and distorting the older statistics, with the object of discrediting the evidence based upon them, that there may be especial advantage in studying the most recent outbreaks before they pass out of reach for the purpose of verification. Even here many red herrings will doubtless be drawn across the scent. As regards adults, there will, of course, still be the usual cavilling as to the classification of patients as "vaccinated" or as "unvaccinated." This difficulty, however, cannot arise as regards the children in recent epidemics, the records of whose vaccination are still in existence, and here the evidence in favour of vaccination is simply overwhelming and unanswerable.

In the following table, therefore, I have endeavoured to summarise the facts relating to all the more important recent

small-pox outbreaks in this country, respecting which statistics and reports have reached me, and I feel that the more that information is studied the more clearly does it bear irrefutable evidence of the protective value of "efficient" vaccination. With respect to some of the recent outbreaks I have not been able to ascertain in detail the age distribution of the cases, and they therefore cannot be tabulated uniformly. These I have omitted from the tabular statement, but I have subsequently dealt with the facts individually.

I should have been glad to have added to this table columns showing how the population in each town was made up at the time of the epidemic, how many of the inhabitants were vaccinated, and how many were unvaccinated; how many of the children under 10 years were vaccinated, and how many were not. But as calculations of that kind could only be approximately accurate, it might needlessly afford the opponents of vaccination an opportunity for quibbling, and might thus lead to obscurity of the main points which the indisputable figures amply prove. These points are that the vaccinated children under 10 have been almost immune from death by small-pox, and that where they have contracted the disease they have suffered from it in its mildest form, often having only "a few spots" and little constitutional disturbance; whilst, on the other hand, the unvaccinated children have suffered in every instance more severely, some 20 to 50 per cent. of the cases amongst them terminating fatally. The unvaccinated children have, in short, suffered terribly, whilst the vaccinated have suffered very lightly, and this in spite of the facts that, broadly speaking and taking the aggregate of the enumerated towns and districts, the vaccinated are seven or eight times as numerous as the unvaccinated, that the vaccinated include a large

Table Showing the Distribution of Small-pox Cases and Deaths in a number of Large Towns between the Years 1887 and 1894.

Period of Epidemic.	Towns.	Popula- tion.	Total Small-pox			Under 10 Years of Age.									Over 10 Years of Age.											
						Vaccinated.			Unvac- cinated.			Doubtful.			Vaccinated.			Unvac- cinated.			Doubtful.					
			Cases.	Deaths.	Mortality Per Cent. of Cases.	Cases.	Deaths.	Mortality Per Cent. of Cases.	Cases.	Deaths.	Mortality Per Cent. of Cases.	Cases.	Deaths.	Mortality Per Cent. of Cases.	Cases.	Deaths.	Mortality Per Cent. of Cases.	Cases.	Deaths.	Mortality Per Cent. of Cases.	Cases.	Deaths.	Mortality Per Cent. of Cases.			
March, 1887, to Feb., 1888	Sheffield ...	274,112	4,677	474	10.1	353	6	1.7	228	100	43.9	—	—	—	3,774	194	5.10	322	174	54.2	—	—	—			
Year 1892	" ...	329,585	47	3	6.4	1	0	0.0	2	0	0.0	—	—	—	36	2	5.50	8	1	12.5	—	—	—			
" 1893	" ...	333,922	102	4	3.9	6	0	0.0	7	0	0.0	—	—	—	79	3	3.70	3	0	0.0	7	1	14.2			
Aug. 1892, to Dec., 1893	Leicester ...	184,547	347	21	6.05	2	0	0.0	105	15	14.3	—	—	—	190	1	0.52	48	4	8.3	—	—	50.0			
May, 1892, to March, 1893	Warrington ...	54,000	598	60	10.03	24	0	0.0	32	13	40.6	1	1	—	506	32	6.30	34	13	38.2	1	1	—			
1892-3	Halifax ...	84,000	513	44	8.5	4	0	0.0	67	22	32.1	—	—	—	421	8	1.90	21	14	66.0	—	—	—			
Jan., 1892, to June, 1893	Oldham (West-hulme Hospital)	166,000	605	63	10.4	15	0	0.0	97	27	27.8	2	1	50.0	431	19	4.40	51	14	27.4	9	2	22.2			
1893	Blackburn ...	124,000	79	8	10.1	3	0	0.0	—	—	—	1	1	—	68	2	2.90	4	3	75.0	0	2	66.6			
1893	Bolton ...	117,000	44	6	13.6	1	1	—	—	—	—	—	—	30	0	0.00	6	3	50.0	7	2	25.0				
1892	Bradford ...	219,262	25	4	16.0	2	0	0.0	1	1	—	—	—	20	2	10.00	2	1	50.0	—	—	—				
1892	Brighouse ...	10,500	134	15	11.2	6	0	0.0	19	7	36.8	—	—	—	104	6	5.70	5	—	40.0	—	—	—			
1893	" ...	23	2	8.7	3	0	0.0	2	0	0.0	—	—	—	17	2	11.70	—	—	—	1	0	0.0				
1893	Derby ...	87,000	46	7	15.2	1	0	0.0	6	3	50.0	—	—	—	31	2	6.40	8	—	25.0	—	—	—			
1892-3	Glasgow ...	677,883	259	18	6.9	10	0	0.0	2	2	100.0	—	—	—	238	11	4.60	9	—	55.5	—	—	—			
1894	Hastings ...	63,466	86	9	10.4	4	0	0.0	10	4	40.0	—	—	—	63	3	4.70	2	0	0.0	7	2	28.5			
1893	Huddersfield ...	97,500	45	2	4.1	—	—	—	1	1	—	—	—	35	0	0.00	11	1	9.1	1	0	0.0				
1893	Keighley ...	32,000	72	7	9.7	1	0	0.0	24	4	16.6	—	—	—	36	1	3.30	17	2	11.7	—	—	—			
1892	Liverpool ...	517,514	194	15	7.7	7	1	14.4	11	5	45.5	—	—	—	163	5	3.07	13	4	30.7	—	—	—			
1892-3	Manchester ...	515,598	378	22	5.8	4	0	0.0	19	3	15.7	—	—	—	332	14	4.20	23	5	21.7	—	—	—			
Nov., 1892, to June, 1893	Middleton ...	22,162	22	2	9.1	2	0	0.0	3	1	33.3	1	0	0.0	11	0	0.00	2	1	50.0	3	0	0.0			
April to July, 1894	" ...	34	4	11.7	0	0	0.0	8	2	25.0	—	—	—	25	1	4.00	1	1	—	—	—	—	—			
1892	Ossett ...	11,100	19	1	5.2	0	0	0.0	1	1	—	—	—	18	0	0.00	—	—	—	—	—	—	—			
1893	" ...	26	0	0.0	0	0	0.0	1	0	0.0	—	—	—	23	0	0.00	2	0	0.0	—	—	—	—			
1893	Pudsey ...	13,400	17	1	5.9	0	0	0.0	1	0	0.0	—	—	—	13	0	0.00	3	1	33.3	—	—	—			
1893	Salford ...	203,431	174	21	12.0	7	0	0.0	20	7	35.0	—	—	—	125	8	6.40	17	5	29.4	5	1	20.0			
1893	Southampton ...	65,325	152	8	5.2	13	0	0.0	8	3	37.5	1	0	0.0	103	0	0.00	7	4	57.1	20	1	5.0			
1893	Swansea ...	93,816	23	1	4.3	3	0	0.0	—	—	—	—	—	19	0	0.00	1	1	—	—	—	—	—			
Oct., 1892, to July, 1893	York ...	66,912	72	7	9.7	2	0	0.0	5	1	20.0	—	—	—	56	4	7.10	8	1	12.5	1	1	—			
			Under 15 Years of Age.									Over 15 Years of Age.														
1893	Birmingham*	487,897	979	70	7.1	107	0	0.0	69	20	29.0	4	0	0.0	740	38	5.10	36	12	33.3	23	0	0.0			
1893-8	Bristol*	327	37	11.3	64	0	0.0	22	12	54.5	—	—	—	208	11	5.30	33	14	42.2	—	—	—	—			
1893	" ...	235,028	164	19	11.5	12	0	0.0	15	6	40.0	—	—	—	126	8	6.33	11	5	45.4	—	—	—			
1893	Walsall*	74,000	778	71	9.1	123	2	1.6	141	41	29.0	4	3	75.0	431	4	0.90	66	20	30.3	13	1	7.7			
Totals ...			11,084	1,026	9.2	780	10	1.2	927	301	32.4	14	6	42.8	8,466	331	4.50	774	313	40.6	103	15	14.5			

* In these instances the available statistics only enable the cases to be distributed according as they were under or over 15 years of age, instead of under or over 10 years of age.

proportion of children whose vaccination has been very imperfectly performed, that both the vaccinated and the unvaccinated are drawn from the same aggregate population, and that, again speaking broadly, all live in the same sanitary conditions. The only line of broad distinction between the two classes of children is in regard to their vaccination. Further, as regards adults, we find that although a larger number of vaccinated than of unvaccinated cases occurred, the disease in the one was, with comparatively few exceptions, mild; whilst it was, with comparatively few exceptions, severe in the unvaccinated. This is broadly shown by the fact that only 4.5 per cent. of the vaccinated cases terminated fatally, whilst as many as 40.6 per cent. of the unvaccinated cases died. We must also, in fairly considering this question, bear prominently in mind that the so-called "vaccinated" often scarcely deserve to be so classed, the evidence as to their original vaccination being very vague, and the marks on their arms being in many cases quite invisible. This will be seen to be an important element by those who wish to arrive at a just appreciation of this vitally important national question.

I wish now to set out a variety of details which it has been found impossible to embody in the tabular statement on preceding page, but which are of great interest and importance. I have placed the Sheffield epidemic of 1887-8 at the head of the table for various reasons. Sheffield is not a centre of antivaccination. The law has been carried out there so well that, roughly speaking, some 97 or 98 per cent. of the population are more or less efficiently protected by vaccination. Consequently, when small-pox broke out there in 1887, "well-vaccinated Sheffield" in the throes of a small-pox epidemic was pointed to as about to settle once for all the long-debated vaccination question. The vast importance of the occurrence was so evident that an exhaustive investigation of the matter was wisely instituted at once by the Government through the Local Government Board. This arduous task was entrusted to Dr. F. W. Barry, and his admirable report on the matter, together with Sir George Buchanan's excellent introductory summary, deserves to be carefully studied by anyone desirous of learning whether or not vaccination is what its supporters claim for it. The facts disclosed in that report form such a monumental testimony to the value of vaccination that nowadays one seldom hears the Sheffield epidemic referred to by antivaccinators.

Dr. Barry commenced his inquiry at a time when some 300 new cases of small-pox were occurring each week in the borough, and he was consequently in a position, by prompt personal inquiry and personal observation, to place beyond cavil many matters of fact which otherwise might have been disputed or distorted. He proceeded, with assistants, to make a house-to-house census of the infected localities. I can only give here the broad important facts disclosed by that census. It was found that the total enumerated population of the borough, or rather of the infected divisions of the borough, was 274,112, of whom 268,397 were classed as vaccinated and 5,715 as unvaccinated. Under 10 years of age there were 68,236 vaccinated children, and of these 353 (or 0.51 per cent.) were attacked, and 6 (or 0.009 per cent.) died; whilst at the same age there were only 2,259 unvaccinated children, yet of these 228 (or 10.09 per cent.), were attacked, and 100 (or 4.4 per cent.), excluding for obvious reasons children under 1 month of age, died. Above 10 years of age there were 198,905 vaccinated persons, and of these 3,774 (or 1.9 per cent.) were attacked, and 194 (or 0.09 per cent.) died; whilst there were only 3,429 unvaccinated persons, yet of these 322 (or 9.3 per cent.) were attacked, and 174 (or 5.07 per cent.) died. There were, in addition, 3,256 vaccinated and 27 unvaccinated individuals whose ages could not be ascertained, and who have therefore been excluded from the above calculations, together with the 24 and 2 cases of small-pox which occurred among them respectively.

These figures are by themselves sufficiently convincing as to the value of vaccination; but I cannot refrain from quoting the following paragraphs from Sir George Buchanan's masterly analysis of Dr. Barry's report:

"First, of the children under 10 years of age living in Sheffield during 1887-88, under the common conditions of infection in the whole borough:

"Per 1,000 of the number of children in each class:			
"The attack-rate of the vaccinated was ...	...	...	5.00
"The attack-rate of the unvaccinated was ...	...	...	101.00
"The death-rate of the vaccinated was ...	...	...	0.09
"The death-rate of the unvaccinated was ...	...	...	44.00

"Under the general circumstances of the Sheffield epidemic, therefore, the vaccinated children had, as compared with the unvaccinated children living in the town, a 20-fold immunity from attack by small-pox, and had a 480-fold security against death by small-pox. The above relates to the general children—population of the borough; but "children living in houses actually invaded were, of course, exposed to an intenser and more continuous infection," and presented even stronger contrasts.

"Next, concerning persons over 10 years of age living in Sheffield during 1887-88 under the common conditions of infection of the borough. The vaccinated and unvaccinated members of this class are found to have always differed to a considerable degree from each other, both in regard of attack and of death, and also whether the borough as a whole or its component subdistricts be examined. But this degree of difference, considerable though it has been, has not been nearly so large as in the class of children.

"Per 1,000 of the number of persons over 10 in each class:			
"The attack-rate in persons twice vaccinated was ...	...	...	3.00
"The attack-rate in persons once vaccinated was ...	...	...	19.00
"The attack-rate in persons not vaccinated was ...	...	...	94.00
"The death-rate among persons twice vaccinated was ...	...	...	0.08
"The death-rate among persons once vaccinated was ...	...	...	1.00
"The death-rate among persons not vaccinated was ...	...	...	51.00

"Under the general circumstances of the Sheffield epidemic, therefore, the twice vaccinated persons over 10 years of age, as compared with the unvaccinated persons of the same age living in the town, had a 31-fold immunity against attack by small-pox, and had a 640-fold security against death by small-pox."

As regards the more limited outbreak in Sheffield in 1893, the medical officer of health records that of the 85 vaccinated cases, 30 were varioloid, 30 "discrete" or mild small-pox, 11 "coherent," and only 14 confluent. Nine of these last cases showed bad vaccination marks.

(To be continued.)

LITERARY NOTES.

In some of the biographical notices of Mr. Hulke an error has been made in counting his Jacksonian Prize Essay and his Treatise on the Ophthalmoscope as two separate works. The subject for the Jacksonian Essay in 1859 was "The Morbid Changes of the Retina as seen in the Eye of the Living Person and after removal from the Body, together with the symptoms associated with the several Morbid Conditions." The prize was awarded to Mr. Hulke. In 1861 he published the essay under the title of *A Practical Treatise on the Use of the Ophthalmoscope*. In the preface to the printed book he accounts for the delay in issuing the essay by stating that he had no idea of publishing it, and only did so because he was repeatedly asked by the students at the Royal London Ophthalmic Hospital for a guide to the ophthalmoscopic examination of the eye. In the printed book many cases and copious anatomical notes are omitted, and an account of all the ocular structures and of the optics of the ophthalmoscope is added.

A copy of *Wiseman's Treatise of Wounds* (1672) has just been added to the library of the Royal College of Surgeons of England. When Sir Thomas Longmore was writing his *Life of Wiseman* he was unable to hear of more than two copies, one in the British Museum and one in the Library at Netley. This copy which has just come to light is a very interesting one, as it is a presentation copy from the author. On the cover is written, "May 27th, '73, this booke was sent me by ye Author from Kinge's Streete in Covent Garden. Ja. Welsh." From James Welsh it passed to Thomas Welsh, who sold it in 1678 to Mich. Cadman, jun., for 2s. 6d. This inscription throws some light on Wiseman's place of residence. There are references to his living in Covent Garden, but except this note no mention of the name of the street in which he lived.

Dr. Thomas Harris, of Manchester, has in the press a monograph entitled *Indurative Mediastino-Pericarditis*, which will shortly be published by Messrs. Smith, Elder, and Co.