

ARTICLE III.—*Small-Pox in Scotland, as it is, was, and ought to be; with Hints for its Mitigation by Legislative Enactment.* By ALEXANDER WOOD, M.D., President of the Royal College of Physicians, Edinburgh, and Member of the General Council of Medical Education and Registration.

I. SMALL-POX AS IT IS.

WHETHER rightly or wrongly, an impression prevails extensively among the public that small-pox is steadily on the increase; that the protective power of vaccination has diminished; and that we are rapidly drifting back into that state in which the close of last century found us, when the “annual ravages of small-pox in Europe alone have been estimated at half a million of lives.”¹ It were not difficult to show that there is no foundation for any such dread; that there is no reason to believe that the protection afforded by vaccination has diminished; or that small-pox has increased to such an extent as to give the least occasion for any fear that it will regain its former fearful power. At the same time, there is abundant evidence to show that, by our criminal apathy and carelessness, valuable lives are being continually sacrificed; long and tedious sickness, and often death itself, introduced into families; deteriorated constitutions rendered a permanent affliction to the survivors, and an unhealthy offspring entailed on posterity; and this to an extent which by a little vigilance and care could easily be prevented.

But the question must be dealt with as one of facts;—the data are easily gathered from the registration returns for Scotland, which have now been in operation for the last four years and a half. As yet, however, these returns are limited to the eight principal towns in Scotland.

TABLE I.

Total Annual Mortality in the Eight Principal Towns of Scotland from Small-Pox, for the last Four and a half Years.

Year.	Glasgow.	Edinburgh.	Dundee.	Aberdeen.	Paisley.	Greenock.	Leith.	Perth.	Total.
1855 ($\frac{1}{2}$ year.)	33	8	113	1	...	18	4	2	179
1856	129	133	229	65	51	7	27	4	645
1857	405	67	7	5	33	18	61	2	598
1858	115	36	3	9	5	1	6	...	175
1859	200	168	2	17	2	31	45	1	466
Total	882	412	354	97	91	75	143	9	1993

¹ See the admirable and exhaustive Report of Mr Simon on Vaccination, laid before the Board of Health, and presented to both Houses of Parliament in 1857.

TABLE II.

Deaths by Small-Pox, as compared with those by Scarlet Fever, Hooping-Cough, and Measles, in Edinburgh, Glasgow, Aberdeen, Dundee, in 1856.

	Small-Pox.	Scarlet Fever.	Hooping-Cough.	Measles.	Deaths from all Causes.
Edinburgh....	133	446	58	118	4136
Glasgow.....	129	358	928	139	10,280
Aberdeen	65	54	86	2	1659
Dundee.....	229	163	120	177	2453

A third table will be necessary subsequently, and may for convenience be inserted here.

TABLE III.

Deaths from the above Four Diseases at Four Periods of Life in the Eight Principal Towns of Scotland, Year 1856.

Causes of Death.	Years of Age.				
	0—5.	5—20.	20—60.	60, etc.	Total.
Small-Pox.....	531	62	52	...	645
Measles.....	465	36	501
Scarlet Fever.....	1003	346	22	...	1371
Hooping-Cough	1283	62	2	1	1348

From these tables the following inferences may be safely deduced :—

1st, That the disease is not steadily increasing year by year; but that it fluctuates in frequency and fatality just as it did before the discovery of vaccination.

2^d, That at one time it prevails extensively in one town; at another, it leaves it and ravages another. Thus in 1856 Dundee, and in 1857 Glasgow and Leith, were the towns principally affected by it.

3^d, That taking the year 1856, when small-pox was epidemically present, out of a total estimated population of 854,066 individuals, 645 died of small-pox.

4th, That the total mortality from all causes being in that year 22,248, the deaths from small-pox (645) thus constituted 2·8 per cent., which is double the average of London for the last ten years, or of England and Wales for the last seven, and fourteenfold the average of Bohemia and Lombardy.

5th, That a large proportion of that mortality (229 deaths) oc-

curred in the town of Dundee, where, in the single month of January, 95 individuals died from small-pox ; alluding to which, the Registrar-General observes, "The deaths from this single disease constituted not less than 30 per cent. of the total mortality,—a mortality which has been exceeded by no single disease during the last ten years, with the exception of the epidemic typhus in the month of November 1847, and the fatal cholera epidemic of 1849, when the deaths from that disease, during the months of July, August, and September, numbered respectively 209, 420, 159."

6th, The calculations of Dr Seaton, appended to Mr Simon's Report, enables us to view these figures comparatively ; and it appears that, "taking the mortality of this town (Dundee) from small-pox for the entire year, it was proportionally more than three times greater than the highest mortality which has taken place in London for the last ten years ; viz., that in 1848, when the deaths amounted to 1617, which is above double the annual average of the metropolis ; but had the deaths taken place in the same proportion to population as in Dundee in 1856, they would have amounted to upwards of 5000."

But passing, for a time, from the consideration of these tables, let us look at another aspect of the question.

What number of cases is indicated by 645 deaths ? Such an inquiry is attended with great difficulty, and the result can at the best be only conjectural ; for it will be found from a table, implying great research, in Mr Simon's Report, that the fatality of small-pox, as it occurred in unprotected persons, ranged from under 15 (Carinthia) to 60 (Philadelphia) per cent.¹ The Bohemian returns, made with great accuracy for twenty-one years on four millions of people, make the deaths about 30 per 100 patients ; thus, for every 30 dying, 70 will probably recover, so that a mortality of 645 would imply a total number of 2150 cases. But as this per-cent-age applies to the unvaccinated, and as when small-pox prevails epidemically a number who have been vaccinated will take it, and as, according to the same (Bohemian) calculations, the death-rate of vaccinated persons is only $5\frac{1}{6}$ per cent. of those attacked, the probability is, that a much larger number of persons than is indicated above will have passed through the disease.

Great as is the evil of premature death, more especially from a disease which cuts off, not the surplus, but the valuable portion of life ; and much as may be the amount of premature widowhood and orphanage, and the pauperism thereby augmented, which may be caused, the evil does not stop with that. "Among those who outlive it (says De la Condamine, quoted by Mr Simon), many either totally or partly lose their sight or hearing ; many are left consumptive, weakly, sickly, or maimed ; many are disfigured for life by

¹ Rhazes the Arabian, Mead, Sydenham, and Huxham, all bear testimony to the great variety, in severity, of small-pox epidemics.

horrid scars, and become shocking objects to those who approach them. Another learned writer, after describing these frequent sequels of the disease, says, that its very nature is one *qua nulla furea sese expelli patitur, sed usque recurrit*. 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."

It is true that the year 1856, on which the foregoing calculations are chiefly founded, is in some respects to be regarded as an exceptional year, inasmuch as small-pox was then epidemically present. In its form as controlled by vaccination, it shows the same tendency that it did when it presented its severest characters, to rapid and sudden alterations of prevalence. Thus, while the total deaths in Scotland from small-pox in 1856 were 645, in 1858 they fell to 175; and, in 1859, they rose again to 466. Illustrations of this tendency could be easily collected: one only need be cited from the extremely accurate returns of the Faculty of Medicine at Prague, which displays sudden changes in the prevalence of the disease, both before and after vaccination.

TABLE IV.

*Illustrating the tendency of Small-Pox to sudden increase in prevalence.
From the Prague Returns.*

Year.	Before Vaccination.		Year.	After Vaccination.	
	Total Deaths.	Total from S. P.		Total Deaths.	Total from S. P.
1797	86,885	1,988	1838	108,419	62
1799	99,079	17,587	1840	118,471	699

In the same way, it is recorded by Mr Cross, in his excellent *History of the Variolous Epidemic at Norwich in 1819*, that Norwich was nearly entirely free from small-pox from 1805 till 1818, when it was introduced by a girl from York. It spread rapidly from this focus, and also from three children who had been inoculated by a druggist for small-pox; and in that year Mr Cross is satisfied that "considerably above 3000 individuals, or a thirteenth part of the whole population of Norwich, had small-pox in that year."

II. SMALL-POX AS IT WAS.

It is very difficult, in the absence of reliable data, to obtain an accurate idea of the mortality occasioned by small-pox in Scotland previous to the common use of vaccination. The following table is offered, with the names of the observers, as perhaps the nearest approximation that can be made:—

TABLE V.

Mortality from Small-Pox before the introduction of Vaccination.

Observer.	Place of Observation.	Per-cent-age of Deaths from S.P. in Total Mortality.	Years.	Where Recorded.
Haygarth,	London, . . .	16	1759-1768	Sketch of a plan, etc.
Watt, .	Glasgow, . . .	18.82	1783-1800	On Chincough.
Dobson,	Liverpool, . . .	18	1772-1774	Haygarth, <i>op. cit.</i>
Percival,	Manchester, . . .	15	1769-1774	Med. Obser.
Nettleton,	{Eleven Towns} in Yorkshire, . . .	19	...	Phil. Trans., 32.
Jurin,	18	...	Do.
Heberden,	London, . . .	8½-9	...	Increase and Decrease of Diseases.

Let a calculation be attempted on this basis for Scotland. Dr Watt's Glasgow average (Table V.) seems to have been carefully prepared, and approximates remarkably to those of Nettleton, Dobson, and Jurin. But, assuming the mortality from small-pox to have been 18 per cent. of the whole population, the following approximative result would be arrived at:—

The mortality from all diseases in the eight towns in Scotland was, in 1856, 22,248; 18 per cent. of such a mortality would give, at the old rate, 4003 deaths from small-pox,—a number contrasting not unfavourably with the 645 which actually occurred.

It has been calculated, and apparently on good grounds, that “were small-pox now let loose in its former virulence on the increased population of this country, it would sweep into the grave more than 50,000 every year, and leave many times that number in a state of debility which would predispose them to fall victims to other diseases, probably often becoming the parents of debilitated children; for no single disease ever contributed so largely and so directly to the deterioration and destruction of human beings as small-pox.”¹

Another change, which will hereafter be of importance in the argument, is the different position in the social scale of those who fall victims to the disease.

Formerly, it might be said of small-pox, as of death itself—

“ Pallida Mors æquo pulsat pede pauperum tabernas
Regumque turres.”

Mr Simon has given a sad catalogue of the victims furnished to small-pox from the royal families of Europe. “In the circle of William III., for instance, his father and mother died of it, and,

¹ *Brit. and For. Med. Rev.*, vi., p. 495.

not least, his wife, and his uncle the Duke of Gloucester; and his cousins, the eldest son and the youngest daughter of James II.; and he himself (like his friend Bentinck) had suffered from it most severely, barely surviving, with a constitution damaged for life. Or, again, in the court of Austria: ‘Joseph the First (says Vehse) was carried off, when not more than 33 years of age, by the small-pox; to which, in the course of the eighteenth century, besides him, two empresses, six archdukes and duchesses, an elector of Saxony, and the last elector of Bavaria fell victims.’ To this list might have been added, no doubt, many other names; among them, for instance, a dauphin (1711) and a king (1774) of France, a queen (1741) of Sweden, and an emperor (1727) of Russia. In one of Horace Walpole’s letters we read,—‘Lord Dalkeith is dead of small-pox in three days. It is so dreadfully fatal in his family, that besides several uncles and aunts, his eldest boy died of it last year; and his only brother, who was ill but two days, putrefied so fast that his limbs fell off as they lifted the body into the coffin.’ It would be thought an awful epidemic now-a-days, that should strike like this in high places.”—(*Report, etc., v. and vi.*)

Every medical practitioner has had more or less experience of small-pox; but I feel sure that every one will bear out the assertion that severe attacks of that disease are very unfrequent, and deaths exceedingly uncommon among the upper classes of society, and that the disease, when it does occur among them, usually presents that modified form which it assumes when it attacks those who have been vaccinated.

Another and concluding remark under this head may be made, that Table III. distinctly shows that, as has always been the case, the largest proportion of the mortality takes place in children. This has perhaps been, without sufficient caution, attributed entirely to neglect of vaccination. Whereas it distinctly appears from the Chester Tables, 1772–77, that “nearly the same mortality took place between the ages of one and two, two and three, and three and five; and that between five and ten it did not exceed two-fifths of the mortality of each of the previous periods. It must at the same time be observed, that this diminution between the fifth and tenth year depends upon local causes, since few of the natives of Chester above seven years old had not been exposed to the variolous contagion.”¹

Enough has been stated to show the very marked change which has taken place in the prevalence and character of small-pox since the introduction of vaccination: whether the maximum of benefit which that discovery is capable of conferring has yet been attained, is our next subject of inquiry.

III. WHAT SMALL-POX OUGHT TO BE.

The contrast afforded by the comparison between what small-pox

¹ *Craigie’s Practice of Physic*, vol. i., p. 581.

was up to the beginning of the present century, and what it now is, in respect alike to its prevalence and to its severity, leads naturally to the inquiry, what the agency has been by which so striking a change has been effected, and how far that agency is capable of being further extended in its application and efficiency.

The attempt to discover some protection against small-pox is of old date in its history. Boerhaave (*Aphor.* 1388–1392) discussed the possibility of preventing small-pox by internal medicines; but about the beginning of the eighteenth century,¹ the practice of inoculation, which had been resorted to in the East for ages, and which is said not to have been unknown in Scotland and Wales, was recommended by British physicians, who had witnessed in Constantinople and Smyrna the great success of the practice.—(Baron's *Life of Jenner*; Simon's *Report*.)

In small-pox a virus is elaborated, which is found in the fluid contained in the pustules; this virus contains, as it were, the essence of the disease, and being inserted under the cuticle of a healthy person, it excites a local specific action, which is afterwards communicated to the system.

There can be no doubt that the chances for the life of the patient were much greater under the artificial than under the natural disease; but still virus taken from the mildest case of small-pox might communicate the severest form of disease. Many died of the inoculated small-pox. But the chief objection to the practice was, that however great the advantage might be to the individuals inoculated with, and passing safely through the artificial disease, by multiplying the foci of contagion it tended progressively to augment the general mortality from small-pox.—(Heberden on the *Increase and Decrease of Different Diseases*, 1801; Moore's *History of the Small-Pox*.)

In the history of the Norwich epidemic given by Mr Cross, already referred to, the inoculation of three children by an apothecary was a powerful means of diffusing the poison and increasing the spread of the disease; and in India, where the natives still practise it, it is found to cause a great increase of the disease. In 1841, chiefly by the exertions of Mr Wakley, a bill passed through Parliament rendering its employment in this country illegal.

That its use will ever be resorted to again, is extremely improbable, although the late Dr George Gregory, of the London Small-Pox Hospital, believed “that the argument against inoculation, drawn from its supposed tendency to augment and multiply the force of contagion, is not so forcible as the opponents of contagion invariably allege;” and that author seems to anticipate a time when “inoculation may co-operate with vaccination in the general design of mitigating the severity of small-pox” (*Library of Pract. Med.*,

¹ Lady Mary Wortley Montague's child, Edward, was inoculated in 1717 at Constantinople, and her daughter in England in 1722, being the first case in this country.

vol. i.). But the very close of the eighteenth and the beginning of the nineteenth century witnessed the discovery and introduction of vaccination,—a method of procedure which, while it seemed to afford a protection as efficient as inoculation, was free from the two great objections to that practice—danger to the individual operated upon, and danger to those with whom that individual might come in contact.

It is a law of epidemic diseases, subject of course to exceptions, that they seldom attack the same individual more than once. The protective power of vaccination, equally with that of inoculation, depends on the operation of this law.

In the latter case, the disease of small-pox attacks the patient in a modified, and usually a mild form; in the former, the poison becomes still further changed, and communicates a disease of the mildest possible character, but still sufficient in most cases to secure immunity from future attacks of small-pox. But to the law which has been stated there are exceptions. Individuals *may* have more than one attack of small-pox, and the second attack *may* be of a severe character; to such persons, neither inoculation nor vaccination can insure perfect security, and much of the doubt which has been thrown of late years upon the efficiency of vaccination seems to have arisen from the necessary occurrence of these exceptional cases having been lost sight of. It is a curious circumstance, that after inoculation had been some time in use, similar doubts as to its efficacy were started, arising apparently from the same exceptional cases. The early inoculators, like the early vaccinators, denied the possibility of the secondary occurrence of small-pox, dreading that such a belief might be injurious to the diffusion of the operation.

But, says Dr Thomson (*History of Small-Pox*, p. 137), “Notwithstanding this unwillingness on the part of inoculators to admit the occurrence of secondary small-pox, cases of this kind have often presented themselves to the observation of medical practitioners, in the epidemic prevalence of this disease, at different times, and in various countries of Europe; and these cases have occurred in circumstances, and with symptoms, which do not appear to have left any room for doubt with regard to the genuine nature of the disease.”

Another great advantage which the practice of vaccination with cow-pox has over inoculation, is, that while epidemics of small-pox greatly increased during the prevalence of the practice of inoculation, they have greatly decreased since the introduction of vaccination. An ingenious writer in the *British and Foreign Medico-Chirurgical Review* (vol. xx.) shows, from the Report of the Epidemiological Society, that during 63 years, in which inoculation was practised, there was a ratio of 84 epidemics in 100 years; during the last 50 years (from 1807), the ratio is 24 epidemics in 100 years.

The great alarm which at present prevails, not only as to the frequent occurrence of small-pox, but also as to the number of those previously vaccinated who are attacked by the disease, appears to

arise from an opinion, once cherished by medical authorities, still pervading the public mind, that those who pass through cow-pox in a regular and satisfactory manner are, or ought to be, rendered *wholly* unsusceptible of small-pox contagion. Now, in every epidemic of small-pox a certain proportion of those who had suffered previously from the disease are found to be attacked a second time, and therefore it is only reasonable to suppose that a certain number of those who have been vaccinated will also suffer. Epidemics vary also in their power; and hence, during the prevalence of certain epidemics, an unusual number of those who are still liable will be attacked. It seems to have been established in all the outbreaks of small-pox, that certain individuals who seemed proof against contagion in one epidemic succumbed to it in another.

The following conclusions, arrived at by the Faculty of Medicine at Prague, and appended to Mr Simon's Report, put the whole case on so clear and satisfactory a footing that I make no apology for quoting them entire:—

“1. Small-pox not only may, but does attack even persons who have been successfully vaccinated.

“2. Death from small-pox occurs not only with non-vaccinated, but also with vaccinated individuals.

“3. Vaccination with cow-pox does not, therefore, secure a certain safety from small-pox.

“4. The number of small-pox cases in general (vaccinated and unvaccinated), in proportion to the number of the population, is, at the present time, unproportionally smaller than before the introduction of vaccination.

“5. If the proportion of small-pox patients who have been vaccinated greatly exceeds that of those who have not been vaccinated, this fact must not be lost sight of, that in the present day (in this country) the population of non-vaccinated individuals is very much smaller, and with the spread of vaccination for cow-pox it decreases each year.

“6. The greatest number of small-pox cases which terminate fatally in the present day, is not only much lower than the highest number during a like period in times before the introduction of vaccination, but even in an extraordinary degree lower than even the lowest number in such former times.

“7. The great variability of small-pox cases and deaths observed in the different years, shows that now, as formerly, the small-pox at times takes a greater range; at the same time experience teaches

“8. That, in comparison, a greater number of non-vaccinated persons (notwithstanding their great minority) are attacked with small-pox and die, in almost the same proportion as before the introduction of vaccination; whilst,

“9. As regards vaccinated persons, notwithstanding their overwhelming majority, the favourable comparison shows itself in an extraordinary manner, inasmuch as the cases which terminate

fatally may almost be termed singular, when it is taken into consideration that in forming these conclusions only the successful cases of vaccination could be reckoned."

Observing, as we do, that in the prevalence of epidemics the non-vaccinated exhibit the disease in as severe a form as was ever witnessed in its history, and yet that the mortality from it is so much diminished, and also that those severe cases are seldom seen in the upper classes of society, the conclusion becomes irresistible, that we are indebted for these modifications of the disease to the practice of vaccination; and that, were that practice as general and as carefully performed among the lower as it is found to be among the upper classes of society, they might enjoy an equal share in its protective power. That small-pox will ever be entirely exterminated by it is very doubtful, when it is remembered,

1st, That small-pox spreads epidemically as well as by contagion.¹

2^d, That there are individuals to whom neither a previous attack of small-pox nor vaccination affords immunity from a subsequent attack of the disease; but, though isolated cases might occur, yet were vaccination universally practised, they would be surrounded, so to speak, by non-conductors of the contagion, and thus the spread of the disease from each focus of contagion would be to a great extent prevented.

3^d, The mortality from small-pox in the unvaccinated, taken generally, is 35 per cent. of those attacked, but of children under five years of age it is 50 per cent.; the mortality, on the contrary, among the vaccinated attacked by small-pox, is 7 per cent. taken generally. But among what may be characterized as the badly vaccinated, it is 15 per cent.; among the well vaccinated, 1 per cent.—(Mr Marson's *Petition to House of Commons on Vaccination Bill*, 1856.)

4th, The deaths from small-pox in Scotland are never less than 2 per cent. of the whole annual mortality in the eight large towns, and in January 1856 were as great as 30 per cent. in one of them.

5th, It appears, by evidence collected by the Epidemiological Society, that since compulsory vaccination was resorted to, the fatality of small-pox in Copenhagen is but an eleventh of what it was; in Sweden, little over a thirteenth; in Berlin, and in large parts of Austria, but a twentieth; in Westphalia, but a twenty-fifth. In the last named instance, there now die of small-pox but four persons, where formerly there died one hundred.²—(Simon's *Report*, p. xxiii.)

An opinion has been maintained, that the protective power of vaccination becomes gradually weaker, and at length apparently dies out, in the individual. It may be admitted that there is ground for

¹ The existence and spread of small-pox epidemically, though urged by Al-Rhasi, Sydenham, Hoffmann, Boerhaave, Ramazzini, Frank, and many others, was, nevertheless, denied by Seuderi and Haygarth.

² These calculations, however, cannot be recorded without the caution that in the worst days of small-pox, it often disappeared from certain localities for a time.

a suspicion that this may in part be true; and that as, after childhood, the susceptibility to small-pox increases from fifteen to twenty-five years, revaccination about puberty will always be a safe precautionary measure.

Another opinion has been hazarded, that the vaccine lymph has lost its power, to a certain extent, by its passage through numerous human bodies, and that it would be well to recur from time to time to the cow for a supply. There can be no doubt that the effect produced by matter direct from the cow is often more severe than that from matter transferred from one child to another, especially in the febrile disturbance; and the experiments of Gregory, Field, and Steinbrenner have shown that the matter taken from the human subject does not produce all the effects of that from the cow. The National Vaccine Establishment, however, state in their Report for 1854, "that the vaccine lymph does not lose any of its prophylactic power by a continued transit through successive subjects."

IV. SUGGESTIONS FOR LEGISLATIVE INTERFERENCE.

1. *Necessity of Interference for Scotland.*—England has a Vaccination Act,—Scotland has none. "Bearing in mind," says Dr Seaton, "that in no country in Europe, which furnished returns to the Epidemiological Society, is the average mortality from small-pox so high as in London, or in England and Wales generally, in either of which it constitutes about $1\frac{1}{2}$ per cent. of the mortality from all causes; bearing in mind that the proportional mortality in London has never, during the last ten years, attained 3 per cent., we read with amazement and regret, that in Aberdeen, in July 1856, small-pox caused 10 per cent., in Edinburgh $5\frac{1}{2}$ per cent., and in Paisley 5 per cent. of the total mortality; and that Paisley and Leith should now (1857) be going through epidemics similar to that which, at the commencement of last year, was so fatal in Dundee" (30 per cent.). The cause of this high mortality has been shown, by the inquiries of the Registrar-General and district registrars, to be the neglect of vaccination. This was demonstrated in 1857, in a Report presented to both Houses of Parliament; but up to this time, no attempt has been made to remedy so glaring a defect in our sanitary state.

The only regulation respecting it is contained in an order of the Board of Supervision, dated 21st October 1848, requiring every parochial medical officer to be at all times furnished with vaccine virus, and to vaccinate without charging a fee, at stated times and places to be named by the Parochial Board, all persons who may come or may be brought to him for that purpose. Another minute of the Board of Supervision, dated July 13, 1854, explains that the gratuitous vaccination is not to be limited to paupers, but to be extended literally to *all* persons claiming it.

It would not require a very careful investigation to show that these rules are, in most country districts, entirely inoperative. At

first, medical men attended at the stations; but finding that infants were not brought,—although they had travelled great distances without renumeration to meet them,—they fell back on the rule compelling them, if they disappointed the parents by non-attendance at the stations, to vaccinate the infants at their own houses. In many extensive parishes, no applications for vaccination under the rules of the Board are ever made.

The first grand error in these regulations, is similar to one which may be held to lie at the bottom of much of the inefficiency of the English Compulsory Act,—the placing the arrangements under the charge of the Poor Law Boards. In this case, as also in that of the enforcement of the Nuisance Removal and Diseases Prevention Act, we cannot look upon authorities constituted merely for the control and relief of paupers, as the fitting body to whom to commit measures of sanitary police.¹ The opinion of the Epidemiological Society may be quoted on this point:—

“It is manifest, in the first place, that the vaccination of the people, which is a measure undertaken by the State for the security of the public, has nothing in it of the character of alms, and does not fall properly under a department of Government whose sole function is the distribution of alms.”—(*Report*, 1855, p. 4.)

To this cause much of the opposition which the Act has met with both from the public and from medical practitioners in England may be ascribed;² and one can scarcely refuse to sympathize with the reluctance of parents in the more independent classes of society, to send their children, along with those of paupers, to a public vaccination station, there to have the operation performed by a public officer,—a perfect stranger to them, it may be,—and paid by the Poor Law guardians.

Security ought, however, to be taken, that the operation is efficiently performed. We admit that there is room for improvement in this respect, though we cannot see any ground for the late very sweeping regulations of the Privy Council,—as yet only applicable to England. By these, it is proposed to take vaccination out of the hands of the profession altogether, and to place it in charge of certain individuals specially educated for the purpose. We consider this as degrading to the profession. If a practitioner holding a qualification in medicine and another in surgery,—as he must do before obtaining a Poor Law appointment,—is unable to perform the simple operation of vaccination, let the authorities in our medical schools, and especially let the General Council of Education, look to it.³ But is there any evidence of this to an extent to require

¹ For some admirable remarks on this, see Rumsey's *State Medicine*, Essay iv. chap. 4.

² For numerous instances of this, see Rumsey, p. 380 et seq.

³ Our Examining Boards should require a certificate that every applicant for their license has seen and watched the progress of a certain number of cases of vaccination.

so obnoxious a regulation? It is admitted that, among the lower orders, inefficient vaccination does prevail; but not so much from ignorance, as from carelessness on the part of the medical attendant, and still more on that of the parent. The mere operation is so simple, that the failure cannot be in the method of its performance, and must consist in neglect to watch the subsequent progress of the vesicle; and can this be wondered at, when two shillings and six-pence is considered sufficient pay for an educated medical man, for vaccinating, inspecting, once at least,—travelling, possibly, four miles each visit, or eight in all,—keeping three separate entries, and granting two certificates! The face of a legal gentleman called on to do the same amount of work, for the same pay, would be an interesting study to the physiognomist!

The recent order of the Privy Council appears to have been suggested by Mr Marson's paper and elaborate tables, published in the *Med.-Chir. Transactions*, vol. xxxvi. Now, the test which Mr Marson assumes to determine the character of the vaccination, and on which he decides that vaccination is often inefficiently performed, is the cicatrix.

Mr Marson says, "The most trustworthy evidence we can generally obtain of its perfection, is from the cicatrices." Now, tried by a much more delicate test—that of revaccination, the Wirtemberg physicians were led to conclude, according to Heim, that little or no reliance is to be placed on the character of the cicatrix. "It was ascertained," says a reviewer (*Brit. and For. Med. Rev.*), "that the pustules of genuine cow-pox (analogous in this respect to small-pox) may leave an imperfect mark, or even no mark at all; and that, on the other hand, to depend upon the regular appearance of the mark, as a sign of protection, was only to adopt a dangerous error, and to lull the public into a state of false and dangerous security. The circumstances attending the epidemic prevalence of small-pox, as well as the effects of the revaccination, prove that the cicatrix-theory is untenable."

Nor can we, consistently with any admitted theory of the operation of cow-pox as a protective, recognise the necessity of making numerous punctures in the operation of vaccination.

3. Another error in the English Compulsory Act would appear to have been the fixing of the age of three or four months as the extreme limit for vaccination. That the bringing of young infants to vaccination stations in inclement seasons must be most dangerous, few will be inclined to dispute; and in many of the continental states, where the mortality from small-pox is at the lowest, vaccination is not enforced under one year.

To suit the requirements of Scotland, no very complicated Act would be required.

1st, In the first place, it would be exceedingly unwise that Scotland should be left dependent for its supplies of pure lymph on the London Vaccine Establishment; a central depot should be provided

in Edinburgh, with corresponding ones in every town having a population sufficient to support it. These, in the towns which are the seats of medical schools, would also afford the means of instructing students in vaccination.

Mr Ceely,¹ in his communications with the Secretary of State in 1853, stated it as his opinion, that a station for weekly careful vaccination could not be maintained by its own operation, and with advantage to the public, in any population less than 60,000.

Only four towns in Scotland have a population over 60,000.

Glasgow, with an estimated population of 388,537, and 15,887 births annually, would require six stations.

Edinburgh, population 182,464, annual births 5186, would require three stations.

Dundee, population 94,299, births 3475, one station.

Aberdeen, population 80,429, births 2396, one station.

Eleven stations would thus be required in Scotland, ten of which would be at the seats of the medical schools, and no town having a medical school would be left unprovided. The vaccinators at these stations should of course be salaried, and be bound to furnish lymph of good quality, free of expense, to all applicants. The immense facility for this afforded by the ingenious method of preserving lymph fresh and fit for use, protected from all decomposing agents, introduced by Dr Husband of this city, and now recommended by the Privy Council, will be appreciated by all who have employed it.

2d, The machinery for securing universal vaccination should be transferred from the Poor Law Board to the registration officers. Let each parent, on registering the birth of a child, be furnished with a blank form to the following effect, which should be returned by him to the registrar within a year, signed by a duly qualified medical man, under a penalty :—

I _____ qualified and registered as a (a)
under the Medical Act, hereby certify, that I duly vaccinated (b)
on the _____ day of _____ 186_____, by (c) punctures; that
I saw the child (d) days after, and the vesicles exhibited the appear-
ances of the true Jennerian vesicle, as laid down in the official
instructions to vaccinators, or (here insert any deviations).

(Sign here) _____

Dated at _____

(a) Physician, Surgeon, or Apothecary.
(c) Number.

(b) Name of child.
(d) Number.

3d, All paupers should be entitled to apply for vaccination for themselves and children to the parochial surgeon, who should receive a suitable fee for each operation and for furnishing the certificate.

4th, Parents, not paupers, but who may object to pay for vaccina-

¹ By the kindness of Mr Ceely, I have had an opportunity of perusing these communications, and trust that they will yet be published.

tion, should be furnished by the inspector of the poor with an order on the parochial surgeon, who should then vaccinate, and be paid by the Board.

5th, Penalties should be inflicted for false or fraudulent certificates.

6th, No one should be admitted into any public employment, or into any workshop or factory, where numbers are employed, or into any school under Government inspection, without the production of a vaccination certificate.

By these means, the general diffusion of vaccination might be anticipated, and the mitigation of the severity of small-pox epidemics realized.

To carry out these objects, a memorial was submitted, in 1859, by the Colleges of Physicians and Surgeons of Edinburgh to the Lord Advocate, in which the lamentable neglect of vaccination was set forth, and the heads of a simple measure for remedying it suggested. Such a bill would only require nineteen clauses, the nature of which may be shortly indicated.

1st, Preamble, pointing out the necessity of such a measure.

2d, Interpretation clause, defining terms used in the bill.

3d, Act to apply to Scotland, and to be in force from 1st Jan. 1861.

4th, Expenses of execution of Act in each district to be borne by the registration assessment except as provided by clauses 11 and 12.

5th, Vaccination not to be considered as poor law relief.

6th, The registrar of each district to deliver to every one registering a birth a blank form of certificate. (*Vide antea.*)

7th, On such a certificate being returned, the registrar to enter it in register of births.

8th, The registrar to transmit to procurator-fiscal the names of parties in arrear of certificates.

9th, When vaccination has to be delayed from bad health or any other cause, a certificate to that effect to be sent, and tosist prosecution.

10th, When vaccination has not taken effect after three vaccinations, at intervals of three months, a certificate of insusceptibility to be sent to registrar, and to bar further procedure.

11th, Provision for vaccinating at charge of Parochial Board, and by parochial surgeon, all persons on the poor roll and their children.

12th, Allowing inspector, after inquiry, to issue a warrant for vaccination, gratuitous to the individual, but at the expense of the Parochial Board, to all persons not actually paupers, but who satisfy him that they are unable to pay a fee for vaccination.

13th, Provision for securing vaccination in emigrant ships, poor-houses, jails, schools, and all other institutions supported wholly or in part at the public expense; as well as in factories, for admission to which a surgeon's certificate regarding age is at present required.

14th, Provisions for securing the vaccination of the adult unvaccinated population.

15th, Provision for the institution of a general and local vaccine establishments, to provide a due supply of lymph and to form schools where vaccination can always be seen in operation.

16th, Penalties, and their recovery.

17th, To forbid inoculation, and to impose penalties to prevent persons recently convalescent from small-pox, travelling in public conveyances.

18th, The due performance of the Act in each district to be watched over by the superintending Registrars, and the Registrar-General to report annually to Parliament on execution of Act.

19th, Short title.

As at present the children of all parents on the poor-roll are vaccinated, and as in the upper classes of society vaccination is universal, it is only unvaccinated adults and the floating population immediately above pauperism that would require to be dealt with, so that the expense of carrying out the Act would not be great, especially as existing machinery would be made available.

ARTICLE IV.—*On the True Relation between Synovitis and Ulceration of Articular Cartilage.* By RD. BARWELL, F.R.C.S.E., Asst.-Surgeon, Charing-Cross Hospital, London.

MANY of the processes, which are carried on in the human body, are the more comprehensible to our minds, because a machinery for their performance is plainly perceptible to our senses. Thus voluntary motion is produced by the evidently demonstrable muscles, and nutriment is carried to them by straight vessels, which may be seen running among the fibres. Secretion is performed by a number of cells on one side of a flat, corrugated, or tubular membrane, on the other side of which are vessels, supplying pabulum to those cells.

On the other hand, processes, either normal or abnormal, which we know are carried on, but for whose performance we have not yet found adequate machinery, remain obscure to our comprehension, and will so remain until we either find a hitherto undiscovered power, or until the powers, already known, shall have been proved sufficient to produce the effect we would explain.

Much of the physiology, as at present accepted, of the articular cartilages, is in this latter condition, and naturally the pathology is in a similar or even less comprehensible state. It is but a short time since articular cartilage was looked upon as a dead material,¹ incapable of any vital action,² whose changes depend upon its being soaked in diseased fluids from the joint-cavity,³ just as a sponge is softened by saturation in alkalies; and that this softened tissue was

¹ Key, *Med.-Chi. Trans.*, vol. xviii.

² Key, *loc. cit.*, *Henle and Mandl. Müller's Archiv.*, vol. iii.

³ Toynbee, Rokitansky, and others.