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Contributors

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For Review

VACCINATION,

AND WHAT IT DOES,

SIMPLY EXPLAINED.

BY

MRS. ERNEST HART,

AUTHOR OF "DIET IN SICKNESS AND IN HEALTH."

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VACCINATION, AND WHAT IT DOES.

The discovery of Vaccination.

TOWARDS the end of the last century, when small-pox was an ever-present and virulent disease afflicting and killing hundreds of thousands of persons every year, Dr. Jenner, a practising physician in the Vale of Aylesbury, noticed the fact that the dairy-maids who got sores on their hands after milking cows whose udders were covered with similar sores, never caught small-pox though it was raging around them. This strange circumstance set him thinking upon a course of investigation into its cause. The result of his inquiries was to discover that the sores on the udders of the cows were identical with the pustules of small-pox, and,

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further, that the reason why the dairy-maids who had sores on their hands from milking the cows did not catch small-pox, was due to the fact, that if the poisonous matter or virus of the disease be passed through the body of another animal, it is rendered thereby much weaker. If the virus be then taken from the second animal and introduced in its weakened condition into the human system, it will produce a much milder and a strictly limited attack of the original disease, which attack will at the same time effect such a change in the human body as to render it incapable of contracting the disease in its virulent form,—much in the same way, indeed, as an attack of a disease (as, for example, scarlet fever) protects the patient from a second attack of the same disease. This is the principle of vaccination. Its truth and its application to other diseases have been fully confirmed since the days of Jenner by the discoveries and practice of Pasteur and others. It was subsequently found that it was not necessary to pass the

virus always through the body of the cow, but that virus which had been once passed through the cow, could then be safely passed from one human being to another from arm to arm for many generations, it being only necessary to obtain from time to time fresh vaccine lymph by passing the virus again through the body of the cow.

What Small-pox used to be.

In the last century small-pox was a terrible plague. In England it killed 3000 people every year out of 1,000,000 of the population, and those it did not kill it often left blind and maimed for life. The children suffered most. Out of every 100 children born, 90 caught the small-pox, and one-sixth of them died, and scarcely anybody grew up without having had small-pox. Rich and poor suffered equally. Queen Anne lost three of her children by small-pox, and Queen Mary died of it. It always became epidemic every two or three years. All writers of that time speak of the awful

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disease with dread, and the people looked upon its ravages with despair.

What Vaccination did.

With the discovery and introduction of vaccination came a great change. From 1798 to 1840 vaccination was voluntary, and a number of charitable institutions were started to enable the poor to be vaccinated. The people eagerly took advantage of the benefit of Jenner's discovery, and nine years after vaccination was introduced, small-pox had become a milder disease in the vaccinated, and the mortality fell from 3000 to 600 per million of the population.

The following table will show what vaccination has done to diminish the ravages of small-pox :—

ENGLAND.		Deaths per million of the population.
Before the discovery of vaccination	.	3000
1798-1840. After the introduction of vaccination	.	600
1840-1853. After Parliament had granted funds to make vaccination gratuitous though not obligatory	.	305

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1854-1871. Vaccination obligatory, but means not provided to carry out the law	223
1872-1891. Vaccination compulsory, and more efficiently enforced	89

SCOTLAND.

1855-1863. Before vaccination became com- pulsory	319
1864-1873. The first decade of compulsion, including most of the epidemic of 1871-1874	227
1874-1883. Second decade: Vaccination actively promoted among the people . . .	38
1884-1893. Third decade	4

IRELAND.

1831-1841. No public provision for vacci- nation	725
1841-1851. After Parliament had provided for gratuitous though optional vaccination .	493
1851-1863. Further facilities provided for vaccination	193
1864-1873. First decade of compulsion, during which occurred the epidemic of 1871-3	109
1874-1883. Second decade	63
1884-1888. Strengthened arrangements for enforcing vaccination	5

The population of England and Ireland now numbers 30,000,000, and there would at the present time be a probable annual death-rate of about 90,000 from small-pox if

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it were not for vaccination. These deaths would be chiefly among our children, who, owing to infant vaccination, are now the most protected from this disease. The protection is not as great as it might be, as owing to the pernicious influence of anti-vaccinators and the ignorance of many people on the subject, only 95 per cent. of the population are vaccinated.

What has been done in Ireland and Scotland.

In Ireland, where there are no Anti-vaccination Societies, the people are so well protected that the deaths from small-pox only number about 5 per million.

In Scotland the compulsory law only took effect in 1863. Eight years later, when the great epidemic which originated in the armies engaged in the Franco-German war struck Scotland, it found only the children protected by vaccination; but with the strong common sense which characterizes the Scotch people, the adults rushed to be

vaccinated, and thus the epidemic was stamped out. The number of deaths rapidly fell in 1875, and the latest figures available show that during the ten years 1884-1893 the small-pox mortality in the whole of Scotland had dropped to 4 per million of the population.

What has been done in Germany.

Before 1874 re-vaccination was not compulsory on the whole population, but recruits for the army were re-vaccinated. In the year of the war between France and Germany, Prussia had 216,426 of her soldiers re-vaccinated. France in her hurry and alarm neglected this precaution, and only 40,000 soldiers were re-vaccinated. Small-pox broke out in the French army, and no less than 23,469 French soldiers died of the disease, while of the re-vaccinated German soldiers exposed to the same contagion and the same hardships, only 316 died. The soldiers carried, however, the small-pox back to Berlin, and there the

unprotected population suffered severely. From the hotbed of small-pox among the unvaccinated French soldiers, small-pox spread all over Europe, and even extended to North and South America, and to the South Sea Islands.

The barrier of vaccination, with all the breaches made in it by the presence of unvaccinated persons was not strong enough and perfect enough to resist this great wave of epidemic. The lesson was not, however, thrown away on Germany. She noted that her soldiers had suffered much less than the French, and a Royal Commission was appointed to make inquiries, with the result that it recommended not only that the soldiers should be re-vaccinated, but that the whole civil population should be re-vaccinated on reaching the age of puberty. This recommendation has been carried out, and the results have been most remarkable. In the German army, for the four years previous to the great epidemic of 1871, the cases of small-pox had been on an

average 46 per 100,000 soldiers with 0·4 per cent. deaths. In 1871 they rose to 1249 with 60 deaths. At the introduction of compulsory re-vaccination the cases fell to 8, 6, 4, 2, per 100,000 with no deaths. Among the civil population the same protection has been obtained. Previous to the passing of the law in 1874 making re-vaccination compulsory on reaching the age of 12 years, the mortality from small-pox varied between 15 and 20 per 100,000 of the population, but reached more frequently the latter figure, and during the epidemic of 1871-1872 it rose to 243 and 262. In 1874 the law making re-vaccination compulsory came into force, and in 1875 the mortality fell to 3·6 and has not risen above this figure, but has fallen as low as 0·3.

Does Vaccination prevent Small-pox entirely?

That efficient vaccination in infancy and re-vaccination in adult life can stamp out

small-pox entirely, is proved by what has been done in Germany during the past twenty years. Let the same plan be followed everywhere for fifty years, and small-pox will become an unknown disease of the past. It is the unvaccinated population who generate small-pox, and it is they again who suffer from it. From France's unvaccinated soldiers all Europe was infected. The deaths from small-pox are in exact proportion to the protection afforded by vaccination. In the London epidemic of 1881, 3350 of the total unvaccinated population died of small-pox; whilst only 90 per million of the vaccinated died. Moreover, of the vaccinated who died, it was those in whom the vaccination marks were imperfect, few in number, or worn out, who suffered the highest mortality.

The epidemic of small-pox in Sheffield in 1887-88 illustrates in the most striking manner the protection afforded by vaccination. In this town it was found that there were 68,236 vaccinated children and 2259

unvaccinated under 10 years of age. Out of the 68,236 vaccinated children there were 353 attacks and 6 deaths, but out of the 2259 unvaccinated children there were 228 attacks and 100 deaths. It may be deduced from these facts that, if all the children of Sheffield had been vaccinated, there would have been 364 cases of small-pox with six and a fraction deaths, and if all had been unvaccinated there would have been 7110 attacks with 3120 deaths, or more than 500 times greater mortality.

In the London Small-pox Hospitals the nurses and doctors are fully protected by re-vaccination, and there has never been a case of death from small-pox among them, though they are exposed to the full effects of the contagion. Persons vaccinated not only die in much fewer numbers, but when they contract small-pox they generally have the disease in a much milder form. It may be estimated that of the unvaccinated, about $97\frac{1}{2}$ per cent. have the virulent form, and $2\frac{1}{2}$ per cent. have the mild form of the disease ;

and of the vaccinated, 73 per cent. have the mild form, and only 27 per cent. the virulent variety. There is no doubt that by a perfect system of infantile vaccination and adult re-vaccination the loathsome disease of small-pox could be stamped out altogether.

**Vaccination should, however, be
Efficient.**

It is not enough, however, to be vaccinated, it is vitally important to be efficiently vaccinated. Three good marks should be the badge of efficient vaccination. There is nothing more plainly evident and demonstrable to those medical men who have practically and thoroughly studied this question that, though inefficient vaccination and the production of one or two marks may be sufficient to modify the disease when it is contracted and make the attack milder, it is only efficient vaccination, with the production of three good marks, that will give full protection.

The Dangers of Vaccination.

These must be considered, for though vaccination has saved millions of lives, and prevented an amount of misery and suffering which cannot be estimated, it is alleged it has caused some deaths. These deaths are said to be owing to the introduction of a foul disease, and to erysipelas set up by the tiny wound made. The danger from the first is, even in the published opinion of Mr. Peter Taylor, the great anti-vaccinator, "infinitesimal." From 1852 to 1883, 17 millions of children were vaccinated, and among these there were six very doubtful cases of specific infection. Gross carelessness alone can produce this catastrophe, and proper care can prevent it. In one year 930 children were smothered under the bedclothes. Is this a reason for discarding bedclothes? Is it not rather a plea for exercising greater care in their use? Erysipelas and eczema may, we admit, follow the irritation of teething, or any small wound in an unhealthy child ; but

shall we condemn millions of children to a loathsome disease and painful death because an infinitesimal few suffer from the process of protection? As well might we return to the barbarous and painful methods of performing operations before chloroform was introduced, because chloroform has caused the death of some persons operated upon. Man is mortal; we cannot protect him from death, but we can protect him from disease and suffering, and we can protect him from small-pox by vaccination and re-vaccination.