morning by a bath containing some dried carbonate of soda; and she was directed to take five drops of Donovan's solution (liquor arsenici et hydrargyri iodide) twice daily in a glass of water after meals. The diet was ordered to be vegetable and fatty. In ten days, the scales were completely removed, the mother remarking that the lotion seemed to dissolve them. The alkaline baths cleansed the skin, leaving faint reddish colorations indicating where the patches had been.

I saw her several months later, when the disease had not recurred; but it remains to be seen whether the cure is permanent or not.

ON THE USE OF GOULEY'S TUNNELLED INSTRUMENTS IN THE TREATMENT OF TIGHT STRICTURES OF THE URETHRA.

By REGINALD HARRISON, F.R.C.S.,
Surgeon to the Liverpool Royal Infirmary.

At the last meeting of the Lancashire and Cheshire Branch, I advocated the more general employment of Gouley's tunnelled bougies in the treatment of tight strictures of the urethra. I have recently had under treatment, in my wards at the Liverpool Royal Infirmary, three cases which well illustrate the observations I then made as to the great service these instruments were capable of rendering.

CASE I.—On June 27th, 1878, J. P., aged 27, was admitted suffering from stricture of several years' duration. On this, as well as on a previous occasion, it was found necessary by my house-surgeon, Mr. Hodgson, to tap the bladder above the pubes with the aspirator. This gave immediate relief. Two days after his admission, he again had retention whilst I happened to be in the Infirmary. I succeeded in passing one of the finest filiform bougies, and upon this a tunnelled catheter, which was retained for some hours; from this date, dilatation upon the same principle was gradually commenced, the size of the tunnelled instrument being increased from time to time until a No. 9 ordinary bougie passed easily, when the patient left the hospital.

CASE II.—J. W., aged 60, was admitted under my care on June 12th, 1878. Thirty years previously, he had a fall on his perinaeum, rupturing his urethra, for which perineal section was successfully performed by Dr. Evans of Belper. Unfortunately, the patient does not appear to have followed up the treatment of his own case by that regular introduction of bougies which in all cases of traumatic stricture is absolutely necessary, and occasional attacks of retention were the natural consequence. As I expected, I found a very tight stricture, which would only admit a filiform bougie. Upon this a tunnelled bougie was passed, and dilatation continued until a Holt's instrument could be introduced. On several subsequent occasions, I passed Holt's instrument, using it as a dilator on the principle of a glove-stretcher; by these means, the dimensions of the urethra were soon enlarged, and the patient was able to leave the Infirmary, passing urine in a good stream.

CASE III.—W. J., aged 42, was admitted on July 5th, 1878, suffering from retention of urine, which had existed almost completely for a week, it having been found impossible to pass a catheter. On admission, I could only get into the bladder the finest filiform bougie, upon which a catheter was passed. The urine was most offensive, and cystitis was present. Rapid dilatation was employed until a catheter was passed sufficiently large to allow of the bladder being washed out. In addition to the cystitis, there was a large suppurating pouch behind the stricture, with extensive kidney-disease. The condition of this patient illustrated the consequences which may arise where a stricture of the urethra is allowed to remain untreated. He gradually sank with symptoms of uremia, and died on July 14th. A *post mortem* examination showed what had been predicted—viz., a suppurating pouch behind what had been a very tight and extensive stricture, cystitis, and suppurative nephritis.

In commenting upon my remarks, Mr. Lund drew attention to an objection that can be raised to the use of these instruments—viz., that, on passing the metallic bougie along the whalebone guide, unless care be taken, the bougie is apt, on reaching the stricture, to double upon the guide, and then, if force be exercised, a false route may unintentionally be made. Short of failing to introduce the guide, this is the only accident that is likely to occur in the use of these instruments. It does not, in my opinion, detract from their efficacy, inasmuch as I can hardly imagine any surgical instrument being made without requiring in its use that skill and knowledge which can only be acquired by experience and observation. I admit the propriety of Mr. Lund's comment, and record it as a point to be remembered when using these instruments.

VACCINATION.*

By CHARLES E. STEELE, M.R.C.S.E.

VACCINATION is the term used to designate the process by which a disease derived from the cow, called "Variola Vaccinia," is introduced into the human subject as a protection against small-pox. Before the discovery of vaccination, namely, until the close of last century, small-pox was by far the most formidable and fatal of all diseases that afflicted mankind. Macaulay, the historian, describes it as "the most terrible of all the ministers of death. The havoc of the plague," he says, "had been far more rapid; but the plague had visited our shores only once or twice within living memory, but the small-pox was always present, filling the churchyards with corpses, leaving on 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."

In England, the annual deaths averaged about three thousand out of every million, a death-rate which, with the present population, would give an average of more than six thousand deaths a year. Its effects on those whose lives it spared were so serious, that we are told that two-thirds of the applicants for relief at the Hospital for the Indigent Blind owed their loss of sight to small-pox. The writings of physicians of that time show that it was frequently followed by deafness, and, in constitutions disposed to scrofula, by glandular swellings, obstinate ulcerations, and other evidences of the development of that disease.

An attempt was made, early in the last century, to mitigate the ravages of the disease by the practice of inoculation, which was introduced into England, in 1721, by Lady Wortley Montagu. The process consisted of introducing the disease into the system artificially, by rubbing the matter of small-pox into the skin, which had been previously pricked or scratched. The advantage which this method claimed for itself was, that the disease was contracted in a much milder and more tractable form than when it entered the system in the ordinary way, by breathing the infected atmosphere. But although the advantages which the individual derived from inoculation were so great, there was one serious and fatal drawback to its use; and this was that its effects on the general population were most disastrous, for, the disease produced by inoculation being just as contagious as natural small-pox, it was found to multiply the foci of contagion. Hence, the general mortality from small-pox, after the practice of inoculation had become diffused, instead of being diminished, was considerably greater than it had been before that practice was known. "However beneficial," say the Royal College of Physicians (London), in their report on vaccination, "the inoculation of the small-pox may have been to individuals, it appears to have kept up a constant source of contagion, which has been the means of increasing the number of deaths by what is called the natural disease. It cannot be doubted that this mischief has been extended by the inconsiderate manner in which great numbers of persons, ever since the introduction of vaccination, are still every year inoculated with the small-pox and afterwards required to attend two or three times a week at the places of inoculation, through every stage of their illness."

Such was the state of things when, towards the close of the last century, Jenner made known to the world that he had discovered and matured a process by which persons might be protected against small-pox, without any risk of infecting others; this discovery being what we now know as vaccination. When apprenticed to a surgeon in Gloucestershire, Jenner had observed that, in that county, where cow-pox was frequently met with among the dairies and where the milkers' hands were continually getting accidentally infected from sores on the cows' teats, the notion was widely diffused that such as had been thus infected were insusceptible of small-pox. This observation led him to make investigations into the subject; and, after pursuing his inquiries for many years, he conceived the idea that not only might the cow-pox be given at will to man by the process of inoculation from the cow, wherever opportunity offered, but that it might be transferred and continued by that process from one human subject to another, and that, in this way, protection against small-pox might be imparted to mankind in perpetuity. He believed that vaccination conferred upon individuals exactly the same degree of protection (neither more nor less) as small-pox itself; or, as he stated it in his own words: "Duly and efficiently performed, it will protect the constitution from subsequent attacks of small-pox as much as that disease itself will. I never expected it would do more; and it will not, I believe, do less." In fact, he believed that the human small-pox and the vaccine disease were products of the

* Read before the Liverpool Royal Infirmary Debating Society.

same virus, and that a person having contracted the cow-pox was safe from small-pox, not because he had gone through a disease which was antagonistic to small-pox, but because he had actually gone through the small-pox itself in a modified form; hence he gave to the vaccine disease the name of "variola vaccinia", or "the small-pox of the cow". A proof of the truth of this view has been afforded on several occasions. Cows have been inoculated with human small-pox matter, and an eruption has broken out which, when communicated to the human subject, was found to produce the cow-pox.

Such was Jenner's opinion with regard to the degree of protective power of vaccination, before it had been thoroughly put to the test; but seventy years' use of the practice of vaccination has shown us that it acts, not solely in the way in which he anticipated—that is to say, not invariably by protecting—but also by controlling small-pox; or, as Seaton expresses it: "The modes in which the power of vaccination over small-pox is manifested are: 1. By conferring on the large majority of the vaccinated complete immunity from that disease; and 2. By modifying the course of the small-pox, or otherwise diminishing its danger, in those in whom the protection has not been absolute."

Having considered the degree to which vaccination protects against small-pox, let us see what results have been obtained since it has been practised. National statistics show that, since the introduction of vaccination and its general adoption, the average death-rate from small-pox is scarcely, in any European country, one-tenth part (and, in those countries in which vaccination has been most carefully carried out, it is much less than one-tenth part) what it was at the end of the last century; for instance, in England, while the annual death-rate from small-pox, per million, averaged three thousand before the introduction of vaccination, the present death-rate from the same cause only amounts to two hundred per million. It will be seen by the following table that, by taking four groups of years, each group comprising epidemic and non-epidemic years, the decline of small-pox mortality exhibits a regular progression in correspondence with the progress that has been made in the adoption of vaccination.

TABLE.

PERIODS COMPARED.	Annual death-rate of Small-pox per million of Population.
1.—Average of thirty years previous to introduction of vaccination	300
2.—Average of three years (1838-40), when vaccination had become diffused, but before public provision was made for its gratuitous performance	770
3.—Average of nine years, when public vaccination was gratuitously provided, but was not compulsory (1841-53).	304
4.—Average of twelve years (1854-65), during which vaccination was to a certain extent obligatory	202

That vaccination has exercised a marked control over small-pox generally is too conclusively shown by statistics to be disputed, but still the numerous individual instances where vaccination has failed have been put forward as arguments against it. These instances, however, may be explained as follows. In the first place, small-pox occasionally occurs twice in the same individual, and we know that small-pox occurs just as often after cow-pox as it does after small-pox. Thus we see we are able to attribute some of the cases where small-pox has followed vaccination, to the susceptibility of the occurrence of small-pox twice in the same individuals. Again, vaccination confers no protection at all upon an individual, until the cow-pox resulting from it has run its proper course, which occupies about ten days; thus we occasionally see instances where small-pox has been taken within the ten days after vaccination, the result of which is that the two diseases—cow-pox and small-pox—are seen concurrent in the same individual, each disease presenting its own characteristics. Lastly, though vaccination confers life-long immunity from small-pox upon the vast majority, there are a certain number of cases where its protective influence wears out by the lapse of time, the time of this decadence probably being about the period of puberty.

This leads us up to the subject of revaccination, and the question, to what extent is it necessary or desirable that it should be performed. It seems desirable that revaccination should be resorted to in all cases, for its objects are: 1. Repairing whatever was irregular in the course of a primary vaccination; 2. Supplying what was imperfect in the amount of infection in cases in which the course of the disease was regular; 3. Extinguishing the susceptibility to small-pox which may remain or may re-arise in an indeterminate number of persons whose primary vaccination may have been complete as well as regular. It is true that it is only in certain cases that we are able to state whether revaccination

is necessary to protect from small-pox; hence the necessity of adopting its practice in all cases, whereby we make sure of meeting all exceptional instances.

The age at which revaccination is recommended to be performed is about puberty, as this has been found by the best authorities to be the age at which it is best calculated to meet most cases, where it is necessary.

We may here allude to a prevalent error with regard to what is supposed to be the test of previous protection as afforded by revaccination. If revaccination produce a genuine vesicle, the individual is supposed to have lost the protective influence of the previous vaccination; but this is shown to be a mistake, from the fact that revaccination often succeeds even when the individual is protected by small-pox itself. In fact, Dr. Heims's experiments show that revaccination succeeds, or otherwise, in persons who have had small-pox or cow-pox almost exactly in the same ratio. And on this point, Dr. Seaton remarks: "The local results obtained by the revaccination of any individual give us absolutely no information whatever as to the constitutional condition in which the revaccinated person was with regard to liability to contract small-pox." Again, Mr. Simon observes that "inoculation of lymph, whether vaccine or variolous, is, so to speak, a finer and more delicate test of susceptibility to the small-pox poison than is the breathing of an infected atmosphere, so that many persons, when lymph of cow-pox or small-pox is inserted in the skin, evince evidence of susceptibility which no atmospheric influence would have elicited from them".

Before leaving the subject of the protective influence of vaccination, we have to consider a question which has important bearing upon it, namely: Does the vaccine virus become deteriorated by successive transmissions through numerous individuals? Jenner's opinion on the subject, before it had been put to the test, was that, with proper care, deterioration would not occur at all, though this, he said, was a point which time alone could determine; further experience fully satisfied him that his opinion was correct. But, in deciding this opinion, Jenner was most careful to draw the distinction between deterioration of lymph by mere successive transmissions (the subjects for transferring it having been proper ones), by mere lapse of time since it was taken from the cow, on the one hand; and deterioration by transmission through unselected subjects, through subjects not fit for transferring it, on the other; so that, as he said, "the matter may undergo a change that may render it unfit for further use, by passing even from one individual to another, and this was as likely to happen in the first year of vaccination as the twentieth". But that, with due care and attention, lymph underwent no change, he proved by the fact that vesicles he was then producing were, in every respect, as perfect as they were sixteen years previously, when the lymph was taken from a cow. Now, if lymph could undergo eight or nine hundred transmissions without giving any evidence of change, it seems difficult to understand how, with equal care and with similar opportunities of choice, it should not remain equally unchanged after an indefinite number of transmissions.

The lymph now used throughout the stations of the National Vaccine Establishment is, if not exclusively, nearly all of Jenner's stock, and yet it has not lost any of its infective power; and the vesicles produced by it correspond accurately, in their character and course, with those of Jenner's description. These facts may serve to set at rest the question of the desirability of resorting to the cow for fresh supplies of matter.

Having considered the protective influence of vaccination, we have to answer the question: How is it that, since vaccination can so control small-pox, there should be still such a large small-pox mortality in England? The reasons are: (1) That vaccination is still largely neglected; and (2) That in many cases it has been inefficiently performed. That these are the reasons, we have proof from analysis of the death-returns and from the results of special inquiries. An analysis of the death-returns shows that seven-tenths of the small-pox mortality is in children under puberty, at a time of life when the power of efficient vaccination to protect from small-pox is indisputable; from which we may assume the non-performance of successful vaccination in these cases; and, since fatal cases of post-vaccinal small-pox have occurred within this period of life at the Small-pox Hospital, we may assume that, in these cases, inefficient vaccinations were performed.

Special inquiries, made under the directions of the Privy Council, show that, in numerous districts, where infantile vaccination was completely carried out, not only did the death-registers show absence of small-pox mortality of the native population, but the disease itself had never made any serious lodgment, and had never to any extent spread. From this we may rightly assume that, where small-pox has raged, infantile vaccination has not been properly carried out.

With regard to the question: Why has not small-pox been stamped out entirely? or, When will it be entirely stamped out? we can only say, this will not be the case till both vaccination and revaccination are

both properly and universally performed; for, just as it will be necessary for a complete system of primary infantile vaccination, in order to control small-pox, by the prevention of the many deaths which are due to its neglect, so will it be necessary for an universal adoption of the practice of revaccination, in order to stamp out small-pox, both by preventing deaths where the primary vaccination has not been satisfactory, and in preventing the occurrence of the disease, even in its mildest form, in those cases in which the primary vaccination has been good, but, from lapse of time or other causes, the disease is liable to be taken in a modified form.

Before concluding the subject, we must consider briefly the objections advanced against vaccination. We shall not, however, stop to argue some of the absurd notions that have been put forward: such as the idea that vaccination has produced new and unheard-of diseases; that it has caused degeneration, mental and physical, of the human species; diminishing men's stature; incapacitating them for the fatigue of military service, or even for the exercise of dancing; and driving them for consolation to tobacco. These must be regarded in much the same light as notions that diseases are produced by witchcraft and the evil eye. But many, who firmly believe in the protective power of vaccination, have expressed very conflicting opinions with regard to the question: whether it is the means of increasing the mortality of other diseases, or of producing them. It has been alleged that vaccination has led to increase of the mortality of other diseases; that cutaneous and glandular diseases and syphilis may be communicated from one person to another by vaccination; and, lastly, it has been urged, as an objection to vaccination, that it is occasionally followed by erysipelas. It is alleged that, even if vaccination have lessened mortality by its protection from small-pox, yet it has increased the number of deaths in another direction, viz., of the diseases which have been communicated by its means; and, therefore, there has been no saving of life on the whole. The answer to this is: The mortality of other infantile diseases, such as measles, scarfeula, tuberculosis, etc., is not so great since the introduction of vaccination as before, and this has been well shown by statistics published by Mr. Simon.

The communicability by vaccination of cutaneous, glandular, and other diseases, including syphilis, although a popular, has never been a professional, belief. Those who have had most to do with the performance of vaccination, on the one hand, and those who have been most concerned in the treatment of infantile disease, on the other, concur in the belief of the non-communicability of disease by vaccination. Dr. Seaton says that, although he has investigated many of such alleged cases, he has never yet in a single instance found that the child from whom the lymph was taken was suffering from the disease it was said to have imparted. Mr. Marson states that, in the performance of forty thousand vaccinations, he had never seen any other diseases communicated with the vaccine disease, nor did he believe in the popular reports that they are so communicated. The experience of the late Mr. Leese, whose vaccinations had been equally numerous, was the same. Sir W. Jenner, at University College Hospital, London, in six years, in thirteen thousand cases, and Dr. West, in seventeen years, in twenty-six thousand cases, both say that in no single case had they reason to believe that any constitutional taint had been conveyed from one person to another by vaccination. The experience of Drs. Latham, J. H. Green, and others, including Sir James Paget, is to the same effect. The latter, from his experience among children at St. Bartholomew's Hospital, states his opinion as follows:—"Vaccination may, though I believe it very rarely does, give opportunity for the external manifestation and complete evolution of some constitutional affection, which, but for it, might have remained rather longer latent." "This is," he added, "the worst thing that can, with any show of reason, be charged against vaccination. Even this can very seldom be charged with truth."

In short, if men who have been all their lives professional vaccinators, as Marson, Leese, or Tomkins; if men whose professional lives have been spent in the midst of syphilis, as Lee, Acton, or Langston Parker, have met with no cases in which syphilis originated in this way, the conditions under which the occurrence can take place must be instances of rare exceptionability. During the time that there has been systematic inspection of vaccination in England, some millions of vaccinations have been performed; but the inspectors have no knowledge of such accident having occurred in any one instance. "Either," as Simon has well put it, "it is the case that, even with reprehensible carelessness as to the source of lymph, vaccination (so long as, in any sense of the word, it is vaccination) cannot be the means of communicating any second infection, or else it is the case that, in the world of vaccinators, care is almost universally taken to exclude the possibility of danger."

The thousands of lives which are, on an average, saved annually from

small-pox in England alone are not gained without here and there a child getting erysipelas from its vaccination, and even, in cases of excessive rarity, dying of it; and what reasonable man ever hesitates, on account of this risk, to have his child vaccinated? The danger, if indeed there can be any at all, of communicating through vaccine-lymph, as, in all ordinary well performed vaccinations, any other infection than its own must be so infinitesimally small that, for all practical purposes, we may regard it as non-existent.

With regard to the communicability of syphilis by vaccination, it is important to know that Taupin and others have tried by experiment to inoculate syphilis and other contagious diseases purposely, but without effect. Unvaccinated persons suffering from chancre have been vaccinated, and vaccine vesicles raised in the neighbourhood of the chancre; and from the vesicles so raised vaccinations have been performed. But never has it happened on a single occasion that syphilis, or that any other result than vaccinia, has followed the use of vaccine lymph thus purposely taken from a syphilitic subject.

These experiments have been very numerous, and yet in no single case have they succeeded. Moreover, it is known that, if lymph be taken from a vaccine vesicle in a patient suffering from variola, with due care to procure it from the vaccine vesicle only, and unmixed with the products of any of the variolous vesicles, nothing but vaccinia is ever produced. "Since then," says Simon, "it is a quite unquestionable certainty that, even when the system is drenched with that subtlest infection small-pox, the Jennerian vesicle preserves its own contagion pure and isolated, the argument may be reasonably extended; and, even if there were no evidence in relation to other diseases, this analogy would have rendered it eminently improbable that any, the most infectious of their number, could admix its contagion with the specific products of cow-pox. Indeed, so definitely and so constantly characterised are those local changes which morbid poisons severally and specifically produced that, to say of a given phenomenon, 'This is a typical Jennerian vesicle', is, I believe, tantamount to saying, 'This is a vesicle which only one unmodified influence can produce, which no second influence can concur in producing, and in the contagion of which no second principle of infection can possibly reside'."

With regard to the occurrence of erysipelas after vaccination, it should be borne in mind that this follows as the result of external causes or irritation of the wound, just as it may, in surgical operations or wounds, however slight; but that it is never caused by any effective influence in the lymph.

The whole subject may be summed up by saying that there is conclusive evidence that the vast majority of mankind may, by a single properly performed vaccination, be rendered wholly unsusceptible of any subsequent action of the variolous poison; and that, in the minority, whose susceptibility to that infection has not been entirely exhausted by the vaccine process, the small-pox will, with rare exceptions, be so modified that, if all the population were completely vaccinated, i.e., vaccinated in the best way, serious and spreading small-pox would be but little known among us, and entries of fatal small-pox would be all but banished from our death-registers.

ON ULCER OF THE FRÆNUM LINGUÆ IN WHOOPING-COUGH.

By CHRISTOPHER ELLIOTT, B.A., M.D.,

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In a paper read before the Harveian Society, and published in the BRITISH MEDICAL JOURNAL of June 10th, 1876, Dr. Thomas Morton drew attention to a new symptom in whooping-cough. Although there is no mention of ulceration of the frænum linguæ in English text-books of medicine, yet its existence had been recognised previously in France and Germany, and by a few practitioners in our country. Bouchut, in his *Traité des Maladies des Enfants*, mentions having noticed it frequently, and the following paragraph from the English translation of Ziemssen's *Cyclopædia of the Practice of Medicine* (vol. i, page 699) proves that it is well known to our German brethren. "If whooping-cough is severe, we shall not fail to find, in the majority of cases, an ulcer on one or both sides of the frenulum linguæ, less often on the upper surface of the tongue." Steffen, the author of this article, adds further: "the first descriptions of this ulcer come from about 1840".

After reading Dr. Morton's paper, I was much interested in the subject; and owing to an epidemic of whooping-cough breaking out in Bristol soon after the appearance of his paper, an opportunity was afforded me of testing his statement that an ulcer of the frænum linguæ was to be found in 41 per cent. of cases; as it was to me a matter of some surprise that it should have escaped the notice of clinical observers in this