

MANUAL  
OF  
VACCINATION.

REECE COLLECTION

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# MANUAL OF VACCINATION

FOR THE

## USE OF PUPILS

OF THE

# VACCINATION DEPARTMENT,

M A D R A S.

BY

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## PREFACE.

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In the year 1871 a School for Pupil Nurses was established at Madras, and a Manual for their instruction, which has since gone through a second edition, was prepared by Surgeons Major vanSomeren, Harris, and Keess, and Surgeon Harvey.

In the year 1844 a Lying-in Hospital was opened in Madras, which, in 1854, became a School of Midwifery, and a Manual for the Pupil Midwives has been prepared by Assistant Apothecary Newland.

The present Manual, prepared by Surgeon Major Shortt for Pupil Vaccinators, has now been printed to form one of the series for the pupils under instruction as Nurses, Midwives, and Vaccinators.

EDWARD BALFOUR, Surgeon General,  
*Indian Medical Department.*

MADRAS,  
1st March 1874.

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## VACCINATION.

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ITS OBJECT: DISCOVERED BY DR. JENNER.

THE object of vaccination is to protect the human system from attacks of small-pox by the artificial introduction of matter taken from the disease, termed cow-pox, which occurs occasionally among cattle and is limited to the udder and teats of milch cows. Cows having suffered from this disease in the year 1798, the late Dr. Jenner discovered, that those people who took the cow-pox never took the small-pox and his name has been immortalized by the blessings he has conferred on mankind by his noble discovery, the result of much practical experience, careful observation, and the persistent attention given to this subject, amidst his other avocations as a Physician. This he soon put to the test and found that it confirmed all his previous observations. Jealousy, indifference, and much cavilling at first tended to retard the benefits of Jenner's discovery to mankind, but time soon proved the self-evident fact, and vaccination received the support and countenance of all medical men, and is now daily practised throughout all parts of the civilized world.

Vaccination is a specific eruptive disease, the eruption not being general, but appearing only at the insertions. When once it has passed through the body, it protects the system from small-pox. This fact, each one can test for himself by watching those who have been properly and correctly vaccinated, or by exposing a vaccinated person to the contagion of small-pox, or by subjecting the patient first to vaccination, and then to small-pox inoculation. In rare instances a vaccinated person may take small-pox; but in all such cases the disease is generally mild, seldom occasioning death after proper and successful vaccination. The taking of small-pox after vaccination may be accounted for from the fact, that some individuals, from peculiarity of constitution, occasionally take small-pox a second, and in rare instances even a third, time. In such cases, therefore,

small-pox may occur a second time even after vaccination, just as it would have done naturally after a previous attack. But if the precaution be taken of getting re-vaccinated once in every five or seven years, perfect immunity from so pestiferous a disease is almost ensured. This is no theory, but a practical fact obtained from large experiences in the various small-pox hospitals of Europe and America, where all the nurses, attendants, and other servants are vaccinated periodically; and, notwithstanding their daily and constant attendance on small-pox patients suffering from the worst forms of the disease, they have not contracted small-pox.

Re-vaccination like primary vaccination is but a simple operation, producing little or no inconvenience. Should the system be already protected, no effect whatever results from the operation. In some cases the insertions or vaccinated spots may show slight irritation and then subside, or they may form imperfect vesicles prematurely; or in other cases the true vaccine disease may result; but the whole course is over in a week, and in most cases the operation will not interfere with routine work. Such being the case, what is there to prevent people from taking advantage of so simple and beneficial a remedy? Nothing but apathy and indifference, till we are over-taken by this terrible disease that not only destroys life, but renders us so loathsome to our own relatives and friends. Then, should we, by the mercy of God, recover from the disease, it not only leaves us scarred and often maimed for life, but frequently weakens and destroys the general health, and leaves the system so excited that it is open to the reception of diseases from which it might otherwise have escaped.

The operation of vaccination consists in inserting vaccine lymph into the arms of a healthy subject. On the day after vaccination, or the insertion of vaccine lymph into the arm under the skin, the punctures may be felt to be slightly elevated, and, on the third day, slight red points may be seen. If these be not visible to the naked eye, a small papule can be seen by a magnifying glass. On the fifth day, the papule is pointed into a distinct vesicle; and in the course of the day, the

point gets depressed in the centre. The vesicle gradually increases in size; and on the eighth day, it appears distended with clear lymph. The vesicle, being circular and of a pearly or yellowish white color in form, size, and appearance, resembles the pustule of small-pox. The margins are swelled, firm, shining, and wheel-shaped. The vesicle is made up of a number of cells, which secrete a colorless fluid, termed lymph. A red streak or circle may now be observed around it which, on the evening of the eighth day, increases into a bright red circle, termed the "Areola," and it enlarges in breadth and color for about 48 hours, measuring from one to two inches or more in diameter, breadth across, from one end to the other. On the evening of the 10th day, the areola begins to diminish in size and firmness, losing its brightness, and shades off into circles of a bluish red. The vesicle is now termed a pustule from the clear lymph in it becoming turbid and forming into pus, or a yellowish white matter. Then, either during the night of the 10th, or on the 11th day, it bursts; and the matter having become viscid, dries into a hard, brown scab, which in a day or two contracts, becomes almost black, and from about the 11th to 21st day drops, or falls off, leaving a whitish scar, which is circular, and depressed below the level of the surrounding skin. This depression is marked with several minute pits, each one being quite distinct from the other, and they may even be streaked with white lines.

Vaccination is generally attended with constitutional disturbance. Fever may show itself on the third, fifth, and following days after operation; but, as a rule, it comes on generally on the evening of the eighth day with the areola. This fever may in some be very slight, and simply last for a few hours; in others it may continue from 24 to 48 hours. Young children become restless and hot, and frequently the bowels may be disordered. The glands under the arms become swollen and painful; and in some instances, the maxillary gland also is enlarged and painful. From the 10th day after vaccination, the child is almost well again, and attains its usual health and spirits. Such is generally the natural progress of the vaccinal disease in healthy sub-

jects. In robust, healthy children, there may be greater constitutional disturbance; high fever and great swelling of the arm; the areola around the different vesicles unite, and the arm becomes painful, looks red or reddish brown in color, and much swollen. Notwithstanding, all these symptoms subside, and health returns with the subsidence of the disease about the 10th day. In unhealthy scrofulous children, there may not be much constitutional disturbance; the vaccine vesicle may be small and soft with a faint shade of the areola. In some rare instances, vaccination awakens any latent disease that may have been inherent in the system. These diseases are not occasioned by vaccination, but they are simply brought out by the constitutional disturbance occasioned by vaccination, much sooner than they would have otherwise occurred.

In European or other fair-skinned children, the different appearances and progress of the vaccine vesicle may be witnessed from day to day, and noted, but this cannot be done with native or dark-colored children.

In some rare instances, the natural progress of the vaccine disease may be retarded for a fortnight or three weeks, when the disease shows itself and runs its usual course. It may sometimes show itself prematurely. This more especially occurs when preserved vaccine lymph is used. These facts are worth remembering.

*Treatment.*—As a general rule, medical treatment is very rarely called for after vaccination, but it is a good plan to give a little castor oil, or other mild medicine on the fourth or fifth day, to act as an aperient, and the child may have its usual daily bath, provided the arm is not interfered with, so as to injure or break the rising vesicles. Vaccination is very tenacious when once the lymph is correctly and rightly inserted under the skin; no rubbing or washing of the part, even immediately after the operation, can interfere with the success or progress of the disease. After the fourth and subsequent days, however, great care must be taken not to injure the forming vesicle. It is a very great advantage, therefore, to practise infant vaccination; for then the little patients do not suffer much, nor can they scratch the vesicles, or otherwise interfere with the progress of the



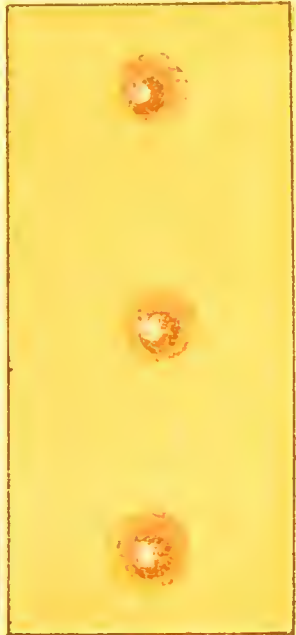
# VACCINATION

SHOWING DAILY PROGRESS OF THE DISEASE FROM THE DAY OF OPERATION UP TO THE TENTH DAY IN EAST INDIAN, AND NATIVE CHILDREN

NATIVE  
1<sup>ST</sup> DAY

EAST INDIAN  
2<sup>ND</sup> DAY

NATIVE  
3<sup>RD</sup> DAY



A

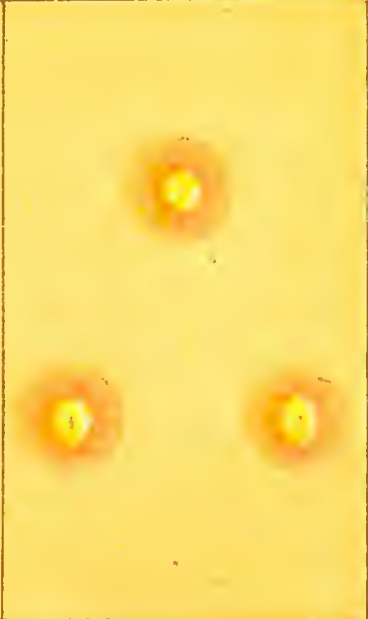
B

B

NATIVE  
4<sup>TH</sup> DAY

NATIVE  
5<sup>TH</sup> DAY

NATIVE  
6<sup>TH</sup> DAY



A

B

A

FEMALE ARMS

B-MALE ARMS.

EAST INDIAN  
7<sup>TH</sup> DAY

NATIVE  
8<sup>TH</sup> DAY

EAST INDIAN  
9<sup>TH</sup> DAY



B

A

B

EAST INDIAN  
10<sup>TH</sup> DAY

NATIVE  
16<sup>TH</sup> DAY



A

B

A. FEMALE ARMS.  
B. MALE ARMS.

VACCINE SCABE

A-UPPER, OR, OUTER SURFACE.  
B-UNDER, OR, INNER SURFACE.

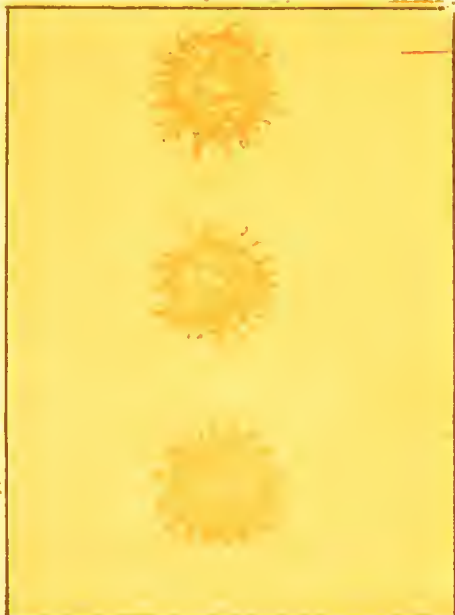
SHOWING CICATRIEES OR MARKS AFTER  
SUCCESSFUL VACCINATION AFTER A PERIOD OF.

10 MONTHS

1 YEAR



A



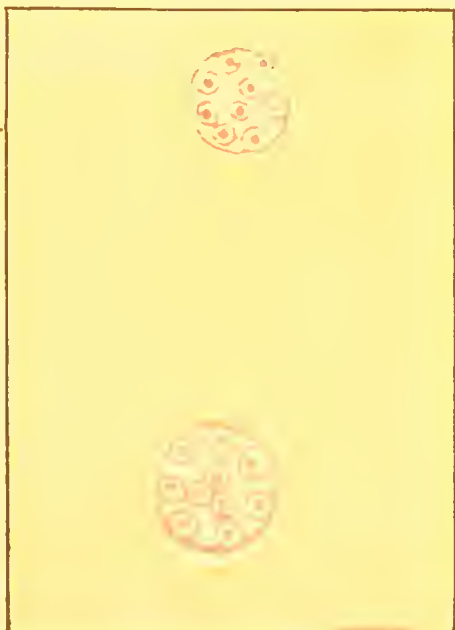
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5 YEARS

FIFTY YEARS AFTER SUCCESSFUL  
VACCINATION

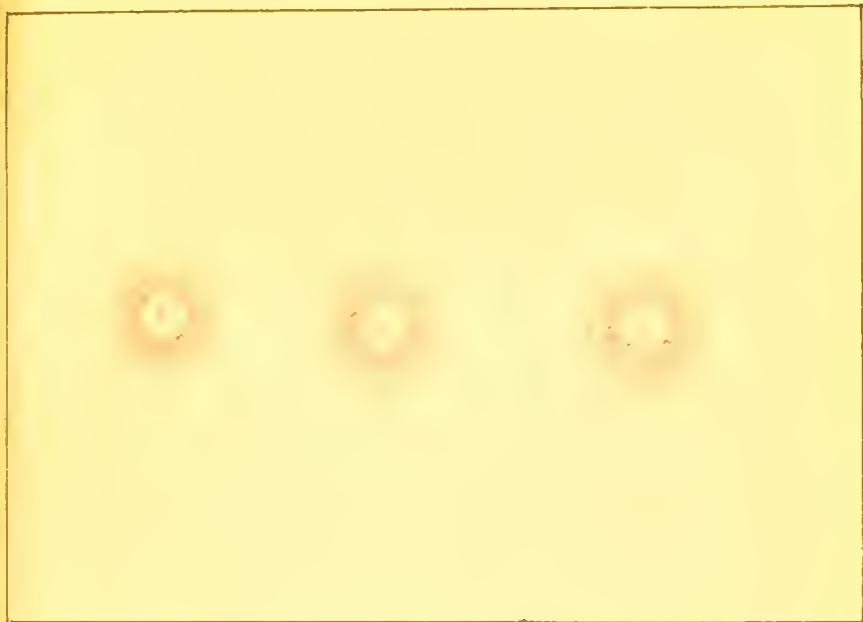


A



B.

A. FEMALE ARMS  
B. MALE ARMS.



LITHO BY R. J. BALDREY GOVT LITHO PRESS FORT ST. GEORGE MADRAS 1874.



disease. This is the great point to which especial attention should be given by mothers, nurses, and others in charge of vaccinated subjects, be they young or old.

*To native mothers.*—As a rule, we advise that the little patient should have a bath on the fourth and a dose of castor oil on the fifth day. This, in a measure, gives importance to the operation according to native views; and the more intelligent among them carry out the instructions and attend to the progress of the vesicle subsequently.

From carelessness, either on the part of the patients, or of their parents and guardians, the vesicles are broken from frequent scratching, and form open ulcers. A large majority of the people are in the habit of applying ground margosa leaves and turmeric to the vaccine vesicles. On the whole, this is not a bad practice, if properly attended to; but the composition, so applied, dries up and cracks, breaking the vesicle, and, in falling off subsequently, carries the scab off, exposing an open sore to which flies and dirt have ready access. This keeps up the irritation, and the ulcer may, from these causes, give much subsequent trouble. All that is necessary, in these cases, is to keep the parts perfectly clean, and to apply some simple ointment; even a little butter answers the purpose very well, and the sores soon heal. In unhealthy and scrofulous subjects, rest of the arms and an aperient followed by some mild tonic may become necessary.

#### INSTRUCTIONS AS REGARDS VACCINATION.

The proper age to vaccinate is from six weeks to three months after birth; and, in exceptional instances, infants have been successfully vaccinated at every age, even immediately after birth. In these cases, the operation was called for from some special circumstance that placed the life of the child in imminent danger, and of the two evils vaccination was preferred. Infantile vaccination is far superior to vaccination at any other period of life. It is as well at all times to get over vaccination before teething begins. It is a false feeling on the part of mothers to put off vaccination on the plea of the tender age of the child, and that it will suffer more from the

operation. On the contrary, experience shows that young children go through the operation much better than adults. The rule is, except when there is immediate danger of small-pox, to vaccinate only children who are in good health; but when small-pox is prevalent, it is best to vaccinate without reference to the state of health, as children are much more susceptible to the disease than adults, and the greatest mortality from small-pox occurs among young children,—the younger they are the greater the danger. Infants should not be vaccinated when suffering from fever, irritation of the skin, more especially irritation or chafing behind the ears, about the groin, or other folds of the skin, and when measles, scarlet fever, or erysipelas is prevalent.

A register should be kept of all the cases operated on, with the name and particulars entered on the same day, giving all the required particulars. Make it a rule to inspect your cases on the fifth day; should any insertion not have vivified, insert fresh lymph into the part without hesitation at once, and inspect again on the eighth day on each day of inspection, noting the results. Never enter results, from hearsay, of those cases you have not seen for yourself, and note as successful only those cases in which the vesicle is normal; should you revaccinate, enter only those cases as successful in which either normal or modified vesicles or papules surrounded by areola have resulted.

Should you intend to practise vaccination regularly, always endeavour to maintain a succession of cases, to enable you to operate from arm to arm with fresh liquid lymph, and do not under ordinary circumstances resort to any other method of vaccinating. To provide against emergencies, always have a store of preserved lymph, either dry, as on thickly-coated glass stoppers of lymph bottles, well protected from damp, or liquid, in capillary tubes, hermetically sealed at both extremities.

Lymph thus preserved, either dry or in a liquid state, may be kept and used with success without reference to time; but with all stored lymph caution is necessary, lest, in time, it may become inert or otherwise unfit for use. If in order to vaccinate with recent liquid lymph you convey it from case to case, otherwise than in

hermetically sealed tubes, do not let more than six hours intervene before it is used. Lymph should not be taken after the formation of the areola.

Care should be taken to see that no vaccine lymph, which has even the slightest admixture of blood, is used at any time. In storing vaccine lymph, be careful to keep separate the charges obtained from different subjects, and to affix to each set of charges the name or the number of the subject on your register from whom the lymph was derived. Should you furnish lymph to others, keep a note of all such supplies to enable you at all times to identify the source of supply.

“As a rule, never take lymph from cases of re-vaccination. Procure your supplies only from good healthy subjects, and as far as you can ascertain of healthy parentage, preferring those whose families are known to you, and who have elder brothers and sisters of undoubted health. Always examine your subjects carefully, to see that no skin disease, more especially hereditary taint of syphilis, exists. Take lymph only from uninjured well characterized vesicles on the seventh, or as a rule, on the morning of the eighth day, when the vesicles are well and fully formed and plump, and before signs of the areola begin to be manifest. Open the vesicles with scrupulous care to avoid drawing blood. Take no lymph which, as it issues, is not perfectly clear and transparent, or, if at all thin and watery, do not take from such a vesicle more lymph than will suffice for the immediate vaccination of five subjects, or for the charging of four glass plates, or for the filling of three capillary tubes. From large or smaller vesicles take in proportion to their size. Never squeeze or drain any vesicle. Be careful never to transfer blood from the subject you vaccinate to the subject from whom you take lymph.”

“Scrupulously observe in your inspections every sign which tests the efficiency or purity of your lymph. Note any case in which the vaccine vesicle is unduly hastened, or otherwise irregular in its development, or wherein any undue local irritation arises; and, if similar results ensue in other cases vaccinated with the same lymph, desist at once from employing it. Consider that

your lymph ought to be changed if your eases at the usual time of inspection on the day week after vaccination have not, as a rule, their vesicles entirely free from areola." \*

The advantage of infantile vaccination being very great, even at the risk of repetition, the attention of vaccinators is drawn to the subject, and it is imperative that steps should be taken to extend vaccination among the infant population as much as possible, and to impress on mothers the necessity for subjecting their children, as early as possible, compatible with health, to the operation, and to forego all false feeling as regards tender age, pain, &c., in the interests and welfare of their children. When small-pox is suspected vaccinate at once. The presence of areola is the best test of vaccination in small-pox.

#### THE NEEDLE VACCINATOR.

In the Madras Presidency, the only instrument at present in use is the needle vaccinator.† It consists of four common sewing needles, No. 5, tied together and fixed roughly with sealing wax into the shaft or barrel of a quill for a handle, and the instrument is ready for use. The whole of the needles are placed within the handle, except the merest points, of which only about one quarter or half a line should protrude beyond the wax that fastens them to the handle, care being taken to see that the points are level, and that they do not touch each other. No especial care is necessary to keep the points free; for when the needles are placed side by side and tied together, the difference of size in the body will prove sufficient to keep the points from touching each other. With this instrument, the vaccine vesicle should be gently scratched on the surface so as to rupture the cells, and let out the lymph, into which the points are dipped, and the needles subsequently pricked into the skin of the arms of the subjects required to be operated on. Care should be taken not to allow the needle points to touch the raw surface of the lymph-supplying vesicle, as it will not

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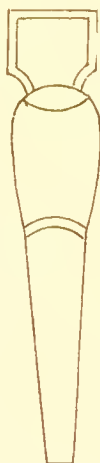
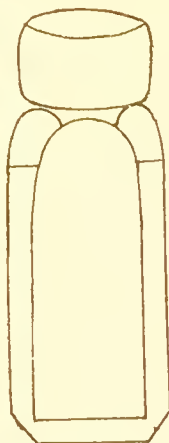
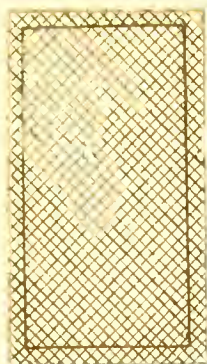
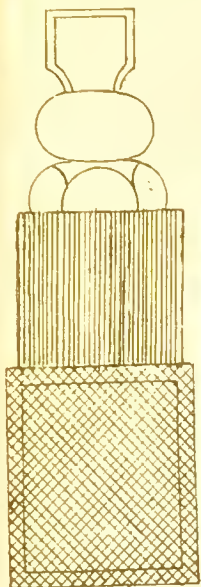
\* Abstracted from instructions issued to Vaccinators, by the Medical Department of the Privy Council.

† *Vide* plate 1, fig. 1.

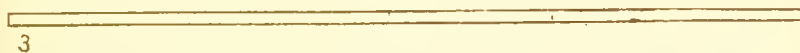
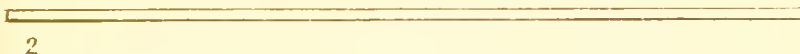
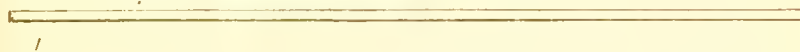


LYMPH BOTTLE IN CASE

LYMPH BOTTLE AND STOPPER



CAPILLARY TUBES



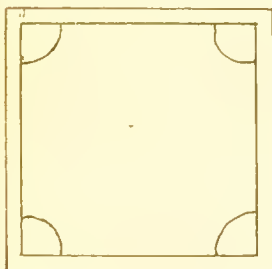
VACCINATOR NEEDLE



NEEDLES TIED TOGETH



SQUARE GLASS PAIRS



only cause pain and make the child struggle and cry, but also most probably cause it to bleed. This can be avoided by allowing the lymph to collect into a drop, or by laying the needle points flat or horizontally on to the vesicle to coat them with lymph. By attending to these particulars, vaccination can be carried on with the greatest ease and rapidity. In using preserved lymph from capillary tubes, the lymph is either gently blown on to the part intended to be operated on and the part is then pricked with the needle, or, if economy of lymph be necessary, the tube lymph can be blown on to a plate of glass and the needle then be inserted in the lymph and be pricked into the arms. The punctures caused by the needles do not bleed as a rule, and all that is seen at the part is a slight rising of the skin and there may be visible four minute blood points after a while. If the needle is well dipped into the lymph only one insertion is necessary; but it is as well to prick the parts two or three times over; and when properly done, the pain of the operation is so trifling that most children do not cry, nor even flinch from the operation. As a rule, six distinct insertions should be made, three on each arm, about half to one inch apart. When the needle is dipped into the lymph, the points are simply coated with it, and by the insertion of the needle the lymph is carried beneath the skin, and when withdrawn the resilient skin wipes the lymph clean off the points. Care should be taken to keep the needle points clean and to prevent them from rusting. For this purpose use a small piece of woollen cloth, steeped in oil with which the needles are cleansed after every operation. The only drawback to the use of these needles is, that, after being in use for some time, they become brittle and the points snap off. They should never be used for any other purpose but vaccination.

As a rule, six insertions should be made in every case without exception as to age, &c. It is quite in accordance with the best modern authorities on the subject to raise several vesicles, never less than half a dozen, for the better protection of the system by vaccination. Each insertion makes a distinct vesicle, and experience does not show that six insertions cause more pain or give rise

to greater constitutional irritation than that caused by two or four vesicles. In the male, the insertions are made longitudinally, thus ; and, in the female, a triangle is formed, thus .∴ This is simply done to prevent the marks being seen low down the arms of girls ; and with native children, when we have to deal with large numbers, it enables us to recognize the sexes at sight by the marks on their arms.

When six vesicles have been successfully raised two and when four, one vesicle only should be broken. In cases of emergency where two vesicles only have been raised, one may be ruptured for furnishing lymph ; and, where only a solitary vesicle exists, in no instance should it be broken to furnish lymph for arm to arm transfer, or for charging capillary tubes. Great care should be taken to see that the vaccine vesicles are not injured during their progress, or that the crust is not removed prematurely.

Arm to arm operation should invariably be preferred and practised on all occasions, and preserved lymph be used as seldom as possible.

Vaccination may be carried out in practice by the following six methods :—

1. From arm to arm operation.
2. From vaccine lymph preserved in tubes.
3. Do. do. in square pieces of glass.
4. Do. do. in lymph bottles.
5. Do. do. in seabs.
6. Do. do. from the cow direct,

when naturally suffering from cow-pox, or by inoculating the cow with small-pox virus and transferring the lymph from the resulting disease, or by vaccinating or passing the vaccine lymph through the cow and re-transmitting it to the human subject.

1. As regards arm to arm operation, good eighth day vaccine vesicles from healthy subjects should be selected for transferring lymph, or, in other words, from which to take lymph to vaccinate with.

2. From vaccine lymph preserved in capillary tubes. Capillary tubes are small, hair-like, glass tubes, in-

tended for collecting and preserving vaccinc lymph in a fluid state ; and when the tubes arc hermetically sealed, the lymph may be kept for years fresh and in a liquid state. To charge capillary tubes, the selected vaccine vesicle is gently ruptured ; and, as the fluid lymph rises and collects on the surface, a clean, empty capillary tube is taken between the index finger and thumb, and one end inserted into the centre of the risen lymph and kept well under the fluid ; and, as the other end is gradually depressed, the lymph is seen to rise in the tube by capillary attraction. Should the end of the tube not be kept well under the liquid lymph, or should it be taken off and be again applied, a break will be seen in the column of lymph in the tube caused by the entrance of air ; and as often as this is done, so many sections will appear in the lymph ; but care should be taken to avoid, as much as possible, the entrance of air, as it will favor decomposition and render the lymph putrid. The only way to avoid the entrance of air is to wait till such quantity of lymph has risen to the surface, as will suffice to charge a capillary tube in one application.

If the lymph in a capillary tube is to be kept merely for a day or two, the ends may be closed by soft bees-wax ; if for a longer period, by dipping the end of the tube into melted sealing wax ; but when required to be sent to a distance, or to be kept for any length of time, the ends should be inserted into the flame of a candle, which will cause the glass to melt and close the orifice. In the last case one-third or one-half only of a tube should be charged with the lymph, so as to keep the contents of the tube away from the effect of the flame. When a charged or hermetically sealed capillary tube is examined, the lymph should appear perfectly clear and in a continuous column, filling two-thirds or one-half of the tube, and it should contain no flakes, air, blood, or other foreign matter in it. Should the ends be carelessly sealed with the flame of a lamp, the lymph in the tube will appear opaque at either extremity, in consequence of the effects of the heat, such lymph should be rejected.

In proceeding to use a charged capillary tube, snip off its two ends, then blow gently into one end of the tube, so as to drive the lymph through the opposite end,



either on the arm itself or on a plate of glass, from which the needles may be charged.

3. From vaccine lymph preserved on square pieces of glass :

Pieces of glass, one inch square, are procured for the purpose. Two pieces are charged by means of blowing the contents of a charged capillary tube on to the glasses, and allowing the lymph to dry. This process may be repeated two or three times, so as to coat the glasses thickly with lymph ; and, when a sufficient supply has been secured and the same becomes dry, the charged surfaces of the two pieces are brought together, so as to adhere, and the margins around moulded over with soft bees-wax to keep the glasses in position and exclude air from the crevices. They are then closely wrapt up in pieces of wax cloth and reserved for use.

When required for use, the glasses are separated, and the dried lymph moistened with a few drops of glycerine or water, and in a couple of minutes the lymph is quite softened and attains the consistence of syrup, into which the needles are dipped and inserted into the arm.

4. From vaccine lymph preserved in lymph bottles :

These bottles are intended for the preservation of vaccine lymph in a dry state. The stoppers, which are long and pointed, should be dipped into the vaccine lymph as it collects after the rupture of a vesicle ; and, as it becomes dry, the stopper should be re-applied over and over again several times, so that large quantities may adhere to it in successive layers, and when dry the stopper can be inserted into the bottle and kept for use.

When required for use, the stopper is dipped into glycerine or cold water and rubbed over a square piece of glass to soften and liquify the lymph, when it is ready for use. By this means, large quantities of vaccine lymph can be collected and preserved in a dry state for a long while, and will be found to be very effective for vaccinating purposes. Ivory points are also prepared in this manner by dipping their ends repeatedly into the lymph and allowing the same to dry, so as to secure a good dry coating. The lymph bottles have

in a measure superseded the use of ivory points, so that now, in Madras we seldom have recourse to them.

5. Vaccine scabs are the crusts formed on the vesicles by the rupture of the vesicle itself from over fulness, and the concretion of its contents into the form of a scab. Vaccine scabs are more or less circular, semi-transparent, light in weight, and of a brown or dark brownish color. These crusts or scabs become detached on the vaccine disease having completed its course. Though perhaps not the best mode of propagating vaccination, as they are made up of the dried matter, &c., from the pustules, yet it proves useful in India for preserving and transmitting lymph from one district to another, and they may be preserved for long periods by wrapping them up in bits of bibulous paper and keeping them in glass-stoppered bottles. They cannot, however, at all times be depended on. They are used by moistening them with glycerine or water on the back of a plate and then working them up with the handle of the needle-vaccinator to get them into the consistence of syrup, into which the needles should be dipped and pricked into the arms several times.

#### 6. Vaccine lymph from the cow direct :

Cattle are liable to attacks of cow-pox, more especially milch cows, or rather the disease is most likely to attract attention from the animals refusing to be milked. The disease may not be discovered at the proper time, so as to secure a supply of vaccine lymph; and it is only when a number of animals in a regular dairy are affected successively that an opportunity may occur, but this is very seldom the case. When discovered, the vesicles will be found chiefly located about the udder or teats of the cow. The animal should be secured, and the vesicle be gently ruptured, as the quantity of lymph is generally small; and if care be not taken, the lymph may be lost by the struggles of the animal, resulting in free bleeding, &c. The lymph may be transferred at once to a subject, or be preserved in capillary tubes. Lymph from the cow direct never keeps well, and it is always best to use it immediately or to wait and secure

the scab, which is prepared for use in the same way as the vaccine scab from the human subject.

Small-pox matter from the human subject has been inoculated into the cow, and lymph from the resulting vesicle retransferred to the human subject with success, in the form of the cow-pox, as human small-pox and cow-pox are believed to be identical diseases. The cow might be vaccinated with vaccine lymph, and the lymph be retransferred to the human subject with advantage. These are experiments that can only be undertaken by medical men who can bestow the necessary time and have the required leisure to prosecute them, so as to prevent disappointment at the best of times.

The vaccine cicatrix or scar resulting from a genuine vaccine vesicle, when it has progressed normally, and the vesicle has been in no way interfered with, is permanent through life, of a circular form, slightly depressed below the level of the skin, and indented with several pits, or it may be slightly radiated. A regular and well-formed cicatrix is from two lines to a quarter of an inch in diameter and is the best test we have of the security of the system against small-pox.

Not only in India, but in other countries also, vaccine marks may show many irregularities, dependent on the health, vigor, size, and progress of the vaccine vesicle. The resulting scars will vary as regards size; they may not be uniform, and the pits may have been destroyed by subsequent ulceration, or the cicatrix may become irregular, or it may form little protuberances at the insertions, the result of ulceration, and the subsequent growth of proud flesh, or thickening of the skin before the healing process sets in; but the systematic number and order of the insertions must prove the guide in such cases; and on this account, it is absolutely necessary that the system of vaccination should be uniform and be carried out with mathematical precision as regards the part of the arm and the number and the distances of the insertions that are to be made. Care should be taken in this matter, in India, more especially where the natives are naturally careless and either from neglect or the application of irritants to the part, allow the insertions to form open ulcers.

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**MANUAL  
OF  
VACCINATION.**