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on
variola
Smallpox or Variola

This disease is the product of a fever poison, or minaret, which, after a period, produces fever, followed by an eruption, which passes through the various stages of pimple, vesicle, pus-tule, and scab.

History—At what time this malady first made its appearance in the world, is uncertain. It does not seem probable, however, that it was known to either the ancient Greeks, or Romans; although physicians at various times have endeavored to prove that they were acquainted with it.

Dr. Head, Friend, Gregory, and others support the former supposition, whilst Dr. Villan, Baronese are in favor with the latter view. Rhazes an Arabian author, who flourished in the tenth century, was the first accurately to describe this disease; he also refers to the writings
of Galen in proof of its having been known to the Greeks; but Dr. Greenhill has shown the "virus" of Galen was not smallpox, but the acne of modern authors. Mr. Moore has endeavoured to show that this complaint was known in China, & Hindostan, even before the time of Hippocrates; but most other authors on the subject disagree with him. It is however probable that it prevailed in China & the surrounding countries long before it was known in Arabia or Egypt. Piscopiues gives the history of a malady which look like smallpox. It first appeared at Pelusium in Egypt in the year 544. Many of the symptoms being similar to that disease; but he describes it as having been accompanied with buboes & carbuncles, on which account it more closely resemble plague than smallpox; although recent epidemics of the latter complaint, especially those occurring in warm climates, have been described as being complicated or followed by eruptions, of the foregoing character. Certain it is, that Variola was known in Arabia, and neighbouring parts, and even...
in Europe before Rhazes described it. Head remarks that, Dr. John I. Reiske, affirms that he read the following words in an old Arabian manuscript in the public library at Leyden this year in fine the smallpox of measles made their first appearance in Arabia. (viz. the year 572). Several facts concur to prove that the diffusion of smallpox was mainly to be attributed to the successes of the Saracen armies in the sixth century.

Through a physician of Alexandria, at the commencement of the seventh century, mentioned the symptoms, the different varieties, and treatment of smallpox, and he also states that in the year 640 when the eruption of the Saracenes into Egypt took place, the disease appeared in so destructive a manner, that many writers considered it a new complaint. It reached Europe in the eighth century, but does not appear to have arrived in England until the ninth century, although, Dimsdale, Head, and other place it two centuries later. The time at which this malady first made its appearance
in Ireland has not been as yet fully determined. It does not seem to have been known in Norway, Lapland, or any of the very northern countries of Europe so early. From Europe it was carried to Mexico. In the latter place there being a fearful epidemic in 1527, from whence it extended through the whole American continent.

In the year 1721 Lady Mary W. Montague introduced inoculation into England, from Constantinople, and was, at that time, a great improvement in the history of variola, in consequence of the diminished mortality which it insured. This has been superseded by the great discovery of Dr. Jenner, and is now abolished by Act of Parliament.

Symptoms — Two varieties of the disease have been recognised by authors; the distinct ones the confluent, besides these there are the variola petechialis, variola sine variola.

Distinct smallpox is characterised by the isolation of the corpuscles. The first stage of this malady, like other fevers, is ushered in with rigors, followed by heat of skin, acceleration of pulse, loss of appetite, thirst, furry tongue, epigastric
uneasiness, often nausea & vomiting, headache, pain in the back and limbs, and general muscular weakness. There is, however, nothing in the above symptoms to distinguish it from other febrile affections, except the pains in the back and limbs which are somewhat characteristic, perhaps; so also the frequent occurrence of obstinate vomiting, which cannot be referred to gastric inflammation or cerebral disease. Sore throat, coryza, sneezing, and an excess of tears are common. In severe cases delirium, stupor, and convulsions are sometimes present. The latter symptoms are more commonly observed in connection with confluent variety. The fever is often decidedly remittent.

The second stage may be considered to commence with the appearance of the eruption, which generally makes its appearance on the third day after the occurrence of the rigor. The earlier it appears the severer the disease for the most part proves to be. The eruption first makes its appearance in the form of minute bright specks, which show themselves first on the face, next on the neck, upper part of the body,
and arms, and lastly on the inferior extremities. There are, however, exceptions to this rule. On the second day there is a little fluid in the eruption, on the fifth day the eruption is fully vesicular, and on the eighth it is fully pustular. In some instances papillae continue to spring up after the main crop is fairly completed, but these seldom arrive at maturity. The eruption is generally completed by the end of the fourth day, at which time the fever has entirely disappeared, its subsidence often being abrupt on the development of the eruption. Then the pustules are fully formed, they are a little flattened on the top, in the centre of which is often a little depression, giving to them their characteristic umbilicated appearance. The quantity of the eruption is very different in different cases. Sometimes very few pustules are present. At other times in such quantity as to cover the whole body; in such a manner, however, as to be quite isolated. An eruption also takes place on the mucous membranes of the mouth, fauces, eyelids, prepuce and femal
labia, which may be distinctly seen two or three days after the first appearance of that upon the skin, in the form of small circular white spots, which neither contain lymph nor pus. Between these the membrane often becomes red and inflamed, and, on the seventh or eighth day of the complaint, sore throat, swelling of the fauces, painful deglutition & salivation, are apt to occur, which are amongst the most disagreeable symptoms. The severity of the attack is almost always in direct relation to the quantity of the eruption. The number of pustules indicating, first, the quantity of the variolis poison reproduced in the blood. Secondly, it is a direct sign of the extent to which the skin suffers inflammation. For both these reasons the patient is endangered in proportion to the quantity of the eruption. With the progress of the pustules there is generally more or less swelling of the skin especially on the face where a feeling of burning & tension is often painful. The scalp is also occasionally affected in a similar way. Both the extreme tremefaction & soreness of mouth
and also the salvation, increase as the eruption approaches maturation; and begin to subside so soon as these have reached their greatest height. During the period of maturation, the body exhales a peculiar and disagreeable odour, which is very characteristic of this complaint. About the seventh or eighth day of the eruption, a febrile action is again frequently developed, constituting what is called the secondary fever, or fever of maturation. Depending essentially on the sympathy of the constitution with the local irritation, therefore, it is most violent, when the eruption is most copious, and when this is scanty may be altogether absent.

The third or declining stage, is in this variety little more than a period of convalescence. About the eleventh day of the disease (eighth of the eruption) a dark spot forms on the top of the pustule, at this part the burst and the various matter oozes out & dries into a scab; from this time the process of desication goes on rapidly, the swelling of the face gradually
subsides, and in a short time only dry scabs remain, which begin to fall off three or four days after the period of incrustation. Then the crust falls off it leaves behind it either a purplish red stain, which is still very characteristic of this complaint, and which very slowly fades; or a depressed scar which is indelible. In the latter case the patient is said to be pitted with the smallpox or pockmarked. This is the course which the eruption follows on the face, which does not differ from that on the body or extremities except that it is earlier.

Many of the pustules, however, instead of forming a regular scab, shrunk away in consequence of their contained fluid being absorbed, and nothing but a pellicle of cuticle is left, which separates by desquamation. This is especially the case with those upon the arms, and legs. It is generally believed that the pus is absorbed in these cases; but Gregory states that they do not contain pus, only a serous fluid being in them.
However the pocks which thus shrink away, are often to all appearances fully formed, and differ in nothing to the eye from those on the face which form scabs.

The eruption on the mucous membrane is almost always resolved, without the formation of ulcers, or anything that can be considered a scab.

According to Dr. Gregory, it is not the formation of pocks upon the conjunctiva or eyelids, that produce the ophthalmia, from which such serious consequences sometimes accrue in bad cases of variola, because, he states that true various pustules do not form on the conjunctival membrane, and that the blindness which is so common a result of this malady, is produced by an intense kind of ophthalmia, which sets in at the period of the secondary fever, and rapidly spoils the transparent tissues of that organ.

Confluent Smallpox—It is from the appearance presented by the pustules on the face, that we distinguish the confluent
from the distinct variety of this malady. The
disease being confluent when the pustules in
the above mentioned position, are confluent,
whether the be so or not on the trunk; or
sometimes the are neither strictly confluent
nor strictly distinct, but stand just close
enough to touch each other, without absolutely
coalescing, every pustule presenting its usual
outline. In that case the complaint is said
to be of the cohering form, but little attention
has been paid to this distinction. There is
every grade between the extremes of the two
varieties, the confluent being only a more
aggravated form of the same disease. All
the symptoms are generally more or less
aggravated in the latter variety, as compared
with the former. The pain in the back
is more severe, convulsions, delirium, and
stupor are more frequent, nausea and vomiting
more distressing and obstinate, and the disease
is more liable to inflammatory or malignant
complications. The delirium is occasionally
violent and uncontrollable, and though
sometimes associated with signs of inflammation,
congestion of the brain, is, in other cases, dependent apparently on excessive nervous irritation alone. Cough and pains in the chest are more frequent in this form. The epigastrium and other parts of the abdomen are often painful and extremely tender upon pressure. The eruption appears somewhat earlier in this than in the distinct variety, and is not attended with the same complete subsidence of the fever, on the appearance of the eruption, which always in some degree remits. The pimples are at first very minute and crowded together in patches, and frequently accompanied by a rash, like scarlet fever, or erysipelas; at this stage, it may closely resemble measles, only that the eruption of rubella, appears in a crescent form. The similarity and uncertainty are, however, soon at an end, for the pimples soon begin to exhibit the appearance of fluid on their summits. They do not fill up so completely as the advance, and are transformed into pustules; the are as a general rule flatter, less plump, more irregular.
depressed, and of a different colour, to what
the are in the distinct form, being at first
whitish, then of a brown colour, and seldom
of the yellow-purulent hue, which is so
common in the varicella discreta. Sometimes
the are even of a bluish, or purple colour; these
contain blood or a viscid ichor instead of
pus, and constitute the varicellae nigrae
of Sydenham, or the bloody smallpox of
Allad. It often happens that large portion
of the face are covered apparently with a
nearly uniform layer of pus beneath the
epidermis, and sometimes, even the whole
face is thus affected. In such instances,
the pustules appear to be fused into one
mass of suppuration. The eruption on the
mucous surfaces, viz., the mouth, fauces,
is more conspicuous than in the distinct,
and consequently the swelling and pain
in those parts is greater, and the saliva
more profuse. Not unfrequently the eruptive
and attendant inflammation, extend to
the larynx, and trachea, and also to the
larger divisions of the bronchia.
producing cough, hoarseness, painful attacks at expectoration, and sometimes proceeds so far as to produce complete extinction of the voice. This is one of the most dangerous accompaniments of smallpox, causing death by suffocation, in some instances by closure of the rima glottidis in others by the closing of the bronchial tubes with their viscid secretion. Consequently, in the advanced stages, and arising from a want of arterialization of the blood, there is dark discoloration of the skin, a livid or purplish hue of the extremities, feebleness of the pulse, coolness of the surface, and general prostration. Dehydration which is painful from the state of the fauces, becomes in some cases still more difficult from the inflamed state of the epiglottis and also from a want of proper adaptation between it and the orifice of the glottis. The nostrils are often closed by the swelling of the Schneiderian membrane, so as to render breathing through them impossible. The patient may be troubled with pharyngitis or parapharyngitis; buboes may form
in the groin, and parts of the surface where there is little eruption are often affected by an erythematous inflammation. Throbbing sores often form on the hips & sacrum. Phlebitis may also occur. Oftentimes after death, the large joints may be found full of matter. Concerning the occurrence of pustules in the interior of the body, which I before spoke of. Cotonius asserts that these are produced only on the skin, and those parts of the mucous membrane, which are freely exposed to the air. He considered that previous desiccation was necessary to their formation, and says that none appear on the cornea while it is kept moist. He denies that they occur on the foetus in utero. The best proofs which he asserts in support of the necessary presence of air, besides the fact that the eruption is greatest in those parts which are most freely exposed to the atmosphere—are that pustules do not form on the inner surface of the eyelids, except in cases of eczema. That the nevus appear on hemorrhoidal tumours, except
when those project beyond the margin of the anus, and only that portion of the glans penis is affected by them which is uncovered by the prepuce. There are however many cases recorded, which go to prove that pustules form on the foetus in utero. Mr. Finders relates of the case of a woman near her full time who took smallpox, about eight days after the pustules were mature on her, she gave birth to a child, upon whose body and face there were many pustules nearly ripe. Dr. Head relates the case of a woman who had formerly smallpox, and who attended her husband affected with that disease, when near her full time. She was shortly after delivered of a dead child, whose body was covered with a crop of variolous corpuscles; the mother however, being unaffected. Many other cases of a similar nature have been observed. The fever which had remitted on the occurrence of the eruption, but had never entirely left the patient, increases again on the eighth.
ninth, or tenth day, the exacerbation being often marked by the occurrence of rigors. There is a difference between the secondary fever of distinct & Confluent smallpox, principally with regard to severity; it may have more or less of a sthenic character, which in some vigorous constitutions it never looses, but very often it assumes a low form consequent partly upon the exhausted strength of the patient, and partly, in all probability, upon the deteriorating effects of the absorbed pus, and putrid secretions, upon the blood. Generally at this stage of the complaint there is frequent and feeble pulse, a dark and dry tongue, low delirium, tremors, muscular weakness, occasionally involuntary evacuations, or perhaps retention of urine, and the patient if no favourable change takes place, may die either from extreme exhaustion, or the interruption of some one of the vital functions, from the severity of the local irritation. Should the patient survive the period of maturation, he has still great dangers to encounter.
It is now that disorganising inflammations show themselves in various parts of the body. Symptoms indicative of the habit diathesis. Obstinate abscesses of the ear sometimes form. In hospitals, erysipelas of various parts of the body, is one of the most frequent attendants on this disease, occurring not only in the period of decline, but also in that of maturation. Boils frequently break out over the surface of the body; and various eruptive affections, as the pustules of erthema, and the bullae of rubra, give rise to troublesome sores, and greatly add to the sufferings of the patient. Even when the direct dangers of this malady have been escaped an extraordinary tendency to suppuration sometimes remain in the cellular tissue, beneath the skin and among the muscles. Gangrene may occur and large portions of skin slough.

Any existing tendency to scrofula or syphilis is apt to be developed, and the patient merely suffers from one disease into another not less destructive.
Desquamation is seldom completed and health restored, under three or four weeks, and sometimes complete recovery is still further postponed.

There are doubtless cases of confluent smallpox which run a milder course than that above described, and which after surmounting the dangers of maturating go on without interruption to a favourable issue.

There is a condition of this disease which merits particular attention. It is that usually known as malignant smallpox, in contrast of its extraordinary virulence. Its peculiar consists in the association, with the special influence of the varioloid poison, of an asthenic state of system, which causes the patient to sink under the disease, at a comparatively early stage, and without the cooperation of those inflammatory complications already described, which are the ordinary sources of danger at this period.

This state of system may be connected with any of the forms of smallpox, the distinct confluent, or even the modified form called varioloid, but it is more frequently observed with
the confluent than the other forms. It is evinced, first, by an utter prostration of the nervous power, inducing insufficient reaction, with coma, delirium, or excipive restlessnes and anxiety, and sometimes an imperfect development of the eruption, or a sudden retrospection of it when formed; or, secondly, by those symptoms which characterize a depraved condition of the blood, such as petechiae or vesicles, oozing of dark blood from the mucous membranes or abraded surfaces, a purplish or bloody and badly developed eruption, which fills partially and rises but little above the surface, paleness and lividity of the intervening skin, a disposition to gangrene, oppressed breathing, an anxious countenance, and great feebleness of the circulation. Sometimes the signs of malignancy do not exhibit themselves in the primature fever, unless perhaps by unusual severity of the lumbar pains, but in other instances the are striking almost from the beginning, and there is reason to believe that patients
have sunk under them before the period of eruption. Death, however, generally takes place from the seventh to the ninth day of the disease. It is this form to which the name of black smallpox has been sometimes given.

Writers on smallpox have noticed various modifications of the disease, occurring principally during the prevalence of epidemicus, long before vaccination was known. Thus there occur a variolip fever without an eruption, (variola sine variolis) the crystalline pock, in which the eruption continues vesicular; the stone-pock, the horn-pock, and the wart-pock, in which the vesicles dry up into small tubercles instead of proceeding upward to maturation. Most of these are now considered as the result of the modifying influence of vaccination, or previous smallpox, and are known by the name of varioloid, which has been applied to the diversified forms of the disease originating in the cause alluded to.
The variolus fever occurs for the most part in those who have been vaccinated or have been previously affected with smallpox; it occurs generally during variolus epidemics, and is of about three or four days duration. In cases attended with eruption which are far more common, the fever is of various degrees of violence and duration; it is in general more severe in proportion to the quantity of the eruption, as in unmodified smallpox. Very often the eruption is preceded by a scarlet efflorescence like that of scarlatina or roseola, and is often followed by a very small crop of the true varioloid eruption. Not unfrequently the eruption is copious, and sometimes, even confluent. It may not proceed beyond of mere papule or pimple, at other times it proceeds the regular course of smallpox only stopping a day or two sooner than in the unmodified form. Another difference between the severest forms of varioloid and genuine varioeula, is the absence of odour in the former. These may be considered
diagnostic of varioloid.

Cause—Smallpox is undoubtedly the result of a specific contagion, and is generally admitted to be one of the most contagious of diseases. There are none, who being unprotected, either by vaccination or a previous attack, but are liable to be affected on exposure. Many resist the effects of the contagion to old age, but even then the are not secure, for it often happens that after frequent exposure to the disease without effect, an attack has at length occurred. Perhaps in advanced life, and persons who have escaped the malady in the natural way, though exposed to its influence, may become affected by inoculation. The theory has been advanced that those who seem to be insusceptible to the complaint, may owe this peculiarity to having been previously affected in utero. The contagion acts either through the air, or by contact either in the liquid or solid state with the sound skin, or mucous membrane, or by insertion beneath
the cuticle of the virus. What products of the diseased body are contagious is not exactly known; but the purulent contents of the pustules and their scabs are undoubtedly so; and it has also been communicated by using the same lancet in bleeding which had been used a little before in the case of a patient affected with the malady, its not having been properly cleaned between the times of its having been used. As to the period at which it is contagious, some consider it to be so only after the commencement of the fever, while others, believe it to be capable of self-propagation at any period, after the first commencement of the fever. The body after death, retains the power of imparting the disease, according to the truth for at least a period of ten or twelve days, even without contact. Some consider that the odour is connected with the contagious effluvia, but it is certainly not essential, for the complaint may be propagated when there is no appreciable smell. The contagious principle of smallpox in
common with most others seems to have the power of attaching itself to the clothing, which may retain it for month or even years if confined. It appears to be easily dispersed by the air so as to become inert. Attempts have been made to determine the distance from its source at which the volatile poison is capable of acting, but without affect, for the distance must vary greatly, with the degree of concentration of the poison; and its activity is probably much greater in certain conditions of the atmosphere than in others, as during the prevalence of an epidemic. It is certain that the virus emanating from one chamber may affect all the individuals living in a large house, and may even extend to those of a neighbouring house. Generally one attack acts as a prophylactic, against any further recurrence of it, and, where it does not afford complete immunity from the complaint, it so modifies the subsequent attacks as to render them almost harmless. Fatal cases of secondary smallpox do occur, but not often.
Some families are more susceptible to the various poison than others, and those who are most susceptible generally suffer from it most severely. It is a disputed question whether any other cause is capable of producing smallpox besides its peculiar poison. It often occurs epidemically; after an interval of years perhaps, a city or district of country is visited by it where it continues to rage for a longer or shorter time, after which it declines and soon for a time ceases to be heard of. It may then return at intervals, until at length the influence which produced it seems to be exhausted, an entire exemption may then be enjoyed for some time, interrupted occasionally by cases arising from obvious contagion. It is during those epidemics that persons supposed to be protected by inoculation, vaccination, or any other cause, are most likely to be affected. It is doubtful whether the epidemic influence has the power of originating the disease or not. In all likelihood it acts simply by increasing in some unknown manner the susceptibility of the system, or by increasing
the virulence of the contagion, so that a smaller amount of it is capable of producing the malady than under ordinary circumstances. That it operates chiefly by increasing the tendency to the disease, may be inferred from the fact, that, during an epidemic of smallpox there is a greater tendency to other cutaneous disorders and to eruptive fevers generally. Dr. Gregory has advanced, as a proof against its spontaneous occurrence, that smallpox has never yet been seen in Australia or Van Diemans Land; but the first patient who was ever affected, could not have derived it from direct contagion.

Variolus epidemics observe no regular rule of recurrence. They may take place at one season as well as at another. Generally those which take place about the middle of winter are more severe than those which take place in spring. It appears that the character of the communicative case, has no influence on the appearance or grade of the one produced.
Treatment—This may be considered under two heads, viz.: 1st. The therapeutic or curative. 2nd. The preventative.

With regard to the first of these, the main object, is to prevent, as much as possible, the quantity of the eruption, since the danger and severity of the attack, depends for the most part on the quantity of the eruption. Formerly the treatment was carried on from a different principal, viz, that of favouring the production of the eruption. It was endeavoured to promote this by blisters, stimulating drinks, large bleeding, opiates. Down to the days of Sydenham this was the practice followed; but a revolution in it took place from the recommendation of the above named physician. At present the treatment of smallpox, is directed with a similar view—to that recommended in other fevers, viz, to modify the febrile phenomena, whenever they are excessive or severe, to support the powers of life, & to treat any other urgent symptoms that may show themselves.
Very often the primary fever is not recognised as being that of variola; from its similarity to other fevers. When it is fully ascertained that the complaint is variola, the patient should be placed in a chamber which is cool and freely ventilated. The bed clothes should be light; the body linen daily changed; and, when the attack is prolonged, the patient's back should be often examined to prevent bed sores forming. If the malady be recognised before the appearance of the eruption, it would be well to have the scalp shaved; but if the eruption has already made its appearance, the hair should be cut off to prevent matting. In the early stage of the primary fever, a dose of calomel with ipecacuanha or antimonial powder may be given, followed by a saline cathartic. Saline draughts, in a state of effervescence may be prescribed, and the bowels kept open by the usual cooling aperients. The surface of the body may be sponged several times a day with tepid water; caution being necessary to prevent exposure to cold.
In children if the patient be robust, or had been previously in good health, local bleeding may be found useful, especially when there is delirium, heat of head, intolerance of light or sound, all of which indicate a tendency to meningeal congestion. With regard to the propriety of bleeding in adults, it is now generally believed that it will neither eradicate the fever, nor diminish the quantity of the eruption. An opiate will be found useful, when there is dizziness, wakefulness, and a frequent pulse. Emetics have been recommended by some writers and condemned by others, and are found to be seldom of any advantage. During the progress of the eruption very little should be done with regard to treatment, except to regulate the secretion, to keep the patient cool, and when there is much cuticular irritation, or great distress from want of sleep, opiates should be administered. The diet should be light and nutritious. If the attack be complicated by an affection of the throat, gargles of various kinds may be
used. When there is great difficulty in swallowing and when the tonsils are much swollen, leeches should be applied to the throat, followed by warm water or poppy-water fomentations. A solution of nitrate of silver applied to the affected part is strongly recommended by some, and will be often of service.

During the secondary fever purgatives are to be freely administered. The are of the greatest service when the skin is hot and dry, or when the body is covered by a scarlatinal rash. In their administration care should be taken not to induce diarrhea or dysentery, or any enteric complication. When the attack proves severe and exhausting, or when there is hemorrhage from the mucous canals, or when the eruption is of a dark brown or black colour, tonics will be necessary; as cinchona in combination with the mineral acids, or with the alkalies. External means have been used to relieve pain and to preventfitting. For this purpose, the face has been covered with simple dry powders such as starch, or powdered calamine etc. Ointments have also been employed. Nitrate of silver has
been used, with a similar view. Various other applications have been used, for the same purpose, all of which have been thought of service by different physicians.

Preventive treatment—Two principal methods have been followed, to prevent this disease. 1st By inoculation. 2nd By vaccination. The former of these two methods was first introduced into this country, by Lady M. W. Montagu, whose own daughter was the first inoculated in England. Its efficacy in mitigating the severity and danger of the malady was truly great; but it appears to have promoted the frequency of epidemics. This method of preventive has now become illegal, since the introduction of vaccination. It having been observed that sometimes cows were affected with an eruption on the udder, which, when communicated to the milkers, rendered the various virus inocuous when applied to them. Dr. Jenner having inoculated several, who had been before affected by the cowpox, and finding them insusceptible to its influence, he conceived the idea of propagating the cowpox from one human being
to another, and so render them innocuous to the complaint. It was then necessary to prove whether, if transmitted from one person to another, it still retained its protective power. It is now generally considered that vaccination is a safe and efficient protective, and confers an immunity equal to that of inoculation. It is also observed that smallpox after vaccination is neither more frequent nor more severe than after vaccination. The mortalitity from smallpox has decreased since the introduction of vaccination, as is shown from statistics.

In the practice of vaccination it is necessary:
1st. That the lymph be pure.
2nd. That it has been procured from the vaccine vesicle, between the eighth and ninth day of its course.
3rd. That the vesicle produced shall pass regularly through the stages already described.
4th. That the cicatrix left behind have the distinctive characters of a snout.
To ascertain that the operation has been successful, re-vaccination may be practised.

Firis