Vaccination Eruptions
(a thesis)
by
Thomas Dobson Poole
M.B., C.M., Edin.
Introduction

As Political Economy is to the politician, so is Vaccination to the investigator.

After reading more or less extensively the subject of Vaccination, one cannot avoid the conclusion that authors have discovered more words than matter. "For the wit and mind of man, which is the contemplation of the creatures of God, workseth according to the stuff, and is limited thereby; but if it work upon itself, as the spider worketh his web, then it is endless, and brings indeed cobwebs of learning, admirable for the fineness of thread and work, but of no substance or profit" (Bacon).

Nor is the difficulty simplified by a few antivaccinists, who, grovelling in their own inventions and conceits, have concocted a panorama, in which we see a war between the antivaccinists and the vaccinists, the former being repu-
resented as using the instruments of the present day, while the latter are represented as using those of the time of Jenner. This has diverted the attention of the thoughtful and polluted the minds of those not educated to think. Our present inconsistent law on vivisection is another cause that still further tends to postpone the day when vaccination is to be revealed.

Does vaccination minimize the small-pox mortality? Is what the statesman, in particular, asks. Although I do not intend dealing with this question at present, it may here be pointed out, that (to borrow the idea from C.W. Newman) a true statesman who has a liberal education (as distinguished from a scientific education), and who is endowed with what is termed capacity, will, in making a law, use the skill and opinions of others. Therefore, in
making a law regarding a scientific subject he will use the skill and opinions of scientific men.

Assuming that vaccination minimizes the small-pox mortality, it is plain that the small number who die from vaccination cannot be weighed against the thousands that are saved thereby. It is mere sentiment to say that the Compulsory Vaccination Acts should be unconditionally repealed because a few infants die from vaccination, or because other diseases may come with it. Taking cow-pox to avoid small-pox is simply a small risk in order to avoid a great danger. Life is a game of skill, not of chance.

Since the Public, who are indirectly the law makers, are so influenced by sentiment, it is evident that if sentiment has not to rule, the minds of the public must be kept as far as possible neutral; and that any publication whose
Tone is calculated to generate sentiment is inadmissible. A time may come when sentiment will be out of the pale in the making of a law on cremation.

It is argued — as we are led to believe from the tone of some anti-vaccination literature — that the public have a right to know the details of vaccination. If so, then the public have a right to know the details of some points in obstetrics or in toxicology about each of which there is a law.

Considerable insincerity is shown by the anti-vaccinists in their arguments to prove that compulsory vaccination is inconsistent with freedom, and they recommend isolation to take its place. But no legislature can give to an individual that freedom whereby he becomes a source of danger to himself and his fellow creatures; or otherwise the laws on suicide and murder
ought to be repealed. The law simply requires that an infant be vaccinated in order that its chances of contracting small-pox are diminished; or if it do catch the disease the probability is that recovery ensues (whereas small-pox is very fatal in unvaccinated children); at all events the small-pox virus, after passing through the system of a vaccinated person, becomes so attenuated, or modified, or in other words is disarmed to a great extent of its virulence, that it either fails to give the disease to a second vaccinated person or becomes more weakened still, and in this way an epidemic of the disease tends to become extinct; and surely there is nothing inconsistent, immoral, or unjust about such a law. And it is difficult to see how compulsory isolation could be more consistent with freedom, provided hospital accommodation
were sufficient to enable such a law to be carried out. Fortunately the present system answers the purpose. The Registrar-General's report shows that the deaths from small-pox in 1890 were sixteen; but it may be safely predicted, that if the people in some parts of England persist in remaining misguided in regard to the vaccination question the record of 1890 will not so soon be broken.

Parliament has just as much right to compel a healthy child to be vaccinated for the public benefit as it has to expose a healthy soldier to the enemy's bullets or to the diseases and drudgery of an unhealthy climate. Nor has a physician a right to treat as his own judgement dictates, for there are conditions of worry and anxiety (and in some instances amounting to melancholia) that might be relieved by a procedure, which,
if permitted, would act disastrously on the public morals — although perhaps beneficial to an isolated patient. Thus one individual is allowed to suffer an inconvenience for the good of the community.

Again, there are others who scoff at the scientific opinion of vaccination by saying that science is now in its infancy. The typewriter and the phonograph are not the productions of anything comparable to infancy whose helpless imbecility is characteristic. If any such comparison be needed, science would be more aptly compared to a daughter of Eve on the verge of womanhood — who is as we wish to make her, true, or false. The time may not be far distant when she will be comparable to a sensible nation.

In the meantime when we consider, how that previously
to compulsory vaccination in six
months there died of small-pox in
Glasgow alone 600 persons, how
that at one time the contraction of
small-pox was almost inevitable
to every one, how that at present
the number of cases in a small-
pox epidemic is counted by the
teens and not by the thousands, and
how that there are hundreds of
practitioners who, while in a practice
of many years, have seen neither
a small-pox patient nor a case
in which vaccination has been followed
by an untoward effect, we cannot
help thinking that to repeal the
Vaccination Act is a risky experi-
ment for Parliament to undertake.

The literature of vaccination ex-
tions is so meagre — thus differing
from the literature of vaccination
with which however it is blended
— and no one can boast of a
large experience in the complication
of vaccination, that no attempt
whatever can be made to give the frequency of the various accidents that may attend the inoculation with vaccine lymph.

"The extreme paucity," says Malcolm Morris (Brit. Med. J., 1876, p. 1229), "of the literature of this country, may be ascribed on the one hand to the fear that any full account of unusual appearances may be detrimental to vaccination as a system, and on the other hand to the fact that eruptions are fortunately rare. However, I would urge that it is one's duty to record, as far as possible, any deviation from what may be considered the normal course." And Dr. Lee says (Brit. Med. J., 1874, p. 1179) that we "should recognise that vaccination may cause certain eruptions which we might not to disregard but rather to explain. Thus the prejudices which have of late been increasing against vaccination will be diminished and the cause for them prevented."
Classification

Undoubtedly, the best method of classifying disease is based, as modern pathology teaches, on the etiological factor. (W. Malcolm Morris, Brit. Med. Jan. 90, p. 1230) Appreciating this, suggests two principal groups for the classification of vaccination eruptions:

1. Eruptions due to pure vaccine inoculation.
2. Eruptions due to mixed infection, that is to say, to vaccine together with an additional virus.

Dr. Colcott Fox (ibid) however, prefers a classification made in accordance with the one so ably put forward by Morrow, and arranges all departures from a normal vaccination in one of five groups. The classification of vaccination eruptions presents no ordinary difficulty, and must of necessity be faulty, since it is a classification of a variety of diseases relative to another disease.
It is necessary, in order to describe them in anything like an orderly manner, that some arrangement be made, and I propose using the admirable classifications of Malcolm Morris and Colcott Fox.

**Proposed Classification (Malcolm Morris)**

**Group I - Eruptions due to pure vaccine inoculation**

**Division A** Secondary local inoculation of vaccine.

**Division B** Eruptions following within the first three days before the development of the vesicles.
- Urticaria
- Erythema multiforme
- Vesicular and bullous eruptions

**Division C** Eruptions following after the development of the vesicles due to absorption of virus.
- Rosacea - like measles
  - Erythema - like S. fever
  - Purpura
2. Generalised vaccinia (“vaccine generalisée”)

D. Eruptions appearing as sequelae of vaccination; eczema, psoriasis, urticaria, etc.

Group II. Eruptions due to mixed inoculation.

Division A. Introduced at the time of vaccination

Subdivision a. Producing local skin disease.
    Contagious impetigo.
    Erythema.

Subdivision b. Producing constitutional disease.
    Syphilis.
    Leprosy?
    Tuberculosis?

B. Introduced not at the time of vaccination, but subsequently through the wound.

1. Erysipelas.
2. Cellulitis.
3. Furunculosis.
5. Pyaemia.
Classification (Colecott Toy)

I. Local abnormalities or irregularities in the development of the vaccine vesicles.

II. Incidental exanthematic eruptions.

III. Diseases inoculated with vaccinia at the time of the operation.

IV. Diseases (chiefly of a septic nature) which find a nidus in the wounds subsequent to the operation.

V. Diseases excited in subjects specially predisposed to the same.
Local abnormalities or irregularities in the development of the vaccine vesicles

It is difficult, with ordinary care, to deviate from even a branch of such an extensive subject as vaccination, and a brief notice of some of the more salient features of vaccine lymph will not be a needless digression. Weak antiseptics appear to exert little influence upon vaccine and Dr. R. Potter (Brit. Med. Jour. 82, 1, p. 592) says that salicylic acid (1–3%) hypochloric acid (3.5%), and carbolic acid (1–5%) solutions do not destroy its activity, but over 5% of carbolic acid solution does so. And Dr. W. Husband in his essay on vaccine is said (ibid.) to have stated that...
Vaccine, properly secured in the tube, retains its activity for seven years. There are two principal kinds of vaccine lymph, the translucent and the opaque. The translucent variety, the one to be recommended for vaccination purposes, is alkaline in reaction, and shows under the microscope micrococci, varying in size from 1 to 5 μ, which are stained with comparative ease by aniline methyl violet. These micrococci are supposed to be the active principle of lymph. Besides these micrococci, there may be seen, according to M. Ferré (Brit. Med. Jour., 84, 1, p. 695) different structural elements, such as lymphatic cells, blood corpuscles, and more or less misshapen granular carbonate of ammonia. These must be regarded as accidental ingredients and not as true products of vaccine. The clearest lymph is obtained at, or just before, the time when the node is mature, for these cellular bodies make their appearance in daily increasing numbers after the 7th day.
The opaque lymph is acid in reaction. It owes its opacity according to Buist (Vaccinia and Variola) to the "germ" of vaccinia itself and to a slight extent to the germinal matter found in commercial vaccine tubes, which assists in the production of the opacity. A cover glass preparation of opaque lymph, stained with aniline methyl violet, shows chains of micrococci, diplococci and tetrads, the micrococci being twice the size of those seen in a similar preparation of clear lymph. These microorganisms bear a resemblance to those seen in Dr. Buist's artificial cultivations of lymph.

The attempts to cultivate lymph artificially have been, up to the present time, practically a failure, although much light has thereby been thrown into the dark corners of pathology. Among the names of those who have worked at this difficult subject we may mention those of Buist, Cohn, Neil Carmichael,
and Quist. Buist's cultivations were carried on in solid media and his experiments led him to conclude that he had attenuated his lymph.

On the other hand, Dr. Carmichael (Proc. Philos. Glas. 1886-7 p. 369) who, using a fluid medium, claims to have succeeded in cultivating lymph artificially but not in sufficient quantities for general inoculation.

Dr. Carmichael's cultivations succeeded in 10% only of the children inoculated, who were susceptible in a special degree. "It is not, I think," says Dr. Carmichael, "a truly attenuated lymph, for when it does succeed, its success is perfect." In this way it differs from Dr. Buist's cultivations.

Quist (Brit. Med. Jour. 57 p. 380) concludes that the micrococci to which lymph owes its activity can be made to multiply without losing its activity. His medium is blood serum and glycerine to which he adds a small quantity of carbonate of potash.
We cannot however avoid associating the idea of mixture with fluid media and lymph, for the latter is well known to tolerate considerable dilution with such fluids as glycerine and water without losing its effect.

The discovery of a method of cultivating lymph artificially, in such quantities sufficient for practical use, would place vaccination on such a firm basis, that no apology need be offered, for suggesting a method; and since the vast field of bacteriology is in such an uncultivated condition a struggling gleaner may hope by chance to obtain as ripe a sheaf as a professional reaper. The causes of failure in the cultivation are not known.

It must be due either to the want of a suitable medium, under proper conditions of time and temperature, or to the micrococci giving rise to a product which
prevents their natural proliferation. Nearly every known medium has been tried and under various conditions without success. If the speculation that lymph generates a "stroma" that interferes with its growth be at all feasible, then the cultivation of lymph in a test-tube would be the last thing to expect; for the medium in the test-tube, on the introduction of the lymph, would be contaminated and thus protected.

The comparison between this imagined process of lymph and the behaviour of yeast assists in making the theory more tenable. The growth of the yeast fungus is checked by its product, alcohol, when the latter is in sufficient quantity. I would therefore suggest to any one desirous of making another attempt to cultivate lymph artificially, that it be cultivated in a receptacle made of some material as flaxen, sausage skins (or earthenware pots)
which would permit the product of lymph, if dialysable, to escape, care being taken to add salts to the fluid outside the dialyser in sufficient quantities as to prevent those escaping from within.

It would appear that all those organisms which cause diseases that give partial or complete immunity from subsequent attacks present the greatest difficulty in cultivation and therefore in detection.

If we believe, as there are reasons for doing, that cowpox is smallpox modified, we can easily understand the importance of taking special care in the natural (the only practical) cultivation of vaccine, in order that it may not undergo still further attenuation. The lymph should be cultivated in healthy children whose vaccination pursues a normal course. It is a question whether it would be not advisable to postpone
the using of humanised lymph until after a lapse of time necessary to prove that no ill effects had happened to the vaccinifer from whom it was taken. This would of course do away with arm-to-arm vaccination, but by this means specific disease which might have been inoculating in the vaccinifer could, in most cases, be avoided.

When vaccine lymph is rubbed into a small area of scarified skin, nothing occurs until the 2nd or 3rd day, when a papule is seen at the seat of inoculation. This increases in size and on the 4th or 5th day a vesicle is formed. On the 8th day the vesicle is plump, rounded, and pearl coloured, has an elevated margin, a depressed centre, and contains translucent potent lymph. It is surrounded by a zone of inflammation (areola) which continues to increase for several days and the contents
of the vesicle begin to be permanent.

A scab then takes the place of the vesicle. The scab becomes harder, drier, and firmer, during the third week when it drops off, leaving a depressed, circular, or ovoid scar. Any departure from this simple and beautiful process may be considered an abnormality.

It sometimes happens that on inspecting a case of vaccination there are found more pocks than was the apparent number of insertions, or the pocks may be irregular, or dumbbell shaped.

In the great majority of cases these extra vesicles are to be explained by the restlessness of the infant together with the decomposure of the person who brings it to be vaccinated. This causes the operator to "lose his place" as it were, when making the necessary incisions, and the result is that he makes more insertions.
than he intended. The shape of the pock depends much on the shape of the area of skin scarified, but it tends to assume a rounded outline.

There is another condition not unlike the preceding which has received the name of "supernumerary vesicles." A whole group of vesicles, some confluent, some isolated, develop on the areola of the vaccinated arm and are commonly accompanied with vesicles in other regions of the body.

The explanation generally offered is that they are due to auto-inoculation, but I shall attempt to show, under the head of vaccine pinocytosis, that they are probably due, in most cases, to absorption of vaccine lymph into the system, and the areola on the arm is simply a weak point in the cutaneous system most favourable for their development. As an illustration we may mention a case by P. Hugh

Supernumerary vesicles
Thompson (Brit. Med. Jan. 901, p. 1232), which is interesting to compare with the one that came under my notice (case of H. S—). "The great difference," says Dr. Thompson, "between vaccine and variolous virus is in my opinion— as I have pointed out in a pamphlet— a certain fixedness or non-diffusibility," in the former, so that it remains germinating where it has been planted, have little or no tendency to spread except by contiguity of tissue, being pre-eminently aerotile. As an illustration of this I may mention the details of a case of so-called supernumerary vesicles of a very marked character. It seems a case half and between a local and a general eruption—a sort of connecting link. I note that when the supernumerary vesicles are extensive with an early developed areola (which indeed is only a local extension of the virus into the skin, and always more or
less vesicular at the margin of the parent vesicle), the vesicles are dry, yielding very little lymph on puncturing them, thus showing that the virus has been either absorbed into the blood or diffused through the surrounding skin.

Case of Vaccination, Illustrative of Supernumerary Vesicles.

M.M., 14 Abington St., aged 43 months, vaccinated Oct. 11th 1886, at the Hall of the Faculty of Physicians and Surgeons, Glasgow.

18th All four insertions successful and areola considerably developed with numerous supernumerary vesicles.

22nd Since the 18th supernumerary vesicles have greatly increased in size and number, three or four being of the size of a small pustule with a central depression, in the immediate vicinity of the primary vesicles, and many smaller ones of different sizes scattered over the whole of the area; those at its outer border being in general the smallest and the last come, some of the latter within the
lost twenty-four hours. The number of vesicles counting small and large together might be about fifty or sixty. Nevertheless the constitutional disturbance has been very slight. The primary vesicles have meanwhile increased in diameter, the three depressions corresponding to the three punctures made for each insertion, have, by the gradual extension of necrotic action, coalesced, forming one large depression in the centre, whilst on the outer margin a vesicular border is observed, from which as well as from the supernumerary vesicles, lymph could still be obtained.

23. Still more minute vesicles coming out, one or two, even beyond the areola, which has never exhibited a distinct line of demarcation. A small pimple or vesicle was also seen on the clin. 25. The vaccination now markedly on the decline; many of the supernumerary vesicles have dried up and fallen, leaving no cicatrix. The four primary
Vesicles have quite dried up, and the areola become dusky and faded.

Dec. 24<sup>st</sup> Vaccination all healed well; cicatrices measuring each half an inch by a quarter of an inch square.

The evolution of one or more vesicles may be tardy or too rapid, or they may be ill-formed. Such abnormalities are more rarely found in infants than in adults. Dr. Samuel Prall (Brit. Med. Journ. 1874 p. 127) is of opinion that no true vesicle can be obtained in an infant suffering from congenital syphilis. In unvaccinated adults, more commonly than in infants, some of the vesicles from the same vaccination may be in an early stage of development while others are fully formed. In other cases and especially when attenuated lymph is used, little more than a seb is produced. From the typical Jennerian vesicle on the arm of an adult sister (vaccinated with calf lymph) I re-vaccinated an adult brother and produced a...
a vesicle much less typical. From
the vesicle on the arm of the brother
I revaccinated another adult brother
and then resulted a small "mark"
which was more a scab than a
vesicle. The progress of the pox
was rapid and the scab dropped
off early. Undoubtedly the lymph
underwent attenuation as it passed
through the systems of the re-vacci-
nated adult. Lymph taken
from subjects who have already been
revaccinated is not to be recommended
and M. Bucquoy (Brit. Med. Jour. 85;
\textit{p. 713}) maintains that such lymph
is useless. In France a ministeri-
\textit{\textipa{el}}al decree of 1883 sanctions "the
use of vaccine lymph from adults
who have been vaccinated only when
no other can be obtained."

In cases of tardy vesicles, especially
those associated with an acenocicous
condition, M. Enoch Snell (Brit.
Med. Jour. 85; \textit{p. 109}) highly recom-
mends the following ointment:
Rp. Ung. Hydragrypi Ammon. 3 1/2
Ung. Plumbi Carbonatis 3 1/2
Nat. Ung.

Instead of the vesicles making signs of appearing on the 2nd or 3rd day, they may be delayed for several days, and in some instances for months or years. This delayed appearance is said to be more common when calf lymph is used. Mr. Bryaly (Medical Times 611, p. 442) cited an instance in his own practice, in which the vesicles appeared just two months after a child, then suffering from whooping cough, had been vaccinated; and Dr. Geo. Harlay (Med. Times 81, p. 5-72) mentions a case where the vesicles did not develop till one year after vaccination. A case quoted Sir Thomas Watson (Med. Times 77, p. 621) in which the vesicles did not appear till fourteen years after vaccination is more surprising still. It was a case of a girl, aged 14, who, when attacked with influenza,
began to complain of pain in each arm at the spots where when an infant, she had been vaccinated, and in these places vaccine vesicles now became perfectly developed. An elder sister was revaccinated with lymph thence obtained and beautiful vesicles resulted.

Closely allied to the late appearance of vesicles is the revivifying vaccination, by which is meant the appearance, after some subsequent inoculation, of vesicles at the site of a previous and apparently unsuccessful vaccination. Dr. H. J. Ilott (Brit. Med. J. vol. 85 11 p1017) relates a case of a child who was vaccinated in Oct. 27th and when inspected on Nov. 2nd, no signs of any vesicles were found. It was therefore again vaccinated on Nov. 2nd and on the third day following, five out of the four vesicles commenced to develop at the sight of the first vaccination. They were all well marked on Nov.
9th, and pox developed at the site of the second vaccination also. 
Mr. J. A. I. Shepherd (Lancet 81, p. 918) records a case illustrative of vacci-
nation being revived after four years. Mr. Shepherd vaccinated, 
with the left arm, a nurse who had 
been vaccinated on the right arm 
four years previously. One of the 
four insertions on the left arm was 
successful and the vesicle was ac-
companied by the usual inflam-
mation. The four places on 
the right arm where she had 
been vaccinated four years previously 
became distinctly vesicular, ex-
uded an appreciable amount of 
lymph and in fact became 
tolerably characteristic of secondary 
vaccination. The most feasible 
explanation of these phenomena 
appears to be that the active princi-
ple of lymph lying dormant in the 
skin at the site of a previous vacci-
nation receives an impetus from a 
latent circulation and is kindled into activity
Vaccine vesicles sometimes "run" and the lymph forms a crust on the arm which is to be distinguished from impetigo contagiosa. The vesicles may have been ruptured by their being too distended with lymph, and this is apt to occur in infants with delicate skins, or by accident or intentionally. The accidental rupture of a vesicle is attended with more risk of septic contamination than when the vesicle is opened with an instrument. Such complications demand treatment, and there is no reason why a wounded vesicle should not be treated antiseptically like any other wound. Dr. Radcliffe Crocker (Brit. Med. Jour., 90, 2, p. 1232) agreed with Mr. Malcolm Morris as to the necessity for antiseptic treatment of vaccine vesicles and thought it could be simply and efficiently carried out by keeping them constantly covered with corrosive sublimate wool now in general use. When the vesicles "run"
the application of powdered oxide of zinc, or starch, or flour is useful. Moist applications as oil or cream are inadmissible, and they fail to prevent the parts sticking to the clothes. For the spontaneous rupture of the vesicles in the wound from the lanceet, Dr. Alex. A. Sinclair (Brit. Med. Jour. 84, 11, p. 127) recommends the firm application of clean blotting paper. The wound is thereby closed, the lymph prevented from forming a crust on the arm, and the natural drying of the vesicle and the formation of a scab thereby attained. When the vesicles are inflamed Dr. Illingworth (Brit. Med. Jour. 85, 7, p. 264) recommends the following to be applied to the vesicle on the 8th day:

1. Zine ointment $\frac{3}{4}$
2. Glycerine $\frac{3}{4}$
3. Carbolic acid $\frac{3}{8}$

"If there should be any inflammation around them it should be gently rubbed in with the finger nail and then"
applied on linen twice a day."

In the case of infants the utility of vaccination shields is generally admitted to be more than doubtful. The vaccinator should vaccinate the child's arm that is away during nursing, from the nurse's body. Protection by shields is rarely wanted in the case of an infant. The arm can easily be altogether taken out of the clothing, care being taken to wrap the child up warm in some loose shawl or similar article which is free from irritative dye. Absorbent antiseptic pads, for once using only, do pretty well. (See enypipelas).

The vaccine vesicles may ulcerate and all of them are affected as a rule. The ulcers are deeply excavated and there is much suppuration and inflammation. The margin of the ulcer is irregular and the floor uneven. The induration is inflammatory and the inflammatory area assumes an enypipelas aspect.
If there is any gland swelling it is inflammatory and complications as sloughing and erysipelas are liable to occur. A vaccination ulcer is to be distinguished from a syphilitic ulcer (see vaccine-syphilis). Ulcers are liable to complicate vaccination in individuals whose tissues are broken down from any cause, constitutional acquired, the weak, the fat and flabby children, and particularly the strumous egestomatous type. The introduction of septic germs, as our experiments have shown, either at the time of, or subsequently to, the operation, such as after the scabs have been prematurely removed off, is often the exciting cause of an ulcer.

The treatment is like that of any other ulcer, cleanliness, antiseptics, e.g., inacric acid (the weak ointment useful), dusting powder for the inflammation and the avoidance of all applications that
May induce a more unwelcome complication, as shields, quack nostrums, jane, etc., are the points to be attended to. The constitutional treatment must not be overlooked.

Accidental vaccination may be described here. From the number of cases recorded it does not appear to be very uncommon. A vaccine vesicle occurring in an unusual situation is very liable to lead to an erroneous diagnosis unless one's mind is on the alert, but there is nothing especially to distinguish an accidental pock from the following ordinary vaccination, except by its unusual situation and the fact that it is accompanied with greater inflammatory action. The sites where the accidental pocks are mostly found are the exposed parts of the body, the face being the most common locality, but the mucous membrane of the mouth, nose and tongue, the conjunctiva, and the vagina are not exempt.
When occurring in the latter situations they are to be distinguished from chancres. If vaccine lymph come in contact with any abrasion of the skin, such as, a scratch, or a plica-tite, or a skin disease, a vesicle may develop. That there probably is some abrasion in each case is shown by Dr. Brist (Ed. Obstet. Trans. Vol Xvi p. 109) who failed to produce a vesicle by rubbing lymph mixed with blood on the unbroken skin. Using a pocket-handkerchief that has come into contact with vaccine vesicles, the vaccinated arm of the infant touching the breast or the face while in bed, using some application that has been contaminated with lymph from vaccine vesicles, and that scratches from a vaccinated child, are mentioned among the causes of accidental vaccination. Another possible cause of accidental vaccination is the using of a vaccine
lancing for a different purpose, as is shown by Dr. Buist's experiment (ibid.) of inoculating a monkey with common yeast which apparently produced a typical vaccine vesicle; but Dr. Buist admits that the lanceet was probably charged with any yeast. This shows, as Dr. Buist points out, how necessary it is not to employ a vaccine lanceet for any other purpose.

The symptoms vary according to the site affected but there is more or less inflammation, with its symptoms, accompanying the process, and in some cases closely resembling syphilis. And this is a point of difference between an accidental pox and one due to vaccine generalisés (from blood infection). The lymph in its transit from the vaccairifer becomes tainted with septic germs which are the cause of the inflammation. Dr. R. W. Felkin (Ed. Obstet. Trans., Vol. XVI, p. 104) records nine cases
of accidental vaccination that have come under his notice. Two were inoculated in the corner of the eye, two on the mouth and cheek, one on the labium, one on the lip, one on the cheek, one on the breast, and one on the buttocks. The last mentioned case was curious. The patient, aged 28, had chafed himself in riding and had used some vaseline from a foot from which his wife was dressing the vaccinated arm of the child. When Dr. Felkin saw the patient there was a large area on the buttocks presenting well-marked vaccine vesicles.

Another of Dr. Felkin's cases—a girl aged 20—was vaccinated accidentally at the outer angle of the eye, which she subsequently lost.

The following account by Dr. Geo. A. Berry (Brit. Med. Jour., 90, p. 1483) explains the symptoms and peculiarities of accidental vaccination on the eyelids. He mentions that he has seen five cases, four in women
and one in a man. "In all the
the pocks were found on the lower
lid but there were also to be found
one or more ulcerated patches on the
margin of the upper lid. Swelling
was great and involved not only the
lids but also the cheeks. The base
of the ulcer was decidedly harder
than the surrounding swelling, but
not so distinctly indurated as in
the case of a chancr of the lid, and
the glands were not indurated. There
was comparatively speaking very
little pain. In no case was
the eye affected. The affection
never lead to any alteration in
the position of the lid, and even
the cicatrix left was slight, barely
perceptible, owing no doubt to
the rarity of the skin in this
situation. The main interest
in these cases consists in the
possibility of the inoculation taking
place at all, and the differential
diagnosis between vaccinia and a
primary syphilitic sore.
As the manner of inoculation: in three of my cases this could not be ascertained; in one there was little doubt that a direct transfusion of lymph took place owing to the child's arms often being in contact with the mother's face. In another the handkerchief used for wiping the vaccinated arm was admittedly used by the mother also. A syphilitic sore is more or less distinctly cut, eaten out ulcer, which has taken a considerable time to develop from its first appearance as a pimple on the lid margin. The opposite lid is not ulcerated as a rule. The base of the ulcer is greatly indurated and the pre-auricular glands as well as the submaxillary glands are often swollen. There is no history which can connect the case with vaccination and usually one which renders a syphilitic contamination possible??
none of Dr. Berry's cases was the eye affected. That the eye is sometimes affected is seen by the following case communicated by Dr. Swanzy for Dr. Kinniss (of New-
castle, New South Wales) before the Ophthalmological Society of the United
Kingdom. Such cases have received the names of "vaccinal ophtalmia".
An unvaccinated woman was inoculated in the left conjunctiva culi,
and on the side of the nose, by the
finger nail of her infant. On the
nose she had a normal vaccine
vesicle. Ocular symptoms consisted
in very severe swelling of the tides with
mucopurulent discharge and finally
Keratitis with hypopyon. C. W.
Anderson Critchett (ibid) referred
to an interesting case he had pub-
lished, of a medical man who
was very myopic, and whose elbow
was jogged while vaccinating a child.
The lancet entered the eye and a
well marked vaccine vesicle appeared
at the corneo-scleral sclerotic margin,
On the 9th day there was hypopyon which became reabsorbed. Finally an artificial pupil resulted.
A case of a vaccine vesicle developing on the tongue is recorded by Dr. Q. R. Buckell (Brit. Med. Jour. 897, p. 1403). He thought injury to the tongue with a fish bone and kissed the vaccinated arm of her infant, crotoad results followed. And Whiteville (Brit. Med. Jour. 897, p. 160) related a case of accidental vaccination occurring in a child, aged 8 months, suffering from eczema of the face and scalp, and who was accidentally vaccinated from the arm of an elder child with whom it slept. The child at first did well but refused food on the 14th day and died. The eruption on the child was almost entirely limited to the parts affected with the eczema, but there were a few isolated vesicles on the forehead, nose, eyelids, and chest.
We have seen the points of difference between a vaccine vesicle
and an indurated chancre occurring on the eyelids, and so characteristic is a typical vesicle on a plain skin surface that to mistake it for a chancre is hardly possible. The differential diagnosis is not, however, so easy when the pox occurs in a locality where, by mechanical and other irritation it becomes disfigured. A hard chancre commences as a small red, itchy papule, and is of slow development. A vaccine vesicle develops rapidly and there may be a history of exposure to vaccine lymph. A hard chancre has a base more indurated than that of a vaccine pock, is always accompanied by a bubo, and is followed by secondary symptoms. Mercury would not much influence a vaccine vesicle and the glandular swelling if any would be inflammatory. It must be remembered that the
Ulceration caused by a vesicle occurring in a syphilitic subject would be still more confusing, and would be influenced by anti-specific remedies. Moreover, accidental vaccination of a syphilitic subject might be cause of some specific phenomena, rash, etc. (see vaccine syphilis).
Eruptions due to Pure Vaccine Inoculation.

There is a stage in the study of vaccination when one is inclined to become antivaccinist—join the rabble, and to share their bubble myth—and while seeking a cause for these weak tendencies, there is found, not a hope of adding any startling evidence of the ill effects of vaccination, much less of denying its utility, but rather a feeling that if vaccination were stamped out, then some of the theoretical difficulties with which it is associated would suffer the same fate. To allow such a sentiment to remain unbalanced by reason is to acknowledge a weakness, of which, in calmer moments, we should be ashamed. The necessity then of exposing the
facts already demonstrated and of pointing out what is unexplained will be evident. No subject is more fascinating, none more subtle, and none that is involved in so many theoretical, but yet crowned with such practical success, as vaccination. We are aware of the impropriety of defending this important system of medicine by the method of argument used by its opponents—argument by ridicule; and our endeavours will be turned rather in the direction of indicating some of the untoward effects of vaccination, leaving what is claimed for it to be a sufficient defence.

A physician who disbelieves that vaccination is occasionally followed by rashes, could not, on being called to a case, exercise his skill with the same advantage as if he were acquainted with these sequelae. No surgeon could be said to be conversant in the treatment of fracture of the
ferm. if he were ignorant of
the hypostatic congestion of the lungs
which may follow it.
At the onset of describing vacci-
nation eruptions there arises a
fear, partly of exaggeration, and
partly that their Exposition may
be thought detrimental to vaccination.
Out of a few evanescent rashes
however, the antivaccinists will,
it is thought, be able to make
little capital - some, no doubt,
since by this time they must be
weary of attacking the stanch
foundations on which vaccination
is built. If vaccination is to be
condemned because it is known
to be the occasional indirect cause
of skin eruptions, or of momentous
accidents, then the drugs which
give rise to the same eruptions,
and indeed all surgical operations,
must, for a similar reason, be
discontinued. But denying or
hiding facts is simply flinching
from the enemy and thus allowing
them to gain headway. When Science was in her infancy philosophers turned the universe into a vast theatre for their amusement and entertainment; but now that day is past, and whilst yet retaining some of her infantile props. she affords us authoritative direction in addition, and if we are by reason to follow her, we are bound to listen to what she dictates. Science is our captain, we are her soldiers, obedience is our first duty.

On grounds a priori nothing is easier to imagine than the possibility that Vaccinia may be accompanied with a rash. For what do we occasionally see in small-pox? Morbilliform and scarlatiniform rashes preceding the true cutaneous manifestation, as also a purpuric rash distributed in a triangular form at the lower part of the abdomen. The same rashes may occur
in cow-pox. The specific rash — the pustular — of small-pox contains the poison that causes the disease, and in this way differs from the occasional rashes. The same is true in regard to cow-pox.

What is the explanation of these non-specific rashes? The most feasible one is that the skin tends to eliminate a poison (whatever may be its nature and wherever formed) generated by the disease, just in the same way as the skin tends to eliminate the poison of small-pox, scarlet fever, etc. The same rashes are caused by such drugs as chloral, copaiba, etc., and are met with in various diseases, e.g., Bright's disease. Thus one poison has a peculiar affinity for the skin, another for the intestine, and another for the kidney or lungs.

But how comes it to pass that vaccinal rashes are seen in some subjects and not in others, who
are inoculated with lymph from the same source? There is no other means of explaining this fact than by the old term idiosyncrasy. A constitutional predisposition is required, perhaps a faulty chemistry of the body, whereby a foreign agent acting on the vasomotor system induces a skin eruption. There is, as it were, stored up in the system, a potential energy, which is now and again liberated by vaccination, and the kinetic effect shows itself in the form of a skin affection. The predisposition in many cases is quite strong enough to require no other liberator of energy than time, as is shown by children whose vaccination has been postponed or neglected, and who develop eczema at what would have been the vaccinal period. It is in virtue of this peculiarity that certain people suffer after partaking of such food as shellfish. I know a practitioner who is
attached with urticaria after eating oatmeal porridge, by which means he can bring on an attack of the disease which he used to demonstrate to his fellow students. Another practitioner with whom I am acquainted suffers from urticaria when excited. I witnessed on one occasion when he had been worried by the calling of two or three patients at an unsupervised hour, that his hands and face, about an hour afterwards, were covered with an eruption of urticaria. The type of the eruption not uncommonly gives a hint as to the constitution of the patient. The French aphorism, always true in medicine, "il n'y a pas de maladies, il n'y a que des malades" is illustrated by the nature of the skin affection differing in different individuals while the same cause is at work. Thus in a haemophiliac the eruption will show itself in
the form of purpura, and as a syphilitic in the form of an eruption. Characteristic of that disease, and if there be much cachexia perhaps in the form of pemphigus. It must not, however, be concluded that if pemphigus happened to follow vaccination the vaccinée is syphilitic.

Dr. Gustav Behrend (Brit. Med. J., 1882, p. 551) is of opinion that vaccinal eruptions are not caused by any specific action of the vaccine lymph, as precisely similar ones are noticed after the administration of certain drugs and articles of diet. Dr. Behrend says that blood change might give rise to skin eruptions (pyaemia, septicaemia, perforation wounds), but that a certain predisposition is a necessary factor in their production. There are, says this author, two distinct phases in the course of vaccinæa: (a) in the early ones (first three days) the vaccination itself might be a factor; while (b) the later ones (beginning from the eighth day) are due to
absorption of certain materials from
the developed pustule. Analogous
eruptions occur in variol.
The great factor in the cause of
vaccination eruptions is, as we have
said, a constitutional predisposition;
but it has generally been noticed
that vaccination with calf lymph
has been followed not as infor-
mately with eruptions as vaccination
with humanised lymph. In
regard to this question M. Depeau
(Brit. Med. Jour., 80, ii., p. 22) distin-
guished three kinds of virus as causing
vaccinal eruptions: (1) humanised
vaccine virus which rarely gives rise
to secondary eruptions; (2) calf
lymph of which the inoculation is
more frequently followed by these
eruptions; (3) finally, varioloid lymph,
if it may be so called; that is to say,
attenuated varioloid virus; for instance
that of discrete varioloid pustules
which often gives rise to a generalised
dysgn eruption. Calf lymph
is said by Brist to cause eruptions.
We propose here giving a separate description of each of the eruptions mentioned in Mr. Malcolm Morris's classification (Group 1).

**Roseola**

Erythema vaccinale, roseola vaccinale, rash vaccinal, are terms used by French authors in describing this affection. Its existence has long been recognised and it is perhaps the most frequent of vaccinal rashes. It appears as a rule about the time of the maturation of the vaccine pustules, usually from the 6th to the 11th day; exceptionally is it seen at the 3rd day, and some authors pretend to have observed it about the 18th day (Roger quoted by Dauchy, Vaccinides p. 876). It is a very macular rash like that of measles, for which it has more than once been mistaken. It disappears on pressure, but uncommonly it first makes its appearance in the locality of the
Vaccine pustules, and from thence spreads to other parts of the body, where it may attack the face and thus be easily detected. Sometimes the macules are isolated but they may become confluent and even exhibit these two characters on the same subject and at the same time.

It is a benign eruption. According to Dauchey (p. 142) rosacea is syphilitic, but Prof. Tower (see Vaccino-Syphilis) says that vaccinal rashes are accompanied with fever. From recorded cases it would appear that the opinion of Dr. Dauchey was more correct. There is little constitutional disturbance. It may be quite evanescent, but it usually dies away after two or three days, without desquamation or itching.

There are several diseases with which it might be confused, and the one it resembles most is measles. The absence of quick fever, cough, cataract of the conjunctiva &c., and the existence of vaccination marks, 

Diagnosis
would assist in avoiding the error.
Rosela generally attacks the limbs, trunk, and afterwards the face, and may appear and disappear in the course of 24 hours. There may be the possibility of confision in the case of measles. According to Prof. Bouchet (quoted by D'Arcy, p. 93), the spots of rosela are larger than those of measles. Mr. Thomas expressed himself in the following terms: "The spots of rosela are rounder, and less angular than those of measles. They are rather macules than papules, and never in the beginning of these eruptions has there been found that projecting, which is so frequently observed in the beginning of measles. There exist, however, cases where the analogy is so striking that confusion is possible" (ibid). It must be distinguished from rothelin, and also from rosola which precedes the characteristic eruption of smallpox. As an example of the
latter we may state a striking case mentioned by Daukesy (p. 82) of a child, aged 10 yrs., in the practice of M. Fabre. The child had been ill for four days and was brought to the Hospital for Diseases of Children on Jan. 1st, 1833.

The entire surface of the body was covered with a rosy reddish-pink eruption constituted by red macules, describing on the face and neck, crescents of a remarkable matrix.

In the evening of the same day the child was taken to the small-pox patients and its hands, face, and feet were quickly covered with a vesiculo-papular eruption, which was the proleve of a grave variola attack to which the child succumbed. Had this child been vaccinated after the small-pox poison had stolen a march on the vaccination, that is to say, too late for the vaccine to check the action of the variola, the vesicle from which the patient suffered
might have easily been mistaken for that following cow-pox. The evidence of recent vaccination, the absence of fever, pains in the back, vomiting, together with a consideration of possible complications, are the means of avoiding any confusion. 

Roseola vaccinea is to be distinguished from skin affections caused by certain drugs as chloral, belladonna, and that following diphtheria cholera. A question, in the case of an infant in regard to cutting of the teeth, would not be out of place in making a diagnosis.

The following is an illustrative case of vaccine roseola (Dauery 1891). On July 15th 1882 Dr. G. vaccinated, Rue de Madame, Paris, a child aged 2 yrs. Marguerite N. Three punctures were made on the right arm and calf lymph was used. On July 16th, a red spot appeared on the inoculated arm, and was soon followed by a papule which developed into a pustule on July 22nd.
About the 8th day following the operation, a slight febrile action declared itself, the child lost its appetite and complained of its arm. The mother undressed it and behold, to her great astonishment, a multitude of rosy spots which covered the nape of the neck, the neck, shoulders, trunk and limbs. On the following day the eruption reached the cheeks and alae nasi, and simulated the scabrum of measles. In fact, the invaded surface were set with perfectly flat, rosy spots, separated one from another by intervals of healthy skin. But differing from what passes in measles the little patient is apyretic, there is no cough, no pain, no conjunctival injection, nor can any tonorous role be detected by auscultation; in short there exists on the surface of the body a confluent roseola without fever and without mucous catarrh. Three days after its appearance the scabrum completely
went away in one night without leaving any colouring to. At the same time the vaccinatin mark faded, the roseola spontaneously died away and the patient was quite well, without passing, as in measles, into a stage of desquamation.

We have found in the antecedents of Marguerite N. no peculiarity which allows us (outside the vaccination) to explain the appearance of the red rash described. Its mother was a young woman, strong and vigorous, and who has always felt well, although she had in her infancy suffered on several occasions from acute herpes of the lip. Its father is an old soldier who has never had any affection of the skin except—a very intense boil. Our little patient has cut all its teeth with the exception of the four last molars.

Another case not quite so typical as the above and which is given by the same author (p. 101)
illustrated roseola appearing on the eighth day after vaccination and showing successive areas attacked. It was a child aged 19 months who was brought to the hospital for diseases of children on July 12th, 1883. The father and mother were healthy and never had had any eruption; nor was there any history of vaccination. The patient was vigorous, well developed for its age, and had not suffered from measles or scarlet fever. During the previous June it was attacked with convulsions of short duration without any known cause ten days before its vaccination (treatment perspiration and emetic). The dentition was actually in an advanced state. The diet of the child was not varied, which consisted of bread, eggs, soup, milk, peas and vegetables. In fact the child took no medicine which would explain the eruption for which it was brought. The eruption appeared 8 days after its vaccination.
On July 3rd the little patient was inoculated at the Académie de Médecine. By eight punctures (four on each arm). July 10th. Eight large vesicles appeared at the points of inoculation. Each of them is flat, umbilicated, and surrounded by a ring of inflammation quite extended. July 11th. The febrile action is a little marked (no digestive troubles). In the evening the mother observed two large rosy "plagues" symmetrically placed in the front of each ear.

On July 12th these "plagues" disappeared in order to give place to rosy, irregular spots (which disappear on pressure), appearing on the back of the hands, back and front of the arms, and which died away in about twenty-four hours. July 13th. The red colouring nearly effaced in the upper limbs. Complete appetite.

After having encouraged the mother we prescribed some bran pastes. The infant has not returned.
Erythema. Urticaria

Much confusion has arisen through the term erythema, as the disease which is indicated by this name, occasionally assumes different characters.

In the meager literature of vaccination eruptions we find little more than the names of the skin affections which may follow vaccination. All, however, are agreed that they do occur, but in many instances disappear so soon and are of such benignity that only in some cases has a thorough clinical note of them been made. In the classification by W. Malcolm Mordin we observe that erythema multiforme and urticaria may make their appearance before the development of the vesicles, and that urticaria may also occur as a sequela of vaccination. The scarlatiniform erythema may appear after the development of the vesicles, but Dr. Gustav Behrend, who has had much experience as a public vaccinator,
has been frequently informed by
mothers that evanescent erythema fre-
guently appears in the first twenty-
four hours, rapidly subsiding, so that
it was no longer visible on the day of
inspection (7th day). Urticaria due
to vaccination is very rare. Dr. Austin
Martin (Medical Record Apr. 16, 1862),
questioning of vaccination eruptions says:
"There are certain rashes like the eruption
of rosola (or die rötheln in German
measles, to use a modern nomenclature)
and sometimes like that of measles
or scarlatina, and now and then,
quite rarely, like that of urticaria,
and occasionally of large splashes
or blotches covering part or whole
of the body. The eruptions are
very superficial, very evanescent, and
of very little consequence to anybody
except the ardent anti-vaccinator.
They always appear where the anode
is in its acme of development,
and are not without analogues
in instances where any very intense
inflammatory eruption occupies
a limited portion of the cutaneous system." A case of urticaia is recorded by Daukes (p. 120) of a child suffering from a vesicular eruption and whose vaccine pustules were drying up and covered with black crusts, and who was attacked with an urticarial eruption covering different parts of the body. The back of the hands, the back of the thumb, middle of the left hand, and the sternal region were adorned with spots of popular purpuraeous urticaea, each measuring from one to two centimeters in diameter.

Mr. G. R. Darling (Brit. Med. Jour., 70, ii, p. 1366) mentions a case of a girl, aged 17, who had been inoculated through milking cows suffering from vaccinia and who developed urticaea on the back of the arms and on the left side of the face. This urticaea supervenoned when the pocks were nearly all healed up. Sometime urticaea assumes character which may lead to an erroneous diagnosis. A case by Dr. Hugh Thompson
(Brit. Med. Jour. 90, ii, p. 1232) illustrates that the diagnosis of these rashes is sometimes difficult. "The following case" says Dr. Thompson, "although perhaps not one of pure vaccinal rash, I may give as presenting points interesting and allied to the present discussion: E.B., aged 6 months, vaccinated in Glasgow Royal Infirmary, June 16th 1890. A weakly child having syphilitic eruption (maculae patches) on nape, fontanelle open and some snuffling; had undergone treatment for congenital syphilis June 23rd. All four incisions had taken; olives somewhat retarded with no ulosa.
June 24th. The child was seen by Dr. B.M. McQuay, who, finding grading a rash which he considered vaccinal, notified it at once to the sanitary officer who next day sent it to the Fever Hospital, Belvidere. Dr. Gemmell under whose charge the child was placed at Belvidere informed me that when the child was admitted, on June 26th, the rash was already declining and..."
The temperature 98.6; the mouth red, but no swelling of the tonsils. On June 28th with Dr. Gemmel's permission I saw the child when the rash had entirely disappeared; the vaccine vesicles had developed into four compound vesicles; the areola still considerable and without line of demarcation. The eczematous patches on the natives had means while almost healed, and the child was looking well and cheerful.

July 14th. Dr. Gemmel informed me that, since July 6th, free desquamation had been going on.

That this rash, if vaccinal, did not arise from anything in the lymph used in vaccination, is evident from the fact that the vaccinifer had no symptoms of vaccinia either before or after being vaccinated; as also none of the other children vaccinated with the same lymph, so far as I have been able to ascertain—and I have been two of them—have shown any symptoms of vaccinia.
possible criterion are points to be considered in making a differential diagnosis between variolar eruption and scarlet fever.

Resume. He may then say that erythema associated with vaccination, is related to roseola, is usually evanescent, accompanied with little or no constitutional disturbance, and presents itself in two principal varieties, erythema multiforme and the scarlatiform erythema; and that scarlet fever, a rare manifestation, may appear within the first three days after, or as a sequela of, vaccination.
Miliaria

"We give the name vaccinal miliaria to a satellite eruption of the vaccinal fever, appearing from the 8th to the 12th day (very rarely later) after vaccination. It is constituted by little vesicles of the size of a grain of millet, accumulated in great numbers on large surfaces, containing a transparent liquid at first, then opaque, followed by slight purpura and never leaving cicatrices after it." (D uncleze p. 110)

Miliaria after vaccination is a very rare affection and cannot be distinguished by its anatomical character from malaria due to other causes. There is nothing that signifies its onset unless it is a slight febrile action. Like most of the vaccination eruptions it makes its appearance usually at the time when the vaccine area is at its full development, but Mr. Malcolm Morris has classified vesicular eruptions as occurring before the
development of the vesicular
in most of the vermicelli cases it ap-
fears from the 8th to the 11th day.
its distribution is generally very irreg-
ular, the skin of the limbs, neck, face,
and back being affected. It com-
menso as little grey spots which are
soon eroded with a multitude of
vesicles the size of a pin's head, and
presenting, whether near the site of
the inoculation or on other parts of
the body, a similar appearance.
At first the vesicles contain a clear
fluid, but they may pass in the
course of twenty-four hours into
a purulent, milky stage, and then
dry up after 36 or 48 hours.
There is usually little or no cuta-
neous disturbance, nor is there
any itching of the skin. The vesicles
are too small to be complicated,
or at least to appear so to the
naked eye. If the disease be
complicated with some other eruption
it may be prolonged six weeks.
A vesicular eruption is sometimes
seen in the neighbourhood of the vacciniae vesicles. "Now and then," says Dr. Martin (Med. Record, Apr. 15th, 1882), "very rarely, when the areola is most vivid, in pletonic infants and children with very vascular skins, are seen in it, little globular vesicles not at all umbilicated, and containing a fluid which on inoculation induces no effect whatever. These are nothing more than effusions beneath the epidermis without any specific character, and mere results of intense congestion of the vessels in the corium. The very minute milian eruption is composed of vesicles, which, on examination with the aid of a good lens, reveal decided umbilication."

Dr. Martin had failed to produce vaccinia by the inoculation with the contents of these milian vesicles. Dr. Scott Fox (Brit. med. Jour. 90, ii, p. 1400) says: "The different phases represent probably stages of the
same inflammatory process, just as we
see in eczema. The most intense phase is the
vesicular. The following case, which
has come under my notice a few
days ago, is a good illustration. The
vaccination of a child, age six months, had
been postponed from time to time owing to the
strong repugnance of the mother to the operation.
On Nov. 8th, it was vaccinated in the place
with calf lymph and the vesicles ran a perfectly
normal course. On the 10th day an itching, dry,
miliary, papular eruption appeared, and eventually
covered the cheeks and extensor aspects of the forearms.
On the cheeks many of the lesions macerated slightly
and on the arms they threatened to do so but just stopped
short of that stage. The eruption then declined and
the child was but very slightly disturbed in health.
The vesicles were small, conical and never umbilicated
and the affection was quite distinct fromlichen rosea.

As an illustration of miliania we may cite a
case recorded by Danley (p. 114), of an infant in
the practice of M. Labie: R. Gallot, age 22 months, admitted
Into the Hospital for Diseases of Children on Feb. 16th, quite well and vigorous. Is usually in good health, a little lymphatic (blonde, fine, grey tined skin). There is evidence of a suppressed pruritic eruption. No rachitis. The child is weaned. We find quite easily in the farther this child trace of an herpetic diathesis. The mother appears well.

The following is the history which she gives us. On Feb. 6th she had the child vaccinated at the Hospital Lépine. Five punctures were made on the arms (3 on the right and 2 on the left). Feb. 12th. In spite of a slight feverish action the child remains out of bed. No diarrhoea or sickness. The five inoculations resulted in five a very white pruritic eruption. The inflammatory areas which circumvented each pruritic extended about two centimeters without affecting the flanks of the axilla. Feb. 14th. The arms, wrists, backs of the hands, the neck, and the
face was covered with redness which rapidly disappeared and gave most place to a multitude of little vesicles, at most the size of a pin's head. On the face they very shortly assumed, in the 13th day, a deep red tinct. In the evening they enlarged at their bases and became slightly popular. Struck by the character of this eruption, and entertaining doubts about the development of a slight varioid attack, a doctor in the town city recommended the woman to bring her child to the hospital for consultation.

On Feb. 16. the day of admission, the macules which covered the face became vesicular. On undressing the child we find in the regions already mentioned, that on the external aspect of the limbs the very vesicles, as large as a pin's head, furnished on pricking them, a drop of clear fluid. Scattered on the limbs they described in one place a linear series, and in another
groups of 8, 10, and 15 isolated vesicles. The eruption is more abun-
dant on the front of the left arm, it covers the back of the hand, and it is found even between the fingers. The child is neither feverish nor sick, nor is there any diarrhea or sore throat.

The five vaccine vesicles have actually dried up and are covered with thick crusts. Oct. 17. Temp. normal. Some of the vesicles transparent yesterday have become turbid during the day. Some are dried up and hooded with little black crusts. On each spot there exists no trace of scratching. Oct. 18. The examination of the mouth discloses the eruption where two canines are emerging to pierce the gums. In the evening we see again some of the pearly vesicles already described.

None of the vesicles has increased in size; none umbilicated; temp. normal. Oct. 19. Little diarrhoea in the evening.
temperature elevated 3 degrees; no functional trouble. Oct. 20. general state excellent. 21. Aphirosis in the morning, evening limp, elevated 3 degrees; examination of all the organs shows nothing; eruption disappeared. Child left on the 25th.

The above case may be looked upon as more or less typical but the eruption may be confluent in some localities, discrete in others, and fresh areas may be attacked after the vesicles in other parts are developed; in other instances the patients have presented macules, papules and vesicles simultaneously.

The prognosis is good but the diagnosis is not always easy. It must not be confused with a similar eruption due to denudation with one associated with a slight varicella attack.
**Pemphigus**

Little mention is made in English and French literature of this affection as following vaccination, but like psoriatic cases of it have been recorded. In Vienna, however, Hebra, Hapchi and the greater number of German dermatologists have described it as occurring in febrile, rachitic and anaemic infants. (Hebra Traité des Maladies de la Peau p. 249 de la trad. francoise par le Dr Doyon).

G. Behrend (quoted by Dauchez p. 125) says the bulla vary in size from a pea to a strawberry and are filled with a clear fluid which on drying up gives place to little crusts covering red ulcerations. According to one bulla disappears new ones spring up on other parts of the body.

A pemphigoid eruption appearing during the vaccinal period is usually followed by recovery, but that due to cachexia may result in death of the infant. It is most liable to occur in very young infants.
particularly in those whose health is undermined by rickets, anaemia or cachexia from any cause. It has no character that distinguishes it from pemphigus unassociated with vaccination. The prognosis should be guarded but unless some complication, such as a septic process or diarrhea, supervenes, recovery is the rule.

The treatment would be according to the constitution of the patient, and a suitable nourishing diet, but liver oil, paraffin ointment, iron and calamine. Where a complication, such as a gangrenous condition, supervenes, surgery is the rule. Following vaccination pemphigus is, however, all too uncommon. A case is mentioned by Daubeny (1827),

General Pemphigous Eruption (Hospital for Sick Children; practice of M. Labrie; note communicated by Dr. Igni) In 1879 M. Labrie received into his charge a child, aged 4, with a purple appearance and suffering from whooping cough. On account of the fever and incessant cough

Treatment

Case
which contraindicated vaccination, the latter was put off. Nevertheless, some hours after its entry this child was subjected to vaccination, calf lymph being used. This regulating measure is necessary in the Children's Hospital on account of its vicinity to the small-pox patients. On the 3rd day of inoculation two vaccine pustules appeared on the left arm, and on the 7th day they had acquired their complete development. On the following days the aspect of the pustules completely changed and each of them was transformed into a large bulla which contained a sero-sanguinous liquid. On the 9th day at the morning visit the child was taken down in health and suffering; the fever declared itself during the night. On undressing the child we find on the surface of the body a confluent eruption of pemphigoid bullae on the arms, trunk, neck and lower limbs. Each of bulla encloses a sero-
sanguineous liquid. The cicatrization of the ulceration was produced little by little, and was complete about the 8th day. Two months later the child died of broncho-pneumonia.
Purpura

In subjects with haemorrhagic tendency, a purpura like that occurring in smallpox may show itself after vaccination. It is extremely rare, generally makes its appearance after the 7th day, and lasts about a week. It may be accompanied by other haemorrhagic symptoms, and the vaccine particles themselves may be implicated. Purpura is liable to cause some constitutional disturbance, but from what is known of its prognosis is good. Several cases have been recorded. A little girl, aged 4 yrs, was vaccinated on March 19, 1842. Five punctures were made on the left arm, the lymph used having been taken from a perfect vesicle of the 8th day. An older brother and a younger sister were vaccinated with lymph from the same source. On the 23rd the arm was more inflamed than usual, and some spots were observed on the face. The child according to all reports enjoyed perfect health.
On the 26th, the eighth day after inoculation, the pustules were black as if filled with blood. Numerous petechiae were dispersed over the body, but more especially over the face, neck, and arms. A slight emesis in the temple gave rise to an ecchymosis. A little blood escaped from the left ear and nose but there was no blood in the alimentary material.

The general health appeared good and the petechiae scattered over the body disappeared at the same as the vaccine pustules, and on the 16th day all evidence of haemorrhages had gone, two years having dropped off, but the three others as black as yet remained. In the brother and sister the vaccination followed a most normal course (Gregory, Med. Chir. Trans. Vol VII, 1842)

A case of vaccine ecchymotis appearing on the 8th day is mentioned by Dr. Bergeron (Dauchy p. 138). An infant was vaccinated three months after its birth. On the 7th day
after inoculation, at the time when the pustules were fully developed, the infant was seized with a slight febrile attack and was ill. The same evening all the surface of the body was covered with a confluent eruption of very fine purpuric spots, simulating those made with a puncture of a needle, or those of flea-bites. The minute examination did not discover even any parasite. The eruption remained stationary during the first 3 or 4 days and then progressively faded on the following days. On the 9th day it had almost disappeared, and on the 10th day there was hardly any fever. The hereditary antecedents showed nothing.
Eczema

Eczema associated with vaccination presents several points of interest. Vaccination often causes eczema, now and then aggravates it, but rarely is it the cause of the disease. Eczema is the common skin lesion in auto-immunization. Dr. Colecott Fox (Brit. Med. Jour. 90, IV, p. 235) is of opinion that eczema is of frequent frequency in early infancy and that vaccination has no specific influence in producing it, though it does occasionally excite it. The little understood nature of eczema of necessity makes its study in relation to vaccination a very difficult one. Eczema is well known to occur in the gouty, rheumatic and septic phlegmonic constitutions and it is under these conditions that it occurs after vaccination. Like other vaccination eruptions a constitutional predisposition is required in its production, and instances are known where all the children of the same family have
suffer from eczema after their vaccination. In many such children with hereditary tendencies, if the vaccination be postponed, the eruption shows itself at what would have been the vaccine period.

It is well known that vaccination often causes, and is in fact recommended as the treatment of, eczema; but it should only be resorted to after other means have failed, as there is a risk of auto-inoculation. Acute eczema should never be thus treated. D. C. D. Hill Drury (Brit. Med. Jour. 80, 17 p. 414) mentions the case of three children whom he vaccinated and the eczema soon disappeared; and Dr. Carrick Murray, Thos. Wilson, and R. P. Tyler (Brit. Med. Jour. 80, 17 p. 497) relate cases in which eczema made its speedy disappear once after vaccination. W. D. M. Williams (Brit. Med. Jour. 80, p. 690) records three cases which he vaccinated with success, the eczema on the buttocks of a child...
Vaccination had almost disappeared on the day of inspection.

The treatment of eczema by vaccination has been tried with varied success in the case of adults. Dr. E. Haughton (Brit. Med. Jour. 86, 7, p. 725) mentions a case of eczema in an adult whose condition was at first aggravated by vaccination but afterwards improved. Dr. Haughton also records the case of a lady who was similarly treated for eczema which was cured.

In both of these cases an asthmatic condition supervened after the improvement of the eczema. There are analogous cases where the sudden disappearance of a patch of eczema is followed by cardiac irregularity to which rapidly subsides on the eczema again breaking out.

Like eczema occurring at other times that following vaccination is due either to some hereditary predisposition, as poor, rheumatism, asthma, or to errors of diet, or toowing, or injury, or the effect of an illness,
vaccination only adding, as it were, the last straw to the camel's back.

It generally commences late in the vaccinal period. It may show itself in the region of the vaccine vesicle (which in strophulous subjects are liable to become ulcerated) and from thence extend to other regions of the body, where successive patches may appear showing the disease in its various stages.

The eczema may be eruptive and may last a considerable time but this is rare. The onset of the disease is occasionally sudden and the constitutional symptoms are slight. Itching is a symptom and the acarus stables should be kept in mind in making a diagnosis.

The following is a brief account of a case of generalized eczema appearing on the 10th day after vaccination (Dancing p. 123). Marie L... born Oct. 14th was vaccinated on Nov. 4th by Dr. G. The vaccinifer was a vigorous child, aged 2 yrs. and chosen among several at the Academie de Medicine. Nov. 11. The vaccine pustule
are well developed. There are two on each arm and the infant shows no trouble; no diarrhoea or fever. It takes the breast well and sleeps quietly.

By a part of the day. However, on undressing it, on Nov. 14th, in order to give it a bath, there is discovered a very intense eruption. It has appeared during the night, over the whole surface of the body; the arms, the neck and the face are red and inflamed. The buttocks and lower limbs are also affected.

15th. The eruption has given place to a second vesicular swelling, very purplish, which leaves bare, red, and inflamed surfaces.

16th. The inflammatory action, very pronounced during the night is less; the eruption pursues its course; on the arms it is less; it persists on the shoulders, face, forehead and cheeks; the patches on the eye-brows and temples show perfect symmetry; it is also found behind the ears, on the nape of the neck, and in front of the armpit.
18th to 30th. The eruption lost its acute character but the eczema on the face lasted till the end of Jan. 1813. The parents of this child have never had eczema, the father is rheumatic, and the mother is subject to acne eruptions especially at the menstrual epochs.

The treatment of eczema following vaccination does not differ from that occurring at other times. The treatment should be commenced early, and a careful inquiry about the diet should be made. The child put on a judicious dietary, and the alimentary canal regulated by calomel &c. For the treatment of eczema in the locality of the vaccine vesicles, see "Vandyce's". The washing of the infant should be performed only when absolutely necessary, warm a gruel with a little boiling soap and water taking the place of soap and water. When struma or debility exists, parties syrup, and in elder children, Easton's syrup or Fellows syrup, are indicated.
There is a difference of opinion as to the utility of arsenic in eczema and no lines can be laid down for the guidance in its employment. Without mentioning all the applications used in the treatment of eczema, e.g., Carbonic Detergens, 3% and Oi, or weaker, would perhaps be the most useful to begin with. If the eczema scabies be suspected, a modification of the treatment would be required and the tender skin of an infant taken into consider
ation.

The vaccination of infants suffering from eczema ought to be postponed till the patient is well, except in times of small-pox epidemics when the danger of variola is far greater than the risk of auto-inoculation which is usually a mild illness.
Vaccine Généralisée

The term "vaccine généralisée" does not appear to have conveyed the same meaning to the minds of the various medical men who have drawn attention to it. Thus Mr. G. R. Darling (Brit. Med. Jour. 90, p. 1362), after describing a case of a girl, age 17, who was inoculated from the teats of a cow and who developed poxes on the face, asks: "Were the poxes on the face auto-ins inoculation, or were they vaccine généralisée?" Dr. J. B. Longstaff, kindly writing to me concerning an interesting case which he published (and which I shall mention further on) says: "My own was that some of the vesicles were due to auto-infection of the legema — some were "generalized vaccinia." And we see in the classification by Mr. Malcolm Morris that secondary local inoculation is not mentioned under the same heading as "vaccine généralisée." At the British Medical Association, in the discussion on vaccination eruption,
(Journal 90, II, p. 1231), the following question was submitted for further elucidation: Is there such a disease as vaccine generalisation, due to blood infection, or are the secondary vesicles following vaccination, produced by external inoculation? Dr. Coleott Fox (ibid.) says: "But there is another very interesting eruption, quite distinct from the other vesicular and bullous eruptions, which has occasioned much dispute and some who believe it to be the specific vaccine eruption have called it 'vaccinola.' Infer to the cases in which a more or less widespread evolution of vaccine vesicles occurs. After a careful study of the recorded cases of records, I am strongly inclined to the opinion that they are, certainly most are, cases of auto-inoculation. xxxx 'That they are vaccine vesicles is proved by inoculation; but the doubtful cases are very rare and the eruption does not involve the mouth.' From this it can readily be seen that the disease called vaccine
genitalia is little understood. When we refer to the French literature on the subject we find that the term does not appear to have caused much confusion. Dauchez (p. 11) divides vaccine genitalia into two heads: (a) appearing spontaneously, and (b) developing by auto-inoculation from the 8th to the 18th day (Bernin). After the 9th day says the same author, auto-inoculation is very rare.

We wish therefore to be understood in the following pages, that the term vaccine genitalia is to signify a generalised eruption of vaccinia, whether due to blood infection, or to auto-inoculation, or both. After studying the recorded cases and those produced experimentally, we are inclined to favour the opinion that the poxes containing the peculiar are the specific eruption of vaccinia, just as those in small-pox are the specific eruption of that disease; although, as we have seen, the great feature in vaccine is, as Dr. Hugh Thompson
points out, a certain "fixedness in non-diffusibility", thus differing from small-pox. But this fixedness is sometimes seen in variola also, for example, when the poison is taken from the discrete variety of the disease. The several monkeys which Dr. Burnet (Vaccinia and Variola) variolated showed poxes at the sites of the punctures only and there was no secondary eruption. It is a curious fact that small-pox is very mild when introduced through the skin; in fact many maintain that there is little risk in variolation especially when the poison is taken from discrete small-pox. Whether vaccinia is an exanthem or not, we shall be better able to judge after discussing vaccine generalisation; which we now hasten to do. And, in order to give as brief and concise a description as possible it would be best perhaps to discuss firstly, the eruption produced experimentally; secondly, to mention a case or two illustrative of what
we think to be due to the absorption of the virus into the system, and to
discuss one of these cases (the one
that came under my notice and which
presents unusual character); thirdly,
to briefly describe the disease when
due to auto-inoculation; and
finally to give a resume of the subject
with the diagnosis.

There are some striking points of dif-
ference between horse-pox and cow-pox.
The poison of the former is more active
than that of the latter and is often accom-
panied by a generalised eruption.
Moreover the pox on the poison of
the horse are larger than those due
to vaccinia. A case of generalised
eruption from horse-pox is mentioned
by Dr. Malcomont (Traité de la Vaccine
p. 70, 1863). If one of Prof. Bouley's
pupils, who, having injured his finger,
and after dressing the leg of a horse
suffering from scab, was taken
the same day with pain, and the
next day with a feeling of malaise
and weakness. On the following days
Pustules showed themselves on the finger of the left hand, on the face and on the bridge of the nose between the eye-brows, and which was followed by adenitis of the cervical and axillary glands. The contents of these pustules were inoculated with success into a young bull which furnished vaccine for an infant in whom the pox was of a beautiful appearance. The differences between cow and horse pox are given by M. Chauveau (Chauveau, p. 17).

(a) The eruption which results from an inoculation remains absolutely local in the cow, whilst in the horse there occurs occasionally, if the animal is young, a primitive local eruption which is accompanied with a secondary exanthem more or less isolated.

(b) When one introduces the vaccine virus into the system without its coming in contact with the skin, it is easy to obtain in the horse a generalised vaccinal exanthem, with all the characters it presents in natural
cases. Obvious has this natural vaccinum been thus produced in
the cow.
(c) When the subcutaneous connective

tissue is chosen by which to introduce
the virus, then happens in animals
of the bovine species, as in the horse,
a local tumour, and as in the
horse also, the generalised influence
over the system transmits immunity
of vaccine.
(d) If the injection be made directly
into the lymphatic vessels or veins,
it does not appear to exercise, over
the bovine species, the least general
influence.

Much light has been thrown on this
subjects by the admirable experiments
of Prof. Chauveau (Vaillomont p. 80)
M. Chauveau produced a generalised
vaccine eruption in a horse by in-
jecting vaccine into a lymphatic
vessel of the animal. Eleven days
afterwards the vaccinal exanthem ap-
peared on the nose and lips and on
the 14th day, on the third leg. The liquid from the eruption inoculated into four animals of the bovine species caused in all a beautiful vaccinal eruption which remained absolutely local. Inoculated by your punctures it turns into a child only one very small bubble resulted whose evolution was extremely slow but whose size, transmitted to a second child, caused on each arm three pustules of which the evolution was equally prolonged and which ended by acquiring extraordinary dimensions. In another experiment the eruption was produced by injected the virus into the cellular tissue, through a small wound made in the side of a young calf, aged 1 month. On the 10th day after the inoculation the animal presented a very characteristic vaccinal eruption in the naso-labial region. M. Chauveau obtained very similar results by administering to colts lymphate mixed with their drinks.
The following case by Mr. G. B. Longstaff (Brit. Med. Jour. 1844, p. 457) is not unlike the one that came under my notice: On Jan. 18th I vaccinated my fourth child, a boy aged 3 months, with lymph obtained through the Association for the Supply of Pure Vaccine Lymph. Vaccination was affected in 4 places by the superficial scratching with a new needle. There was no bleeding. The child had been strong and healthy from its birth. It had slight malar attack some weeks before and had been subject to repeated attacks of "red gum"; but no vesicles or pustules were observed up to the time of vaccination, when there was an appearance on the left cheek that was taken for another incipient crop of "red gum". On the 2nd and 3rd day the papules on the cheek became surmounted by vesicles which soon began to weep and presented all the character of eczema. On the 5th day there were four vesicles at the points of inoculation, fairly well developed,
and with clear lymph oozing from them. On the 7th day, or possibly late on the 6th, a crop of papules appeared round the points of inoculation and also a few scattered over the body. On the 8th day the primary vesicles were large and well formed, oozing a good deal. There was very little area. On the 9th day vesicles appeared on what may be called secondary papules. On the 10th day, the primary vesicles, still discharging copiously, were surrounded by at least 50 discrete, circular, well-formed vaccine vesicles several of which were discharging lymph. There were also similar vesicles distributed as follows: one on the opposite elbow, one on the top of the head, one on the neck, one on the ear, and a few on the body. The child's back, scalp, back of the forearm were now covered dotted with a scaly erythematous rash. The arm was swollen and bruised but not more so than is frequently
observed in ordinary cases. 11th day.
A disturbed night but yet the child slept a good deal. About 40 secondary vesicles were counted on the left arm, 5 on the ear, one on the back and one on the right elbow. 12th and 13th days. The vesicle on the arm became empyreumatic; indeed the upper portion of the limb presented exactly the appearance of empyreumatic small-pox. Swelling and constitutional disturbance were still inconsiderable; scabs beginning to form on the primary vesicles.
15th day. All the vesicles, secondary as well as primary, dried up; eszema on the cheek quite dried up; the rash on the back of the scalp subsiding. 16th. Scalp and back well; eszema still on left cheek; a small eszema on the nipple; a few erythematous patches on neck and chest. The child appeared very well and the scabs separated in the usual course. Dr. Walsmont in possession of Dr. Lingaftech that he
considered the case one of vaccine generalisation which is said to be less rare with calf lymph than with humanised lymph. Dr. Walcot attributed the "anomalies much rather to the ground than to the cow seed." Dr. Longstaff further asks: Ought I to have delayed vaccination? To what what extent was the generalized eruption due to auto-inoculation?

In the Medical Record, Ap. 15th, 1882, Dr. H. Austin Martin records a most rare, possible unique, case of general eruption of vaccinia. "The case was a most perfect and undoubted one of general vaccinal eruption. What any competent and careful observer would call a general spontaneous eruption of vaccinia has always been a very rare anomaly, a very large proportion of cases so recorded and recorded, having most clearly been either eruptions of varicella, or from auto-inoculation, or contact with another vaccinée."
I find no case in all the literature of vaccination which I have toiled through in this special research, in which the re-vaccinated nursing mother communicated undoubted vaccinia to the nursing through the medium of lactation, and such, without doubt, was the ease I now put on record." The case is as follows:

"A lady of Boston, aged 36, was re-vaccinated on the 13th day of Sept 1882, with live virus vaccine. On the same day one of her two children, a boy aged 3, was also vaccinated, but the other, a seven months infant at the breast, was not submitted to the operation. The reason for this omission was that the latter was suffering from eczema capitis (incurta lactea), and the physician in charge feared an aggravation of the eczema by eruption from vaccination, and took a consequent considerable and very undesirable burden to the mother in case the own secondary vaccination should be at all troublesome.
The vaccination of the mother was affected, but only a slight vaccinal effect was noticed—itching, slight efflorescence, and a faint approach to a vesicular eruption and areola, but on the 1st of March (Wednesday) the slight seat which had followed it had fallen. On that day, the sixteenth after the mother's vaccination, it was observed that the infant was somewhat fretful and feverish, and a number of red pimples were seen on the arms about and below the elbow. On the 3rd day after this (Saturday) these had so increased in size, changed in character, and multiplied in number, and so many others had appeared on other parts of the body, that the attending physician was called.

It was very noticeable that the portion of the surface on which the eruption of eczema had been most marked was the seat of the most abundant eruption of this new visitation. The physician
in attendance on the case most kindly allowed me repeated opportu-
nities of seeing it, and, on the first  
occasion, visited it with me, desiring  
my opinion as to its character, for it  
thad appeared to him as very much  
like small-pox that, as a measure  
of prudence, he had reported it as  
such to the local board of health.  
I first saw it on Monday, March 5th,  
the fourth day after the commence-  
ment of the eruption had been  
noticed on the arms and the two-  
teenth day after the mother's re-vaccination.  
I found the infant very fretful  
and continually trying to scratch  
the parts most covered with the  
erupion. When, however, the  
mistaken application of vaseline  
on rags was removed, the most  
visible parts of the skin bled, and  
then dusted freely with finely  
powdered starch, this symptom  
subsided considerably. The tempera-
ture was slightly elevated, not more  
than two degrees above normal.
On examining the entire surface of the body, at least 400 clearly defined, perfectly circular, invariably umbilicated vesicles were apparent. The two forearms, chiefly on their lower surfaces, the ankles, and legs below the knees, and left cheek were the sites of certainly all but about one hundred of these. The remainder were scattered about on other parts of the surface, singly and in groups of two, three, or more. The surfaces of the abdomen and back were almost free from them. On the upper part of the chest, the upper arms, the thighs, the neck, forehead and right cheek, were very nearly all the vesicles not found on the two forearms, the legs and the left cheek. On these five places, when I first saw the case, the eruption was nearly confluent, the vesicles being closely coherent. The eruption had wonderfully the appearance of that of variola on the 5th or 6th day. The vesicle
were, however, more perfectly and invariably absolutely circular. No matter how near to each other not one vesicle varied in the slightest degree from a perfect round. On the arms — on one particularly — a considerable number of vesicles had been torn open by the patient, exhibiting very clearly the peculiar cellular structure of the vaccine vesicle and from these exuded a considerable amount of perfectly colourless pellucid lymph. Around each separate vesicle, and group of them, was a bright areola of limited extent and of more symmetrical approach to a circular outline than observed, at a certain stage, around the pustules of variola, varioloid, or varicella. My diagnosis was of a general eruption of vaccinia, and, if I was right - desiccation would soon follow. On visiting it in the forenoon of next day (Tuesday) I found the beautiful, clear definition of
Every vesicle had almost entirely disappeared or been much modified. Desiccation had not only commenced but was very considerably advanced, and already there was a confluent scab covering a large portion of the surface on which the eruption had been most abundant. I visited the case again on the 7th (Thursday), many scabs had been rubbed off, but on each of the confluent patches they remained adherent except when somewhat broken by at edges. There was no indication of loss of substance below the epidermis or, of course, of subsequent pitting.

Dr. Martin further gives the translation of an account of a case (as being analogous to his) found in the Rapport du Comité Central de Vaccine sur les Vaccinations pratiques en France pendant l'année 1810. À Paris de l'imprimerie impériale 1812. A girl, aged 7, had been vaccinated
in vain several times in 1810.

This persistent refractoriness:

She was again vaccinated without effect in 1810. This persistent refractoriness of the system to control vaccine induced M. Lazal, a physician at Agde, to adopt the following method: He was in the habit of using the vaccine crust; he thought this had proved too speedy as an external appliance, and to accomplish the desired end he induced the parents to give the child, as a pretended vermifuge, a pinch of powdered vaccine crust. This was done in a tablespoonful of soup. The child suffered no inconvenience till the fourth day, at which time the place previously vaccinated exhibited a slight appearance of effect. She suffered from evident lameness, nausea, and even vomiting as in variola. There was very smart fever, with faintness, nervous
restlessness, and extreme prostration. This condition continued during six days, and at the end of that time there appeared a general eruption of one hundred and eighty (180) vesicles all of clearly vaccinal type; each followed its natural course, the inflammation of the circle or areola extending to several millimeters around each vesicle, in many places all the areola combined so as to make one single large area of cutaneous emaciation.

From the 11th to the 12th day the areola declined. There remained some slight, hardly perceptible efflorescence, and from ceased at the beginning of the 13th day. On the 14th day the scales became black, but did not fall off till the 21st day.

The following, case, which came under my notice, observation, presents several points of interest and will, I think, throw much light on this very little
Undescribed subject.

Ap. 16th. H. S. — an apparently child, aged 6 weeks, having a good family history and living at a farm in a country district, was vaccinated by me, in 4 places on Ap 16th. 1891. None of the insertions took. There was no skin affection.

Ap. 23rd. I again vaccinated the child in 4 places on the same arm (left). The lymph used was taken directly from a healthy child, who had 4 large typical Jennerian vesicles from which when opened a great quantity of clear lymph exuded, and which, though the dropping off of the scabs was retarded, progressed favourably.

May 6th. I inspected the case (H. S. —) which the mother said had done well, and found that there was one small "mark" with a blackish surface, the surrounding skin being inflamed to no alarming extent (see diagram).
May 11th: The mother brought the child to me and I found it fitful and feverish. On the arm (left) there was a collection of vesicles varying in size from a three penny piece to a small pea, and covering an area about the size of a crown piece. In the centre of these vesicles was a black patch representing the original vesicle. The vesicles in the centre of this collection were confluent while those at the periphery were more or less isolated. The whole of this area was surrounded by a ring of inflamed skin in which were dotted, irregularly, papular-like elevations evidencing developing into vesicles. I found also a vesicle about the size of the finger nail in the lumbar region. There were several small vesicles (or bullae) on the fingers and toes (see diagram). The mother informed me that the mischief began the day after
I last vaccinated the child, i.e. on May 7th. From her story it would appear that on May 7th (the 14th day after successful vaccination), papular-like elevations began to arise in the inflamed skin around the original "mark" and developed into vesicles; and that about two days afterwards, she first noticed signs of these extra vesicles on the arm, there were some coming on the fingers and toes and in the lumbar region.

May 12th. I found the child more fatigued and the inflammation on the arm had extended about 1/2 inch. Some of the vesicles on the arm, originally isolated, had become confluent, and it was noticed that the vesicle in the lumbar region had grown. There were several "shotty" points on the buttocks.

May 13th. More vesicles were discovered and the area on the arm had extended. There were about eight
Vesicles on the buttocks, one on the bridge of the nose, and some coming on the soles of the feet, that in the lumbar region looked inflamed around. Lead lotion was applied to the collection of vesicles on the arm.

May 14th. The mother said the child had been vomiting. The vesicles on the arm had extended so as to almost surround the arm, though the inflammation was to a slight extent less.

May 15th. The general state of the child was about the same. One vesicle was found on the waist and a little pus exuding from the umbilicus and believed to have been due to a vesicle have formed there. Lead lotion continued.

May 16th. The vesicles had a less tendency to develop. Child was ill.

May 18th. Condition, if anything, improved.

May 20th. One vesicle was seen on the lower lip, and one on the forehead.
May 21st. The vesicles seemed to have ceased developing on the arm. The tops of the vesicles in the center of the cluster on the arm had come off, leaving an irregular shaped weeping surface about the size of a florin piece. The tops of one or two vesicles on the back had come off (probably mechanically). The vesicles on the face (eight in number) and on other parts of the body were growing laterally.

May 22nd. Sumpth taken from a vesicle (or bulla) on the toe.

May 23rd. One vesicle on the back was noticed to have grown laterally and there were three or four smaller ones surrounding it.

[My observations of the case were temporarily interrupted]

June 8th. It was noticed that no more vesicles had developed since May the 21st, and that the vesicles on the arm had disappeared, leaving an ash-colored surface in the
centre of which was, situated in a depression, a black scab (original vesicle). The vesicles generally were drying up and (for example one on the ala nasi and one on the upper lip) had been replaced by scabs, but the majority were in pretty much the same condition as they were on May 23rd. A pock on the ala nasi appeared to be eating it away. (see also gram 14)

June 10th. Child died.

Remarks. The child vaccinated in the usual way, an instrument specially adapted for vaccination being used and which was cleaned with a clean napkin and water before and after performing the vaccination. Besides H. S.—two other children (Moota and McLeod) were vaccinated with lymph from the same source, one child in 4 places and the other in 2 places.

In neither of these children (as in the child H. S.) only one pock resulted.
As these two children presented only one scab each, they, like H. S., were again vaccinated, in one place, on the other arm about 8 days after their first vaccination. In one of these children only was the second vaccination successful. About the same time I vaccinated upwards of 50 other children, concerning whom I had no complaints, nor did I hear of any complaints to the other medical men in the district. I daily visited a fever hospital about that time, but the usual precautions to avoid carrying infection were taken. There was no infectious disease (unless "influenza" be considered so) in the immediate vicinity where the child H. S. lived, and the only disease of an infectious nature I had to deal with was typhoid, scarlet fever, diphtheria and measles. There was no small-pox or chicken pox.
Besides myself three well-informed medical practitioners too saw the case, and were of opinion that it was not one of a well-recognized skin eruption. The vesicles (or bullae) on the fingers, hands, legs, and feet were circular and not umbilicated. The vesicles on the other parts of the body were circular, broad, and umbilicated, free from a ring of inflammation (except one large vesicle on the back and three on the arm), contained a clear fluid, and, in short, could not be distinguished from vesicles following ordinary vaccination except by their unusual position. They were distributed on the fingers, toes, hands, feet, back, buttocks, thighs, face, the nape of the neck, and left arm. There was one on the vulva and one near the anus. There were no vesicles on the chin but one on the lower lip, one on the wrist, and with the exception of one on the umbilicus there was none on the abdomen.
If any symmetry was shown the most marked was on the extremities where the eruption attacked the flexor surface. No connection could be traced between any horses or cattle and the case, neither was there any similar disease prevailing in the district. The child was not isolated and none of its brothers or sisters (four in number), or adults, in the house suffered in any way referable to the case. The child lived at a farm in the county district and was nourished by the breast previously to, and during, its illness.

This case is interesting for many reasons; the late appearance of the secondary vesicles i.e. on the 13th or 14th day after successful vaccination; the almost simultaneous appearance of the vesicles on the arm and those on other parts of the body; the presence of vesicles (or bullae) on the fingers and
toll; and the prolonged duration of the illness resulting in death of the patient.

Was it a case of varicella? The large size of the spots, their duration, the absence of chicken pox in the district, the other children coming in contact with the patient escaping the disease, are reasons sufficient for not attributing the infant's illness to chicken pox.

Was it natural small-pox? Against this the patient was not isolated and none in the house suffered from contagion. It is only proper to mention, however, that the children, at all events, were vaccinated. Besides, there was no small-pox in the district, and the (most of them at least) had not dried up after 28 days; and its evolution had other points to distinguish it from natural small-pox.

Was it a case of variolation? The patient was vaccinated arm to arm from a child (vaccinated with humanised lymph) who served as vaccinifer for two other children,
and in these latter, as well as in the vacciner, no ill effect was noticed.

It is curious to note that in each of the three children (one of whom was the patient) vaccinated from the same source, only one vesicle resulted; and each of these were was again vaccinated, as they showed only one vesicle each, and in only one was this re-vaccination successful.

It would appear to resemble the secondary vesicles following variolation, for Kaposi (quoted by Danby p. 42) in referring to inoculated variola says: The specific eruption of variola, usually little confluent, simulating varioloid, appears from the 11th to the 13th day; and Rayez (Traité de la maladie de la peau) states that the local eruption of inoculated variola is complete on the 7th day. It is after this time that the general eruption commences to appear, and is complete only after the 13th or 14th day.

The symptoms, however, shown in the case in question have other points
to distinguish it from variola. We are thus compelled to conclude that we have here a case of vaccine generalisè. Our experiments confirm this conclusion. On May 22nd, as already stated, the mother kindly allowed me to procure some lymph from a vesicle (or bulla) on the toe. Several punctures were made with a clean needle into a distended bulla on the great toe, allowing several drops of clear lymph to exude. The cuticle was quite hard and on the following days the bulla showed no signs of injury, or that lymph had been taken from it, thus proving that the cuticle had some reparative power.

From this bulla I was enabled to partially fill three vaccine tubes which I placed in a 3½ dispensing bottle. Some days previous, I had pricked with a needle some of the vesicles on other parts of the body, and a small quantity of lymph exuded, but the mother objected to my collecting lymph from them.
The lymph thus collected from the toe was used for the following experiments:

Exper. I Jan. 13th. Several cover glass preparations were made from the lymph of one of the tubes. The stained with aniline methyl violet, showed under the microscope forms of micrococci, seen in a similar preparation of ordinary clear lymph (vaccine). In fact the preparation could not be distinguished from those of clear vaccine similarly treated.

Exper. II Jan. 13th. Guineapig A. was vaccinated in two places after the skin had been shaved, and washed in the process of lathering. The lymph was blown from the vaccine tube on to the skin and several scratches were made with a common needle. The day following the wounds looked a little inflamed. 4th day.
Distinctly elevated scabs but no areola. 5th day. Scabs drying up. 6th day. Scabs dropped off leaving two oval scars.

*Experiment III* Jan. 1873. It was noticed that the end of the remaining tube was broken allowing the air to come in contact with the lymph, which had acquired a reddish tinge, thus differing from the lymph in the other two tubes whose contents were perfectly transparent. This lymph with the reddish tinge was, however, used in the vaccination of Guinea pig B, which was vaccinated in two places. The operation did not take and nothing remained to be seen except the scratches caused by the needle.

We notice that it is difficult or impossible to produce a typical Jennerian vesicle in the guinea-pig, and it may be concluded that the scabs in guinea-pig A were due to vaccine and not to blood serum.
It is to be remembered that the lymph used in the vaccination had been in the body over sixteen days and would, in consequence, undergo attenuation not unlike Dr. Pasteur's artificial cultivations.

In regard to guinea-pigs B3, the failure of the vaccination may be ascribed to the fact that air was allowed to come in contact with the lymph while in the tube. The facts that the microscope showed micrococci like those seen in ordinary vaccine lymph, and the scabs followed by scars after the inoculation of guinea-pig A, are sufficient evidence, after excluding varicella and variole, that the case was one of vaccinia.

After being satisfied of its being a case of vaccinia, the next question is: Was it totally or partially due to auto-inoculation, or to blood infection (spontaneous "vaccine simianic")?

Was it due to auto-inoculation? The idea that it might be due to is this is supported by the statement of Bannier, as we have already pointed out, that
auto-moculation may occur from the 8th to the 18th day. The opinion of Dandy is that auto-moculation has chances of success from the 6th to the 9th day, and the spontaneous eruption is contemporaneous with the local vaccinal pus-tules (p. 52). We shall however see that auto-moculation may occur as early as the 3rd day. Against auto-moculation there are several interesting facts. The primary vaccine vesicle was not opened either intentionally or accidentally. There was no evidence of the child's scratching the vaccinated arm. There was no skin disease or appreciable skin lesion, in which to plant the virus; and we have previously seen that Dr. Bantl failed to produce a vesicle on the unbroken skin. If there were any skin lesion, although unappreciable, in some parts of the body, the remarkable symmetry as shown by the eruption on the fingers and toes, could not be attributed to an accidental mechanical breach of the skin; and
It is difficult to imagine how lymph could penetrate the hard cuticle of the fingers and toes, which, as already stated, had some eruptive power after being touched with a needle.

If due to inoculation it can be readily conceived that the lymph, in its transit from one part of the skin to another, and coming in contact with the soiled linen, would run a great risk of being contaminated with such organisms as would cause an inflammation in relation to each vesicle; but there was, almost without exception, no areola around the secondary vesicles. Under the heading of accidental vaccination I have shown that inflammation around the sook is very common, and which would be best explained by the mixture of organisms with the lymph. The risk of vaccinating with septic matter is explained elsewhere. Another piece of evidence against auto-injection is that the third vaccination performed
the day before the onset of the
generalized eruption, was unsuccess-
sful; and if the child's clothing
were impregnated with lymph, it would
be expected that at the site of the
scarifications there would have de-
developed a pock, or that if the
patient's own lymph could produce
a pock then any other lymph
might do likewise.

Were the secondary vesicles on the arm
due to auto-inoculation and those on
the rest of the body due to infection
from them? The fact—that the
mother noticed that vesicles were com-
ing on the rest of the body two
days after the observed signs of
them appearing on the arm, and
that when I first saw the child
with this illness I found a vesicle
in the lumbar region quite as
developed as any on the arm, thus
showing that the vesicles on the arm
and some in other regions probably
 arose simultaneously—do not appear
to make this supposition tenable.
Was it a case of blood infection (sup-
"taneous vaccine generalisation)? In a
discussion on vaccination eruption,
(Brit. Med. Jour. 90 IV p. 1229) Dr. Colcott
Foy expressed his opinion that most
if not all, cases of vaccine generalisation
were due to auto-inoculation, and
Radcliffe Crocker believed that the
same disease was due to auto-inoc-
ulation at the early stage of develop-
ment of the original vesicle.
We have stated the evidence against
blood infection, that is, the appearance,
in the case H. S., of secondary vesicles
on the 13th or 14th day after vaccination;
but at the same time adduced
facts that go far to prove that
it was not a case of auto-in-
fection. Let us for a moment
recall to mind Dr. Martinus case,
of an infant developing a spontaneous
generalised eruption due to its being
rubbed by the re-vaccinated mother;
and the case of the girl aged 4 yrs,
who took the powdered vaccine
erupts, and four days afterwards
exhibited alarming constitutional symptoms which were followed after a lapse of six days (i.e., 10 days after taking the powder) by a general eruption of one hundred and eighty vesicles.

Two such cases are also mentioned by Dr. Dauchéz (p. 45) are interesting. One is by Dr. Étienne. It was a child, aged 4 yrs., who had undergone a very regular vaccination. On the 9th day it puckered the vesicles which it had infected. Six days afterwards there arose, malaise, nausea, delirium, and all the symptoms of variola. Soon the body was covered with vesicles each of which followed a most regular course, and of which the material inserted into another child gave rise to local vesicles without a general eruption.

The other case, by Dr. Richard, was a girl, aged 8, who, four days after sucking the vaccine vesicles of her younger brother, developed
a score of vesicles having every appearance of those at the point of insertion.

From these cases and the experiments of M. Chauveau it may be justly inferred that the incubation of coco-pot, when introduced into the system by the mouth, or by injecting it into the subcutaneous tissue, is on an average eight days. Dr. Martin's case—the infant affected through lactation—tends to show that lymph may be absorbed into the system without producing any tangible result; and M. Ferre (Brit. Med. Jour. 84, i, p. 695) has found the micrococci of lymph in the blood of different animals after vaccination.

We have seen that the various pains following vaccination are due to the absorption of some material from the vaccination wound, that they may occur at any reasonable time after vaccination, and that they require a constitutional predisposition.
in their production. Now, remembering that the symptoms show themselves about eight days after the vaccine has been introduced into the system, it is easy to imagine that if, in the case A.S., lymph were started on the 5th or 6th day, the general eruption would appear on the 13th or 14th day. The day of the appearance of the eruption would date from the day of absorption and not from the day of vaccination. The fact that M. Chauveau failed to produce a generalised eruption in the cow shows that it is the host, and not the poison, that is peculiar. In variolation the secondary eruption appears on the 13th or 14th day and is due to absorption. Why small-pox introduced in this way is very mild is not known. Perhaps it may be explained by the partial protection given by the absorption of some material from the primary vesicles, that is, before the micrococci of the disease have had time to develop.
The absorption of the cow-pox virus would seem quite as likely as that of small-pox, or as the products from the vaccination wound.

The absorption of the virus, however, is not as difficult to understand as the manner in which it develops afterwards.

But why do the secondary vesicles predominate in the region of the primary vesicles? Have we not seen that miliaria, purpura, eczema, diseases occasionally brought out by vaccination not uncommonly first show themselves in the locality of the vaccine "mark." Nay, the pocks in small-pox are well known to be more abundant on a piece of skin whose vitality has been lowered, say by a blister. Moreover, Dr. Thos. Dutton (Brit. Med. Journ. 1873, 1, p. 356) records a case of a child whose vaccination was progressing favourably, when, on the third day the arm inflamed and there were scabs "all over" the child.
When Dr. Dulot saw the case he found it one of varicella. He noticed that the varicella vesicles clustered round the weak part in the arm near the remains of the vaccine vesicles.

I venture to hold that the inflammatory areola is a weak point in the skin, and is thus a most suitable locality for the development of the secondary vesicles.

We may then conclude that the case of H.S. was one of vaccine generalisation (spontaneous), due to the virus being absorbed into the system, and the numerous confluent vesicles on the vaccinated arm were not due to auto-infection, but developed there on account of its presenting the weakest spot in the cutaneous system.

Why the eruption on the hands and feet was not complicated is difficult to say. The explanation might be that it was partly owing
partly to the special structure of the skin in these regions, and partly because the "bullae" were very distended with lymph. A vesicle in the region where the Digitus Achillis is inserted, just a the spot where the thick epidermis joins the ordinary cuticle, was slightly umbilicated. The eruption in these localities was confined entirely to the flexor surfaces. A case recorded by Darcy (p. 333) of a child suffering from generalized vaccinia showed on the plantar aspect of the foot a pustule which was a little umbilicated.

In regard to the third vaccination which was unsuccessful the cause of the eruption could not be ascribed to it, for the eruption appeared the day after this vaccination was performed. The first vaccination, performed a week before the second, the successful one, might have had some influence over the disease, as it is possible to
imagine that the lymph in its
scarifications might have been to
some extent revivified (see revivi-
ifying of vessels). The lymph
was not to blame and the only
explanation that appears to be
correct is that the disease was due
to some constitutional peculiarity
of the patient — whatever that
might mean.

Vaccine généralisée due to auto-
inoculation. Vaccine généralisée
from this cause is recognized and
is comparatively frequent. There
is generally an accompanying skin
disease, the most common being
eczema. Lymph coming in contact
with diseased skin is very liable to
produce a pock. A recruit having
abundant acne on the neck, shoul-
der, and back was vaccinated without
effect on the healthy skin of the
arm. As no result followed, the
operation was repeated six days after
on the other arm, as also on
the papillae of the arm on the shoulder and back. In these localities a few punctures were developed, while in the healthy skin on the arm no change occurred. In another case several punctures made in the eruption of psoriasis were followed by development of vesicles, while vaccination on the healthy skin was twice performed without success. (Dr. Hiiiler, Medical Times 761, p. 261.)

Dr. Radcliffe Crocker, as has already been indicated, believes vaccine pustule to be produced by auto-inoculation at the early stage of development of the original vesicle. Dandy says auto-inoculation rarely takes place after the 9th day, while Beanie maintain that it is possible as far as the 18th day. Thus it will be seen that a reliable diagnosis as to the kind of vaccine pustule cannot be made from the date of the secondary vesicle. The following case of auto-inoculation illustrates
that the secondary vesicles may appear on the 3rd day. It is of an eugemonic child. (Duhring p. 64)

Jules B., aged 6 months, has not been vaccinated on account of eczema of the forehead, hairy part of the neck and face, and the front of both arms. The eruption commenced to improve and it was decided to vaccinate the child on account of there being an epidemic of small-pox.

Feb. 18. A single puncture was made on each arm and the vaccinal fluid was taken directly from the cow. Feb. 21. On the 3rd day elevations commenced to show themselves at the seat of puncture, but already there are four supernumerary punctures on the eczema of the front of the right arm. Feb. 23.

5th day. Several new vesicles are recognized scattered over the two arms; 5 or 6 on the left, 7 or 8 on the right, some isolated on parts of sound skin, others in
group of 3 or 4 on the patches of exudate. An exudative patch about the size of a five-cent piece is covered with pustules encroaching one on the other.

After the 9th day, the eruption appeared to have attained its height. There was swelling of the axillary glands, fever, incontinence of the right arm, and the isolated pustules followed the ordinary course of vaccination, desiccating on the 13th day.

22nd. Swelling of the axillary glands disappeared; and the pustules did not leave a depressed cicatrix.

The vesicles from auto-inoculation may follow the course of ordinary vaccinia vesicles but their progress is usually slower. Constitutional symptoms, fever, etc., are also present and vary according to the severity of the disease. The poxes are usually confined to the areas attacked by the skin disease, but apparently healthy skin
is not uncommonly affected, and
some portions of the skin may be
invaded in succession. The lumps
may be conveyed by the child's nails
or the hands of the mother, from
the site of the original vesicle to
other parts of the cutaneous system.
When the secondary vesicles appear in
the region of the vulva or anus they
may be disguised or modified and
are to be distinguished from syphilis.

**Resume**

We may then say that spox-
taneous vaccine generalized, that is,
due to blood infection, can no
longer be doubted, and that there
are in consequence two varieties
of the generalized eruption of
cow-pox; one, the spontaneous,
due to blood infection, and
the other caused by auto-
immunization.
Spontaneous Vaccine Sinualisé

is a very rare disease, due to the absorption of the active principle of vaccine lymph into the system. The vaccine loses its "fixedness" probably owing to the primary vesicles having failed to give protection against a further development of the microwebs in the system. It has been most frequently noticed in infants or young children, but cases have been recorded in which adults were affected. The disease may show itself after vaccination either at the same time as the vesicles at the seat of puncture (thus resembling injection), or later. When vaccine has been taken internally, such as by sucking a vaccinated arm, the symptoms manifest themselves in the course of four to eight days, and simulate those of an attack of variola.

In some cases the secondary vesicles appear at the same time as those
on the vaccinated arm and follow the same course of development.
In others the symptoms arise suddenly and consist at first of fever and irritability of the patient; about the same time the vaccine areola shows papular points which in the course of two or three days develop into vesicles, the ones more centrally situated being confluent and more developed than those at the periphery, which shows isolated vesicles, other papular points, and is surrounded by inflamed skin.
At the same time, or soon afterwards, a similar growth of isolated, irregularly scattered vesicles takes place in other parts of the body, presenting in their in their early stages a decided "shotty" character as in small pox. The vaccine areola is now everted and may be absent. The vesicles may be distributed in any region of the body, but they have a special affinity for a weak point in the skin as is shown by their
developing in greater numbers near the original "mark." There is some asymmetry shown in their distribution, especially when the eruption attacks the extremities, and in this latter situation the flexor surfaces are mostly affected. Constitutional symptoms, usually slight, vary according to the severity of the disease. The pocks generally scab after a fortnight and the resulting scars do not exhibit that depression ordinarily seen, but in severe cases the scabbing may be delayed more than three weeks. No case has been recorded in which the eruption affected the mouth. The prognosis ought to be guarded but recovery has been the rule.

Vaccine généralisée due to auto-inoculation

This kind of the disease is the less rare of the two and is generally accompanied with some skin disease as eczema, erythema, papillo-
vesicular eruption is or other cutaneous lesion. It may occur from the 3rd to the 10th day after vaccination. The infant, by scratching, conveys the vaccine from the arm to other parts of the body, or this may be done by some other person. Sometimes there is much swelling in the region of the secondary vesicles, especially if the lymph in its transit from one part of the body to another, be contaminated with septic serum.

The secondary vesicles predominate in the region of the skin lesion, where they may be copious, but apparently healthy is occasionally affected. The pox vesicles as a rule about the 14th day, but they may in very rare cases ulcerate and thus prolong the illness, which, unless complications arise, usually terminate favourably, and the resultant scars do not exhibit that depression characteristic of an intentional vaccination scar.
Diagnosis

Vaccinia generalis must be distinguished from varicella which may occur at the same time as cow-pox.

The large size of the pox in vaccinia (varicella pox measuring from ½ to ¾ in.), together with the evidence of vaccination, and the possibility of contagion in the case of chicken pox, would assist in avoiding the error. Fresh crops of vesicles arise in varicella but rapidly pass into scabs. It is to be distinguished from varioloid by the general symptoms (vomiting, pain in the back, pyrexia, &c.) together with a consideration of possible contagion. When the eruption is complete the pox are equal in variola, which does not show the fresh crops, as are seen in generalised vaccinia. Vaccine pox are larger, more isolated, and very irregularly scattered. Small pox may affect the mouth. The disease would
however, in some cases be difficult to diagnose, if it occurred during an epidemic of small-pox. The fact of vaccine lymph being used for inoculation would distinguish it from variolation.

I venture to give in a tabulated form the points of difference between the two varieties of vaccine generalization:

<table>
<thead>
<tr>
<th>Spontaneous</th>
<th>Auto-inoculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) no skin disease</td>
<td>(1) Skin disease</td>
</tr>
<tr>
<td>(2) no evidence of scratching</td>
<td>(2) May be evidence of scratching</td>
</tr>
<tr>
<td>(3) very irregular distribution of secondary vials</td>
<td>(3) Secondary vesicles confined chiefly to skin lesion</td>
</tr>
<tr>
<td>(4) Vaccine areola, if any, normal</td>
<td>(4) Areola may be inflammatory and there may be much swelling</td>
</tr>
<tr>
<td>(5) Eruption shows some symmetry</td>
<td>(6) Symmetry, if any, depends on the symmetry of the skin disease</td>
</tr>
</tbody>
</table>
Treatment. As regards treatment so little is known of the spontaneous variety of the disease that no special method of treatment can be suggested. The vaccination of infants suffering from skin should be postponed till the patient is well, except in times of small-pox epidemics, when the risk of small-pox is far greater than that of a benign eruption due to auto-inoculation. The strength of the patient should be supported and the pox, if inflamed, or causing itching, dusted with some powder, as oxide of zinc or starch, after tapping them with warm boracic solution.