I have not made any reference to the complications which may mark the course of a vaccination and their treatment. The various methods of protecting the vaccine vesicle have very largely diminished the risks of the operation, a result which was anticipated in the report of the Royal Commission. If only the vesicle can be kept free from mechanical injury, or, when injured, if exudation can be checked and the ingress of organisms prevented until the scab, kept perfectly dry, has fallen, leaving the typical scar, we shall have little fear of any complications.

One method which I have found of exceptional value, and which I believe is worthy of wide adoption, is the use of a saturated aqueous solution of picric acid to paint over the vesicles and surrounding skin, wherever there has been any such injury to the vesicles. I was led to try this from an observance of the value of the same application in the somewhat similar condition after burns and scalds. The application is painless, and I have simply covered it with antiseptic wool, leaving it untouched for several days.

Fig. 1.—Diagram showing distribution of eruption in small-pox.
(To illustrate Dr. Wanklyn's paper.)

In conclusion, it is necessary to add that the description of the course of the vaccination is an attempt to give a composite picture of the course of a process which is distinctly variable, both by acceleration and retardation and in intensity, and that it is gleaned from the use of the lymph issued by the National Vaccine Establishment, which has been remarkably uniform in its results for some time.

While the writer is probably as sensible as any one of the lacunae which remain to be filled up, his main object has been to open up two lines of investigation to which every one who vaccinates may contribute some facts from his own experience, by the pursuit of which the risks of the operation may be reduced to a minimum, and yet which are but scantily represented in easily accessible medical literature.

DESCRIPTION OF COLOURED PLATES ILLUSTRATING DR. COPE'S PAPER. (Between pages 44 and 45.)

- Fig. 5.—Child, W. L., male, aged 6 months. Appearance at beginning of fifth day. Situation of individual scratches indicated by depressions in the developing vesicles. Faint flush round each vesicle.
- Fig. 6.—Child, D. C., female, aged 10 months. Appearance at beginning of ninth day, but somewhat delayed, and would pass quite well for eighth day, except that surface of vesicles is dull.
- Fig. 7.—Same child, D. C. Appearance at end of twelve days. Two supplementary vesicles on arm. Course of development unusually rapid between ninth and twelfth days in this case, desquamation being active around vesicles, the surfaces of which have darkened right to the edge, though there are patches where the vesicular edge is still visible.
- Fig. 8.—Child, J. S., male, aged 4 months. Appearance on fifteenth day. The lower right-hand vesicle has not advanced so rapidly as the rest, and shows more typically than Fig. 3 the more usual method of desiccation of the vesicle.

Fig. 2.—Diagram showing distribution of eruption in chicken-pox.
(To illustrate Dr. Wanklyn's paper.)

DIFFERENTIAL DIAGNOSIS BETWEEN VARIOLA AND VARICELLA.

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Few problems in diagnosis have been of more practical importance recently than the differentiation between variola and varicella. The following remarks are based upon the observation of 200 cases of varicella sent to the diagnosing station of the Asylums Board during the recent outbreak of small-pox. Since these cases were sufficiently puzzling to be taken for small-pox, it will be of interest to touch upon the distinctive features of the two diseases, and indicate those which led to a correct diagnosis being made.

History.

An accurate history is a rarity. The following is an example:

Day 1.—A. B., male, aged 20, taken ill acutely with fever. Temperature 102° ; *malaise*; general aching and shivering.

Day 2.—Pyrexia continued; *malaise*; patient is unfit for work.

Day 3.—General improvement; papules noticed on chin in evening.

Day 4.—The patient is certified to have small-pox, and comes under observation; an abundant eruption is present. The case was found to be varicella.

The similarity of this history to that occurring in many cases of variola is apparent. Yet such a history is not uncommon in adult varicella, and the example shows of how little value in diagnosis an accurate history may be.

Commonly the history is inaccurate.

The facts of the illness before it comes under observation are so ill observed and ill recorded that as evidence they are of little positive value; in addition they are often misleading. As a matter of practice it is wise to disregard and refuse to hear the history till the first-hand evidence is noted and weighed. After an opinion has been formed thereon the history may be taken into account and considered with caution. To attach much weight to history is certain to lead to error. In no class of case than those under consideration is the dictum of the late Sir G. M. Humphry to his students more applicable, "Eyes first and most, hands next, tongue last and least." The value of the first-hand evidence outweighs altogether that derived from the history.

Age.

This is seldom a point of much practical value in diagnosis. Of the 200 cases of varicella alluded to, 16.7 per cent. were over 18 years of age. Doubtless the lighter incidence among adults is due to the same causes which lead to a light incidence in scarlet fever and measles—namely, the protection afforded by attacks in youth, absence of close contact between adults and infected children, and the immunity conferred by advancing years.

General Symptoms.

While moderate pyrexia, nausea, *malaise*, aching in head and limbs occur in varicella, high temperature, sacral pain and vomiting are uncommon.

There is one point of importance, however, in this group—namely, the fact that in small-pox there is a general prostration with muscular flaccidity and tonelessness. The cases of small-pox are very few in which this phenomenon in the stage of the primary fever is not present, and its absence in a suspected case tells strongly against small-pox. The phenomenon is to be noted in all the voluntary muscles. The patient lies like a man prostrate after severe physical exertion, with limbs flaccid and all his muscles relaxed. It is in the

facial muscles, however, that the condition is most readily recognized, owing to the fact that in them it is measured by the delicate index of the expression.

In a patient marked by an abundant rash, whose expression is alert, attention keen, and mentalization acute, the diagnosis of small-pox is unlikely, and by a practised observer might be excluded altogether by this observation. A patient suffering from small-pox in a corresponding degree has a dull expressionless facies, with a settled aspect of fatigue and inattention.

The Rash.

It should be observed particularly that no accurate diagnosis can be hoped for without a good light, and a complete examination of the skin. Neglect of these points is a fruitful source of error.

(a) Distribution of the Rash.

This is a point of cardinal importance. In the revision of the diagnosis of some 7,000 cases examined here during the present epidemic no one criterion has proved more useful or reliable. This is not the place in which fully to discuss the distribution of the eruption of small-pox and to follow out its minutiae. Suffice it to recall its well-known character—namely, the abundance on the face, wrists, and hands, and often on the feet, whereas in comparison it is light upon the trunk.

It is a matter of common knowledge that the site of election for the rash of varicella is upon the trunk, and that the forearms and hands are lightly affected. What is not so generally known is the constancy and reliability of this phenomenon. It should be borne in mind that it is not uncommon in a severe case of varicella, especially in an adult, for the face to show a dense rash, and to be more thickly covered than the back and front of the trunk. But the rash in such a case, as in all cases of varicella, will show a very light relative incidence on forearms and hands, as well as on legs and feet. The

Fig. 3.—Varicella in male adult showing abundant rash on face and its absence on forearms and hands. Photograph by Dr. J. Howell Griffiths.

more distal the rash is upon the extremities, the scantier and smaller it is found to be, and in some cases where the lesions are numbered on the face by hundreds, the skin of the hands is free from any blemish whatever. Such a patient, sitting up in bed, stripped to the waist, with hands crossed, backs outwards, forms a striking picture, and a correct diagnosis might be made readily on inspection, without further examination.

It is not to be thought that if vesicles occur on the palms or soles, varicella is thereby excluded. Such a distribution is met with, though it is not common; and cases in which it occurs are found to conform to the general law of distribution. It is important to bear in mind that it is the *relative*

distribution and density of the rash which are under consideration.

But little importance is to be attached to the distribution on the mucous membranes; lesions on the hard and soft palate are common in varicella.

(b) *Character of the Rash.*

It is well at once to say what broken reeds to lean upon in diagnosis are the words "shotty" and "umbilicated." It is true that in the small-pox rash the focus of each lesion is placed comparatively deep in the skin, giving rise to a circumscribed sphere of inflamed tissue which on palpation feels not unlike a shot imbedded in the skin; and furthermore that the even distension of the vesicle wall is hampered by fibrous internal ties, and that this is shown on the surface by a flattening or positive dimple. The two phenomena frequently occur, but usually where the diagnosis is very plain from other considerations. Both are completely absent in some cases, and often in those of the most puzzling variety. These signs, therefore, are of little diagnostic use in an obscure case of suspected small-pox. Where they are present they are not needed, and where they are needed they are not present. They are also misleading. In varicella, among other diseases, firm papules are not uncommon, indistinguishable in their shotty character from those of variola. In varicella it is in the coarser skins of adults that they commonly occur. In the same disease a dimple in the pustule is common, not in the vesicle, be it observed, and is due to the escape of the contents of the pustule and the consequent falling in of its wall. Yet no sooner are any shotty or umbilicated characters noted of whatever kind, than the case is labelled small-pox accordingly. The expressions are thus pernicious in two ways. Their absence in a case suspected to be small-pox is taken as evidence against that disorder, and their presence in a case otherwise suggestive of varicella is held to negative that disease. The words are fetishes or objects of superstitious worship which help their devotees as much as do most idols, and mislead them far more. They should be treated as such, and discarded. In the differential diagnosis of small-pox there are no more fertile sources of error.

The true distinction between individual lesions of variola and varicella lies in the depth in the skin at which the lesion is placed, and any point which throws light upon this characteristic is of value. As compared with variola the varicella rash is superficial; this is evident in the early formation of the vesicle and its rapid maturation, the early formation and rapid detachment of the scab and in the light-

ness of the scar. The occasional deep ulcers and scarring which occur in varicella commonly result from adventitious causes such as scratching and the insertion of dirt.

The points by which the superficial nature of the lesions in varicella are most easily recognized are the fineness and thinness of the pellicle covering the vesicle, giving to it with its serous contents the familiar pearly translucency. The shape and outline of the vesicle is characteristic, its position in the skin allowing it often to take on an irregularly oval outline the long axis of which is parallel to the creases of the skin of the part. The situation where these are seen most commonly and clearly are the folds of the axilla and flank; the groins and lumbar region often show similar characteristic lesions.

The outline of the vesicle is often crenated and irregular. Owing to the more yielding character of the tissues immediately surrounding it the tension is not so high in a varicella as in a variola vesicle—the outline is less firm and determinate. On palpation the depth of the lesion in the skin may be estimated better by rolling that fold of the skin between the finger and thumb than by pressing it against a bony surface.

Evacuating the contents by a needle is apt to lead to an erroneous conclusion. Complete evacuation occurs in the case of a varicella vesicle, but evacuation equally complete has been noted in several of the cases of variola under consideration in which the lesions when 2 days old have been frankly vesicular.

A point worth notice is the irregular character of the lesions in varicella in a given "window" of the skin. They vary in size remarkably as well as in shape and stage of development. Some may be tense vesicles, others pustular and smaller, others again in various stages of scabbing having run their course, while interspersed are faint and small aborted papules.

In a late stage of either disorder diagnosis rests almost entirely upon the

distribution of the scars and such scabs as remain. The diagnosis of small-pox is clinched if the evenly circular disc-like scabs are found, and the brown insipid remains of pustules in the thick skin of the hands and feet.

In conclusion, the differential diagnosis between the two diseases rests not upon one feature, but upon a careful consideration of all the evidence, care being taken to attach due weight to each point, and especial importance being given to the depth in the skin at which the lesions are placed, and above all, to the distribution of the rash.

[Four coloured plates illustrating Dr. Wanklyn's paper will be found between pp. 44 and 45.]

Fig. 4.—Varicella in girl of 12 years showing freedom of wrist and hand from rash. Photograph by Dr. J. Howell Griffiths.