patient under anaesthesia before the diagnosis is established.

Although eight patients (24%) in the series gave a history of previous anal disorder and treatment it was only in three patients (9%) that this occurred less than two years before the symptoms of intersphincteric abscess developed. In addition 76% of the patients had no previous anal symptoms. Hence if previous anal disorder is an aetiological factor in the development of intersphincteric abscess, it is rare. The initial symptoms, however, might be those of a fissure which had healed.

The treatment by laying open the abscess is effective provided that the subsequent treatment is designed to prevent "pocketing". It is important to remember that a fissure associated with an intersphincteric abscess will not respond to treatment by a lateral sphincterotomy. It is recommended, therefore, that before an anal fissure is treated operatively it is palpated bidigitally for induration and its base very gently examined for the presence of an opening.

We are grateful to the surgical staff of St. Mark's Hospital for allowing us access to the records of patients under their care.

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A New Look at Infectious Diseases

Smallpox

A. B. CHRISTIE

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But is a new look at smallpox really necessary? Smallpox is a dying disease; it still persists in Ethiopia, Sudan, India, Pakistan, and Nepal, but it is likely to disappear in these countries too as the world eradication campaign continues to stop its spread by throwing vaccination rings round infected patients and villages. Routine infant vaccination is no longer advised in Britain, because the risk of severe or fatal illness after vaccinia is much greater than the risk of contracting smallpox. So need one bother in Britain and other developed countries with the fine points of diagnosis of a disease one is likely never to see again? Perhaps not, but it so happens that, as I write, I have under my care a nurse who visited an English girl admitted undiagnosed, but with a modified smallpox rash, to a large general hospital in the south of England. The diagnosis was established in time for my patient to be vaccinated and isolated before she could develop smallpox and spread the disease to her own patients. This was fortunate, but the story is a not uncommon one—the first case missed because the rash is modified and also, because it is a rare disease, no one thinks of smallpox. Infection can then spread readily in hospital by direct contact or on currents of air, as was illustrated in the outbreaks in Meschede[1] and Monschau[2] in Germany and in Vitoria in Brazil.[3]

One can hardly miss a case of ordinary, classical smallpox. There is a profuse rash, pustular when fully developed, and denser on the face and extremities than on the trunk (fig. 1). In its early stages it is very like measles but the resemblance soon disappears. One must at least *think* of smallpox. The difficulty occurs with the extremely mild and the extremely severe types of smallpox, for these can be very unlike the classical case, and unless the doctor is specially skilled because of his experience, or on his guard because smallpox is present in the area, he is quite likely not to think of smallpox as a possible diagnosis.

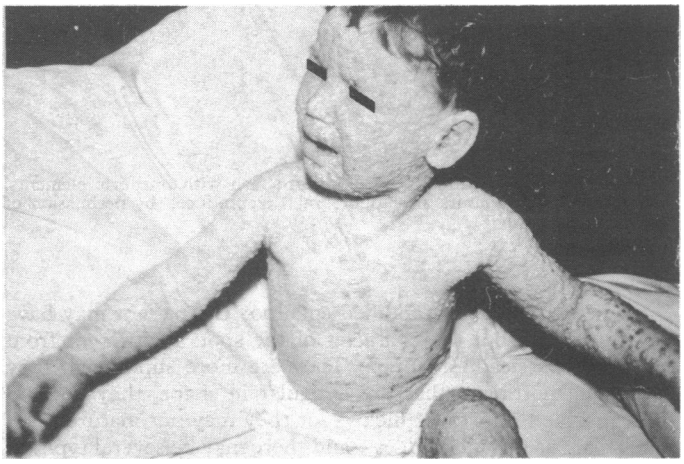

FIG. 1—Smallpox; classical type of spots and distribution (reproduced by permission of Churchill Livingstone).

Modified Smallpox

Smallpox may be a mild disease even in an unvaccinated person, but by modified smallpox one usually means smallpox occurring in a vaccinated person whose immunity is high enough to prevent the classical features of smallpox from appearing, but not high enough to suppress all evidence of the disease. Vaccination gives protection against three characteristics of the disease—the degree of toxaemia, the number of spots, and the character

Infectious Diseases Unit, Fazakerley Hospital, Liverpool L9 7AL
A. B. CHRISTIE, M.D., F.R.C.P., Physician Superintendent

of the spots. The degree of protection against the three varies. Thus a vaccinated person may suffer from a sharp toxaemic illness but develop no spots at all: this is *variola sine eruptione*, or smallpox without a rash, and is most often seen in highly vaccinated doctors or nurses exposed to smallpox. Such patients, unless they develop lesions in the upper respiratory tract, are probably not infectious. Other patients may have a toxaemic illness and then develop only a few spots. I have had a patient with one spot only, another with three, and a third with seven. Such patients are likely to be mildly infectious. My patient with seven spots infected her husband and he died of haemorrhagic smallpox (fig. 2), but she infected no one else, though she had many contacts during the infectious stage. Patients with so few spots are unlikely to be diagnosed as having smallpox unless they are known to have been exposed to infection.

FIG. 2—Hypertoxic smallpox; scarlatiniform rash with purpuric elements. The patient died 12 hours after photograph (reproduced by permission of Churchill Livingstone).

In the third type of modified smallpox the patient may have a profuse rash, but the character of the spots is different from those in "classical" smallpox. They are more superficial, they lose their shottiness, they are irregular in shape, they develop from macule to pustule quickly—or they may not mature at all but remain as maculopapules—and there may be several types of spots all on the same area of the body. Sometimes the spots have a granulomatous base and sprout from the skin as tiny fleshy cones, some of them capped with a minute vesicle or pustule; these are often seen only on the face and may be very deceiving indeed.[4] Usually the rash retains its typical distribution, heavier on the extremities than on the trunk, but even this may go. How then to diagnose smallpox? Only by asking oneself the questions: Can this be smallpox?[5] Can this be modified smallpox? If these questions arise in the doctor's mind he should seek laboratory aid to answer them.

Hypertoxic Smallpox

In hypertoxic smallpox the initial viraemia is overwhelming and the patient usually dies before the true rash appears. Often the patient has a prodromal or "toxic" rash: this may be an intense scarlatiniform or morbilliform rash, or it may be purpuric—*purpura variolosa*—but it has no resemblance at all to the pustular rash of "classical" smallpox. The patient suffers severely from headache, backache, and prostration and usually dies after five or six days. His illness may easily be misdiagnosed as a blood dyscrasia (there are often abnormal cells in a peripheral blood film) or as purpura fulminans.

Sometimes the patient survives longer, and the true rash of smallpox appears, but it is flat and velvety and the lesions tend to creep over the skin, not at all like the round, shotty pustules of "classical" smallpox. Unless one is well aware that severe smallpox may present like this, the diagnosis may still be missed. One must add a third group of questions to one's diagnostic approach: Can this be smallpox? Can it be modified smallpox? Can it be haemorrhagic or hypertoxic smallpox? If these questions arise in the doctor's mind he must take every care and seek laboratory aid before answering them in the negative.

Variola minor

The rashes of variola major and variola minor present the same diagnostic features, though anomalies, especially with regard to the speed of maturation of lesions, are commoner in the minor than in the major disease. Haemorrhagic or hypertoxic cases are very uncommon with variola minor,[6] whereas such cases occur in nearly every outbreak of variola major. The most deceiving aspect of a patient with variola minor may be his wellbeing in spite of a profuse rash. In an outbreak of variola minor one becomes accustomed to seeing this in many of the patients and to accept it as characteristic of the disease. Presented with a single patient with a varioliform rash, one cannot distinguish clinically between variola major and variola minor. The distinction depends on differences in the growth characteristics, especially ceiling temperatures, of the two viruses.

Chickenpox

The rash is superficial, it matures quickly and is scabbed within two days, it is heavier on the trunk than on the limbs and face, and on the proximal than on the distal parts of the limbs, it invades hollows and protected areas rather than prominences, and the patient is not very ill. All this is true, and the diagnosis is usually easy. The main difficulty arises with very severe chickenpox. The patient's body may be so heavily covered with the rash that it requires skill and confidence to trace its distribution (fig. 3), and sometimes, especially in adults, the prodromal illness may be just as severe as in smallpox. If such cases occur during smallpox outbreaks they can be mistaken for smallpox, but though such a mistake may cause inconvenience and alarm it is not disastrous. No one is going to die because someone mistakes chickenpox for smallpox. A mistake the other way round, smallpox diagnosed as chickenpox, does often lead to someone's death.

It is good practice, therefore, with every case of chickenpox, no matter how obvious the diagnosis, to examine the rash carefully and to prove to oneself that it cannot be smallpox. Criteria which can be misleading are: (a) the presence of a vaccination scar, for all the difficult modified cases of smallpox occur in patients with vaccination scars; (b) the shape and depth of the spots, for in vaccinated patients the spots of smallpox are often superficial and irregular, while deep, round, shotty spots are not uncommon in chickenpox; (c) the presence of spots on the palms and soles, for though often regarded as diagnostic of smallpox, this is quite common in chickenpox too; (d) umbilication, a sign known to every doctor, but very misleading; it is characteristic only of the vesicular stage of smallpox, but it is often absent in the severe cases with flat velvety lesions. Moreover as any pustule begins to dry up, its centre sinks in and creates a depression; this looks like umbilication, but it occurs both in chickenpox and smallpox as the pustules dry.[4] Discredit-

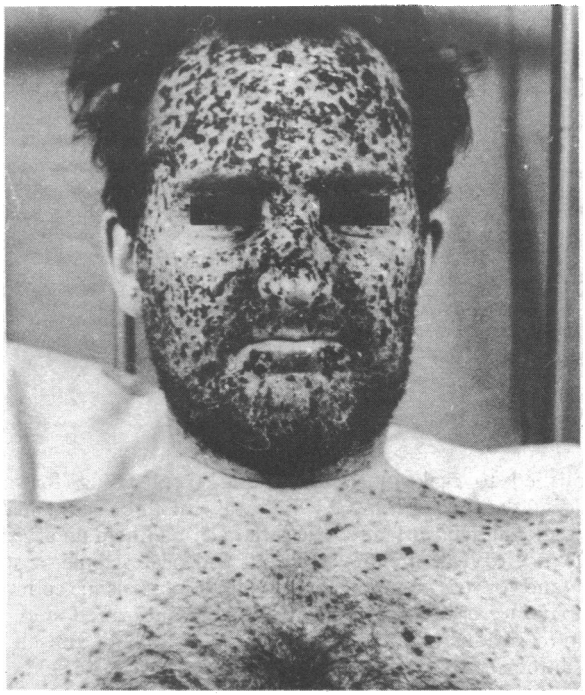

FIG. 3—Severe chickenpox; severe prodromal illness, many anomalies in distribution of rash on face (reproduced by permission of Churchill Livingstone).

ing all these criteria may seem like removing the whole basis of differential diagnosis between the two diseases. This is not so. Clinical diagnosis depends on a careful assessment of the distribution of the rash. This is basic. The speed of development of the rash is next in importance. The other criteria are of very limited diagnostic value. Considered along with the distribution of the rash they may help to strengthen the confidence of one's clinical diagnosis: considered by themselves they can, and often do, mislead.

Vaccinia and Cowpox

After vaccination it is not uncommon to find vaccinia lesions on parts of the body other than the vaccination site. Usually the virus is conveyed on the fingers of the patient: blood-borne generalized vaccinia is rare. The lesions can be indistinguishable from those of smallpox. If the patient has been vaccinated solely as a preventive measure, not as the result of exposure, these generalized lesions are not a source of worry. If they occur on a patient vaccinated because of close contact with a case of smallpox, they cannot be distinguished clinically from lesions of smallpox, and such a patient should be isolated till laboratory examination proves that vaccinia virus alone is responsible. I have seen one patient whose vaccination took after exposure to smallpox, but this did not prevent the almost simultaneous appearance of the rash of smallpox, from which the patient died.

Cowpox is an infectious condition of the udder of cows which occasionally spreads to man. The lesions are usually on the hands of the milker, but sometimes appear on the forearm and the face.[7] They look like vaccinia lesions but may be more hypertrophied and haemorrhagic.[7] Cowpox is more likely to be confused with milkers' nodules or orf than with smallpox: final diagnosis can be made only in the laboratory.

Laboratory Diagnosis of Smallpox

The first thing a doctor in doubt about a possible case of smallpox must do is to contact the virus laboratory and ask advice about the specimens required and the help that is available. The most rapid results are obtained by the examination of material from lesions either under the ordinary or the electron microscope, provided sufficient virus particles are present in the material. The detection of virus antigen in vesicle fluid by gel diffusion takes about six hours, by complement fixation about 24 hours: fluorescent antibody tests are more rapid, but not so reliable. The above tests differentiate between the pox virus group—which includes variola, vaccinia, and cowpox viruses—and the herpes group—which includes varicella virus. For differentiation between variola major, variola minor, vaccinia, and cowpox viruses, growth on chorioallantois requires three days: the type of pock and the ceiling temperatures are important, and a definite diagnosis can usually be made at this point. The rate of growth in tissue culture and the type of cytoplasmic inclusion body produced are also helpful.[7] Rarely, animal inoculation tests may be required: variola virus infects only man and monkeys, while vaccinia and cowpox viruses infect many domestic and laboratory animals.

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