In *variola pustulosa hæmorrhagica* the disease progresses as an ordinary case of severe variola, and the hæmorrhages do not develop until the vesicular or pustular stage. The earlier the hæmorrhage the greater is the danger. There are undoubtedly instances of recovery when the bleeding has taken place at the stage of maturation. Bleeding from the mucous membranes is also common in this form, and the great majority of the cases prove fatal, usually on the seventh, eighth, or ninth day.

There is a form of hæmorrhagic small-pox in which bleeding takes place into the pocks in the vesicular stage and is followed by a rapid abortion of the rash and a speedy recovery. Six instances of this kind came under my observation.* In four the hæmorrhage took place on the fourth day; in two on the fifth day, just at the time of transition of the papule into the vesicle. Extravasation takes place chiefly into the pocks on the lower extremities and trunk, in only two instances occurring in those of the arms. The eruption in all proved abortive, and no patients under my care with an equal extent of eruption made such rapid recoveries. With these cases are to be grouped those in which the hæmorrhages occur in the pustules of the legs in patients who have in their delirium got out of bed and wandered about. This modified form of hæmorrhagic small-pox is also described by Scheby-Buck.

3. **Varioloid.**—This term is applied to the modified form of small-pox which affects persons who have been vaccinated. It may set in with abruptness and severity, the temperature reaching 103°. More commonly it is in every respect milder in its initial symptoms, though the headache and backache may be very distressing. The papules appear on the evening of the third or on the fourth day. They are few in number and may be confined to the face and hands. The fever drops at once and the patient feels perfectly comfortable. The vesiculation and maturation of the pocks take place rapidly and there is no secondary fever. There is rarely any scarring. As a rule, when small-pox attacks a person who has been vaccinated within five or six years the disease is mild, but there are instances in which it is very severe, and it may even prove fatal.

There are several forms of rash; thus in what has been known as horn-pox, crystalline pox, and wart-pox the papules come out in numbers on the third or fourth day, and by the fifth or sixth day have dried to a hard, horny consistence.

Writers describe a *variola sine eruptione*, which is met with during epidemics in young persons who have been well vaccinated, and who present simply the initial symptoms of fever, headache and backache. In a somewhat extensive experience in Montreal I do not remember to have met with an instance of this kind or to have heard of one.

We do not now see the modified form of small-pox, resulting from inoculation, in which by the seventh or eighth day a pustule forms at the

* Clinical Notes on Small-pox. Montreal, 1876.

seat of inoculation; then general fever sets in, and with it, about the eleventh day, a general eruption, usually limited in degree.

Complications.—Considering the severity of many of the cases and the general character of the disease, associated with multiple foci of suppuration, the complications in small-pox are remarkably few.

Laryngitis is serious in three ways: it may produce a fatal œdema of the glottis; it is liable to extend and involve the cartilages, producing necrosis; and by diminishing the sensibility of the larynx, it allows irritating particles to reach the lower air-passages, where they excite bronchitis or broncho-pneumonia.

Broncho-pneumonia is indeed one of the most common complications, and is almost invariably present in fatal cases. Lobar pneumonia is rare. Pleurisy is common in some epidemics.

The cardiac complications are also rare. In the height of the fever a systolic murmur at the apex is not uncommon; but endocarditis, either simple or malignant, is rarely met with. Pericarditis too is very uncommon. Myocarditis seems to be more frequent, and may be associated with endarteritis of the coronary vessels.

Of complications in the digestive system, parotitis is rare. In severe cases there is extensive pseudo-diphtheritic angina. Vomiting, which is so marked a symptom in the early stage, is rarely persistent. Diarrhœa is not uncommon, as noted by Sydenham, and is very constantly present in children.

Albuminuria is frequent, but true nephritis is rare. Inflammation of the testes and of the ovaries may occur.

Among the most interesting and serious complications are those pertaining to the nervous system. In children convulsions are common. In adults the delirium of the early stage may persist and become violent, and finally subside into a fatal coma. Post-febrile insanity is occasionally met with during convalescence, and very rarely epilepsy. Many of the old writers spoke of paraplegia in connection with the intense backache of the early stage, but it is probably associated with the severe agonising lumbar and crural pains and is not a true paraplegia. It must be separated from the form occurring in convalescence, which may be due to peripheral neuritis or to a diffuse myelitis (Westphal). The neuritis may as in diphtheria involve the pharynx alone, or it may be multiple. Of this nature, in all probability, is the so-called pseudo-tabes, or *ataxie-variolique*. Hemiplegia and aphasia have been met with in a few instances, the result of encephalitis.

Among the most constant and troublesome complications of small-pox are those involving the skin. During convalescence boils are very frequent and may be severe. Acne and ecthyma are also met with. Local gangrene in various parts may occur.

Arthritis may develop, usually in the period of desquamation. It is

probably not a genuine rheumatism. Acute necrosis of the bone is sometimes met with.

Special Senses.—The eye affections which were formerly so common and serious are not now so frequent, owing to the care which is given to keeping the conjunctivæ clean. A catarrhal and purulent conjunctivitis is common in severe cases. The secretions cause adhesions of the eyelids, and unless great care is taken a diffuse keratitis is excited, which may go on to ulceration and perforation. Iritis is not very uncommon. Otitis media is an occasional complication, and usually results from an extension of disease through the Eustachian tubes.

Prognosis.—In unprotected persons small-pox is a very fatal disease. In different epidemics the death-rate is from 25 to 35 per cent. The hæmorrhagic form is invariably fatal, and a majority of those attacked with the severer confluent forms die. In young children it is particularly fatal. In the Montreal epidemic of 1885 and 1886, of 3,164 deaths there were 2,717 under ten years. The intemperate and debilitated succumb more readily to the disease. As Sydenham observed, the danger is directly proportionate to the intensity of the disease on the face and hands. "When the fever increases after the appearance of the pustules, it is a bad sign; but, if it is lessened on their appearance, that is a good sign" (Rhazes). In the confluent cases, when maturation does not proceed and the pocks are flat and if hæmorrhage occurs, the outlook is usually bad. In such cases the general symptoms are apt to be severe. Very high fever, with delirium and subsultus, are symptoms of ill omen. The disease is particularly fatal in pregnant women and abortion usually takes place. It is not, however, uniformly fatal, and I have twice known severe cases to recover after miscarriage. Moreover, abortion is not inevitable. Very severe pharyngitis and laryngitis are fatal complications.

Death results in the early stage from the action of the poison upon the nervous system. In the later stages it usually occurs about the eleventh or twelfth day, at the height of the eruption. In children, and occasionally in adults, the laryngeal and pulmonary complications prove fatal.

Diagnosis.—During an epidemic, the initial chill, followed by fever, headache, vomiting, and the severe pain in the back, are symptoms which should put the attending physician on his guard. Mistakes arise in the initial stage owing to the presence of the scarlatinal or measly rashes which may be extremely deceptive. The scarlatinal rash has not always the intensity of the true rash of this disease. In my Montreal experience I did not meet with an instance in which this rash led to an error, though I heard of several cases in which the mistake was made. These are doubtless the instances to which the older writers refer of scarlet fever and small-pox occurring together. The measly rash cannot always be distinguished from true measles, instances of which may be mistaken for the initial rash. I found in the ward one morning a young man who had been sent in on the previous evening with a diagnosis of small-pox. He had a fading macular rash with distinct small papules, which had not however the shotty hardness of variola. In the evening this rash was less marked, and as I felt sure that a mistake had been made, he was disinfected and sent home. In another instance a child believed to have small-pox was admitted, but it proved to have simply measles. Neither of these cases took small-pox. In a third case, which I saw at the City Hospital, the mottled papular rash was mistaken for small-pox and the young man sent to the hospital. I saw him the day after admission, when there was no question that the disease was measles and not variola. Less fortunate than the other cases, he took small-pox in a very severe form. The general condition of the patient and the nature of the prodromal symptoms are often better guides than the character of the rash. In any case it is not well, as a rule, to send a patient to a small-pox hospital until the characteristic papules appear about the forehead and on the wrists.

In the most malignant type of hæmorrhagic small-pox the patient may die before the characteristic rash develops, though as a rule small, shotty papules may be felt about the wrists or at the roots of the hair. In only one of twenty-seven cases of hæmorrhagic small-pox, in which death occurred on the third day, did inspection fail to reveal the papules. In three cases in which death took place on the fourth day the characteristic rash was beginning to appear.

The disease may be mistaken for cerebro-spinal fever, in which purpuric symptoms are not uncommon. A four-year-old child was taken suddenly ill with fever, pains in the back and head, and on the second or third day petechiæ appeared on the skin. There was retraction of the head, and marked rigidity of the limbs. The hæmorrhages became more abundant; and finally hæmatemesis occurred and the child died on the sixth day. At the post-mortem there were no lesions of cerebro-spinal fever and in the deeply hæmorrhagic skin the papules could be readily seen. The post-mortem diagnosis of small-pox was unhappily confirmed by the mother taking the disease and dying of it.

It might be thought scarcely possible to mistake any other disease for small-pox in the pustular stage. Yet I had an instance of a young man sent to me with a copious pustular eruption, chiefly on the trunk and covered portions of the body, which, so far as the pustules themselves were concerned, was almost identical with that of variola; but the history and the distribution left no question that it was a pustular syphilide. It is not to be forgotten, however, that fever, which was absent in this case, may be present in certain instances of diffuse pustular syphilis. Lastly, chicken-pox and small-pox may be confounded. Indeed, sometimes it is not easy to distinguish between them, though in well-defined cases of varicella the more vesicular character of the pustules, their irregularity, the short stage of invasion, the slight constitutional disturbance, and the greater intensity of the rash on the trunk, should make the diagnosis clear. It is stated that the Chicago case, which was the starting-point in Montreal of the

epidemic of 1885, was regarded as varicella and not isolated. If so, the mistake was one which led to one of the most fatal of modern outbreaks of the disease.

Glanders in the pustular form has been mistaken for small-pox, and I know of an instance (during an epidemic) which was isolated on the supposition that it was variola.

Treatment.—In the interests of public health cases of small-pox should invariably be removed to special hospitals, since it is impossible to take the proper precautions in private houses. The general hygienic arrangements of the room should be suitable for an infectious disease. All unnecessary furniture and the curtains and carpets should be removed. The greatest care should be taken to keep the patient thoroughly clean, and the linen should be frequently changed. The bedclothing should be light. It is curious that the old-fashioned notion, which Sydenham tried so hard to combat, that small-pox patients should be kept hot and warm, still prevails; and I have frequently had to protest against the patient being, as Sydenham expresses it, stifled in his bed. Special care should be taken to sterilize thoroughly everything that has been in contact with the patient.

In the early stage the pain in the back and limbs requires opium, which, as advised by Sydenham, may be freely given. The diet should consist of milk and broths, and of "all articles which give no trouble to digestion." Cold drinks may be freely given. Barley-water and the Scotch borse (oatmeal and water) are both nutritious and palatable. After the preliminary vomiting, which is often very hard to check by ordinary measures, the appetite is usually good, and, if the throat is not very sore, patients with the confluent form take nourishment well. In the hæmorrhagic cases the vomiting is usually aggravating and persistent.

The fever when high must be kept within limits, and it is best to use either cold sponging or the cold bath. When the pyrexia is combined with delirium and subsultus, the patient should be placed in a bath at 70°, and this repeated as often as every three hours if the temperature rises above 103°. When it is not practicable to give the cold bath, the cold pack can be employed. These measures are much preferable in small-pox to the administration of medicinal antipyretics.

The treatment of the eruption has naturally engaged the special attention of the profession. The question of the preventing of pitting, so much discussed, is really not in the hands of the physician. It depends entirely upon the depth to which the individual pustules reach. After trying all sorts of remedies, such as puncturing the pustules with nitrate of silver, or treating them with iodine and various ointments, I came to Sydenham's conclusion that in guarding the face against being disfigured by the scars "the only effect of oils, liniments, and the like, was to make the white scurfs slower in coming off." There is, I believe, something in protecting

the ripening papules from the light, and the constant application on the face and hands of lint soaked in cold water, to which antiseptics such as carbolic acid or bichloride may be added, is perhaps the most suitable treatment. It is very pleasant to the patient, and for the face it is well to make a mask in lint, which can then be covered with oiled silk. When the crusts begin to form, the chief point is to keep them thoroughly moist, which may be done by oil or glycerin. This prevents the desiccation and diffusion of the flakes of epidermis. Vaseline is particularly useful, and at this stage may be freely used upon the face. It frequently relieves the itching also. For the odor, which is sometimes so characteristic and disagreeable, the dilute carbolic solutions are probably best. If the eruption is abundant on the scalp, the hair should be cut short to prevent matting and decomposition of the crusts. During convalescence frequent bathing is advisable, because it helps to soften the crusts. The care of the eyes is particularly important. The lids should be thoroughly cleansed three or four times a day, and the conjunctivæ washed with some antiseptic solution. In the confluent cases, when the eyelids are much swollen and the lids glued together, it is only by watchfulness that keratitis can be prevented. The mouth and throat should be kept clean, and if crusts form in the nose they should be softened by frequent injections. Ice can be given, and is very grateful when there is much angina. In moderate cases, so soon as the fever subsides the patient should be allowed to get up, a practice which Sydenham warmly urged. The diarrhœa, when severe, should be checked with paregoric. When the pulse becomes feeble and rapid, stimulants may be freely given. The delirium is occasionally maniacal and may require chloroform, but for the nervous symptoms the bath or cold pack is the best. For the severe hæmorrhages of the malignant cases nothing can be done, and it is only cruel to drench the unfortunate patient with iron, ergot, and other drugs. Symptoms of obstruction in the larynx, usually from œdema, may call for tracheotomy. In the late stages of the disease, should the patient be extremely debilitated and the subject of abscesses and bed-sores, he may be placed on a water-bed or treated by the continuous warm bath. During convalescence the patient should bathe daily and use carbolic soap freely in order to get rid of the crusts and scabs. The patient should not be considered free from danger to others until the skin is perfectly smooth and clean, and free from any trace of scabs. I have not mentioned any of the so-called specifics or the internal antiseptics, which have been advised in such numbers; because, so far as I know, the experience of those who have seen the most of the disease does not favor their use.