in chorea unless, as some writers have done, we regard the joint troubles as arthropathies occurring in the course of a cerebro-spinal disease.

Fever is not, as a rule, present in chorea unless complications exist. There may be the most intense and violent movements without any rise of temperature. I have seen instances, however, in which without apparently any visceral or articular disturbances there was slight daily fever. H. A. Hare states that in monochorea the temperature on the affected side may be elevated; but this is not an invariable rule. Fever is found with an acute arthritis, when there is marked endocarditis or pericarditis, though the former may certainly occur with little if any rise in temperature, and in the cases of maniacal chorea, in which the fever may range from 102° to 104°.

Cutaneous Affections.—These are not very numerous, and in a majority of the cases are probably due to arsenic. There may be an erythematous papular rash. A very interesting condition is the pigmentation which has been found in patients who have been taking arsenic for some time. Herpes zoster occasionally occurs. It was noted twice in the Infirmary records. Certain skin eruptions, usually regarded as rheumatic in character, are not uncommon. Thus, erythema nodosum has been described and I have seen several cases with a purpuric urticaria. There may, indeed, be the more aggravated condition of rheumatic purpura, known as Schönlein's *peliosis rheumatica.* Subcutaneous fibrous nodules, which have been noted by English observers in many cases of chorea, associated with rheumatism, are extremely rare in this country. I have not seen an instance in a choreic patient nor is there a reference in the Infirmary records to a case. This has not been because they were not looked for, as I have seen many instances since my attention was called to them in 1881 by Barlow at the Great Ormond Street Children's Hospital. They are certainly less common in this country than in England. In the chorea returns of the Collective Investigation Committee there were 12 cases out of 439. Cheadle states that they are not uncommon in chorea.

Duration and Termination.—From eight to ten weeks is the average duration of an attack of moderate severity. Cases may be so mild as to get well in two or three weeks; on the other hand, there may be found at every clinic for diseases of the nervous system choreic patients who have been under treatment for three, four, or even six months. Chronic chorea rarely follows the minor disease which we have been considering. The cases described under this designation in children are usually instances of cerebral sclerosis or Friedreich's ataxia; but occasionally an attack which has come on in the ordinary way persists for months or years, and recovery ultimately takes place. A slight grade of chorea, particularly noticeable under excitement, may persist for months in nervous children.

The tendency of chorea to recur has been noticed by all writers since Sydenham first made the observation. Of 410 cases analyzed for this purpose, 240 had one attack, 110 had two attacks, 35 three attacks, 10 four attacks, 12 five attacks, and 3 six attacks. The recurrence is apt to be vernal. Rheumatism seems to favor this tendency; of 60 cases in which there were three or more attacks, there was a history of articular disease in 11, a much higher percentage than in cases with only one or two attacks. The occurrence of heart-disease has been thought to increase this liability, but I think it is the other way—recurrences tend to induce endocarditis and valvular disease. Gowers mentions a case with nine recurrences without history of rheumatism in which there were signs of mitral constriction.

Recovery is the rule in children. The statistics of out-patients' departments are not favorable for determining the mortality. A reliable estimate is that of the Collective Investigation Committee of the British Medical Association, in which 9 deaths were reported among 439 cases, about two per cent.

The paralysis rarely persists. Mental dulness may be present for a time, but usually passes away; permanent impairment of the mind is an exceptional sequence.

Diagnosis.—There are few diseases which present more characteristic features, and in a majority of instances the nature of the trouble is recognized at a glance; but there are several affections in children which may simulate and be mistaken for it.

(*a*) Multiple and diffuse cerebral sclerosis. Cases such as the following are often mistaken for ordinary chorea, and have been described in literature as *chorea spastica:* Nellie P., aged nine years, when two years old had fits which recurred constantly for twenty-one days and persisted on and off with great severity for nine months; she never developed satisfactorily; she learned to talk, but gradually began to have irregular movements. In the ninth year the condition was as follows: Speech hesitating; is unable to sit, stand, or feed herself; can move every muscle of the body, but in an irregular, incoördinate way, which prevents her from using any group of muscles. In attempting to grasp an object the fingers are thrown out in a stiff, spasmodic manner, and she is unable to close them over the object.

In such cases, which are not very uncommon, there are doubtless chronic changes in the cortex. As a rule, the movements are readily distinguishable from those of true chorea, but the simulation is sometimes very close; the onset in infancy, the impaired intelligence, increased reflexes, and in some instances rigidity and the chronic course of the disease, separate them sharply from true chorea.

(*b*) Friedreich's ataxia. Cases of this well-characterized disease were formerly classed as chorea. The slow, irregular, incoördinate movements, the scoliosis, scanning speech, the early talipes, the nystagmus, and the family character of the disease are points which should render the diagnosis easy.

(*c*) In rare cases the paralytic form of chorea may be mistaken for polio-myelitis or, when both legs are affected, for paraplegia of spinal origin; but this can only be the case when the choreic movements are very slight. I have at present under my care a young girl with chorea and loss of power in both legs, who was sent to the hospital as an instance of paraplegia due to spinal disease, but the choreic movements were distinct though slight, and a few days' observation sufficed to render clear the nature of the case.

(*d*) Hysteria may simulate chorea minor most closely, and unless there are other manifestations it may be impossible to make a diagnosis. Most commonly, however, the movements in the so-called hysterical chorea are rhythmic and differ entirely from those of ordinary chorea.

(*e*) As mentioned above, the mental symptoms in maniacal chorea may mask the true nature of the disease and patients have even been sent to the asylum.

Treatment.—Abnormally bright, active-minded children belonging to families with pronounced neurotic taint should be carefully watched from the ages of eight to fifteen and not allowed to overtax their mental powers. So frequently in children of this class does the attack of chorea date from the worry and stress incident to school examinations that the competition for prizes or places should be emphatically forbidden.

The treatment of the attack consists largely in attention to hygienic measures, with which alone, in time, a majority of the cases recover. Parents should be told to scan gently the faults and waywardness of choreic children. The psychical element, strongly developed in so many cases, is best treated by quiet and seclusion. The child should be confined to bed in the recumbent posture and mental as well as bodily quiet enjoined. In private practice this is often impossible, but with well-to-do patients the disease is always serious enough to demand the assistance of a skilled nurse. Toys and dolls should not be allowed at first, for the child should be kept amused without excitement. The rest allays the hyper-excitability and reduces to a minimum the possibility of damage to the valve segments should endocarditis exist. Time and again have I seen very severe cases which had resisted treatment for weeks outside a hospital become quiet and the movements subside after two or three days of absolute rest in bed.

The child should be kept apart from other children and, if possible, from other members of the family, and should see only those persons directly concerned with the nursing of the case. Though irksome and troublesome to carry out, this is an important part of the treatment. In the latter period of the disease daily rubbings may be resorted to with great benefit.

The medicinal treatment of the disease is unsatisfactory; with the exception of arsenic, no remedy seems to have any influence in controlling the progress of the affection. Without any specific action, it certainly does good in many cases, probably by improving the general

nutrition. It is conveniently given in the form of Fowler's solution, and the good effects are rarely seen until maximum doses are taken. Children stand the drug so well that I usually begin with five minims three times a day, and after three days increase the dose by one minim each day. When the dose of fifteen minims is reached, it may be continued for a week, and then again increased, if necessary, every day or two, until physiological effects are manifest. On the occurrence of these the drug should be stopped for three or four days. The practice of resuming the administration with smaller doses is rarely necessary, as tolerance is usually established and we can begin with the dose which the child was taking when the symptoms of saturation occurred. I have frequently given as much as twenty-five minims three times a day. Usually the signs of saturation are trivial but plain, and I have never seen any ill effects from the large doses, but I have heard recently of a case of arsenical neuritis due to the administration of Fowler's solution in chorea.

Of other medicines, strychnine, the zinc compounds, nitrate of silver, bromide of potassium, belladonna, chloral, and especially cimicifuga, have been recommended, and may be tried in obstinate cases.

For its tonic effect electricity is sometimes useful; but it is not necessary as a routine treatment. The question of gymnastics is an important one. Early in the disease, when the movements are active, it is not advisable; but during convalescence carefully graduated exercises are undoubtedly beneficial. It is not well, however, to send a choreic child to a school gymnasium, as the stimulus of the other children and the excitement of the romping, violent play is very prejudicial.

Other points in treatment may be mentioned. It is important to regulate the bowels and to attend carefully to the digestive functions. For the anæmia so often present preparations of iron are indicated.

In the severe cases with incessant movements, sleeplessness, dry tongue, and delirium, the important indication is to procure rest, for which purpose chloral may be freely given, and, if necessary, morphia. Chloroform inhalations may be necessary to subdue the intensity of the paroxysms, but the high rate of mortality in this class of cases illustrates how often our best endeavors are fruitless. The wet pack is sometimes very soothing and should be tried. As these patients are apt to sink rapidly into a low typhoid state with heart weakness, a supporting treatment is required from the outset.

Cases are found now and then which drag on from month to month without getting either better or worse and resist all modes of treatment. Change of air and scene is sometimes followed by rapid improvement, and in these cases the treatment by rest and seclusion should always be given a full trial.

In all cases care should be taken to examine the nostrils, and glaring ocular defects should be properly corrected either by glasses or, if necessary, by operation.

After the child has recovered from the attack, the parents should be warned that return of the disease is by no means infrequent, and is particularly liable to follow overwork at school or debilitating influences of any kind. These relapses are apt to occur in the spring. Sydenham advised purging in order to prevent the vernal recurrence of the disease.

IV. OTHER AFFECTIONS DESCRIBED AS CHOREA.

(*a*) **Chorea Major; Pandemic Chorea.**—The common name, St. Vitus's dance, applied to chorea has come to us from the middle ages, when under the influence of religious fervor there were epidemics characterized by great excitement, gesticulations, and dancing. For the relief of these symptoms, when excessive, pilgrimages were made, and, in the Rhenish provinces, particularly to the Chapel of St. Vitus in Zebern. Epidemics of this sort have occurred also during this century, and descriptions of them among the early settlers in Kentucky have been given by Robertson and Yandell. It was unfortunate that Sydenham applied the term chorea to an affection in children totally distinct from this chorea major, which and is in reality an hysterical manifestation under the influence of religious excitement.

(*b*) **Habit Spasm (Habit Chorea); Convulsive Tic** (of the French).

Two groups of cases may be recognized under the designation of habit spasm—one in which there is simply localized spasmodic movements, and the other in which, in addition to this, there are explosive utterances and psychical symptoms, a condition to which French writers have given the name *tic convulsif*.

(1) *Habit Spasm.*—This is found chiefly in childhood, most frequently in girls from seven to fourteen years of age (Mitchell). In its simplest form there is a sudden, quick contraction of certain of the facial muscles, such as rapid winking or drawing of the mouth to one side, or the neck muscles are involved and there are unilateral movements of the head. The head is given a sudden, quick shake, and at the same time the eyes wink. A not infrequent form is the shrugging of one shoulder. The grimace or movement is repeated at irregular intervals, and is much aggravated by emotion. A short inspiratory sniff is not an uncommon symptom. The cases are found most frequently in children who are "out of sorts," or who have been growing rapidly, or who have inherited a tendency to neurotic disorders. Allied to or associated with this are some of the curious tricks of children. A boy at my clinic was in the habit every few moments of putting the middle finger into the mouth, biting it, and at the same time pressing his nose with the forefinger. Hartley Coleridge is said to have had a somewhat similar trick, only he bit his arm. In all these cases the habits of the child should be examined carefully, the nose and vault of the pharynx thoroughly inspected, and the eyes accurately tested. As a rule the condition is transient, and after persisting for a few months or longer gradually disappears. Occasionally a local spasm persists —twitching of the eyelids, or the facial grimace.

(2) *Tic Convulsif* (*Gilles de la Tourette's Disease*).—This remarkable affection, often mistaken for chorea, more frequently for habit spasm, is really a psychosis allied to hysteria, though in certain of its aspects it has the features of monomania. The disease begins, as a rule, in young children, occurring as early as the sixth year, though it may develop after puberty. There is usually a markedly neurotic family history. The special features of the complaint are:

(*a*) Involuntary muscular movements, usually affecting the facial or brachial muscles, but in aggravated cases all the muscles of the body may be involved and the movements may be extremely irregular and violent.

(*b*) Explosive utterances, which may resemble a bark or an inarticulate cry. A word heard may be mimicked at once and repeated over and over again, usually with the involuntary movements. To this the term *echolalia* has been applied. A much more distressing disturbance in these cases is *coprolalia*, or the use of bad language. A child of eight or ten may shock its mother and friends by constantly using the word *damn* when making the involuntary movements, or by uttering all sorts of obscene words. Occasionally actions are mimicked—*echokinesis*.

(*c*) Associated with some of these cases are curious mental disturbances; the patient becomes the subject of a form of obsession or a fixed idea. I was consulted recently about a young girl in whom the spasms were very slight, amounting only to twitching of the eyes and slight jerking of the shoulder, but who had a most pronounced grade of the fixed idea known as *arithmomania*. Almost every action, even the most trifling, was preceded by the counting of a certain number of figures. Before she went to bed she had to tap her heel upon the side of the bedstead a certain number of times; before drinking the tumbler had to be rotated eight or ten times, and then when set down again the same act was repeated. Before opening the door a certain number of knocks had to be given. The greatest difficulty was experienced in getting her to brush her hair, as it took her so long to count the necessary number of figures before she began. In other cases the fixed idea takes the form of the impulse to touch objects. According to Guinon, who has written an exhaustive article upon it in the Dictionnaire Encyclopédiqué, the prognosis is bad.

The disease is well marked and readily distinguished from ordinary chorea. The movements have a larger range and are explosive in character. Tourette regards the coprolalia as the most distinctive feature of the disease.

(*c*) **Saltatoric Spasm** (*Lata; Myriachit; Jumpers*).—Bamberger has described a disease in which when the patient attempted to stand there were strong contractions in the leg muscles, which caused a jumping or