tive pole. Then the current is regulated so that the patient supports without too much difficulty the successive discharges which result from the extra current. The baths have a variable duration of from fifteen to twenty minutes, and have a decided sedative effect on the choreic movements.

I have dwelt at some length on these galvanic baths, because they have been of precious value to us, not only in relieving the trembling of chorea, but also those that accompany paralysis agitans and disseminated scleroses, and I have seen many practitioners fail in the attempt to give these baths properly.

Beard and Rockwell have proposed a new method of employing electricity in these cases, which they call general electrization, and which resembles the method above described. The feet of the patient are placed on a moist copper plate, or he is made to sit on a wet sponge; this plate or this sponge is connected with one of the poles of a faradic battery, while the other pole is moved back and forth over different parts of the body.

Lubelski was the first, in 1867, to advise the use of ether spray along the vertebral column. The pulverizations are made by means of a Richardson hand atomizer (or a Codman and Shurtleff spray-producer); the duration of the operation need not exceed five minutes. I have used this method of treatment (which is perfectly safe) with considerable benefit; certainly with diminution of the choreic movements. Zimberlin, Mazade, Jaccoud, Rose, Fabry and Marsiglia have reported cases of chorea cured by the ether spray.

The third class of medicaments applicable to the treatment of chorea is constituted by those remedies which produce sleep, and therefore cause cessation of the choreic movements. In this group we place opium, chloral and chloroform. Before the introduction of chloral into therapeutics, great use was made of opium in large doses, and inhalations of chloroform. Trousseau, Benazet and others had advised opium in chorea, while Grey, Dacier and Pollock highly recommended inhalations of chloroform as a means of attenuating the intensity of the choreic manifestations. But these two medicaments have given place to a substance every way as active, and which produces the same effects without having the inconveniences of chloroform and opium, namely, chloral, which is admirably borne by children.

Bouchut has given the most precise directions for the administration of chloral in chorea. He gives in the morning after breakfast forty grains of chloral in one dose, and so produces a sleep which lasts till noon; food is then administered, and forty grains more of chloral; then about tea-time, when the child wakes up, a full meal is given and generally the child goes to sleep again and sleeps all night long. In this way the young patient is kept asleep most of the time for several successive days. Cadet de Gassicourt employs another method. He prescribes every two hours a tablespoonful of a four-ounce solution containing one dram of chloral, and continues the administration till deep sleep is produced.

Whether you make use of the large dose of Bouchut, or the smaller doses of Cadet de Gassicourt, it is necessary always to administer the chloral in a considerable quantity of some diluent, and the best preparation is evidently that

which consists in adding a proportion of syrup of chloral to a cup of egg and milk. [The syrup of chloral of the French Codex contains one gramme to the tablespoonful.—TRANS.]

Chloral can hardly be called a curative medicament, yet it renders great service when the disease attains considerable intensity, for it enables the patient during the sound sleep procured by this remedy to obtain cessation of the fatiguing and painful choreic movements. You ought then always to employ this remedy where you see the strength of your little patient becoming exhausted, and especially where you see the skin becoming excoriated by reason of the intensity of the muscular disorder.

The last group of medicaments is composed of remedies which are addressed more particularly to the general condition, and here we have to study one kind of treatment which is debilitating, and another which is tonic.

Debilitating medication is represented more especially by tartar emetic. Gillette is the most ardent defender of this kind of treatment, which has received a certain amount of favor, since we have seen Cadet de Gassicourt attribute to it a very beneficial influence in cases of grave chorea. These were Gillette's rules for the administration of this medicament: The first day hourly doses were given, till three grains were taken. The next day the dose was doubled; the third day it was tripled. Then the child was allowed to rest for three or four days, and if he did not get any better, the medicine was recommenced in the dose of four grains the first day, eight grains the second, and twelve grains the third day. Then there was another interval of three or four days, and the medicine was renewed in doses of five grains the first day, ten grains the second, and so on.

Whatever may be the value of the facts cited by Bouley, Gillette, Bonfils, Marcotte and Peslerbe, I am a most bitter opponent of this kind of treatment. I consider tartar emetic a very dangerous remedy, especially in the case of children. I expressed myself freely on this subject when lecturing on pneumonia,[1] and am persuaded that under any circumstances it is impossible to find in a hypothetical amelioration a sufficient compensation for the disorders which tartar emetic, administered in these large doses, determines in the digestive organs.

Tonic medication, as in the case of all diseases which tend spontaneously toward recovery, occupies the first place in the treatment of chorea. At the head of the list of tonic remedies we must put arsenic, which is administered by mouth and by hypodermic injection. In this country it was Aran and his pupil Siredy who first showed the advantages of arsenic in the treatment of this neurosis.[2]

[1] Vol. II. of Clinical Therapeutics.

[2] The arsenical medication is very much in vogue in France at the present day. Siredy employs the solution of Boudin, which contains a milligram of arsenic in each gramme, and of which this is the formula:

℞ Arsenious acid,..... 1 gramme (15 grains).
Water..... ..... 1,000 grammes (about one quart).

If you prefer to give it by mouth, you may make choice of Boudins' liquor (preferred by Siredy) of arseniate of soda, which Cadet de Gassicourt employs, or of Fowler's solution, and you may gradually increase the dose from one milligram to ten milligrams of arsenious acid per day; watching of course, the effects of the medicine on the digestive tube. I much prefer the hypodermic method, for this enables us to obtain the good effects of arsenic with quite small doses. Fowler's solution is marvelously adapted for subcutaneous injection, for it occasions no irritation of the skin, or cellular tissue; you may boldly inject from one to four drops of the liquor potassæ arsenitis, and you may even exceed this quantity. This mode of treatment by subcutaneous injections, employed for the first time by Radcliffe in 1866, has been brought into general use by the school of Lyons, and Perraud and Garin have pointed out the advantages of this mode of treatment.

By the side of the arsenical treatment we must place, almost in the same rank, the use of sulphur baths, hydrotherapy, and gymnastics. Hydrotherapy gives excellent results in chorea, and you ought always to resort to it when there is no cardiac complication. It is well to rely on the jet douche, the shower bath being of doubtful utility; you should, as Beni Barde[3] counsels, begin with the tempered douche, and accustom your patient by degrees to the cold douche. When the patient cannot have the benefit of an establishment for hydrotherapy it is well to rely much on wrappings in wet sheets. Sulphur baths are inferior to hydrotherapy in chorea; nevertheless in the rheumatismal forms it is a good mode of treatment. Finally, gymnastics, as Blache has shown, who out of one hundred and eighty-eight cases obtained by this method one hundred and two cures in thirty-nine days, is an excellent method of treatment; but the gymnastic exercises must be directed after a special manner, and Laisné has given the best rules for their performance.

Laisné is one of those who have done the most to raise gymnastics to a practical art in its application, not only to the physical training and development of youth at schools, but also to our hospital service, as a therapeutic means. He several years ago instituted at the Hôpital des Enfants, the gymnastic treatment of chorea, following the directions of Blache. It is necessary that the movements shall be rhythmical, and regulated by chanting ; some cases are speedily benefited, others not at all, by reason of the extreme incoördination, which will not allow the child to stand erect. There are, moreover, choreic children so impressionable that their disorder augments the moment

M. Begin with ten grammes a day [ʒ ijss] of this solution, in the case of an adult, and increase by five grammes [ʒ j and gr. xv] each day till thirty or thirty-five grammes [an ounce and over] are taken daily. In a child you should begin with two grammes [ʒ ss] and increase by two grammes each day. Bouchut, Archambault and Cadet de Gassicourt employ arseniate of soda; they begin with five milligrams and increase to twenty, twenty-five and thirty milligrams each day. Perraud employs subcutaneous injections of Fowler's solution, in the dose of four or five drops once a day, or even once in two days. (Cadet de Gassicourt, Traité des Maladies des Enfants. Pomel on Arsenical Medication in Chorea. Thésé de Paris, 1879), Garin on the treatment of chorea especially by arsenic, and hypodermic injections of Fowler's solution. Thésé de Lyon, 1879.

[3] Beni Barde, Hydrotherapy, p. 645. Paris, 1874.

that you endeavor to make them execute co-ordinated movements before spectators.[1]

In these cases (and here I partake of the opinion of Cadet de Gassicourt) gymnastics can have no good effect. You can aid these gymnastic exercises not a little by massage, which is especially applicable to the muscular groups the most affected by chorea.

Such, gentlemen, are the therapeutic measures the most employed in chorea. It remains for me, in conclusion, to sum up the main points in the management of this affection. From a therapeutic point of view, you will divide the choreas into two groups: those which are relatively benign, and those which are relatively grave.

In the case of the benign choreas ("St. Guy's dance") which do not require the patient to keep his bed, but allow him to walk about and perform certain movements, notwithstanding the motor incoördination, you should employ, above all, gymnastics and hydrotherapy, and administer arsenic by mouth or hypodermically.[2]

If cardiac complications exist, you may apply a blister over the region of the heart ; you must eschew hydrotherapy, and be chary of gymnastics ; here

[1] Laisné trains choreic children in this way: The patient (supposing it to be a little girl) stands before the tutor, being held by his knees; the latter seizes her hands and requires her to make regular movements with each arm, counting, with loud voice or chanting, one, two, three, four, etc., with each movement. The child is told to listen, and to make no effort on her own account, for if encouraged too much to make voluntary efforts, her attempts would be likely to end in abrupt and disordered movements, which would defeat the object intended. Vigilance is required in these first manœuvres, in order to be always ready to yield to the sudden spasmodic contraction of a member so likely to result in some children after these forced movements. The child is held as firmly as possible by the arm, and the endeavor is made to produce movements more or less rapid but always rhythmical with the legs. From time to time the child is allowed a brief rest ; finally the patient is placed with its back against a ladder, called orthopædic ladder, and is made to grasp with its hands the rounds above the head ; the legs are supported while the child is kept suspended, as long as can be done without pain or fatigue ; after a little rest this manœuvre is gone over again. During the intervals frictions are practiced of the extremities and other parts. The tutor must use the utmost judgment and patience and not demand more of the child than it has strength to perform. When a little improvement is noted and the child is getting wonted to its tasks, new gymnastics are attempted, and the little patient is now urged to use its powers of volition. Among these exercises we may enumerate the use of the dumb-bells, the armswing, the horizontal ladder, the parallel bars, etc. After a time the patient can control her movements sufficiently to go through these exercises without any assistance, engaging with her companions in these sports.

In choreic persons who are bad cases, the exercises ought to be very frequent, as often indeed as twice a day. Caution must be taken that they do not injure themselves, and that sufficient intervals of rest are allowed. One is often obliged when patients are extended on a cot or long chair, to hold their arms and legs so that they may not injure themselves by the blows which they inflict, or may not slide off onto the ground.—Laisné, "On the Application of Gymnastics to the Treatment of Certain Diseases.")

[2] Probably no remedy is more used in this country in the treatment of chorea than arsenic. Fowler's solution is the form generally chosen ; beginning with three we gradually increase to eight or ten drops after each meal. The great majority of cases can be cured in from four to eight weeks by arsenic. TRANS.

massage and the ether spray along the vertebral column will do good. In the grave choreas, those which produce by reason of confinement in bed (necessitated by the extreme motor incoördination) excoriations of the skin; and general troubles of nutrition, you may use chloral, bromide and massage. Chloral will enable you to procure sleep, and at the same time arrest of the choreic movements; bromide of potassium will act in the same way, and the combination of these two medicaments makes an excellent sedative remedial agent. Massage methodically practiced will prove a powerful auxiliary, and you can complete your treatment by subcutaneous injections of Fowler's solution. But do not forget that the success of your medication depends more on the period in the evolution of the malady when you render assistance than on the medicines which you employ, and it is necessary when you are treating chorea, always to have in mind that you are dealing with a disease which regularly passes through definite periods,[1] and spontaneously tends toward restoration. Your treatment, then, should have for its end not to cause sudden cessation of the symptoms, which is impossible, but only to obtain a diminution in their intensity, and duration, and this is all that in the present state of therapeutics one can hope to accomplish.

Thus far we have been occupied only with neuroses; we now come to a more difficult subject, namely, the treatment of the ordinary affections of the cerebro-spinal axis, and I shall describe successively the therapeutics of meningitis, cerebral apoplexy, and myelitis.

[1] In accordance with this well-known law of spontaneous recovery, Gray and Tuckwell, (*vide* articles by these authorities in the Lancet for 1876, on the "Expectant Treatment of Chorea") advise expectancy in this disease and recommend only hygiene. Of twenty cases which came under their observation, the average duration was sixty-nine days, and these are the figures which Prof. Sée obtained in an analysis of the 117 cases.

THE TREATMENT OF MENINGITIS.

SUMMARY.—Varieties of Meningitis—Tuberculous Meningitis—Its Curability—March of Tuberculous Meningitis—Symptoms—Prophylactic Treatment—Influence of Heredity—Hygienic Treatment—The General Treatment—Revulsion—Cold Applications—Blood Letting—Internal Treatment—Calomel—Quinine—Calmatives—Butternut Leaves—Iodide of Potassium—Difficulties of Diagnosis—Acute Meningitis—Chronic Meningitis.

GENTLEMEN—This lecture will be devoted to the treatment of inflammations of the meninges[1] with special reference to tuberculous meningitis. The latter is undoubtedly one of the most formidable diseases which you will ever be called upon to treat, and one of the most hopeless.

Inflammation of the meninges may affect different points; sometimes the

[1] The cerebral membranes or meninges, are three in number, named as follows, beginning from without: dura mater, arachnoid and pia mater. *A. Dura mater:* This envelope presents for consideration, in the first place an external surface which adheres in certain places to the skull cap, the inside of which it lines. The adherent portions are of the nature of prolongations, the principal of which are 1st, the external investments of the olfactory nerve (as far as the pituitary body); 2nd, the sheaths of the superior and inferior maxillary nerves (as far as the periosteum of the zygomatic fossa); 3rd, the sheaths of the facial and auditory nerves (as far as the bottom of the internal auditory foramen); 4th, the sheaths of the glossopharyngeal, pneumogastric and spinal accessory nerves (as far as the foramen lacerum posterius); 5th, the sheath of the hypoglossal nerve; 6th, a reflection of this membrane upon the jugular vein. But the dura mater does not form the sheath of the optic nerve nor the periosteum of the orbit. From its internal surface smooth, polished, lined by the outer portion of the arachnoid, are given off, first the falx cerebri, which connects the crista galli and the coronal crest with the sides of the groove (superior arm of crucial ridge), of the occipital bone; second the tentorium cerebelli which separates the cerebrum from the cerebellum; third, the falx cerebelli; fourth, the pituitary fold. The dura mater is formed by fibres of laminated tissue inter-crossing each other without order. It is composed of a single layer, and the processes are duplicatures. Its arteries come from the internal carotid, the vertebral and the external carotid (pharyngeal branch). The veins empty into the sinuses. According to Sappy there are no lymphatics in this membrane. Its nerves are derived principally from the ophthalmic. *B. Arachnoid*: Of a tenacity which is very great and of greater transparence than the dura mater, this serous membrane presents for consideration two layers; first a visceral layer, separated from the pia mater by the cerebro spinal liquid. Where it is in contact with it; a loose cellular tissue unites them. In passing over the various anfractuosities, the visceral layer transforms the sulci into trigonal grooves, and forms towards the central parts of the base of the brain, veritable confluent cavities. The visceral layer, moreover, accompanies the sheaths which the dura mater furnishes to the nerves. Second, the parietal layer, a simple epithelial coat which, as we have said, lines the internal surface of the dura mater. Like all serous membranes the arachnoid constitutes a shut sack, and the two layers of which I have spoken are reciprocally continuous. This membrane is composed of a stratum of laminated tissue in which Marc See has noted the presence of elastic fibres and an epithelial covering; the first of these layers (the parietal) is extremely thin. The arachnoid contains no veins, arteries or nerves. *C. Pia Mater*: The most internal of the three cerebral membranes, it is constituted almost entirely of blood vessels. It is the nutrient membrane of the brain. It follows regularly all the undulations of the encephalon, whence it results that this membrane has more extensive relations with the cerebrum than either of the others;