The Treatment of Locomotor Ataxia.

Leonard. Nicholas. Robinson

April 1878.
Sir,

On reading the rough copy of my Thesis “The Treatment of Locomotor Ataxia” I fear I have made two slight omissions. If such a late addition is not contrary to the regulations, might I ask permission for the accompanying “Addenda” to be annexed to the copy I forwarded to Edinburgh?

Yours faithfully,

L. N. Robinson

The Dean
of the Faculty of Medicine.
The Treatment of Locomotor Ataxia.

It is customary to describe the classical form of Locomotor Ataxia as occurring in three stages:

1. The period of lightning pains.
2. The Ataxic stage.
3. The paralytic or cachectic stage, which period will merit the name of lobes.

This convenient division must be more or less artificial, as we find the lightning pains by no means limited to the first stage. "The progressive abolition of the coordination of the movements" to quote from Duchenne of Boulogne's masterly description (1) may exist from the beginning of the disease; it is the dominating symptom of the second stage though not exclusively so, for the lightning pains and other symptoms of the opening stage are found equally in this period.

After persisting, it may be for ten, fifteen, or twenty years, the disease generally reaches the final or paralytic stage — often complicated by hoarseness, cystitis, the spread of the disease to the bulbar or general paralysis.

The patient may be carried off by an intercurrent disease of microbic origin — the resistance of the
of the tissues is lowered, and thus Pneumonia, Tuberculous disease of the lungs, or Pyelo-nephrosis may be the actual cause of death.

I shall hope to show later that we can now give a much more favorable prognosis, than did Romberg who said: 'In cases of tabes, every therapeutic intervention will be harmful rather than useful.’

For convenience of description I propose to discuss the treatment of locomotor Ataxia under two divisions.

I. Symptomatic Treatment.

II. General or curative Treatment.

I. Symptomatic Treatment.

It is the first duty of the physician to alleviate the immediate sufferings of his patient, to strive to suppress the functional disturbances and their consequences; in fact, to enable the patient as long as possible to follow his profession and to enjoy his social surroundings, the best means of keeping in check the neuroathetic or hysterical manifestations, which so often accompany this disease, when heredity occupies such a preponderating place as a predisposing cause.

Treatment of the Lightning Pains.

Counter-irritation to the spine. Blisters, but more particularly the thermo-cautery may be employed. I have found great relief is given to the patient by the latter means, more especially in the spinal crisis.

The ordinary Piquerin Cautery is used, a fairly broad flat metal knife, as for operations is heated to a red heat; these or four bright strokes each about four inches long are made along each side of the spinal column, taking care not to break the skin. In a few moments there is a quick reaction and the patient describes the feeling of a hot glass the length of the spine. The pains very often disappear entirely in five to ten minutes.

In the majority of cases a single application as above described is sufficient though in those crises the application may be made again on the morrow.

The application of the thermo-cautery may be used as a preventive measure. In one case I employed this means every other day during five months, and during this period the attacks diminished in frequency and duration, though in a disease where remissions are such a marked
marked feature, it is difficult to estimate the value of any particular method of treatment.

The mark of the cauteryisation disappears in from one to six days as a rule, and then only may the cautery be reapplied to these places.

**Cauteryisation** by manipulative means.

Under this heading I include all the mechanical methods of stretching the spinal column.

of. Suspension by Sayre apparatus. This method, first used by Mentzthumseley of Odessa, has been largely employed at the Salpetriere by Professors Charcot and Raymond. The latter writes: "of all the medications that have been directed against tuberculous disease, it is in fact suspension, from which the most benefit is to be expected." The improvement observed is shown principally on three classes of symptoms: on the lightning pains, on the muscular coordination and trouble in walking — on the great urinary troubles. The improvement is often quite remarkable. Patients who were a prey to intermittent lightning pains were relieved after a few days of suspension. Others who had become almost "impossible owing to the intensity of the motor incoordination in the lower limbs recovered very easily the use of their legs, and are now able to take long walks without a stick."

(2) op. cit., p. 92. 1894.
This method is not without danger, the patient often complains of vertigo, or a fainting feeling. There may be syncope with death.

"This treatment is contra-indicated in the following cases."

1. In all tabetic patients with cardio-vascular lesions.
2. Especially in patients with acute insufficiency or arterio-sclerosis.
3. In all cases with pulmonary lesions, tubercular disease, or considerable emphysema.
4. In all patients who have had aphlebic or epileptic attacks.
5. In all patients who are very anemic, who have a tendency to vertigo or syncope.
6. In fat patients."

A patient told Leyden that suspension had cured his gastric crises. Leyden writes (Berlin, Ruih, Buchenfuch, 1892). "I cannot help believing that the stretching of the vagus or of the spinal cord may have been the cause of the amelioration, but I attribute also a great importance to the encouraging influence and exciting influence of hope, for it seems to me from what I have been told, that the doctor in charge practiced the suspension with great prudence and persistence, and that the fact that the doctor as well as the patient believed in the activity of the method perhaps participated in its success."
"participated also in the result."

This method I consider to be dangerous and not practicable, moreover Gilles de la Tourette and Clippel have shown experimentally in the corpse, that suspension by this means produces no appreciable elongation of the cord.

1. Elongation of the cord by anterior flexion.

The mechanical anterior flexion of the spine produces a true measurable stretching of the spinal cord and roots. The dura mater was seen by the above experimentators to be stretched flattened and thrown into longitudinal folds, being lengthened 17 millimetre on its posterior surface, the spinal cord itself being lengthened 1 centimetre.

This elongation is especially marked below the level of the 2nd dorsal pair of spinal roots, with its maximum at the 2nd lumbar pair.

The apparatus figured in the accompanying diagram has been invented by these authors. It consists of a low portable table, 1/2 metre long, 45 centimetre wide (5 foot by 18 inches); at its posterior end is a low back to which is fixed a strap. In the middle line at the junction of the posterior 1/3 and the anterior 2/3.

1 Nouvelle Terminologie de la Sphygmographie 1897, pages 146.
2 idem. page 137 et seq.
of the table is fixed a pulley, under which passes a cord for traction, attached to a block at the lower five toes.

The patient sits well on the table, his legs extended; the pulley between them; the trunk is fixed by the strap to the back of the table; to prevent the body sliding forwards, the legs are kept in a straight line, the heel resting on the table, and the inner edges of the feet touching, by a strap passing below the table, round the thighs and fixed above the knees.

One then arranges the essential part of the apparatus, which consists of a leather strap with four branches forming an X. The upper two of these branches are provided with rings fixed at different heights. Of the two lower branches, the smaller one carries a buckle, and should be placed on the left of the patient; the larger one passes round the pelvis under the table and is then fixed to the buckle of the preceding one.

The two upper branches pass below the patient's arms, at the level of the dorsal region they cross, and are then passed over the shoulders like braces. Their free extremities are provided with rings, to which by hooks is attached a small iron bar in the shape of a semi-
-
circle, in the center of which is a ring through which passes the traction cord. By this means the spinal column of the patient is flexed forwards, the weight employed averages 70 kilogrammes (140 lbs).

Each application lasts 8–12 minutes (the maximum) and is repeated every other day.

"Under these conditions, no accident is to be feared; the respiration goes on freely; the circulation is thrown way impeded, the opposite to what generally happens with suspension."

"This treatment was applied to 47 patients, 29 being men, and gave the following results:"

1. In 22 cases, improvement in nearly all the symptoms.
2. 15 cases: some benefit, but limited to some only of the symptoms.
3. 10 cases: no amelioration.

"Of the 22 patients who derived the greatest benefit, the amelioration took place first and especially in the painful phenomena: the lightning pains and the disorders of sensibility. Secondly, the patients derived great benefit in their urinary disorders, retention in particular. This flexion had almost always a favorable action on the loss of sexual power."

"Of these 22 cases, 12 showed a fairly marked muscular recoordination. In 10 the power of walking returned in a satisfactory manner."

(1) op. cit. pgs. 132, 133. 1815.
(2) op. cit. pgs. 153 line 18. 1816.
The flexion thus had the more marked action on the lower half of the dorsal portion of the cord, the lumbar portion, and on the cauda equina, i.e. on the part which is shown experimentally post-mortal to be the most stretched, and in which the pathological process as a rule commences.

"From the 15th July to 15th November 1897, a fresh series of 21 patients, 18 men and 3 women, were submitted to this treatment. 1) Of these 17 derived considerable benefit from the various painful phenomena, gait, urinary trouble, and muscular uncoordination; the inconvenience of worse on the other hand seemed to be little influenced."

The treatment above described seems certainly in selected cases to give more certain results than suspension, and to be without many of the inconvenience of the latter. It would be interesting to see if the disease could be arrested by the application of this method in the early stage of the disease.

1) The Italian Method. Dr. Bonazzi has invented a mechanical means of forcibly extending the spine, without the use of any apparatus. The patient is seated on a couch with his legs extended; you stand behind the patient and grasping the ankles with your hands, you slowly bring the legs in an extended position.

extended position past the head; the nape of the neck being the fixed point, you thus stretch the spine by a forcible flexion forwards. At the commencement of the treatment the extension is applied for 15 seconds and gradually increased to one minute.

I applied this method daily to a patient for several weeks. The patient bore the treatment well, and during the treatment the lightning pains were in abeyance, though the patient often complained of a sensation of pains and needles in the lower limbs. As the patient had just returned from taking the cure at Lumbar, I am inclined to attribute the freedom from lightning pains to the baths rather than to the mechanical stretching of the spine.

All the means of central irritation previously described require the presence of the physician for their application, so we must put other means at the patient’s disposal.

Medical treatment.

The carbon compounds furnish a large number of Analgesics, antispasmodics, antipyretics, phenacetine, etc. may all be employed and their action unerringly brings relief to the patient. It is necessary to vary these drugs, as with repeated use of the same drug...
drug, its efficacy diminishes, and bad effects may be produced. By their use many patients have been saved from having recourse to Morphia, with its evil effects on general nutrition and on the central nervous system.

Antipyrine may be prescribed in 5 grain doses, to be taken at 11. a.m. and bedtime; or more frequently if pain is severe. Raymond gives 10 grain doses, 2-4 per day with 2 hours interval between each.

Antipyrine in 10 grain doses with Quinina 3 grains may be taken at half hour interval for 3 doses.

Antipyrine may also be given in hypodermic injection: 1 cubic centimetre of a solution in 8. 12. 20 anti-grannies (4 grains). The use of this solution in distilled water is often a very valuable means of stopping the pain when rapidity of action is desired; the patient however must be carefully watched, as by abuse of this method accidents arise. In one case I found oedematous swellings of both legs and ankles, with the presence of albumen in the urine, which completely disappeared in a few days.

One case, an American patient, found the greatest relief for his lightning pains from the use of Antikainina. in 10 grain doses, one hourly for three doses.

Morphia.
Morphine may be given in hypodermic injection or in suppositories. It is advisable to use morphine, unless all other means fail, as patients readily acquire the habit and become morphinomaniacs.

The same may be said of Chloral.

Local Applications. Menthol and Cocaine may be prescribed in the form of ointment, as follows:

R. Menthol. 3 mls.
Cocaine 0.5 grs.
Lanoline 3 grs.

Pilocarpine or Methyl Chloride an often useful to produce local anaesthesia, in the hyperaesthetic foot when the lightning pains repeatedly strike.

The following ointment may be employed:

R. Sapon. animale. 30 grammes.
Ammoniacque liquide 10 "
Camphor 24 "
Huile vétivère de Rhum. 2 "
Huile vétivère de Romanin. 6 "
Alcools de Soranuti 250 "

After the use of any of the above local applications, it is advisable to roll the limb up in a piece of flannel from the toe to the middle of the thigh.
Treatment of the Visceral crises.

Gastric crisis. In the slighter forms of gastric crisis, the aromatic bodies previously mentioned may be given with good results. In the severe forms of gastric crisis which may last 4 or 5 days, we have no very efficient means at our disposal. The stomach is most irritable, and rejects everything or anything introduced into it. Counter-irritation by the Perquin cautery to the spine does not arrest the crisis.

With the Poirot de Rivière I have often obtained a temporary cessation of the vomiting, thus giving some rest to the patient. It is prescribed as follows:

No. 1. Bicarbonate de potasse. 4 grammes.

Sirope de Sucre. 30 "

Eau distillée 120 "

No. 2. Acide Citrique. 4 grammes.

Sirope bromé. 30 "

Agua distillata 120 "

Sig. Take a tablespoonful of No. 1, then a tablespoonful of No. 2. If the dose is repeated let the patient rest ten minutes.

The following Subagotic Mixture may be taken during the crisis between the severe fits of vomiting. It is most refreshing, and has a clean taste which is very agreeable to the patient.

It is prepared
It is prepared as follows:—Acidi Nitrici fort. 8 grammes.

Acidi Sulphuri. 28 "

Alcohol pur. 180 "

To be left in contact till fermentation has taken place.

Dos. 1 tablespoonful of water from time to time.

As a preventive measure if the patient does not digest easily, give a little Peptone Bruger, 3-4.

Sig. Two teaspoonfuls with two tablespoonfuls of lemon juice, a tablespoonful of wine, and a tablespoonful of water, to be taken at breakfast and dinner.

In the milder forms of cronic, although the patient has pain and uneasiness in the stomach, perhaps indicating an approaching gastric crisis, the following pills are useful. 

R. Cocina Hydrochlo. gr. 1/3

Cobrae. gr. 1

Capsicum. q. s.

At pil. with tolox XXIV. 

Sig. One every four hours for three times of pain in stomach.

The pills are rejected or have no effect during the pain crises.

The patient gets relief from sucking ice, by placing a hot-water bottle over the epigastrum, or by counter-irritation in the shape of a mustard tablet in this region. This is often useful.
For the severe attacks of Gastralgia, Morphia may be employed, food is generally rejected, but I have often found that a vanilla ice cream is retained and relieves the patient and helps to nourish him during the crisis.

Rectal Crisis. In this crisis I have always found almost immediate relief given by counter-irritation with the paquelin cautery; two strokes on each side of the spinal column in the lower dorsal and lumbar regions being often sufficient. It is rarely necessary to repeat these measures, which, in my experience, is more efficacious in the rectal than in any of the other forms of visceral crisis.

The patient should also be provided with the following suppositories to be used when medical aid is not at hand: Rx. Belladonnae 0.07 cent

Opia 0.01 cent

Pleurum fibratum, 9 s.

Vesical and Genito-urinary Crisis. The patient often complains of severe pain at the neck of the bladder: this is relieved by the Belladonna Suppositories.

Many patients describe an irritation, which does not amount to pain, coming on especially after meals, for this Bromide may be given. The best form is as Bromide of Camphor in capsule. Dose 0.20 cent.

The patient
The patient takes one capsule at the beginning of lunch and dinner, or may give a mixture of the bromides of ammonium, sodium, and potassium (Solution de Polybromure d'Yvon). The use of bromides should be intermittent, as by continual use, they increase rather than diminish the symptoms of irritation.

Bromides also quiet the general excitement. The application of the faradic current is useful. One pole is placed on the nape and one at the root of the nose. Catheterisation is contra-indicated. Guyon insists on this.

A hot bath is useful in vesical crisis.

Treatment of the addled sensibility.

The patient should take a warm bath every morning, followed by a rigorous friction of the limbs and body with a horse hair glove impregnated with alcohol (Alcool de Lavande), thus gives a good reaction, and improves the tone of the skin. The rubbing should be repeated at bedtime.

Hydrotherapy. The cold douche is an excellent means of treating the anaesthesias and paranaesthesias in locomotor ataxia. As many patients cannot at first stand the cold douche, in many cases it is advisable to begin with a warm douche, and gradually you accustom the patient to take the cold one. This is especially useful in the early stage. (De Jarny Cliniques sur les maladies du ronge universelle, page 17.)
Raymond advised "an energetic application of the paradic current. The paradic brush in communication with the 'negative pole is moved about over the anæsthetic zone, while the other pole represented by a fairly rigid plaque is applied over the sternum; duration of the application is '5—10 minutes.'

By the use of electricity we can certainly act on the peripheral nerves, which are now seen to be frequently affected in this disease. A treatment whereby we excite the sensitive nerves promises its advantages, and is admissible rationally.

Treatment of the muscular atrophy and paralysis.

Muscular atrophy and paralysis, though usually a symptom of the advanced stages of the disease, may be met with in the paralytic stage, even when there is no accompanying incoordination.

The following case under the care of Dr. Péjorius, in the Salpetrière, illustrates this:—

Case I. Patient, a woman aged 44. No specific history. Presents an atrophic paralysis of the antero-external group of muscles of the left leg 12. Tibialis anticus, Extensor communis digitorum, and Extensor proprius hallucis, with the Peronei longus and brevis.

Last July (1897) the patient was taken with lightning pains in the regions of distribution of the left great sciatic

C. Raymond, op. cit. page 256. line 24.
Sciatic nerve, i.e., in the back of the thigh and leg, and in the antero-lateral region of the leg. The pains which lasted 6 to 6 hours, were very intense; on the following morning the patient found the left foot to be paralysed.

On admission to hospital, there was anaesthesia of the whole leg and foot; this has since disappeared from the knee up. Sensibility to heat and pain showed no change. The antero-lateral group of muscles was much diminished in volume, as compared with the right side; these muscles showed an absence of contractility with the faradise current, and the action of degeneration with the galvanic current.

Pressure over the sciatic nerve elicited no pain, thus eliminating a sciatica. The patient presented no dys symptoms. There were traces of the Romberg symptom, the patient being unable to stand on the unparalysed leg, and would have fallen unless supported. The patella reflex was absent.

Since admission the patient has had slight attacks of lightning pain, which she compares to a pin being stuck into the leg.

Present condition. On admission the patient could not make the least movement with the paralysed muscles, now she is on the way to recovery. The affected muscles in the left leg are not quite so firm to the
to the touch as on the right side. Slight but distinct
voluntary movement is possible. Contraction may be
elicited with a strong faradic current: then no
inversion of the formula: with the galvanic current.
The healing is slow, but progressive: it generally takes
12 months or longer.

Treatment. Electroisation of the muscles with the faradic
or galvanic currents should be applied daily if possible.

This early paralytic paralysis occurring in the lower
extremity, of which Dr. Dejerine has seen 9 cases,
is quite analogous to the traumatic paralyses of
the extrinsic muscles of the eye, supplied especially
by the 3rd and 6th nerves. These also are due to
a peripheral neuritis of tabetic origin, and not to
a possible syphilitic lesion in the bulb. The diplopia,
strabismus or ptosis may disappear without treat-
ment, though Duchenne (of Boulogne) notes the
usual results obtained by faradisation in these cases
of paralysis of the extrinsic muscles of the eye
occurring in the paralytic stage of the disease.

A second variety of muscular atrophy is seen
in much more advanced cases, when there is marked
atrophy of the posterior spinal roots. This variety
is very slow in its evolution, though it also occurs
without any fibrillar contractions, as in the previous

(2) L'Electroisation thérapeutique. p. 663. Masson et Cie. 1887.
form. Rarely we may see a more rapid form of atrophy, accompanied by fibrillar contractions, usually beginning in the muscles of the thenar eminence, in the upper extremity. In such cases there is a protracted anteverision, in addition to the atrophy. The treatment is nil.

Case II. a woman, age 69. The disease began at the age of 26. The patient has been confined to bed since the age of 42. 12 for 27 years. In this case the atrophy is more in the anterointernal group of muscles of both legs, though the tibialis anticus has been spared, which is exceptional. The 20th of the foot looks somewhat inward, a tendency to varus, rather than simple equinus, the commoner form.

Both the Faradic current there is absence of contractility with the galvanic current there is no reaction of degeneration, but a simple quantitative diminution of contractility, without any inversion of the formula.

The patient also shows atrophy of the thenar eminences of the Ataxia Duchenne type, the hand resembling that of the Primates. In the advanced stage of the disease, the progressive form of atrophy generally attacks all the muscles of the anterointernal group, producing a true equinus, helped by the contraction of the plantar fascia, with adherence of the sheath of the tendons.

The prognosis
The prognosis is bad, as the atrophy continues pro-
gressively till no muscular fibres are left.
The treatment is nil.

TREATMENT OF THE MUSCULAR MICOORDINATION.

Having previously described suspension, and two more
recently devised methods of stretching the spinal cord by
anterior flexion of the spinal column, I pass directly
to the more rational method, devised by Frinkel, a Swiss
physician, which is primarily and solely directed against
the muscular incoordination.

In Frinkel's method we try by a careful reeducation
of the muscles affected, to compensate for the muscular
incoordination.

Frinkel described his method in 1890 (1), under the
title of "Die Therapie ataktischer Bewegungsstörungen";
in 1895 (2) he wrote a further article with especial refer-
ence to the upper extremities. "Die Behandlung
der Ataxie der oberen Extremitäten." Last year, in
Moscow, he gave the word before the Medical Congress.

Under the personal direction of Frinkel, the
method has been tried at the Salpêtrière in Paris,
in the words of Professor Raymond, who gave
two Clinical Lectures on this treatment, January
17th and 24th, 1896.

(1) Münchener med. Wochenschrift 1890, No. 52.
(3) published in "Revue Internationale de Therapeutique et Pharmacologie".
July, 1896.
We do not inherit the power of coordinating our movements; this has to be learnt, and from this point of view we can certainly say that the child is born ataxic. This acquired power of coordinating the movements, the ataxic patient has lost; he must be taught and the compensatory gymnastics of Frakel have their re-education of the muscles as their object.

"Frakel's method consists essentially in the methodical execution of movements, simple at first, then more and more complicated, which bring into play the elasticity, and not the muscular force of the patients. These exercises must be done under the direction of the doctor."

Frakel divides the movements of his rational gymnastics into three categories:

(i) Simple muscular contractions. Flexion. Extension, adduction, abduction.

(ii) Simple coordinated movements. The preceding exercises in a determined direction, to a given point, avoiding obstacles, etc.

(iii) Complex coordinated movements. Walking, writing, etc.

The execution of these movements requires quite a technical study, and Frakel has invented a series of apparatus and exercises for this purpose. I will describe the principal which Frakel uses in his practice and which I have had occasion to employ myself with beneficial
beneficial results.
A. The reeducation of the lower limbs is treated successively by exercises, the patient lying on his bed, the legs bare, and by exercises in the erect posture.

To begin with, the patient performs simple movements of flexion, extension, adduction and abstraction, first with one foot, and then with the other: then flexion and extension of the leg on the thigh, and the thigh on the abdomen, first with the right leg, and then with the left, then with both legs simultaneously.

These exercises must be continued daily, until the patient has thoroughly mastered them. Then, and only then will he pass to more difficult exercises.

To help in teaching the patient these movements, the following apparatus are useful.

1. A garter, to which is fixed a small vertical piece of wood, is placed round the patient's leg at the level of the knee, the vertical piece of wood corresponding in position to the patella. At the word of command from the doctor, the patient raises the opposite leg in extension, then flexes the leg on the thigh, so as to strike the piece of wood with his heel.

2. A stick is held horizontally about 1 foot above the middle of the leg, midway between the knee and ankle. The patient by successive flexion and extension
Extension passes the foot alternately above and below the stick.

II. A wooden hoop, of about 1 foot 6 in diameter, is placed at the same height as the stick in the previous exercise; but obliquely, if you wish to have more adduction or abduction in the execution of the movement.

The patient learns to pass his foot in and out of the hoop without touching it.

III. This apparatus consists of a horizontal piece of wood forming the arc of a circle, whose radius is about the length of the patient's leg. To this horizontal portion is attached a vertical piece of wood, cut out with 6 notches, large enough to receive the patient's heel.

These notches are in regular order, separated by points; the notches may be made of different depths.

This apparatus is placed on the bed, and on the word of command, the patient places his heel in each notch successively; later you vary the exercise by making the patient move two steps from 1 to 4, 4 to 2, 1 to 6 etc.

To perform this exercise it is advisable for the patient to wear boots, as a bruise on the heel may possibly be the starting point of a perforating ulcer, which heals very slowly.
The exercises in the erect position can be varied subtly. The patient first learns to sit down and to raise himself slowly again to the erect position, without the aid of a stick. Then keeping the body still, the patient moves his foot forward to a given point, returning it to the original position; then he moves the foot backwards, and returns it to the original position.

For now let him do these 2 exercises successively with each leg; then make him take one complete step forwards.

We can thus teach the patient to walk again.

The exercises in walking must first be done in an uniform direction e.g. along a board in the floor, a hall laid with squares tiles of different colours is useful to teach the movements in advance. Later, we can track the patient to walk along lines with angles, curves or following a circle, drawn in chalk, on the floor.

It is necessary to begin with large angles, as the center the angle, the greater is the difficulty of the patient to maintain his equilibrium when changing his direction. The patient begins these lessons in walking with the aid of a stick, later he performs the simpler exercises without a support, till he arrives at being able to walk, without the aid of his stick.

The following exercises are directed more particularly against.
the disturbed equilibrium in the erect posture:

The patient stands upright, without a stick, the feet
drawn together, the hands on the hips.

The patient stands upright, with his feet apart. In
this position he will move his arms. Shifting forwards, raising
the extended arm from the side to above the head etc.

The patient the hands on the hips, the feet apart,
shove the body forwards on the hips, bend to either side or
backwards. He may later rotate the head.

The patient may do the above exercises the feet close
together: this is more difficult.

Doctor Paul Jacob, assistant in the Klinik of Professor
Leysten, recently described the following apparatus(1) used
in Berlin, for treating the incoordination of the lower limbs:

1. **Pendulum apparatus.** The patient placing his foot in
the ring, performs exercises, moving the ring backwards
and forwards, in adduction or abduction, and circular move-
ments of rotation.

2. **Gitter apparatus** consists of a frame work to which
an fixed four horizontal pieces of linen, and four vertical
strings. By moving these the various apertures can be
made larger or smaller as required. The patient sits
on a chair in front of the apparatus, and places his foot
on the linen bands, between the various vertical pieces
of string without touching them. When he begins the
incoordination.

incoordination demands large aperture; as the condition improves, the patient is able to place his foot correctly into quite narrow aperture. The exercise is completed by the patient returning his foot into the cut-out piece of board figured in the diagram, before again placing his foot on the lower board.

3. "Tusslespiel." The game of skittles with the foot. The apparatus consists of two rows of numbered skittles. The patient sits in front of the apparatus, as in the previous exercise, and at the word of command raises the leg, and with his foot knocks down the skittle named. The base of each skittle is provided with a spring, so that it automatically returns to its original position, after being knocked down.

Then he starts this exercise, the patient often passes his foot between two adjacent skittles, or if he touches the required skittle fails to knock it down.

With practice, he accurately knocks down the skittle he is told to.

4. "Gehalter und Landbaren." This consists of parallel bars, which can be raised to the required height for the patient's arms, lowered or removed altogether, and between these, on the floor, planks of wood from which an cut aperture, is tried to receive the foot in waking. The patient of both bars
"Fußregelspiel"

"Gehbüter und Laufbaren"
both bars, learns to walk, placing the foot on the opposite as commanded. Later, he holds the bar with the hand, and advances the foot of the same side on the next hole; the other hand being placed on the hip, and thus alternately. The patient must be watched, that he walks upright. Later on, both may be removed, or then both.

51. An analogous apparatus is in the form of a staircase, with 2 foot plates on each step, and a handrail on each side.

In the words of Professor Leyden, their apparatus is used in preference to the apparatus of Frechel. I have previously described. Frechel’s apparatus is very simple and portable, and also very efficient, and is thus preferable for private patients. The use of Leyden’s apparatus must be limited to ward use, both from their size and, undoubtedly, their cost.

For the lower extremities, the exercise should not be continued for more than half an hour at a time, including the time that the patient is resting. If the patient gets out of breath, his pulse is quicker, his legs tend to bend under him. The fatigue seems due to the patient requiring to keep his attention so entirely fixed on what he is doing. The diminution of articular and muscular sensibility may perhaps account
account for the absence of the feeling of fatigue in the muscles, which is normally felt after an unaccustomed exercise.

(1) Ehringer of Frankfurt-am-Main, at the recent congress held in London (12th-16th April 1898), said that "in the treatment by means of movements, we must always be able to make equilibrium to the weight of the limb by precisely graduated counterpoise, for every effort in a tabetic patient may cause the destruction of the corresponding neurone." Following him in the discussion Paul Jacob (2) said that "during the first weeks of exercise, the limbs must be sustained and directed, at times by passive means, at times actively by special suspension apparatus or worn by the doctors hand."

In using the simple exercises and apparatus of Jacob I have not found their support to be necessary, but no doubt it would be so, if a patient with advanced incoordination were ordered to use Leyden apparatus.

B. The incoordination of the upper limbs. When the patient has incoordination of the upper extremities, his position is a much more disagreeable one, he finds himself unable to dress, write letters, eat or drink, etc.

The accurate coordination of the movements of the hands and fingers is more difficult to obtain, and the slightest uncertainty or deviation renders impossible the accomplishment of the dextrous act.

(1) reported in "La Semaine Médicale" page 198. column 1. Lines 12-22
(2) " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " 

(2) reported in "La Semaine Médicale" page 198. column 1. Lines 12-22
advances the work of the lower extremities is comparatively simple, and the movements not so complex.

Thus, although the reduction of the upper extremities is based on the same principles as that of the legs and feet, yet the movements require more delicacy, and so more care, study and patience in both patient and doctor.

To determine the degree of incoordination in the upper limbs, Frankel advises the following means:—Make the patient stretch out his arms in front of him so that the tips of the two index fingers are touching, the hands being placed on edge, with the pronation of the index fingers in contact by their radial surfaces.

Although this does not prove the complete absence of incoordination, it shows that the incoordination has not affected the entire muscular apparatus of the arms and shoulders; so also properly performed flexion of the forearm on the arm shows the elbow to be unaffected.

In progressive locomotor ataxia, we generally find the fingers and wrists to be affected with incoordination, before the forearm and arm, and this is not shown by the above diagnostic experiment; to find out this point ask the patient to write or thread a needle, put different coins in little piles etc.

For the reduction of the muscles of the fingers and hand,
hands, simple movements of flexion and extension are not sufficient; the principle point consists in a whole series of small complex movements, very delicate in nature, which require the greatest attention on the part of both the patient and doctor.

For this purpose Tsukahara has devised a series of apparatus, the diagrams and descriptions of which I take from Professor Raymond's article:

1. A piece of wood in the form of a triangular prism, whose section is represented by an equilateral triangle, the sides of which measure 5 centimetres (2 inches). It has a length of 40 centimetres (16 inches). It rests on one of its surfaces. The superior angle is grooved, a 2nd angle is a plane surface.

The third angle is sharp. This piece of wood is placed before the patient, and he holds in his hand a thick pencil. You ask him keeping the point of the pencil in the groove, and holding his fingers and wrists immobile, to bring the point of the pencil from the end farthest from his body, to the end that is nearest him. At first the pencil often escapes from the groove.
“groove. It is only after repeated exercises that the patient arrives at being able to keep the pencil in the groove, tracing a straight line without zigzags or undulations," he can thus eradicate the movements of the shoulder and elbow joint. A more available plan is to give the patient a ruler which he holds with his left hand while holding the arm raised to the level of the shoulder by a to-and-fro movement of his right hand he draws straight lines with the aid of his ruler.

Later we may give him a square ruler, which he will turn over and over with his left hand, and he thus can rule pages.

In this manner we teach the arm, without support to rule horizontal lines on paper, these diminish in their irregularities and simonvotes as the incoordination of the arm diminishes.

1. can vary this exercise by making the patient draw vertical lines.

2. "In the intervals of the sessions under the direction of the doctor, the patient will exercise himself in tracing with a pen figures, which are "lithographed on a model, and which are composed of broken lines and curves." A simple plan for the patient to begin with, so to give him the copy of the various geometrical figures and to let him copy them."

(1) Raymond, op. cit. page 221, lines 3-5.
them for himself, with the aid of a ruler, and
for the circles with a tumbler, or a sixpence filling piece;
the pencil has thus some support, as he presses it
against the edge of the ruler or tumbler: he can also
rule diameters in the circle, etc.

The patient may later learn to draw these figures
without the aid of any instrument. When he can
draw a circle without oscillations, he has made
great progress and can then proceed to a more difficult
exercise.

3. "Another apparatus is represented by a small square
board, 25 centimetres by 30 centimetres (10 x 12 inches),
with, at equal distances, depressions large enough to
receive the point of the finger. These depressions are
numbered. The little board is placed before the
patient, who holds the arm raised, and the index
extended. The doctor orders him to introduce the
point of this finger, as rapidly as possible, into the

0 Raymond, op. cit. page 221, lines 8-15.
"Depression, of which he indicates the number. At first one makes him repeat frequently the same movement, on choosing always the same number or neighboring num-
erals; later one makes the exercise more and more "Complicated." For can make the patient introduce successively into the numbered holes, the index finger, the middle, the ring finger, etc. The patient with the required finger raised awaits the word of command, the doctor telling him to introduce the point of the finger into the hole he designates. For can begin by making the patient successively put the point of the finger into all the holes on the board; and later, when he has learnt this manipulation, the doctor will call out to him the number of the hole into which he will put the point of the finger. Frænil makes the patient answer the word of command, the hand placed behind the head, so that the sight does not give the patient much help in coordinating his movements.

For this apparatus we may substitute the common game of 'Solitaire' - which consists of a similar board, though round
though round, made with depressions intended to receive glass marbles. We can easily number these holes; and when the patient has learnt to place his fingers as above in the various depressions, we can then let him pick the marbles out of a bag between the thumb and first finger, and place them in succession in the desired depressions. Later he can play a regular game of ‘solitaire’. Instead of keeping his hands behind his head before each move, the patient may keep them under the table cloth.

By means of employing a game, the patient’s interest is aroused, and he becomes more keen to play and win whereas with the board devised by Edison there is no object besides the reduction of the muscles, and the exercise is done from a sense of duty, and often a tone the patient finds the tedious and wearying.

You may do the same thing with a draught board, the patient learns to place the men as desired, and later he can play a game with the doctor and two friends. The patient is amused and interested, and consequently is not so easily exhausted.

4. Later we substitute for this apparatus another provided also with holes, into which the patient will have to introduce small corks. A little more complicated exercise consists in introducing into the holes of the board a sort
"a sort of cork, provided with a quadrangular head.
"The patient's task consists in collecting these with one hand
and introducing them in the holes pointed out to him. The
various movements, from one moment to another, the rapidity
with which these movements is executed, and the position
of the corks at the beginning of the exercise.
"One will exercise the patient also in displacing the
corks from one hole to another."

Trachten has also devised a board, into which the
corks are not introduced perpendicularly as above, but
obliquely from right to left, or from left to right, the
holes being pierced in these different directions. This
is a much more complex exercise, and requires an
exact coordination of the movements of the fingers and
hands, so will only be employed when the patient
has made very marked progress.

For may substitute for the above, the game of 'Fox and
Geese'.

- ordinary cork
- arrow corks with
quadrangular head.
The board is similar in size to the solitaire board, and is held in the left hand. The board has a series of small holes into which fit small Navy men—one being red, and the remainder white—each provided with a small round head.

The patient will take each man, holding it delicately between the thumb and index, and will first feel all the holes in the board; he then removes the men, one by one, alternately, until the board is clear, according to the rules of the game, which permits of numerous combinations and arrangements.

The patient as well as the doctor can thus follow the progress of the case. He can watch the improvement in the coordination of these delicate movements, as well as in the tactile sensibility if affected.

The patient may also learn to play these. The number of these games can be varied indefinitely, e.g. halma, reversi, etc.; and the patient can then play those which interest him most. They have the advantage of giving the patient a few moments rest between each movement, while his partner is playing his turn.

5. "This is a frame from which are suspended, by means of pieces of string, leaden balls of different dimensions and colours. I swung one of these balls, e.g.

"the largest, and I ask the patient to catch it, while it is swinging. At the beginning of the exercise, the patient is free to catch the ball, at whatever point in its course he likes, or which he finds the easiest. This is generally found to be the extreme point of the swing, just at the moment when the ball is going to swing back again; this is also the moment when, the impelling force being spent, the ball is moving to its slowest.

The patient awaits the moment with great attention, the muscles of the arm braced, like those of a sportsman ready to shoot.

Later we oblige the patient to select a less favorable moment. Later still, we make the act more complex by making the patient catch the ball at the word of command. The fact of commanding, in this exercise, makes the task more difficult; the nerves are not prepared to perform the act, because the patient does not know the precise moment, when he will be called upon to catch the ball. The smaller the ball, the more difficult is the exercise. Later on, we set in motion several balls at once, big and small, and the word of command will alone indicate the colour of each ball to be grasped."

The above
The above is a most excellent exercise to develop quickness in thought and action, and also the good coordination of the movements.

By the various means above described we can gradually mediate the muscles of the arm, forearm, hand, and fingers, beginning always with the simplest and only passing to the more complex, when the patient has thoroughly mastered the former.

As a general rule, slow and regular movements are much more difficult for the patient to perform than quick short movements. The doctor, at the first, should not let the patient be in too great a hurry. He must always avoid tiring the muscles and the attention, never letting the muscles of the fingers and hand get cramped; therefore each sitting or lesson should be of short duration, with long intervals of rest between each, two, three or four lessons of a quarter of an hour each in the 24 hours.

To keep up the patient’s interest we may vary the exercises every day, and at each lesson. Thus we find that a patient will more readily learn a more difficult exercise which interests him, than a simpler one which he finds dull.

The patient can now again perform the little duties of his daily life, he can dress himself, write letters, plays
plays games with his friends, and take a hand at cards, which Freudel recommends. One patient of mine used to play solitaire games of 'patience' with cards.

C. The micro-ordination of the muscles of the face. 

When the patient has muscular micro-ordination of the muscles of the face, we can still mediate them. The doctor brings into action certain muscles of his own face while the patient, holding a mirror in front of him, looks at himself in the glass, and learns to imitate the expression on the doctor's face. By this process of miming the micro-ordination is overcome.

*Contraindications.* Professor Raymond says the method of Trukel is contra-indicated in the following classes of patients:

1. In cases of acute or subacute tabs.

2. When the lower limbs are the seat of a tabiotic arthropathy, and in cases which have had what is called a 'spontaneous fracture' or the rupture of a tendon.

3. When there exists a cardiopathy, especially arterior venous insufficiency.

4. In patients who are obese, arthritic, as well as among the descendants of goitrous parents; the patients in this class are more or less subject to arthropathy. (Raymond, op. cit. page 226.)
"V. In patients intoxicated by Morphine, cocaine, alcohol etc.

VI. Lastly, experience shows that the method of Früdel, which suits patients who have amanoric, i.e., those cases which present over a considerable area an anaesthesia superficial or deep, and in the cases when the incoordination of the movements is associated with muscular paralyzis or atrophy, in a marked degree.

Prognosis. By the method of compensatory therapeutic devised by Früdel, we are certain, i.e., suitable cases, to have a good result. A good deal of the success depends on the intellectual capacity of the patient, on the amount of attention he is able to give to his exercises, and also on his will power; one might almost add his pride.

The sympathetic, flabby, patient is easily tired, and is unable for long to fix his attention on the exercises he is doing. The persevering patient assists the doctor enormously, often even devising exercises, which he performs by himself, between the regular lessons under the doctor's direction.

The disorders of sensibility will also influence the prognosis, especially in the upper extremity.

If the patient has Neuroasthenia in addition to his Tabaes, the result is longer in being attained, the lessons..."
Lessons must be shorter, and the treatment requires the greatest perseverance and patience on the part of the doctor, who has to constantly encourage his patient to persevere.

The treatment must as a rule be continued for 2-6 months for the lower extremities, and possibly for 12 months for the upper extremities.

I have used this treatment in three cases, two patients with marked incoordination of the lower limbs, alone, one with slight commencing incoordination in the upper limbs, especially marked in the left hand.

Case III. A man, aged 45, had nervous debility. Specific history, having contracted the disease 10 years ago. Present illness began in 1870. Symptoms of incoordination first noticed three years before the lower limbs. In July 1875, I began the Troxel method of treatment, as previously described. At this time the patient could only walk a few yards, and for this required an arm as well as his stick. Even this was a great exertion to him, and with relief he gained down breathlessness. The exercises were performed for half an hour daily, the patient lying on his bed, apparatus (A) (page 29) being particularly useful.

The exercises lying on the bed and in the erect position
posture, were continued daily for five months, at the end of which time, the patient was able to walk in the Bois de Boulogne for 40 minutes alone, (i.e. without an arm), and the greater part of the time not needing to use his stick. The gait was no longer ataxic, but as the patient stopped rather, he looked like a convalescent from a serious illness. The patient began to walk gradually one step, two steps, four minutes, and so on. He stayed nearly 3 weeks at a quarter of an hour, walking this time twice daily. Then the improvement was more rapid, and the patient not feeling tired, I increased the time two minutes daily, and so he was able to walk for 40 minutes without resting, and for a considerable portion of the time without his stick.

The only symptom affected by the treatment was the muscular incoordination, the patellar reflexes remaind about, and the Romberg symptom was in no way affected; the patient could not maintain his equilibrium with the eyes shut, or in the dark.

In the 2nd case I treated, the ataxia was not so marked, and after 3 months of treatment it had disappeared.

In the 3rd case, there was marked incoordination of the lower limbs, and the upper limbs both hands.
were affected, especially the left one. The patient was no longer able to shave himself, he had great difficulty in tying his tie. I taught the patient to touch the point of his nose with the index finger, this he soon mastered; but when I asked him to touch his ear on the opposite side he failed. However, after treatment being continued for 2 months, the incoordination had almost completely disappeared. I have not seen the patient again, so do not know if the improvement has been maintained.

D. Bérème has mainly placed mine of the patients in his wards at my disposal, so I hope to be able to continue this treatment with some greater success than the three above mentioned private cases have shown.

Professor Raymond showed 3 cases at his clinical lecture, all benefited by the treatment. In all the incoordination had developed somewhat precociously in the evolution of the disease. The following case, by Leyden of Berlin, shows how improvement will follow from an advanced cases of incoordination.

Case No. The patient had suffered from tubes for twenty years. He could no longer stand upright, and during a few seconds only, as long as he was supported by two assistants. He had completely lost the memory of movements. 

D. Raymond, op. cit. page 168.
of movements necessary for walking. The movements which he could perform with his limbs, in the dorsal ataxia, were marred by a very pronounced incoordination. The patient could only write with the pencil grasped by the whole hand. After nine months of treatment by the Fruehaz method, the patient was again able to walk, leaning on the arm of one assistant; the movements performed with the lower limbs, when the patient lay on his bed, no longer showed the slightest incoordination. In the upper limbs, the ataxia had considerably improved. The patient could again write with a pen and he wrote well.

Massage. Before leaving this subject, the treatment of the incoordination, I must mention massage.

Although strength and force are not required to perform the Fruehaz exercises, still the muscular strength has of great importance; the more strength the patient has, the more is the ataxia compensated: the weaker the muscles, the weaker also is the power of the will and the more marked is the ataxia. Everything should be done to strengthen the muscles. Massage undoubtedly increases the activity of the nutritive changes in the muscles and helps to carry away the products of muscular activity. The nutritive exchanges do not occur
occur so well, in the muscles whose sensibility is greatly altered. In one of my patients, the lower extremities (Case III.) were very much thinner than normal, especially the calves. The muscles were soft to the touch. After daily massage for months, which was carried on simultaneously with the muscular treatment, the muscles, although remaining small in size, were very firm, and in good condition.

II. General or curative Treatment.

Having previously discussed the methods of treatment and drugs which are employed for purely symptomatic indications, e.g., given to relieve the suffering caused by the crises, or to ameliorate such a progressive symptom as the ataxia, we now come to the general treatment. Although there is no specific drug to cure Locomotor Ataxia, i.e., to arrest the sclerosis of the posterior columns of the cord, and make it retrogress, still, I consider that it is a curable disease. Babinski describes three cases as ‘mild Tals’, in which the disease retroceded, and terminated by one which was almost absolute. Of these I quote the following, which was followed by a necropsy, confirm  

(1) Comptes rendus de la Société de Biologie. 20, 1887.
ing absolutely the diagnosis:

Case V. Madame Peg. is attacked in 1853 at the age of 38 years, with diplopia which lasts several weeks and then disappears. A little later, the right becomes another, front of the right, then of the left eye; then rapidly progresses, and 6 months after its commencement, then is complete blindness. At the same time the patient begins to feel very sharp lightning pains, coming on in attacks, in different parts of the body: in the forehead, occipital region, roots of the neck, between the shoulders and in the lumbar region. One year later, the lightning pains invade the upper and lower limbs. At this time also, there developed also very violent and painful gastric crises, which reappeared once or twice each month, and last about a week.

In 1869, the patient visited Charcot at the Salpêtrière. Her condition has hardly at all changed since the onset of the disease. Ophthalmoscopic examination shows the presence of gray papillary atrophy of the optic nerves. Charcot at this time diagnoses the case as Tabes.

From this time till towards the end of 1878, the lightning pains and gastric crises kept the same character. In 1876, Charcot looks for the lordotic symptom, and finds that the patellar reflex is abolished.
abolished. — Since the beginning of the disease, the patient has never shown any sign of motor incoordination.

From 1878, the lightning pains and gastric crises diminish in intensity, and completely disappear in 81 days.

The patient dies in 1885, of an ahydraulic pneumonia, without having felt any pain since 1881. The blindness remained absolute, since the beginning of its development.

The anatomical examination which I practiced shows the clear existence of the lesions of Internal Ataxia.

In the lumbar region, the posterior columns, especially in the zone nearest the meninges, so sclerosed. The tubes containing myelins are much less numerous than in the normal cord. The perineurial is thickened in the neighborhood of the posterior columns. In the dorsal region, the sclerosis occupies the columns of Bündch and Goll. In the cervical region, the sclerosis predominates on the columns of Goll, but invades also the neighboring regions. The posterior roots show many fewer tubes containing myelins than normally. In the optic nerves, the tubes containing myelins have almost completely disappeared; one finds scarcely anything but connective tissue, containing blood vessels with very thickened walls.

If we lay aside the atrophy of the pupil, here is a case of Tabes, which never went beyond the first
first period, and which after a duration of 25 years
ended by cure?

When the disease is arrested all the centrifugal
nerves are not destroyed by the sclerosis; the spinal
cord and rather nature, can adapt itself to the new
situation, and the peripheral sensations can reach
the higher centros by collateral paths.

Is not the fact of our being able to reeducate the
muscles, and so compensate for the incoordination,
alone proof that the nerves of muscular sense are
not all affected by the sclerosis.

When one discovers post mortem evidence of former
tubercular disease at the apex of the lung, we consider
the patient cured of that disease, though evidence of
the former lesion still exist, so I consider we are
justified in considering the patient cured of Tuber,
when the disease is not only arrested, but regresses,
and he remains free from all symptoms for a long
period of years. The complete and persistent
attenuation of the symptoms is equivalent to a cure,
without either the process or the lesion from an anat-
omo-pathological point of view being modified.

How is this result best to be obtained?

Many drugs, repeated curative, have been used as
a general treatment, sitter as general tonics, tonics to
the nervous...
the nervous system, or to act on the pathological process in the cord:—Nitrate of Silver, the preparations containing phosphorus, injection of artificial serum, injection of testicular extract, Iodide of Potassium, Ergot of Rye, Arsenic, Strychnine, Mercury, etc.

I confine my description to the above of which I have had practical experience.

**Nitrate of Silver.** may be given in full form. Hygrin in each; or 1 drachm in a percent solution in distilled water applied directly with a camel hair brush to the mucous membrane of the victim, previously painting the part with a solution of Cocaine. I used this latter means for some time in a case with severe rectal erosion, for the local counterirritant action, keeping its reputed general effect in mind as an ulcerative poison.

Though the rectal erosion were distinctly diminished in frequency during the treatment, the drug had absolutely no effect in arresting the disease.

Chloride of Silver has been given subcutaneously. Rosenbaum, in 11 cases of Sabin's, tried this preparation. In one case only then followed distinct improvement.

On the other hand, nearly all the patients had violent pain lasting for 12-24 hours after the injection. The majority refused to continue the treatment, which seems only to be practicable in cases.
when there is recent and very marked anaesthesia.

Phosphorus, given in the form of glycerophosphate by subcutaneous injection or intramuscular injection, exerts a general tonic effect. How much of this action is due to the quantity of more fluid injected as a substitute for artificial serum, it is difficult to estimate.

Injection of artificial serum, exert a distinctly tonic action on the system, increasing the blood pressure, and stimulating the nerves centres and nutrition generally.

Injection of Testicular Extract. Braun-Segurard observed the curability of cases by injections of testicular fluid. Employed increasing doses hypodermically during two months in a case of Locomotor Ataxia; the patient derived no benefit, beyond a temporary tonic effect on nutrition, analogous to that obtained by the use of artificial serum. I made use of the Strauss Helix syringe boiled before and after each injection. There never was any local inflammation; the pulse was always slightly accelerated after the injections, and the patient appetite seemed to improve.

Hydrotherapy: Douche on undoubtedly of service in the early stages of the disease. By the use of the douche daily the patient improves in general health; he has a better appetite, he feels stronger; the troubles of sensibility in the early stage seem to be distinctly relieved.
relieved by this means. Hydrotherapy seems more rational now that peripheral neuritis are seen to play a more important part in the pathological process, than was formerly thought.

Ergot of Rye must be used with prudence. It may be given as follows: 4 grains of freshly prepared ergot of rye in cachet at the midday meal, the first five days of each week.

Arsenic. Boerhave prescribes arsenic as follows: In the middle of each of the two principal meals of the day take ¼ a glass of reddened water, 5 drops of Tellurium solution. Increase by 1 drop daily, till the dose reaches 24 drops daily, 12 drops at each meal. Remain at this dose during 10 days, then diminish by 1 drop every other day till the initial dose is reached and the stop the drug. Be thus avoids accidents from its accumulation in the system, owing to the slow elimination of the drug, and tolerance is not obtained.

Strychnine. Sulphate of Strychnine may be given in 1/2 milligram doses once daily, especially in cases where the bladder is acting badly, where there is frequency and looseness in the expulsion of the urine.

Like the previously mentioned drugs, strychnine does no harm and little or no good; these drugs seem in no way to influence the pathological process in the end.
the case, or to suppress the functional troubles arising
from this process.

Sodio of Potassium, given in small, tonic doses, in all
cases of Tabes, syphilitic or otherwise, is the best drug
we have. It should not be given in large doses nor
for its specific action. The patient may go on taking
the following prescription for months and years, if
necessary. Rx. Soda. 10 grs.

\[\text{Sodio Potassii.} \quad 3 \text{vi.}\]

\[\text{Injection Columbia ad 3vi.}\]

Signature. Frachmann m. o. i. die.

Thus the patient takes 7 grans doses three times daily.
The general condition improves, the appetite increases,
the pains diminish and the disease tends to stop.
This drug should form the basis of the internal treatment.
The following quotation (1) from Duchenne (of Boulogne) shows
his opinion:—“Sodio of Potassium administered with
perseverance, in a dose moderate and proportioned
to the tolerance of the subject seems to me to be still
at the present time the best drug one can oppose to
the progress of this terrible affection. This drug has
the greater chances of success, when it is adminis-
trated at a period remote from the onset of the disease.”

Duchenne wrote these words 26 years ago, and
how true they still remain at the present day!

   to page 665, line 19.
Antisyphilitic Treatment. Though Syphilis occupies a
preponderating role in the etiology of locomotor Ataxia,
antisyphilitic treatment (Mercury alone or with Iodide of
Potassium) is harmful to the patient. It would thus
seem that the syphilis is some indirect way causes
the Taba to develop in a nervous system hereditarily
preposited.

Case vi. A.B. aged 45. grandfather epileptic, father
died of epilepsy, mother of diabetes and cancer, brother
has had 'petit mal'. Patient is neurotic. History of
syphilis 10 years ago, treated thoroughly.

Present illness began in 1892, with severe pain at root
of bladder, which patient thought must be a calculus.
The disease has progressed, the patient has had temporary
strabismus on two occasions, lightning pains in the leg,
metal crisis, vesical crisis, gastric crisis. The
Argyll Robertson symptom is present, though this tempor-
arily disappeared for 2 months in the 3rd year of the
disease. The patient has a very marked girdle sensa-
tion, with a hyperaesthetic zone round the chest;
allodynia, some difficulty in micturition,
brightness of the patellar reflex, the Romberg symptom,
progressive incoordination; in fact patient is a
classical case of Locomotor Ataxia.

In 1893, the patient had a few rubbings, about 1/2
of mercurial
of mercurial ointment, though temporary improvement of short duration followed, the progress of the disease was accelerated, as the difficulty in walking and the first gastric crisis began soon afterwards.

In 1876, the patient again had a longer course of Mercurial treatment. Again, there seemed to be an amelioration, for 8 months the patient was practically free from painful symptoms, and with the friction treatment the microcoordination steadily improved.

Then followed a very severe gastric crisis, then have since returned with intervals of about 6 weeks, and are of a very severe type, twin accompanied by syncope, lightning pains returned with great violence in the legs: the muscular microcoordination in the lower limbs became worse than ever, the patient now is unable to walk, though previously he was able to walk for 30 minutes without feeling tired. Then has also appeared a tingling sensation with diminished sensibility along the ulnar side of the arm, and in the region of distribution of the ulnar nerve in the hand, with slight commencing microcoordination in the muscles supplied by the terminal branches of this nerve on the left hand.

Thus on two separate occasions the use of Mercury has been followed by a temporary amelioration, after which
which, on each occasion, there has been a marked aggravation of all the symptoms, and a more rapid progress of the disease.

The more prolonged period of amelioration following the second and longer course of mercurial treatment seems to me due to the beneficial results of the waters of Lauder, possibly to be ascribed, when the patient had taken a cure, just Previous to commencing the specific treatment.

The following case reported by Fournier, before the 'Societe de Dermatologie et de Syphiligraphie' is in favour of applying specific treatment in cases of acute tabes, rapidly progressive in form, which are taken early.

Case vii. Patient aged 36, without any nervous antecedents, contracted syphilis in 1879. Symptoms lasted some time, however, they had ceased for 3 years, when the patient was taken with severe pain in the loins and lower limbs in December 1889. At the end of January 1890, the patient had lightning pains in the legs, diminution of sexual power, difficulty in walking, diminished sensibility, abolition of patellar reflexes, some apparent ptosis of left eyelid, weakness of the bladder etc. Walking became impossible.

The treatment consisted of Infusions of mercurial ointment.
continent, 6 grammes for 15 minutes every day, with
6-8 grammes of Pellssonum Poidea. Counter-irritation
with the cautery down the spine, and warm baths.
Improvement was rapid and the patient was cured
at the end of March 1890.

Lamalou-les-Bains. In France patients suffering
from locomotor Ataxia are more especially sent to
the station, though Nîmes or Balaruc are advised in
some cases. During the summer of 1895 I visited
Lamalou, and studied the effects of the treatment on
a patient under my care, and other cases I saw there.

Lamalou is situated in a smaller valley opening
into the valley of the River Orb, towards the western
end of the Department of Herault, in the South of
France, only about 20 miles from the Mediterranean
at Céret. The valley is somewhat shut in by high
mountainous ridges, which join the Cevenne Mountains
to the Montagne Noire; thus the air is pure and the
temperature is mild during the spring and autumn
months. For a fortnight during June 1895, the
thermometer showed a maximum of 98°F, at times
we had very severe thunderstorms.

The station is composed of three establishments,
called from their respective situations in the valley—
Lamalou-le-bas, le-caste, and le-haut, each with different properties.

Of Lamalou-le-bas, is the most important establishment for the treatment of locomotor ataxia. I have sometimes seen 10 patients at a time sitting in the bath. The mineral water is naturally hot, the temperature in the various baths varying from 85°F. – 95°F. The amount of salts in solution in one litre of the water is 2.9 grams. The principal salts present in the water are the trihydrates of sodium, magnesium and iron; in smaller quantities, arseniate of sodium, and copper, calcium, potassium, lithium, manganese, and strontium. The water contains a certain amount of free carbonic acid, which may be seen to rise to the surface and burst. When seen in the bath, the water has a thickish appearance, the colour resembling yellow ochre, when examined in small bulk in a tumbler the water is clear. This yellow colour soon fixes itself to and covers the floor and walls of the baths and stains the bathing gowns. The water does not wet the skin much; if the skin happens to be broken, the water is irritating.

Of Lamalou-le-caste, the temperature taken in the baths is 86°F. but a heating apparatus allows of a higher temperature being used. The total amount of salts in solution is 1.97.4915 per litre, with abundant fire.
free Carbonic Acid. The water contains more Iron than at Lamalou-les-Bains.

cf. Lamalou-les-Bains. The temperature taken in the baths varies from 80°F - 86°F with a considerable amount of free Carbonic Acid. The total quantity of salts in solution is 1gr. 4625 per litre.

The establishments can therefore be divided into 2 groups:
1. Lamalou-les-Bains with its water of a higher temperature and a greater degree of alkalinity.
2. Lamalou-le-Cauter and le Haut: with a lower temperature and a slightly degree of alkalinity, containing more Iron and free Carbonic Acid.

Each of these three establishments is well fitted up with baths, douching apparatus etc. The chief treatment is the method of baths; the period of immersion varies from 1/4 - 3/4 hour or more, according to the state of the patient, and the period of the cure. The douches occupy a secondary position in the treatment at Lamalou. Two methods of douching are chiefly employed - a finely divided shower of a moderate temperature, and a fine douse to the spine, with a warm douse to the feet.

Then are also numerous medicinal springs in the valley: the principal are the following: - La Verniere and Le petit Vidiy. Digestion and health, the first is, in addition, slightly purgative; 'Mocade' acts more actively
actively still on the functions of the stomach and bladder. "Epsom" is markedly febrifugeous, and as the water also contains Arsenic, it is employed in anaemic cases.

Thus, some in tonic, and are employed, as an addition to the bath, in cases of tabes accompanied by debility, due to excess or fatigue, or to treat anæmic anaemia. While others are a rather depletive and employed for patients predisposed to congestion, visceral disorders, dyspepsia, gastralgia and paralysis of the bladder.

The fortunate situation of the temperate and hot springs of the 3 establishments in the same valley, allows the physician to adapt this treatment to the particular indications of the case, and to change from one establishment to another, if advisable.

Physiologically, the waters of Lamedon, are especially indicated in patients with rheumatic ailments, and in cases with a previous history of excesses and fatigue of all sorts. Anaemic patients seem to derive the most rapid advantages. In neuroasthenic patients with irritable depression, the waters seem especially indicated. The baths of Lamedon, however, are ordered when the patient's constitution is vigorous, when energetic treatment is advisable, when anaesthesia predominates.

The temperate baths are ordered, when excitation is
easily promoted, when there is much hyperaesthesia, when the patient is nervous and pale.

As an immediate physiological effect, the hot bath of Llanabreka may increase the activity of the general circulation, and especially of the pelvic viscera, causing genital excitement.

At the commencement of the cure there is a marked period of irritation, the disorders of sensibility are increased, and the lightning pains return, often with great violence. This period is generally transient, and almost always disappears before the end of the cure of 22-26 baths. In some cases, Dr. Belgrae told me, the period of calm which precedes the definite amelioration may only be felt 2-3 months after the termination of the cure. In the case under my care, there was a good deal of gastric and intestinal disturbance during the cure; immediately after the cure there was a severe gastric crisis which lasted 5 days. The patient then remained practically free from symptoms for nearly 6 months.

The secondary effects are especially felt after the baths are terminated. I saw one case at Llanabreka, who was there for the 8th time; he told me that once he missed a season, and his lightning pains recurred during the following autumn; whereas, if he took
took his usual cure, he was either free for the whole year
or else the attacks were few and quite mild in character.

The favorable effects of the baths are especially
marked in cases of locomotor ataxia treated as
near the commencement of the disease as possible.
I quote the following statistics from the practice of
Dr. Belégou, who has been in practice at Caracas
for nearly 20 years, and who kindly showed me the
baths and methods of treatment.

"On a total of 531 patients, he found 115 cases
at the beginning of the disease; 218 cases which he
"describes as recent (before the 5th year of the disease)
"and 188 cases of old-standing ataxia. Dr. Belégou
"classes the effects as follows for each of these groups:

1. Very favorable effects.

Ataxics at beginning of disease 32 cases. 3. 28 per 100.
Recent cases 30 . 12. 17 .
Old standing cases 8 . 12. 4 .

2. Appreciable effects.

At beginning of disease 63 cases. 12. 55 .
Recent cases 82 . 18. 38 .
Old standing cases 64 . 18. 32 .

3. Effect nil.

At beginning of disease 20 cases. 18. 17 .
Recent cases 98 . 18. 47 .
Old standing cases 126 . 18. 64 .

(1) Belégou. Traitement Théramal des Maladies du Système Nerveux.
Paris 1898. pages 11-12.
In other words to limit the comparison to the two
extreme groups, in 100 cases of tuberculous in the onset
of the disease, we find in varying degrees 83 good results
as against 17 failures; in 100 long standing cases
64 failures as against 36 more or less appreciable
results.

In progress, it is more important to consider the
extent of the lesion, than the date of the first symptom,
and the length of time the disease has lasted, as
the rate of progress in Tuber varie greatly. It is then
important to have recourse to the thermal treatment as
early as possible in the disease. In such cases, more
or less recent in origin, the lesion is superficial and
easy is possible. In old standing cases where the
lesion is more extensive, the improvement often follows
the repeated use of the waters, and in such cases, if
no retrogression of the disease results, we may still
hope to render the patient's life more supportable in
the intervals of the annual crises.

The disorders of sensibility, in the first stage of the
disease are typically ameliorated by the course of
baths at Lamalou. The good effect is most marked
on the lightning pains: the hyperaesthesia of the skin
is affected in a similar favorable manner but here
also the ultimate amelioration is usually preceded by
a temporary
a temporary aggravation, a period of excitation, so to say, the lightning pains. In the early stage of the thermal treatment, some patients have a general feeling of weariness and "malaise", sometimes accompanied by a slight rise of temperature.

The following table shows the method of taking the baths as followed by my patient:

<table>
<thead>
<tr>
<th>8th June 1st bath</th>
<th>18th June 8th bath</th>
<th>30th June 16th bath</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th...rest</td>
<td>19th...rest</td>
<td>1st July 17th bath</td>
</tr>
<tr>
<td>8th...2nd bath</td>
<td>20th...rest</td>
<td>2nd...rest</td>
</tr>
<tr>
<td>9th...rest</td>
<td>21st...9th bath</td>
<td>3rd...18th bath</td>
</tr>
<tr>
<td>10th...3rd bath</td>
<td>22nd...10th bath</td>
<td>4th...9th bath</td>
</tr>
<tr>
<td>11th...rest</td>
<td>23rd...11th bath</td>
<td>5th...rest</td>
</tr>
<tr>
<td>12th...4th bath</td>
<td>24th...12th bath</td>
<td>6th...20th bath</td>
</tr>
<tr>
<td>13th...5th bath</td>
<td>25th...rest</td>
<td>7th...rest</td>
</tr>
<tr>
<td>14th...rest</td>
<td>26th...rest</td>
<td>8th...rest</td>
</tr>
<tr>
<td>15th...rest</td>
<td>27th...13th bath</td>
<td>9th...rest</td>
</tr>
<tr>
<td>16th...6th bath</td>
<td>28th...14th bath</td>
<td>10th...21st bath</td>
</tr>
<tr>
<td>17th...7th bath</td>
<td>29th...15th bath</td>
<td></td>
</tr>
</tbody>
</table>

The duration of the first 4 baths was 15 minutes, increasing to 30 minutes by the 8th bath.

Temperature 93°F at the beginning, 95°F at the end of each bath. The patient must take precautions on coming out of the bath, to prevent catching a chill; he will return straight to his room and will rest in bed for 1-2 hours.
for 1-2 hours after each bath.

Case VIII. M. X., at the age of 29 in the year 1867, is attacked one day with a very sharp lancinating pain in the knee, returning at equal and short intervals, as if, says the patient, this region was traversed from within outwards by an electric spark.

From this time on, the patient every 8th day, is a prey to similar painful crises, at times in the right, at times in the left knee. The pains increase in frequency and duration; they reach, two years after the commencement of the disease in 1869, their maximum intensity; the patient suffers continually, and from time to time comes on crises of an extreme violence lasting 24 to 36 hours.

In 1871, diminution of the pains, but appearance of weakness of the lower limbs, which makes it impossible for the patient to run. From 1871-75, the condition remained about stationary.

In 1876, the patient consults Charcot. At this time, his condition is as follows: lightning pains in the lower limbs, coming on almost daily, patches of anaesthesia in the legs, attacks of vertigo; the patient cannot walk on a polished or slippery parquet floor, he cannot stand up with his eyes shut, cannot walk at night, or go up a staircase without a banister; there is incontinence of urine and faeces; while walking the patient...
patient throws out his legs a little. Circumcision of the case as told, and advise the patient to go to Lamalou. It returns then 10 years in succession.

From 1875 the disease receded. In 1876 the nicotinism of urine disappears. In 1877 the bladder and rectum function almost normally. Walking with the eyes shut and at night is possible; the patient can dance on a slippery floor; the pain is less violent.

The condition improves more and more. In 1885, of all the symptoms above enumerated, there alone remain lightning pains very mild in character, and which appear not rarely. In 1887, the same condition is cure almost absolute.

Case 18. Stéliez. Patient 36. Various arthritic manifestations, before a sea bath, which was the exciting cause of the present illness. Course of Symptom. Sudden and paroxysmal, quasi-gallopping. Very distinct classical symptoms. Lightning pains; incoordination, nicotinism; loss of sexual power; absence of patellar reflex; contraction. Effects of the cure. The pains disappeared after 15 baths. The other symptoms were alleviated, then disappeared equally, with such rapidity, that it is impossible to admit the fact of a lesion, and in this very striking case, in spite of the presence of all the classical symptoms, one is

(1) Belanger. Pour effet de la cure de Lamalou sur les symptômes du tabac. C.L.
led to suspect rather the existence of a simple con-
gestion. However, it is more than 10 years since
I have been watching the patient, and the Romberg
symptom still exists. Shaking one leg, when tried
really, was almost impossible. The patient has
moreover, in the winter time, a few returns of light-
ning pains; but the other symptoms have completely
stopped for the last 10 years.

In both these cases, we see the beneficial effects
which can be put down to the cure, and doubtless in
both, had a necropsy been possible, the cord would
have shown the classical lesion of the posterior columns.

Conclusion.

Though we have no specific treatment for Locomotor
Ataxia, still I think I have shown that we have
many means at our disposal, which rationally
employed and combined tend to be curative.

The best internal treatment is undoubtedly Potassium,
employed in small tonic doses; without any
thought about its action in cases of specific history.
(Mercury is a dangerous drug, and should never
be given in Tabaes, except possibly in cases which
begin soon after the initial infection, e.g. Case VII)

If the patient can afford it, he should undergo

The Thermal
the thermal treatment at Samalou. The favourable effects of these waters, on the general health, and in the different symptoms of ataxia, are uncontrollable.

The use of douches, especially in the early stages, is an excellent method of treatment, toning and bracing up the system, and acting on the disorders of sensibility.

The general treatment of patients who are subject to gastric crises, demands great prudence and constant watching. In the intervals between the crises it is necessary to arrest the emaciation by a well regulated strengthening diet little by little the patient regains his strength. Not infrequently too, as the patient's strength increases, the crises seem to diminish in intensity. The obstructive constipation sometimes present is perhaps the most difficult condition to treat in this disease.

We now have, a whole host of analgesics, among the aromatic bodies to treat the lightning pains and crises as they arise - so we need, but most exceptionally, have recourse to Morphia.

Trinkel has put at our disposal his solicitate exercises, a very reliable treatment of the muscular coordination. The psychic and moral influence of success in being able to perform the different exercises rests on the whole system: the appetite and
Addenda.

1. The Treatment of the Gastric Crisis.

The Sulfogaotic Mixture may be prescribed as follows:—

R. Mixture.
Syrup. Sulfogaotic. 21 grammes.
Aqua. Limonis. 50 grammes.
Aqua. 200 grammes.

Sag. Horse as written in the thesis.

2. The Waters of Lamalou-les-Bains.

For references as to chemical composition vide:


and sleep improves, and the patient is more cheerful
and better in health, than when treated by most of
the tonics in the pharmacopeia. The treatment
undoubtedly requires on the part of the doctor great
patience; he has to constantly encourage the patient
to continue his efforts, the success of which so largely
depends on his own will power.

Fasciolarization is useful according to indications,
especially in the paralysis of the 1st Stage.

The lightning paresis is undoubtedly influenced
by barometric variations; they come on often with bad
weather, or at any period of change in the weather.

I have generally found my patients to be poorest from
paresis in warm dry weather. If the patient's means
permit it, we must then think of a suitable sunny
resort, e.g. Biskra or Egypt.