

is sometimes so intense as to suggest the existence of real paraplegia, with muscular contracture. In the case of the two female patients, to whom I directed your attention in the wards, their lower limbs, as you have seen, are rigid in semi-flexion; they can neither be flexed nor extended without considerable difficulty. The knees are drawn together in adduction: the feet are stiff, extended, and turned in, simulating the malformation known as *talipes equinus* (*varus*) club-foot; the toes are raised and recurved so as to form

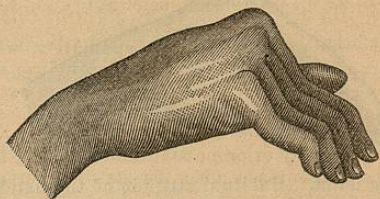


FIG. 10.—Digital deformation, simulating that of primitive chronic articular rheumatism.

a *griffe* (or claw) on account of the extension of the first and concomitant flexion of the second phalanges. Nevertheless, these women still retain the power of moving their lower extremities, though slowly indeed and with difficulty: they are even able, as you have witnessed, to walk in a kind of a way, without assistance or support. I have pointed out to you, gentlemen, that, contrary to what takes place in true paraplegia with contracture, we do not here discover that tetanic tremulation, which, whether arising spontaneously or provoked by certain attitudes, characterizes one of the varieties of spinal epilepsy. This symptom, on the other hand, is generally found in the paraplegia which frequently accompanies disseminated sclerosis, and this is a distinguishing character on which we shall have occasion to lay stress in diagnosis.

As Herr Benedikt has remarked in his recent treatise on Electrotherapeutics, the habitual rigidity of a certain number of muscles undoubtedly contributes, to a great extent, in rendering movement laborious. But this is not, we believe, the only cause that should be recognized. However, it is this rigidity which, determining the general attitude, is the reason that the patients, shrunken upon themselves as it were, seem to move all of a piece; that their joints appear "soldered together," to use a common but fairly descriptive term which I borrow from a patient; and that, finally, the head and body are kept inclined forward—a circumstance which has certainly its own share in producing that tendency to fall forward which the patients experience in walking.

Gentlemen, there are cases, though these are rare indeed, in which muscular rigidity is a symptom of the early stage of the

disease, and a really predominant one. I have recently observed an example which belongs to this category. The patient had scarcely noticed the tremor which, in fact, showed little intensity in his case, and was confined to one hand. He already displayed, however, in a high degree, the peculiar attitude of the body and its members, the difficulty of movement, and the characteristic gait.¹ Such cases are exceptional. Most commonly muscular stiffness only appears, or becomes prominent, in the advanced

¹ The following case, which we abridge, belongs to this category of exceptional facts. Guill. . . , aged 53 years (Salle St. Alexandre, No. 10, La Salpêtrière), after having, for some time, suffered from cephalalgia, wandering pains of a lancinating character, and a feeling of constriction at the epigastrium, noticed, four years ago, that the different joints of the right upper extremity were growing stiff. To this phenomenon, weakness was superadded. The stiffness and debility invaded, successively, the left lower extremity, the left arm and afterwards the right leg. In 1870, a tendency to propulsion and retropulsion made its appearance. Thus when the patient ascended the stairs to her lodging, she was propelled forward, and only stopped when she could lay hold on some resisting body; "without this precaution," she said, "I'd upset."

To-day, her condition is as follows: Head slightly bent forward, neck stiff. The brow is deeply furrowed, especially over the eyebrows, which are uplifted as are the upper eyelids: hence the physiognomy has a sort of stolid look. Utterance is free. In walking, the patient takes short steps and keeps the arms close to the body, the forearms flexed, and the hands joined together, as if for support. The fingers, taken together, are slightly bent and gathered; the whole hand is inclined outward towards the ulnar side. All the joints are stiff, but in different degrees, the stiffness being greatest on the right side. Sensation is preserved. During the night, the patient experiences a feeling of cold which passes down from the shoulder to the wrist, and returns in fits lasting from five to six minutes. The members, especially the right arm, feel heavy. When the patient wishes to rise from her chair, and is hindered from helping herself by grasping adjacent objects, she catches the legs of the chair with her hands in order to draw forward the pelvis, then she puts her hands lower down on the sides of the chair, and after some efforts and a kind of balancing to and fro, she succeeds in getting up.

Her slumber is generally short. During the night, Guill. . . keeps herself covered with the sheet only, having a thin petticoat spread over her knees because they are cold. A coverlet, she says, "would be too warm and too heavy." Let us note also an incessant need of change of posture (or fidgetiness). She is scarcely seated for four or five minutes when she asks to be placed further forward, then to one side, &c. Some moments after, she requests that her legs (which have a tendency to adduction) shall be separated; then she begs to be helped to rise. All these symptoms suffice to show that we have here a case of paralysis agitans. Nevertheless, although the disease is of four years' standing, there is scarcely any trembling, the right hand alone being affected by it, and that only for the last three months. From this it will be seen that it is possible to diagnose paralysis agitans, even when tremor is absent (B.). It was the same with respect to another patient whom M. Charcot observed, a short time ago (1872). This man, aged 50 years, was attacked by "Parkinson's disease" in consequence of a strong emotion occasioned by the attempts of the Federalists, during the time of the Commune, to incorporate him in their battalions. In his case, all the symptoms and especially the attitude were present, but the tremor was likewise deficient. Finally, Mr. Gowers has communicated to M. Charcot a case, noted by him, in the National Hospital for Epilepsy and Paralysis of London; the patient, a woman named Anne Phillips, exhibited all the symptoms of paralysis agitans, excepting the trembling, which is barely perceptible in her movements. (B.) (Note to the second edition.)

phases of paralysis agitans. Now, when it begins to be manifest, the patients have long experienced, in the execution of movements, a notable want of ease which is due to another cause.

You will readily discover, in some of the patients whom I have shown you, that laboriousness in the execution of movements which is dependent neither on the existence of tremors, nor on that of muscular rigidity; and a somewhat attentive examination will enable you to recognize the significant fact that, in such cases, there is rather *retardation in the execution of movements than real enfeeblement of the motor powers*. The patient is still able to accomplish most of the motor acts, in spite of the trembling, but goes about performing them with extreme slowness. We noticed this fact a few moments ago, in its relation to the faculty of speech; there is a comparatively considerable lapse of time between the thought and the act. One might suppose that the nervous influx cannot be set to work, in her case, until after extraordinary efforts, and, in reality, the slightest movements occasion extreme fatigue. This group of phenomena has been frequently taken as an indication of a real paralytic enfeeblement. Nevertheless, you will have many an opportunity of assuring yourselves that in cases where the disease has not yet reached its last limits, the muscular power is retained, in a remarkable degree. This fact has been verified, on several occasions, by means of the dynamometer: in some cases, even, the curious phenomenon was noted of the greatest amount of measured force being present in that member which was to all appearance the weakest and most tremulous.¹

Yet a word upon the *gait* peculiar to patients affected by paralysis agitans. You have seen some of our patients get up slowly and laboriously from their seats, hesitate for some seconds to step out, then, once started, go off in spite of themselves at a rapid rate. Several times they threatened to fall heavily forward. Does this

¹ We have examined the amount of dynamometrical force present, in six of M. Charcot's patients. The following are the results:—

- 1st. Perd.—Eight explorations: average on the right side, 60; on the left, 42.
- 2d. Guill.—Nine explorations: average on the right side, 67; on the left, 63.
- 3d. Berr.—Thirteen explorations; average on the right side, 59.6; on the left, 41.4.
- 4th. Gav.—Five explorations: average on the right side, 39.6; on the left, 43.4.
- 5th. Beau.—Five explorations: average on the right side, 65.5; on the left, 42.3.
- 6th. Dan.—Five explorations: average on the right side, 41.4; on the left, 33.3.

If these figures be compared with the standard average 85, which we obtained by similar explorations in the case of five persons of the same age as our patients, it becomes evident that the dynamometrical force, far from being preserved in paralysis agitans, is, on the contrary, diminished. It is all the more difficult to explain the divergence between the old opinion and our facts, since in two of our patients this diminution is as well marked at the early stage of the disease as at the most advanced. Finally, in three cases, the dynamometrical enfeeblement is greatest on the side where tremor predominates (B.).

irresistible tendency to adopt a running pace depend exclusively on the centre of gravity being displaced forward by the inclination of the head and body? This explanation, which may, perhaps, be admissible in some instances, will not serve for all. There are, in fact, certain patients who, in contradistinction to those described, tend to run backwards when in motion, and to fall backwards, although their bodies are manifestly inclined forward. Besides, propulsion, like retropulsion, is not absolutely connected with the bent attitude of the body, for it is sometimes seen at an early period of the disease, even before there is any inclination of the body at all.¹ In short, these are not constant and necessary phenomena; they are even frequently enough absent, and are to be found in the symptomatic tables of diseases other than paralysis agitans, as in certain cases of cerebral lesion, for example. It is, however, right to mention that, in the latter event, they are often connected with vertigo, whilst in paralysis agitans the movements of propulsion and retropulsion do not supervene in consequence of any feeling of giddiness.

The symptoms which I have just reviewed are not, gentlemen, the only phenomena which deserve to arrest your attention.

¹ These phenomena are very evident in a patient under M. Charcot's charge (Salle St. Alexandre, No. 22). This woman has attained a more advanced stage of the disease, without however being bed-ridden, than the two patients mentioned in the preceding notes. All the symptoms of the disease are met with in her case; but we shall merely select from her history the facts which relate to propulsion and retropulsion. Suppose, when seated, she is directed to arise and walk, what do we observe? She hesitates for a few moments, then bends the body forward, and after swinging herself to and fro, as it were, suddenly rises. When up, she does not set off at once; she seems to require to poise or balance herself first; she appears in some sort uncertain, the body being inclined forward; finally, she decides to start. Slow at the outset, her gait is gradually accelerated, and, after a course of ten yards, she rushes forward at such a rate that if, at a given moment, she did not find some obstacle to lay hold on—a bed, chair, or wall—she would fall suddenly. In this case, therefore, *propulsion* is as manifest as possible.

Retropulsion is sometimes overlooked because, in order that patients should be conscious of possessing it, they must have had some special occasion to walk backwards. M. Charcot employs a very simple method of exhibiting its existence. When the patient is standing, it suffices to pull her, unexpectedly and slightly, by the skirt, in order to make her immediately commence walking backward; the retrograde movement soon becomes very rapid, and would be quickly dangerous if proper precautions were not taken (B.).

The fact of the phenomena of propulsion and retropulsion being both present in the same patient furnishes an argument in support of Professor Charcot's proposition that the propulsive tendency is not absolutely connected with the forward attitude. In this case, the woman when stopped in the midst of an onward walk, being caught by the gown and gently pulled back, immediately began to recede, and this without any perceptible change of attitude. As mention has been made of the existence of a stolid look, in such patients, it will not be uninteresting to note, in relation to the question of the influence of disease on the mental faculties, that although this patient was in an advanced stage of the disease and had the characteristic facial signs, her mind appeared still active (in 1874). "Elle va comme une machine," said an observer, on seeing her walk. "Mais oui, comme une machine à vapeur," was her quick response (Sigerson).

Paralysis agitans is not merely one of the saddest of diseases, inasmuch as it deprives the patients of the use of their limbs, and sooner or later reduces them to almost absolute inaction; it is also a cruel affection, because of the unpleasant sensations which the sufferers experience. Usually, indeed (the neuralgic cases which we have already described being excepted), they are not affected by acute pains, but by disagreeable sensations of a special order. They complain of cramps, or rather of a nearly permanent sensation of tension and traction in most of the muscles. There is also a feeling of utter prostration, of fatigue, which comes on especially after the fits of trembling; in short, an indefinable uneasiness, which shows itself in a perpetual desire for change of posture. Seated, the patients every moment feel obliged to get up; standing, after a few steps they require to sit down. This need of change of position is principally exhibited at night in bed by the more infirm, who are incapable of attending on themselves. The nurses charged with their care will tell you: "They must be turned now on the right side, now on the left, now on the back." Half an hour, a quarter of an hour, has scarcely elapsed until they require to be turned again, and if their wish be not immediately gratified they give vent to moans, which sufficiently testify to the intense uneasiness they experience. In spite of these different troubles, the transmission of the cutaneous sensitive impressions is not altered in paralysis agitans; cold, heat, a pinch, the slightest touch, are all perceived, as in the normal state, and with the wonted rapidity.

But there is one very troublesome sensation which the patients experience, and which I have not found mentioned in any description; this is an *habitual sensation of excessive heat*, so that you shall see them in the heart of winter throw off the bedclothes, and in the daytime only retain the lightest garments. All the cases under our charge give evidence in favour of this assertion. It is a peculiarity worth noticing, although no reason can be given for it, that this sensation of heat is especially felt in the epigastrium and the back. Still it may affect the limbs and face also. It is not of uniform intensity at all times. It appears to attain its maximum after the paroxysms of trembling, and it is then frequently accompanied by profuse perspiration, which is sometimes so great as to necessitate a change of linen; but it may also be found in patients who do not thus perspire and who are but little troubled with tremor.

The knowledge of this fact long since led me to inquire whether the central temperature was altered in these patients. Now experience has proved to me that, whatever may have been the intensity of this subjective sensation or of the tremor, the (rectal) temperature remained at the physiological limit (37.5° C. = 99.5° F.).

You will not be surprised, gentlemen, to find that the muscular

contractions, even when so energetic and general as are those we note in certain cases of paralysis agitans, do not give rise to an accumulation of heat in the central parts. These muscular contractions are *dynamic*. Now, you are aware that *static* muscular contractions alone, as M. Bécclard has pointed out, occasion an elevation of temperature thermometrically appreciable. From this point of view, as we, M. Ch. Bouchard and myself, have endeavoured to establish, in an essay communicated to the Société de Biologie,¹ convulsions may be classed under two heads:—

1st. *Static*, in which tonic contractions predominate; these augment the temperature to a more or less marked extent. To this category tetanus and epilepsy belong.

2d. *Dynamic*, in which clonic convulsions predominate. These do not affect the temperature in a marked manner. Thermometrical explorations, which we have repeated many times in cases of paralysis agitans, and in some cases of chorea, characterized by excessive agitation, seem to us to have placed the latter point beyond all doubt.²

In connection with this question it would be interesting to determine whether the urine, in paralysis agitans, presents any important modification in its chemical composition, and, particularly, any augmentation in the proportion of sulphates, inasmuch as, according to Dr. Bence Jones, such changes take place in chorea and delirium tremens—diseases in which there is great muscular expenditure. This is a desideratum which we propose some day to make good.³

Gentlemen, the symptoms we have described to you persist, such

¹ "Sur les variations de la température centrale qui s'observent dans certaines affections convulsives et sur la distinction qui doit être établie à ce point de vue entre les convulsions toniques et les convulsions cloniques."—*Mémoires de la Société de Biologie*, 1866.

² This statement is corroborated by five new cases. Five explorations made in the case of Ber. gave an average temperature of 37.48° C. In the case of Guill. three explorations gave 37.6° . In the case of Dan. three morning explorations gave 37.3° C.; and four evening explorations, 37.8° . In the case of Grav. two morning explorations gave 37° ; and four evening explorations 37.6° . In the case of Bau. three morning explorations gave 37.1° ; and four evening explorations 37.45° . The pulse in the first case reached 90; in the second, 86; in the third, 84; and in the fifth, 80. The number of respirations, in these cases, was normal (B.).

³ Researches have since been made, in reference to this subject, by M. P. Regnard in the laboratory of Sorbonne,—two of the patients in M. Charcot's wards being placed under examination. In both cases, the urine contained a nearly normal proportion of urea, but a less than normal proportion of sulphuric acid. The average of fourteen specimens gave 19.50 grammes of urea; and 1.25 instead of 2 grammes of sulphuric acid. It follows from these analyses that the excretion of sulphates is diminished in paralysis agitans, contrary to the opinion advanced by Dr. Bence Jones when treating of chorea. In the latter affection, indeed, Lehmann and Gruner have always found a diminution of sulphates. Vogel, on his side, arrives at the same results, and he thinks that the contrary conclusions of Dr. Bence Jones must be attributed to the insufficiency of the analytic method employed.—*Note to Second (French) Edition*.

as we see them, for a less or greater lapse of time; then, sooner or later, there comes a period that heralds the fatal issue, which may be called the *terminal period*. The affection pursuing its course, the difficulty of movement increases, and the patients are obliged to remain, the whole day long, seated on a chair, or are altogether confined to the bed. Then, nutrition suffers, especially the nutrition of the muscular system. There may supervene, as I have twice observed, a genuine fatty wasting of the muscles. At a given moment, the mind becomes clouded and memory is lost. General prostration sets in, the urine and feces are passed unconsciously, and eschars appear upon the sacrum. In such cases, the patients succumb to the mere progress of their disease, by a sort of exhaustion of the nervous system; and it is perfectly true, as several authors have remarked, that at this terminal period the tremor, however intense it was before, is frequently seen to diminish and even to disappear.¹ On a post-mortem examination, it is not common to find any important visceral lesion capable of accounting for the occurrence of death. We do not observe, for instance, the lesions of caseous pneumonia, or of tubercular phthisis, which, as we shall see, usually terminate the existence of women attacked with disseminated sclerosis or with progressive locomotor ataxia.

Such, however, is probably not the most usual kind of death in paralysis agitans. The fatal termination, in fact, is frequently owing to an intercurrent disease. Trousseau thrice beheld death supervene in consequence of pneumonia, and I have noticed the same thing myself in several individuals suffering from paralysis agitans. Was this complication due to the habit which such patients have of remaining uncovered, even in the coldest weather, on account of the sensation of interior heat they experience? We are unable to affirm it.

Let us not forget, gentlemen, that paralysis agitans is one of the grave affections of the nervous system whose duration is the longest. It may last for thirty years. The symptoms of the third period may themselves, as I have witnessed, linger on for four or five years.

If I have dwelt thus minutely upon the symptomatological description of paralysis agitans, it is because it constitutes, even at the present hour, nearly the whole of the history of this disease.

The few autopsies which have until now been made on persons supposedly affected by paralysis agitans may be grouped into three classes.

The first class includes the cases in which no perceptible lesion has been met with in spite of the most attentive explorations.

¹ In the case of a patient under M. Charcot's charge (Latouil—Marie-Françoise) whose clinical history is given, *in extenso*, in the thesis of M. Claveira, the trembling completely disappeared the second day before her death (*De la Paralyse Agitan*, 1872, p. 35).

Several facts of this kind have been placed on record by different authors. For my part, I have noted three well-marked cases of paralysis agitans in which the results of the autopsies were altogether negative. At other times, we find mention made of common-place lesions, particularly of senile cerebral atrophy; now this may exist, as is well known, without the slightest tremor having been ever present.

The second class comprises the observations published by some authors,—Bamberger, Lebert, and Skoda, for instance,—under the head of paralysis agitans, and in which lesions have been found that, in all probability, pertain to disseminated sclerosis. Such are the cases of Bamberger, Lebert, and Skoda. Was paralysis agitans really the disease under consideration, or were not the clinical symptoms rather those of disseminated sclerosis? The latter was certainly the fact, at least as regards Skoda's case. We shall, however, revert to this question, on a future occasion.

Finally, the last group contains the case given by Parkinson and that of Oppolzer. In Parkinson's case, which, by the way, he relates at secondhand, it appears that there was an *augmentation of volume*, with induration of the *pons Varolii*, of the *medulla oblongata*, and of the *cervical portion of the cord*, and that in addition to this the nerves of the tongue and those of the arm were apparently *tendinous*. The latter necroscopical detail, with others unnecessary to mention, seems of a kind to throw doubt upon the value of this case from an anatomo-pathological point of view.

As to the account given by Professor Oppolzer it is scarcely more conclusive in our opinion, in spite of the importance that has been accorded it. On *post-mortem* examination there was also found an induration of the *pons Varolii*, which, after microscopical scrutiny, was attributed to a hyperplasia—a proliferation of the connective tissue. What are the characters of this hyperplasia? The narrative is silent respecting them. There is no mention, in the original text, of any atrophy of the nervous elements, nor of any signs of fatty degeneration, two lesions given, for what reason I know not, in the version adopted by Trousseau in his clinical lecture.

The foregoing considerations show, gentlemen, that the special lesion of paralysis agitans remains to be discovered.¹

¹ Since this lecture was delivered (in 1868), M. Charcot has had occasion to make three new *post-mortem* examinations. The lesions he met with are of two kinds: Those of the first, constant in these three cases, consisted in (a) obliteration of the central canal of the spinal cord by proliferation of the epithelial elements which line the ependyma; (b) proliferation of the nuclei which surround the ependyma; (c) pigmentation of nerve-cells, most marked in Clarke's column chiefly. Of the second kind of lesion, one was peculiar to two of these three cases, and consisted in a multiplication of the amyloid corpuscles—one was found only in a single case; this was a sclerosed patch on the posterior surface of the *bulbus rachidicus*. In the most marked case (of paralysis agitans) there was no lesion of the protuberantia or of the *bulbus* discovered. (For further details see Joffroy, 'Société de Biologie,' 1871.)