AN ACCOUNT ✓ OF A DEMONSTRATION ON THE PHENOMENA OF HYSTERO-EPILEPSY:

AND ON THE MODIFICATION WHICH THEY UNDERGO UNDER THE
INFLUENCE OF MAGNETS AND SOLENOIDS;

Given by PROFESSOR CHARCOT at the *Salpêtrière*.

BY ARTHUR GAMGEE, M.D., F.R.S.,

Brackenbury Professor of Physiology in Owens College, Manchester.

ON the mornings of Friday and Saturday, August 23rd and 24th, several physicians and scientific men, amongst whom were Professors Virchow, Grainger Stewart, Turner, Oscar Liebreich, Ray Lankester, Dr. Broadbent, Mr. Ernest Hart, etc., who happened to be in Paris, met in Professor Charcot's wards in the great hospital of La Salpêtrière, and had the privilege of being present at a demonstration in which this distinguished physician brought under their notice all the remarkable features of hystero-epilepsy—that remarkable disease almost all our knowledge of which is due to the labours of M. Charcot. In these demonstrations, the remarkable influence of solenoids and of magnets upon the diseased organism was exhibited, no less than the ready induction of the so-called *mesmeric* and *cataleptic* conditions in these patients. All the phases of the remarkable hystero-epileptic convulsions were repeatedly observed.

Such was the interest awakened by these remarkable demonstrations, that I have willingly complied with the request of the editor of the *BRITISH MEDICAL JOURNAL*—who was himself an interested spectator—to give an account of the principal facts which were brought under our notice on the occasion of the second demonstration.

In order that the description of these facts may be the more intelligible to those who are unacquainted with even the salient points in the natural history of hystero-epilepsy, I will summarise these briefly, as follows. Hystero-epilepsy is a nervous disease of women of great rarity, affecting them especially during the child-bearing period of life; sometimes, though rarely, occurring before the actual commencement of menstruation, and continuing after its cessation. It is associated with hyperæsthesia in one or both ovarian regions, and is usually attended by hemianæsthesia, and more rarely by anæsthesia of both sides of the body. There is some, if not complete, loss of tactile sensibility, and usually absolute insensibility to pain (analgesia) of skin, and all other sensitive structures on the affected side; the muscular sense being, however, nearly always preserved. There is some degree of paresis of the affected limbs. The loss of sensitiveness may or may not affect the organs of special sense; it frequently does so affect the eye, which becomes affected with a remarkable form of colour-blindness (achromatopsia). It is characteristic of the hemianæsthesia of hystero-epilepsy that by various means—action of magnets, solenoids, metallic plates—it may be momentarily diverted from the affected side, which then regains its normal sensibility, and transferred temporarily to the opposite side of the body. The essential and pathognomonic sign of the disease is the occurrence of attacks, which present remarkable phenomena in a definite order; at first epileptiform, then affecting the mental functions of the patient, who by gesture and actual utterance, reveals to the spectator various phases of emotional activity. The disease usually does not tend towards recovery, though recovery occasionally occurs. It may continue for many years without any perceptible influence upon the health or mental condition of the patient, and when death occurs it appears to result from intercurrent disease which, in relation to the primary disease, may be termed accidental.

Having thus sketched boldly and without detail the main features of a disease, the study of which shows, as the reader will soon learn, how scanty are our physiological conceptions of the nervous system, I present the following simple narrative of that which I saw and heard on August 24th.

1. *Induction of the Mesmeric Condition in a Patient affected with Hystero-Epilepsy.*—Being assembled in the laboratory attached to his wards, Professor Charcot brought before us a young patient aged 20 affected with hystero-epilepsy. In this patient, there exists left-sided hemianæsthesia, which is associated with hyperæsthesia in the right

ovarian region. (By perusing the account afterwards given of the convulsive attacks of hystero-epilepsy, the reader will understand the grounds for the diagnosis of the ovarian irritation in these cases.) Professor Charcot brought this patient before us to demonstrate that usually it is possible in patients affected with hystero-epilepsy to induce the mesmeric condition. The patient being seated opposite to him, at the distance of about two feet, he steadily maintained the index finger of his right hand at a short distance from the centre of her forehead; she was directed to look steadily at the finger, and did so. Several minutes elapsed (the time was not actually noted), and the patient did not seem sensibly affected. She declared that "to day she had no desire to sleep".—At 10.4 A.M., the previous attempts, which may have lasted ten minutes, having failed, Professor Charcot, placing his head on a level with that of the patient, commenced to stare fixedly into both her eyes.—At 10.6, the eyelids drooped, and, at the same time, began to wink in a rapid tremulous manner; this phenomenon continuing throughout the whole duration of the induced sleep, and being, Professor Charcot remarked, constant; at the same time, a tonic contraction of the flexors of both forearms occurred, the fists becoming temporarily clenched.—At 10.7, the patient being asleep, Professor Charcot told her to rise and take a chair. She did so, her eyes being closed and her eyelids tremulous. Having seated herself, he told her to write her name. Pen, ink, and paper being furnished her, she sleepily wrote her own name, and afterwards, when ordered, Professor Charcot's, her eyes remaining closed the whole time. Whilst writing, the skin over the right wrist was transfixed by a thick needle, but the patient appeared quite unconscious of the operation, continuing to write with the needle *in situ*. It is to be remarked that, during the mesmeric state, the patient is anæsthetic on both sides of the body; whilst, in the waking state, it is only the left side which it anæsthetic.—At 10.10, Professor Charcot told the patient to begin to sew. A half-hemmed towel was handed to her, and she at once commenced to sew with great dexterity and rapidity, co-ordinating admirably the movements of the two hands. The patient was then told to rise and go into an adjoining room used for photography; she did so, and, on her way, having to descend a step, she walked with caution and safety, her eyes being still closed. Being bidden to retrace her steps, she obeyed, and came into the room in which we were all assembled, and, turning towards the wall, remained standing listlessly, fast asleep. Professor Charcot then blew into her eyes, when she awoke. The act of awaking, in her case and in that of all hystero-epileptics who have been thrown into the mesmeric sleep, is accompanied by a peculiar reflex: there is an automatic and sudden act of expulsion of saliva—as it were a slight effort to spit.

II. *Instantaneous Induction of the Mesmeric Condition in a Patient affected with Hystero-Epilepsy: Subsequent Induction of the Cataleptic Condition: Hemianæsthesia and Colour-Blindness: Action of a Solenoid.*—An anæmic young girl, aged about 20, was next brought before us. The disease in her case had had for its origin terrible scenes of which she had been the witness during the Commune. It is to be noticed that nearly all, if not all, cases of hystero-epilepsy appear to have been connected with fright or anguish. In this patient, there was complete right hemianæsthesia, with colour-blindness affecting the eye of the same side, with which she could only distinguish red. When papers of various colours were brought before her, the left eye being kept closed, she described all, excepting the red paper, as being of a dirty white or white colour. There was complete analgesia on the right side, so that a needle could be thrust through the hand without occasioning the slightest evidence of pain. The skin of the opposite side was normally sensitive. A spiral insulated wire—a solenoid—connecting the two poles of a large single carbon-zinc and chromic acid element was now made to envelope the little finger of the right hemianæsthetic side. Almost instantaneously, the sound side became hemianæsthetic and the previously normal eye became colour-blind for all colours but red, whilst the power of distinguishing colours on the usually colour-blind eye became perfect. No sooner, however, was the finger withdrawn from the solenoid, than the anæsthesia and achromatopsia reassumed their usual distribution.

This case, as M. Charcot pointed out, was not only remarkable for the extreme rapidity with which the action of the current was developed, but also for the surprising readiness with which the patient could be thrown into the mesmeric and cataleptic conditions, as he proceeded to show. It sufficed merely to open the patient's eyes and stare into them for an instant, to throw her into a profound sleep, from which she could be aroused by certain stimuli, and especially by blowing into the face, when the peculiar reflex noticed in Case I was produced. That the instantaneous production of this mesmeric state was not due to any special influence of M. Charcot was evidenced by his allowing me to repeat his procedure, when instantly the same result followed.

The patient was now taken into a darkened room, in which a spiral of platinum heated by a powerful gas blow-pipe emitted a light almost as intense as the magnesium light. If she stared into the flame for an instant, she immediately fell asleep and passed into a cataleptic condition; her limbs, placed in the most unnatural positions, retained these until some one moved them into a new attitude.

But the most singular fact observed in connection with the cataleptic condition of this patient was the following: If, whilst deeply sleeping and cataleptic, any one stealthily approached one of his fingers or thumbs to within a short distance—about half an inch—of the patient's skin, as, for example, of the palm or back of the hand, she instantly awakened with a cry of "Ah!", evincing by its tone evident mental anguish, if not actual physical pain. When thus awakened, the patient had merely to stare at the bright light instantly to return into the cataleptic condition. We had the opportunity of observing that when she happened to be very close to the light, and watching it very intently, the approach of a finger to the skin sometimes had no effect, and that it was only after repeated approaches that she awoke, though always in the manner previously described.

Before leaving this singularly striking case, it may be remarked that Professor Charcot was led to try the action of a spiral wire traversed by a current on the hemianæsthesia of hysterio-epilepsy because of the already discovered influence of magnets, which will be illustrated in the sequel, and from the fact of the physical analogies of solenoids and magnets.*

III. *Hysterio-Epilepsy in a Woman aged 54, and who is blind: Cessation of Fits for the last two years, but Continuance of Hemianæsthesia of the Right Side.*—The case of this patient is of peculiar interest, as she has been an inmate of the Salpêtrière since the year 1846, and her case has been studied with remarkable accuracy. It will be found fully narrated, and the account illustrated with many drawings, in Dr. Bourneville's *Recherches Cliniques et Thérapeutiques sur l'Epilepsie et l'Hystérie. Compte-rendu des Observations recueillies à la Salpêtrière de 1872 à 1876*, Paris, 1876.) This woman has, it would appear, been a hysterio-epileptic for forty-three years of her life. She was formerly subject to the most characteristic attacks of hysterio-epileptic convulsions, which underwent, in the period during which she was under observation, very remarkable transitions. The disappearance of the menses was not immediately followed by a cessation of the fits; on the contrary, as would appear from Dr. Bourneville's record, in the year following the cessation of menstruation, the fits were more frequent than they had ever been, the utmost frequency being, however, reached in the fourth year after. Since 1876, however, the fits have not recurred; and now there only remains the absolute analgesia of the left side. This patient is quite blind, owing to inflammatory affections occurring in childhood, and is of very deficient intelligence. There is absolute analgesia of the left side. A needle could be thrust through the left hand or arm without occasioning any sensation. Sensibility is, however, tolerably perfect on the right side.

The patient being seated, the two poles of a tolerably large horse-shoe magnet were brought to within a third of an inch of the skin of the forearm on the affected side. From time to time, the sensitiveness of the two arms was examined by pricking with a needle. After some minutes, the arm in proximity to the magnet had regained its sensitiveness, the patient complaining bitterly when a needle was merely pressed against the skin, without pricking it, whilst the arm of the right side had become completely anæsthetic, and could be transfixed with a needle without the patient being aware of the fact. It is to be remarked that at no time during the observation did the arm touch the magnet, which was kept at a distance varying between a quarter and one-third of an inch. It might be surmised, M. Charcot remarked, that the effect exerted by the magnet was one which might be exerted by any mass of iron; not so, however. If, for instance, the convex neutral end of the horse-shoe be turned towards the arm, instead of the poles, none of the effects previously described follow.

IV. *Hysterical Contraction of the Left Arm cured by the Systematic Daily Magnetisation of the Right Arm: Ovarian Hyperæsthesia of the Left Side.*—In order to illustrate the curative action of the magnet, Professor Charcot brought before us the case of a nun who had been admitted into the Salpêtrière for a hysterical contraction which had lasted nine months. On admission, there was found to be a powerful tonic contraction of the flexor muscles of the left arm; there was also anæsthesia of the same arm; there was some hyperæsthesia of the left ovary.

Professor Charcot some time ago applied the magnet, as in Case III, to the right arm; to his surprise, he found that the contraction of the

left arm disappeared during the application, but was transferred to the right side. By repeating the proceeding daily, the hysterical contraction of the left arm is gradually disappearing; and after the magnet has been some time in proximity with the right arm, the left is found to present merely a condition of slight paresis; whilst the right becomes firmly contracted. The contraction of the right arm, thus artificially induced, lasts the whole day.

We have in this case the first example of a method of treatment which will probably be very generally successful in cases of hysterical contraction.

V. *Hysterio-Epilepsy: Absolute Cutaneous Anæsthesia and Analgesia of both Sides of the Body: Achromatopsia of both Eyes, but especially of the Left.*—In this case, by transfixing the skin with needles, M. Charcot showed that analgesia existed on both sides of the body in an absolute degree. The patient, a fine, tall, powerful, and very healthy looking girl, was quite unaware of these operations, unless her eyes happened to fall upon the transfixed spot, when she appeared to resent the act by a pouting, impatient, and almost child-like behaviour.

In this patient, the condition of achromatopsia presents features of great interest. With her right eye she can distinguish all colours but violet. It is to be noted that in the colour-blindness of hysterio-epilepsy, violet is the colour which is most easily lost; in other words, in the very slightest cases, where all other colours are distinguished, violet cannot be seen. With her left eye the patient can distinguish no colour but red. Red and blue, M. Charcot has found, are the colours which persist most, except in those cases where achromatopsia is absolute, and in which, therefore, the patient sees a coloured picture, however bright and varied its tints, as if painted in black and white; there is found to be a persistence of sensibility to red rays.

Having repeatedly demonstrated the exact condition of colour-blindness of the two eyes of the patient, Professor Charcot placed at a distance of about one-third of an inch of the left temple (*i.e.*, on the side where the achromatopsia was all but absolute), the two poles of a horse-shoe magnet. This was at 11 A.M. At 11.5 A.M., on pricking the skin of the left side of the head, which previously had been insensitive, there was slight evidence of sensibility. Her left eye is tested, and the patient is found to be still colour-blind for all colours but red. At 11.6 A.M., when a blue sheet is placed before her eyes, she sees it as white, except at the four corners, which appear slightly blue. She cannot distinguish yellow, green, or purple, even at the corners. 11.7 A.M.—She sees blue all over the sheet; and sees yellow as white, except at the corners. She cannot distinguish green or purple. 11.13 A.M.—She cannot yet distinguish green. 11.13.30 A.M.—She begins to distinguish green at the corners of the paper. 11.14.30 A.M.—She distinguishes perfectly all colours except violet. On now examining the right eye, it is found to be perfectly colour-blind, except for red. There has, therefore, under the influence of the magnet applied at an appreciable distance from the temple on the side of the colour-blind eye, been a transference of the affection to the sound side. It may be added—and the fact appears most worthy of remark—that the disappearance of the power of appreciating particular colours on the sound side coincides exactly, in point of time, with the reappearance of the sensitiveness for the same colour in the usually colour-blind eye.

In most patients affected with the achromatopsia of hysterio-epilepsy, the order of the disappearance of colours is as follows: violet; green; red; orange; yellow; blue. In some patients, as in the one now commented upon, it is red, and not blue, which persists. When by the action of magnets, solenoids, or metallic plates, the colours are made to reappear, it is in the inverse order to that in which they disappeared. There are cases where the above order does not hold in its entirety; on the other hand, it is never departed from materially; as, for instance, blue is never seen if the patient be colour-blind for green.

Leaving the laboratory in which the demonstration of the already narrated facts had taken place, Professor Charcot conducted us successively to the bedside of three patients who afforded the opportunity of studying the varied features of the hysterio-epileptic seizure.

VI. *Hysterio-Epilepsy: Absolute Hemianæsthesia with Right-sided Ovarian Hyperæsthesia: Induction of the Hysterio-Epileptic Seizure by Peripheral Irritation; its Arrest by Compression in the Right Ovarian Region: Inhibition of Fits by continuous Application of Pressure.*—The patient, a young woman of considerable vigour and intelligence, is apparently about twenty-two years of age, and is very frequently subject to the most characteristic hysterio-epileptic attacks. These attacks had been exceedingly frequent on the day preceding our visit, but had been inhibited by the systematic application of pressure to the right ovarian region, as will be more particularly mentioned in the sequel. They still continued to recur.

Professor Charcot pointed out that the hysterio-epileptic seizure, be-

* "Sur l'Action Physiologique de l'Aimant et des Solénoïdes," par MM. Charcot et Regnard. Communication faite à la Société de Biologie, Séance du 6 Juillet, 1878. *Le Progrès Médical*, No. 32, 10 Août, 1878, p. 817 et seq.

sides occurring spontaneously, can usually be induced with ease by some modes of peripheral irritation. In the present case, for instance, by suddenly "gripping" the skin of the breast on both sides, about on a level with the fifth rib, and midway between the anterior and posterior boundaries of the axilla, the patient instantly fell into the hystero-epileptic convulsion. The constancy with which the effect followed the cause was demonstrated over and over again to be absolute.

Although the various phenomena of the hystero-epileptic seizure are known to many readers through the writings of M. Charcot, it may be not uninteresting to describe them with all minuteness as they were presented before us by this patient. The attack may be conveniently divided into three or four stages.

The first stage followed the application of the peripheral irritation without the intervention of any perceptible latent period: its features were the following. The head was thrown violently backwards, the limbs and body became rigid, the respirations infrequent and stertorous; in a few seconds, the tonic spasms were succeeded by clonic spasms affecting the muscular system. A slight remission, lasting for a very few seconds, occurred, and which was spoken of as a kind of *entr'acte*, and then commenced the second stage. The first may be termed the *epileptiform stage*.

The second stage was characterised by extraordinary movements affecting the whole trunk. The back being somewhat opisthotonically arched, the body was thrown with great violence and astounding rapidity alternately on to the occiput and heels. This stage, which, like the first, is of very brief duration, is denominated the "*phase des grands mouvements*"; during its continuance occur the first hallucinations, to be afterwards referred to. The violent movements cease almost instantaneously, and then follows

The third stage, or stage of emotional attitudes (*phase des attitudes passionnelles*). During this stage, the patient assumes successively the expression of face, the attitudes, and the gestures which portray varied emotions, intense and varied. The varied emotional states will be distinguished in the order in which they occurred by letters.

a. No sooner had the great movements ceased, than, raising herself into a sitting posture, with clenched fists and menacing expression, the patient presented the most startling picture of one threatening; but almost instantly the picture changed to

b. The whole expression and attitude portrayed cowering, abject fear. Of no longer duration than a, b was followed by stage

c. The patient now assumed an expression of absolute beatitude. It is impossible to describe the look of saintly happiness, as of one who realised the blessedness of heaven, which the patient presented. It was the expression which some of the old masters have impressed upon their saints and martyrs.

But now occurred a change no less striking than the preceding.

d. The expression of saintly happiness was succeeded by one of intense joy; the patient sees one whom she loves; she beckons to him to come, to come quickly; he has come.....Then succeed gestures which stamp this as the *phase of lubricity* of the stage of the emotional attitudes.

e. Again fear takes possession of the patient; at first it is rats which she sees, and which she appears to fear the attack of, which evoke passionate exclamations of dread and disgust; then it is obviously the fear of some human being which oppresses her, and causes her to beg for mercy.

f. There is no longer fear. The patient hears the strains of music; she is pleased; she herself begins to hum the tune, but only for an instant, for

g. Her singing is followed by weeping, which is broken by reproaches addressed to her parents as the causes of her misery. This last phase (g) in the stage of passionate attitudes may be made to constitute a fourth stage, or a stage of recovery, in which hallucinations persist for a time.

Reference has been made in the preceding pages to ovarian hyperæsthesia as a characteristic symptom in cases of hystero-epilepsy, and more may be said on the subject in connection with the present case. The ovarian hyperæsthesia is evidenced, firstly, by a great tenderness in the region of one or both ovaries; it is usually on the side on which analgesia exists that the ovary is hyperæsthetic; secondly, by the hystero-epileptic convulsions frequently commencing by an *aura* which seems to take its origin in the hyperæsthetic ovary; thirdly, by the extraordinary fact that, at any stage, an attack of hystero-epileptic convulsions may with certainty be instantly cut short by firm pressure made with the fingers or fist in the region of the hyperæsthetic ovary. This inhibitory power of pressure upon the ovary is as surprising as is the influence of definite peripheral irritation in inducing the attack. At the instant that pressure is made in the ovarian region, two results always follow: firstly, the patient's mouth opens and the tongue is

spasmodically extruded; and, secondly, the convulsions cease. The patient can then always describe the hallucinations to which she was subject at the particular instant; and it is found that these hallucinations are always constant—i.e., the same attitude corresponds to the same hallucination. The first, or epileptiform, stage is associated with no hallucinations, as is discovered by cutting the attack short during this stage.

The invariable inhibition of the attacks by temporary pressure on the ovary has suggested the advisability of using continuous pressure to prevent the attacks. On the day preceding our visit, the patient whose case I am now relating having had a very large number of fits, an apparatus just constructed by Dr. Poirier, and which enables pressure to be made steadily on one ovarian region (very much as the abdominal aorta is compressed by Lister's tourniquet), was applied; and as long as the pressure was kept up—i.e., for several hours—no fit occurred. Three minutes after it had been taken off, the fits recurred.

VII and VIII were the cases of hystero-epilepsy in which we had the opportunity of studying the features of the attacks. In VII, the epileptic stage was accompanied by a most piercing epileptic shriek. This patient is subject every night to libidinous hallucinations which have the closest resemblance to those for which innumerable women were burnt as witches during the fifteenth and sixteenth centuries.* Patient VIII was remarkable for the extraordinary attitudes which she assumed during the third stage. Her attitude of "disdain" was typical of that emotion, and excited as much surprise as the expression of beatitude of patient VI.

Having discharged the task which I had imposed upon myself of narrating as faithfully as possible the wonderful and suggestive facts which Professor Charcot brought before us, I cannot refrain from adding a few reflections which have been suggested by them.

The reader who is acquainted with physics and physiology will at once admit that many of the facts narrated are absolutely inexplicable in the present condition of physiology. The influence of magnets and solenoids at a distance on the nervous system of certain patients is one of the most inexplicable of these. To me it was the most interesting, as four years ago I had been led to make several experiments with a view to determine whether the physiological properties of muscle and nerve in the frog are modified by placing the nerve between the poles of the most powerful electro-magnets, the results which I obtained being purely negative. Professor Charcot has very recently been led, by the striking influence of the magnet and solenoid on his patients, to try similar experiments on the frog, and he also has arrived at negative results.

But, if the fact that magnets and solenoids at a distance exert an action on the nervous system be startling, how much more so are those undoubted facts of the transference of sensibility under their influence? Here we are obliged to express ourselves as did Claude Bernard to Professor Charcot a short time before his death, when brought face to face with the same phenomena in the Salpêtrière, "that the facts show how little we do know".

To me the facts which I have described appear specially valuable as calculated to teach a lesson which I am convinced the physiologists of England ought to learn. For a long time I have felt very keenly that the divorce which it has been attempted to bring about between physiology and medicine is certain to be of infinite injury to both these sciences, but especially to the former. It has been too much the fashion with us to imitate in certain matters all that is done in Germany. The complete separation of physiology from the practice of medicine is, I am sure, one of the steps which, because it had something to commend it, has been adopted without a proper understanding of the evil consequences which will result from it. That physiology should be taught by persons who have educated themselves in a special manner in the sciences which are necessarily its bases—by persons who, so long as they continue to teach it, are untrammelled by the engagements of a large medical practice—is intelligible enough, and, without question, expedient; but to go further, and to tear away the physiologist from the hospital and shut him up in his laboratory—to put him very much in the same place as his colleague the professor of chemistry—is to shut him off from the material which, in the future as in the past, will be the most suggestive of great discoveries, if it be not actually needed to place the absolute seal of truth upon the most important generalisations arrived at in the laboratory.

Confessedly, physiology derives its facts from many sources—from anatomy (human and comparative), from development, from a study of

* See *De la Folie* . . . *Description des Grandes Epidemies de Délire*, par L. F. Calmeil. Paris: 1845.

the operations of the organism in health, and from the observation of the facts of disease. It may be said with truth, that the experiment which is performed for us by the ravages of a morbid process is often infinitely more subtle, and, if properly analysed, infinitely more profitable, than the analogous experiment carried on by the most skilful physiologist; and this I say, though I am convinced of the incalculable value of physiological experiments. It is not difficult to prove the thorough accuracy of the above proposition; and I shall endeavour to do so by referring to the following examples illustrative of the kind of facts which clinical study is able to contribute to physiology.

1. The fact taught us by the careful clinical study of paralysis affecting the seventh and fifth cranial nerves, that the lingual branch of the fifth is *not* the nerve of the special sense of taste for the anterior two-thirds of the tongue, but that the fibres which supply this region with gustatory sensibility make their way into the chorda tympani (and thence, doubtless in a roundabout manner, into the glosso-pharyngeal):—this fact illustrates how valuable may be the information supplied by the study of disease; specially valuable, because no induction from anatomical facts and no experiment upon a lower animal could have led to the result.

2. The phenomena of locomotor ataxia indicate a conduction of tactile impressions by the posterior columns of the cord in a manner which no experiment upon a lower animal would have done, and convince one that a detailed knowledge of the functions of the cord is to be acquired, probably, more by a study of spinal disease than by experiments on lower animals, great though the results have been which have followed the labours of such men as Brown-Séquard, Vulpian, and Goltz.

3. The facts of diabetes, incomplete though our knowledge of that disease is, are more valuable in establishing the possible origin of hepatic glycogen from proteids than any experiments of the laboratory.

4. On the important question of the relation of the liver to the formation of urea, all the purely physiological researches hitherto published have been eminently unsatisfactory. They establish a *presumption* in favour of such a connection, but nothing more. On the other hand, the careful clinical work of the last twenty years, when properly analysed, places it beyond a shadow of doubt that the integrity of the liver-cell is essential to the production of the chief product of nitrogenous waste—urea.

The above examples occur to me as amongst the most striking proofs of the kind of evidence which clinical medicine has afforded to physiology, and which could not have been obtained in any other way; and if I adduce them, it is because I feel that there is great need that those whose convictions are strong should insist upon the disastrous policy of depriving the physiologist of medical experience. Because a rich harvest of discoveries has been gathered in by the zealous workers of the modern German school, who have worked in laboratories and not in hospitals, it has come to be considered that the laboratory is the one field in which the physiologist has to labour. He must be a chemist, a physicist, a comparative anatomist, an embryologist; but a physician he need not be, and a physician's experience he need not have: all phenomena which are to be studied upon the organism of the lower animals, dead or alive, he is to study personally; but the study of the phenomena of disease he is to learn only at second-hand—from the physician. He must devote years of his life to master the numerous branches of physical and natural science: he is not to grudge the hours of labour devoted to keeping and extending a knowledge of them; but the hours which he would spend in discharging the duties of a hospital physician, in coming face to face with the experiments of disease, and in bringing the light of his science to bear upon its elucidation—these he is to look upon as hours taken from his science!

Why should we study the phenomena of reflex action, as they are manifested by a decapitated frog, *at first-hand*, and get our knowledge of such startling facts as those narrated in this paper, *at second-hand*, from the physicians who observe them?

NORTHAM.—The Northam Local Board and Urban Sanitary Authority, Devonshire, having delayed dealing satisfactorily with the sewerage of Westward Ho, notwithstanding the repeated and renewed complaints of the defaults of the Local Board in the matter, the Local Government Board have directed one of their inspectors to hold a local inquiry, under Section 299 of the Public Health Act, 1875, not only as to the default of the Board, but also as to whether it may not be advisable (1) to dissolve the district and merge it in the rural sanitary district of the Bideford Union; or (2) to separate Westward Ho from the Local Board District, and merge it in the Rural Sanitary District; or (3) to diminish the number of the members of the Local Board.

SECOND REPORT

ON THE

METALLOTHERAPY AND METALLOSCOPY OF DR. BURQ.

Made to the Society of Biology by M. DUMONT-PALLIER, in the name of the Commission, composed of MM. CHARCOT, LUYS, and DUMONT-PALLIER, August 10th, 1878.

THE kind reception which you gave to the first report of the Commission has encouraged us to continue our experiments. We have not exhausted the subject; for when an experimental research is once started, facts are discovered which had not been suspected and which have often a greater value than those for which scientific demonstration is sought. *A propos* of this general remark, you will remember that the Commission, in confirming, by numerous experiments, all the metalloscopic phenomena denoted by Dr. Burq, had also ascertained that feeble electric currents could determine analogous phenomena to those produced by the external application of metals, and that the return of sensibility to one-half of the body, was frequently accompanied by loss of sensation in the opposite side. To this experimental fact the Commission gave the name of "transference of sensation". Finally, by the external application of metals, the Commission obtained—not without some astonishment—the persistent return of sensation in those patients in whom the hemianæsthesia was due to an organic cerebral lesion. All these facts are present to your memory, and their novelty certainly not a little contributed to impress them on your minds. Further, the Commission has, through its President, M. Charcot, personally demonstrated to you many of these facts: facts which may be considered as belonging to the domain of science. The moment had now arrived, by means of new experiments, to verify and to confirm M. Burq's second proposition: "That the external metallic aptitude being known, the same metal administered internally will determine the same results as its external application." We determined, therefore, to study, in the same patients who had been the subjects of the metalloscopic experiments, the effects of the same metals administered internally. We assured ourselves, first, of the hysterical condition of each of the patients before commencing therapeutical experiments, and also that the drugs were actually taken by the patient in the manner ordered. Either M. Charcot himself, in whose wards were the patients under observation, or his interne M. Oulmont, administered daily various metallic preparations for three months from August 26th to November 17th, 1877; and exact records were kept of the results obtained. We further made many new metalloscopic and electrical experiments on the patients during the period of treatment. These experiments often caused us much surprise. I will now, gentlemen, lay before you the results obtained. An account will also be given of new metalloscopic experiments on relapsing anæsthesia and amyosthenia.

CASE I.—Marçillet, aged 27; ill for eleven years; ovaritis on the left side; sensitive to gold. On June 11th, 1877, she began to take, and took daily, a draught containing 2 centigrammes of chloride of gold and sodium.—June 28th. Complete return of general and special sensation; muscular power, 31 kilogrammes for the right hand, 26 kilogrammes for the left. The general condition was greatly improved, the appetite very large, and weight much increased. Menstruation reappeared after two years' cessation, and leucorrhœa was diminished. By the beginning of July, the dose of chloride of gold and sodium was raised to 5 centigrammes a day. It was not, however, well tolerated by the stomach. Its use was therefore suspended, and a decrease of sensation and muscular power was observed from the 3rd to the 19th of July.—July 20th. The mixture, containing 3 centigrammes, was again taken and tolerated.—July 31st. Sensation and muscular power normal. General condition very satisfactory.—August 1st. Menstruation regular.—August 26th. Sensation normal, both on the right and left side. Muscular power was 30 kilogrammes, right hand; 26 kilogrammes, left. Having obtained these results, we applied externally plaques of gold