At a lower degree of attenuation, the stream of electrode matter pushes back the attenuated gas, and this explains the dark space which appears in the tube. This dark space is analogous to the dark space in a gas flame, which is to be seen near the mouth of the gas tube, and is produced because the outstreaming gas pushes back the particles of air which, coming from an opposite direction, try to enter the tube.

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Another observation of Mr. Puluj also contradicts the conclusions of W. Crookes. Puluj has observed that, at a higher attenuation, the electrode is moving towards the aluminium side, *i. e.*, in opposite direction from that observed by W. Crookes. According to Mr. Crookes the cause of motion is a double one, the higher temperature of the electrode at the metallic side and the emission of electrode particles.

Both effects are opposite. At a lower attenuation the effect of the heat is greater, and the electrode moves in the direction of the wings of the radiometer, with the colder side ahead, at a higher attenuation, the effect of the emission of electrode particles is predominant. Radiant electrode matter and the electrode itself move in the *same* direction.

This remarkable discovery proves not only the incorrectness of Mr. Crookes' explanation, but is also in direct opposition to the principle of the preservation of the centre of gravity, which is made by Mr. Crookes the basis of his arguments.

The Vienna scientist draws from his observations the conclusion that the forces by which the electrode particles are torn off are not interior but *exterior* forces. When the electric current passes through the electrode, there is, according to his opinion, really a stream of extremely fine matter (ether) flowing, which not only tears off particles of the electrode, but also sets the whole electrode into motion.

This view seems to be a new proof of the unitarian hypothesis, which maintains that an electric current is nothing else but a current of ether.

Even if the number of scientists who follow the dualistic hypothesis of electricity is by far greater than that of the Unitarians, the view of the latter deserves at least our attention, especially when such men as Franklin, Secchi and Edlund approved it.

THE MAGNET IN MEDICINE

Translated for "SCIENCE" by Thos. B. Columbia.

Some recent researches made under the direction of Prof. Charot in his laboratory at the Salpêtrière have drawn attention anew to a therapeutic agent known for a long time, but to-day almost abandoned. We find, in fact, even in the works of the oldest authors, traces of attempts made by physicians to apply the magnet in the treatment of disease.[1] But the want of precise rules in its application and the appearance of mystery and of fancy which is attached to this kind of research explain the discredit into which this means of treatment has fallen.

We are indebted to Prof. Maggiorani for having undertaken, in about 1869, the restoration of magnetic therapeutics, by seeking to establish it upon rational and truly scientific principles.

It was in the train of the experiments undertaken by the Commission appointed by the Biological Society, of Paris, with the object of verifying the facts collected by M. Burq under the generic title of Metallotherapy,[2] that the first attempts toward the application of the magnet were made at the Salpêtrière. After the results obtained by the application of metals, it was natural to seek to clear up the singular phenomena by varying as much as possible the conditions of the experiment. In this way it was shown that the plates of the different metals were not the only agents capable of acting upon a certain class of diseases (neuroses, and particularly hysteria, organic affections of the cerebral nervous system). Similar results were attained with many physical agents: feeble currents, statical electricity, vibrations of sonorous bodies, differences of temperature, magnetized bars, electro-magnets, solenoids, etc. Very soon the magnetic bars were noticeable for the constancy of their action and facility of their use.

Magnets are, therefore, not endowed, from this point of view, with specific properties; they form part of a group of physical agents which, to different degrees, possess the same power of impressing the nervous system and of giving rise to biological phenomena; and although magnets are here particularly spoken of, it must not be forgotten that they are not the only ones concerned.

The status of the question has been clearly exposed by Dr. Vigoroux in the *Medical Annual* (1879). To this article I must refer those who wish to become acquainted with the *ensemble* of phenomena, which are included under the name *metalloscopic*. These studies, begun at the Salpêtrière, have given rise to active discussions. The facts announced have been confirmed, wholly or in part, in Germany by Müller of Grätz, Westphal, Vierordt, Schiff, Adamkiewicz of Berlin; Benedick of Vienna, Rumpf of Dusseldorf; in Italy, by Seppilli, Maragliani, and especially Maggiorani; in England, by Gamgee, Sigerson, H. Tuke; in France, outside of the work of the Commission, I will mention only the thesis of M. Aigre and the observations of MM. Dumontpallier, Vigouroux, Landouzy and Debove, who have verified the therapeutical action of the magnet. But the results obtained were sharply attacked on the other side of the Channel by Hughes, Carpenter and Noble, who attempted to explain them by "expectant attention." In a thesis read before the Faculty of Medicine of Paris in 1878, Mr. Oscar Jennings made himself the champion of the ideas expressed by these English writers.

As to what relates to the magnet itself we are going to show, summarily, the arguments upon which are based its physiological action and its therapeutical use.

The action of the magnet, among effects produced by other physical agents of which we have spoken (plates of different metals, electricity, vibrations of the diapason), presents itself in a more surprising way, and, indeed, in a way *à priori* prone to excite incredulity. The application is not direct. The magnet is not placed in contact with the skin of the subject upon whom the experiment is tried, as it is necessary to do with other metalic plates, its action being exerted at a distance. It is sufficient to influence the organism, and produce the same effects as other metals, to place the magnetized bar at a distance of one to two centimetres from the portion of the body upon which we wish to make an impression. All the experiments at the Salpêtrière have been made with these conditions. The effects produced in these cases were not attributed to the action of the metal, and belong properly to magnetism itself.

The magnet, let us say, acts in some way on the organism when in these special morbid conditions. Before speaking of the facts which prove peremptorily that this action exists, can we not, if not explain it, at least conceive of the possibility of such an effect. The action of

[1] Among the authors who have given attention to the action of the magnet in medicine, we may cite: Pliny the Younger, Paracelsus, Albert the Great, the older Hell (1770), Mesmer (1779), Andry and Thouret (1780). Becker (1829).

[2] See *La Nature*, Feb. 17, 1877.

physical forces upon biological phenomena has long since been admitted; who does not recognize the importance of heat, of light, and of electricity upon the vital manifestations? In medicine electricity, under its different forms, is daily employed in the treatment of a multitude of diseases. Why refuse to one physical force that which we accord to all the others? Why, if all physical agents are only varied forms of the same force, should they not all exert an action upon the organism in a measure different for each of them? And then why should not magnetism, which possesses in such a high degree this very singular property of influence at a distance, be able in physiological order to produce analogous effects?

If from conjectures we pass to the consideration of facts, we are forcibly convinced that this physiological action of magnetism at a distance does truly exist.

In physics, experiment leads to a, in some degree, tangible result; it is undeniable; it forces itself upon us. Bring the poles of a magnetized bar near to some iron filings and you have the conditions for the experiment; the iron is attracted and there is the result. Discussions may arise upon the theory, upon the interpretation of the fact, but the fact itself is always present. Furthermore, as it is easy to appreciate exactly all of the circumstances of the experiment, we are certain that with the same conditions given, we shall always obtain the same result. In a word, the experiment can be easily repeated. In physiology experiment is surrounded by the greatest difficulties, but the result is neither less significant nor less certain. As regards experiments made with the magnet, it can be shown that they fulfill all the conditions of certainty of physical experiments.

In the first place it is necessary that the application be well done; that is to say, that the magnet ought to be in good condition and properly placed. It is not necessary that the magnet should be very large, nor endowed with very energetic properties; it is sufficient if the magnetic force exist in an appreciable degree. The experiment has often been attempted with false magnets, that is to say, with bars or horseshoes of variable substance, zinc, copper, wood, etc., not possessing any magnetic action, but having all the appearances of true magnets. In these cases the experiment has always given negative results. Likewise, in making use of the electro-magnet, the action upon the organism takes place only when the established current gives to the soft iron its magnetic properties. It is necessary also that the magnet should be properly applied; the poles alone acting, the neutral portion should remain absolutely without effect. This is easily accomplished when using the magnet in the form of a horseshoe and by presenting it successively by its open and its closed side. A patient has his eyes bandaged; the magnet is applied to the region of the back, in such a manner that he shall have no knowledge of its position, and physiological phenomena always follow such application of the poles, and never follow the application at the neutral line.

But is it easy to verify the result obtained? How does the magnet work? How is its action demonstrated? Does it not depend, one will say, upon phenomena of sensibility which are purely subjective and appreciable with great difficulty to the experimenter, who is obliged to trust to the word of his patient? I will reply at once that it is sufficient to have assisted at a single one of the experiments at the Salpêtrière to be convinced that these phenomena, subjective it is true, can be easily rendered objective. A large needle made to pass unawares through the flesh of the subject whose eyes are kept carefully bandaged, shows in an absolutely objective way the profound anæsthesia which the parts have attained. But the phenomena of sensibility are not the only ones produced; the magnet has an influence upon temperature, as the thermometer distinctly shows.[1] It acts also on the *molilité* of the parts to which it is applied, provoking contractions of an intensity and of a duration which removes all suspicion of simulation. The physician must be a mere novice who could mistake a prolonged and voluntary contraction for a true contracture. Now, the magnet produces in certain cases true contractures. (*La Nature.*)

DR. P. RICHET.

(*To be continued.*)

[1]M. Broca presented to the Academy of Medicine, at the Session of February 7, a note from Dr. Henrot (of Reims) upon the action of the magnet in hemihypothermia. He states that the application of three magnets to the cold limb raised its temperature from 1.8° to 2.3° in twenty minutes, at the same time lowering the temperature of the normal member two-tenths of a degree.

NOTES AND QUERIES.

To the Editor of Science:

[1.] In the 3d. July number of SCIENCE, under "Notes and Queries," J. H. G. desires "reliable information concerning the Tuckahœ."

I will tell him what I know concerning it, in regular sequence with his questions:

1st. What is its geographical distribution?

I know, from North Carolina to Texas, along the gulf States—presumably elsewhere also.

2nd. What is the nature of its growth and production?

An underground fungus or root, growing under the surface like the truffle. Belongs to the gasteromycetous fungi, according to Lindley and Fries.

3d. Its former use and preparation?

Used as bread, by roasting in the ashes, both by Indians and negroes.

4th. In what soil found?

Sandy or loamy surface with sub-soil of clay.

5th. What authors have mentioned it?

Dr. McBride and F. P. Porcher of South Carolina; Clayton, Le Conte, M. J. Berkeley, Fries & Lindley.

6th. By what botanical name is it known?

Lycoperdon solidum.

7th. Has it any medicinal virtues?

I know of none.

It is considered very nutritious hence its name *tuckahœ*, which is Indian for *bread*, and is highly prized by the negroes, who eat it to this day.

There is a district of country in the eastern counties of North Carolina called Tuckahœ from the abundance of these subterraneous bodies.

Although the Tuckahœ has been placed among the fungi, yet there is considerable doubt as to its true position in the vegetable kingdom.

Analysis shows it to consist almost entirely of pectic acid, which would seem to remove it from the fungi, and yet the entire absence of vascular or cellular structure of bark, etc., would seem to remove it equally as far from the phænogams.

I hope these few *enseignments* may help J. H. G., and that he will favor us with the results of his further researches.

MRS. M. J. YOUNG,

HOUSTON, TEXAS, July 19th.

THE Rev. W. Cowell Brown, Wesleyan minister of Sheffield, has patented an invention which appears to be a simple and practical means of lessening the number of deaths by drowning. A chemical preparation is inserted in a portion of the coat, waistcoat or dress. It does not add to the weight, or in any way alter the appearance of the garment. The preparation is inserted between the lining and the cloth; in the case of a coat, it is placed on each side of the coat and up the back. The moment a man falls into the water the coat becomes inflated, and he cannot keep his head under the waves. The invention has already been thoroughly tested, and it is stated that it will sustain a person in the water as long as he can possibly endure the exposure, say forty-five or fifty hours.