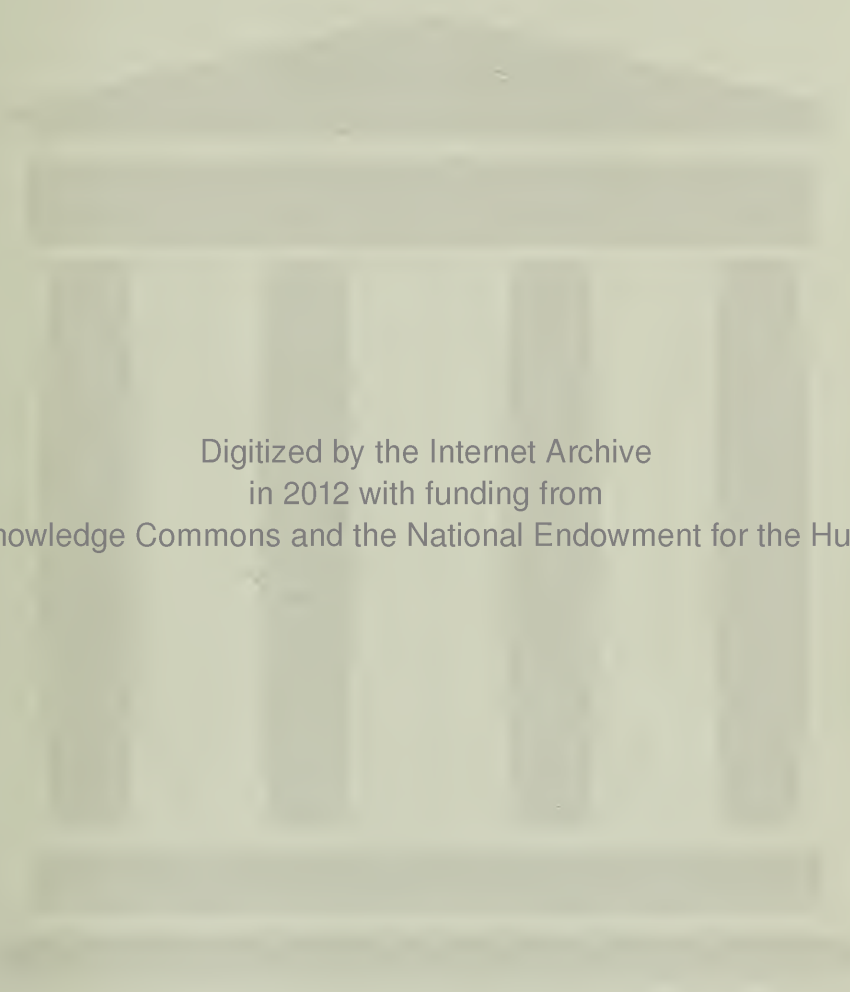




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ELECTROLOGY  
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NEUROLOGY:

A JOURNAL OF

*Electro-Therapeutics and Nervous Diseases.*

EDITED BY

GEORGE M. BEARD, A.M., M.D.

NEW YORK:

T. L. CLACHER, No. 107 EAST TWENTY-EIGHTH STREET.

LONDON: H. K. LEWIS, No. 136 GOWER STREET. PARIS: J. B. BAILLIERE.

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GEORGE M. BEARD, A.M., M.D.,

MEMBER OF THE NEW-YORK SOCIETY OF NEUROLOGY AND ELECTROLOGY; OF THE  
MEDICO-LEGAL SOCIETY OF NEW-YORK; FELLOW OF THE NEW-YORK  
ACADEMY OF MEDICINE, ETC., ETC.

Vol. I.

MAY, 1874.

No. 1.

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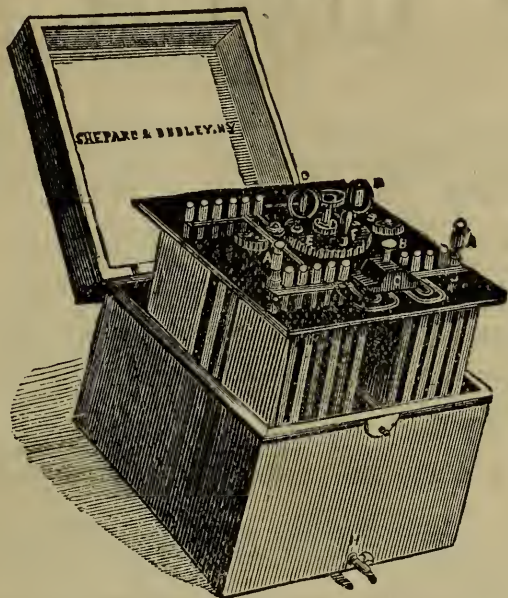
**Cod-Liver Oil, with Phosphate of Lime.** This is an agreeable emulsion, holding three grains Phosphate of Lime in each table-spoonful.

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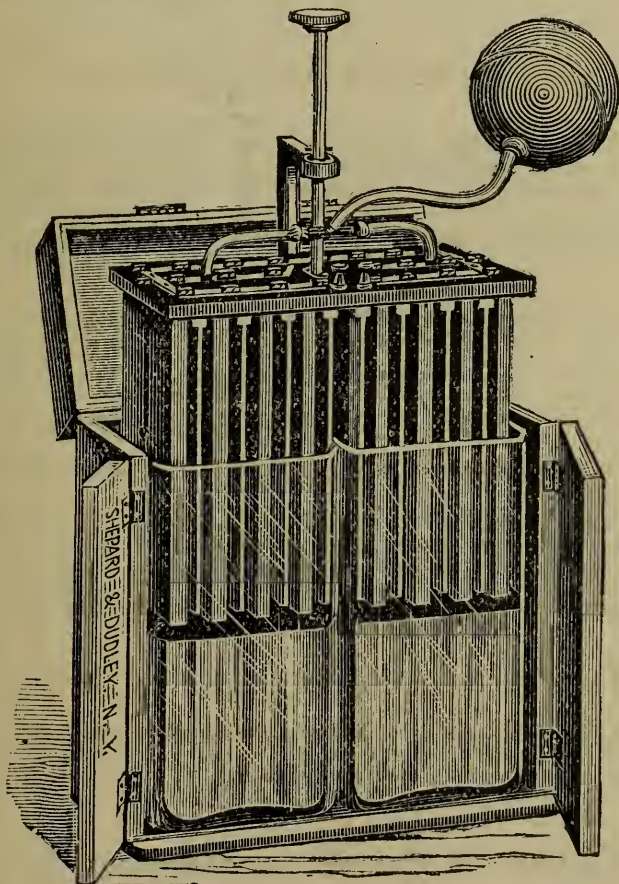
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Each quart contains, in addition to the medicinal constituents of the pure oil, 16 grains of *Iodine*, 2 grains of *Bromine*, and 2 grains of *Phosphorus*, which render it, therapeutically, five times stronger than the richest Cod Liver Oil.

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We add a few extracts from the flattering notices received from the editors of the medical press of the United States :

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"We have personally used Mr. Fougera's Compound Iodinised Cod Liver Oil, and can, from experience, pronounce it one of the best articles of the kind now in use."

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April, 1867.

"We can speak most sincerely in approval of the elegant appearance and purity of Mr. Fougera's Compound Iodinised Cod Liver Oil. Its increased medicinal power will commend it to all who are in need of such a remedy."

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July, 1868.

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#### From the RICHMOND AND LOUISVILLE MED. JOURNAL.

August, 1868.

"Both in this State and in Virginia, private practitioners have been questioned in regard to their experience with this preparation, and the testimony has, without exception, been extremely favorable. The general belief is, that the oil is equal to any that is made, and that the blending, pharmaceutically, Iodine, Bromine, and Phosphorus with it, produces more satisfactory results than where good oil and some preparations of iodine are given separately."

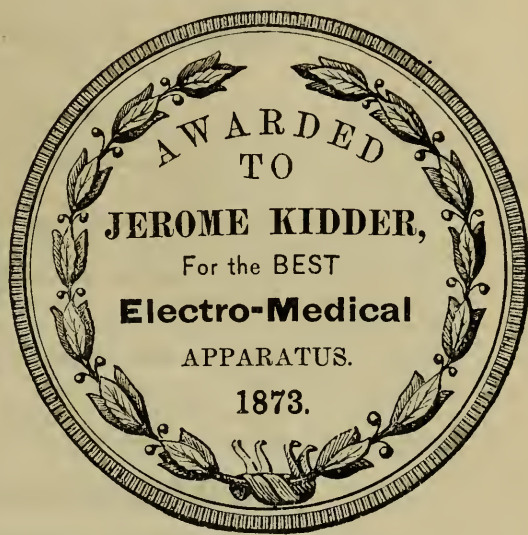
#### From the CANADA MEDICAL JOURNAL.

November, 1868.

"Having made use of Fougera's Cod Liver Oil in several cases, it has impressed us as being of really good therapeutical value, being much more speedy in its action than the ordinary Cod Liver Oil. It seems applicable to all cases where Cod Liver Oil is demanded ; but, in our experience, it is of essential benefit in cases of spinal disease and rickets."

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1. The section on Electro-Physics will be enlarged and divided into several chapters, making in all about 100 pages.
2. The section on Electro-Physiology will be mostly rewritten, and will include the most recent researches, with a discussion of their practical bearings on Electro-Therapeutics.
3. In the section on Medical Electricity, the history of Electro-Therapeutics will be considerably extended ; the chapter on batteries entirely rewritten and illustrated ; a new chapter added on general and practical suggestions to Electro-Therapeutists ; the method of *Central Galvanization* will be described and illustrated ; also the clinical chapters thoroughly revised and the number of cases increased several fold. Several new clinical chapters will be added.
4. The section on Electro-Surgery will be almost entirely new, will illustrate both the methods of electrolysis by a variety of cases, and will fully describe galvano-cautery.

## NOTICES OF THE FIRST EDITION.

By the ablest critics, both at home and abroad, this work has been received with unanimous praise.

The work has been translated into German by Väter, of the University of Prague. The translator in his preface speaks as follows :

“Beard and Rockwell were well and favorably known as Electro-Therapeutists, not only in their own country, America, but also in Europe, and more especially in Germany, long before the appearance of their last work, which is here translated. Their greatest merit consists in their truthful delineations of their cases ; they do not profess to be uniformly successful.

“The practitioner finds not only explained the fundamental laws of physics, a knowledge of which is so indispensable to the rational employment of Electricity, and the Electro-Physiological and historical part thoroughly described, but the work contains, if I may use such a term, the cream of all known writers on Electro-Therapeutics which have appeared until now, besides a valuable collection of well-described cases, which were treated by the authors with electricity.

“A part of the work is given to general electrization, which is useful to the special as well as to the general practitioner. Although general electrization had been used before by some Electro-Therapeutists, yet to Beard and Rockwell belongs the credit of having given it a scientific basis, and reduced it to a system. I have thoroughly and fully convinced myself of the advantages which may be obtained from this method, I can therefore conscientiously recommend the employment of general electrization in many cases.”

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“The impression it gives at first sight is very favorable ; it is beautifully printed, and illustrated with wood-cuts in a way which can not fail to be most useful to students.

“The matter of the volume, again, is admirably arranged ; better than in any book of the kind which I have seen.

“References are numerous and accurate, and we are delighted to have that which we lack so much in almost all other such books, namely, complete indexes, both verbal and bibliographical. They have perfected, if they did not originate, a method of Electro-Therapy which they call general faradization.

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"Supplies a long-existing want in Electro-Therapeutics.

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"In the arrangement of their material, in the presentation of their subject matter, in the scope of their studies, in the manly though modest manner in which they press their own views, and in the very attractive manner in which the volume is published, Drs. Beard and Rockwell must be complimented as having produced a very readable and instructive work on medical electricity, and one which will, perhaps, answer the requirements of the busy practitioner better than any single work on the subject which has appeared in original English or been translated from a foreign language."—*New-York Medical Record*.

"It is unquestionably the best and simplest authority on the subject at present accessible. Those who want in this connection to be abreast of the times, can purchase a work which will be most satisfactory and reliable."—*Richmond Medical Journal*.

"One feels inclined to congratulate the authors that they have so fairly represented the science in so simple a manner, and made the art of electrization the possible property of every physician. The complicated methods and nomenclatures that have disheartened the puzzled works of previous authors on this branch of medicine, have been pruned of redundancies and confounding synonyms."—*American Practitioner*.

"The authors of the above work have been long and favorably known to the profession in connection with the subject of Medical Electricity. They have presented to us, in a compact and practical form, about all that is at the present known on the application of Electricity in the treatment of diseases."—*Leavenworth Medical Herald*.

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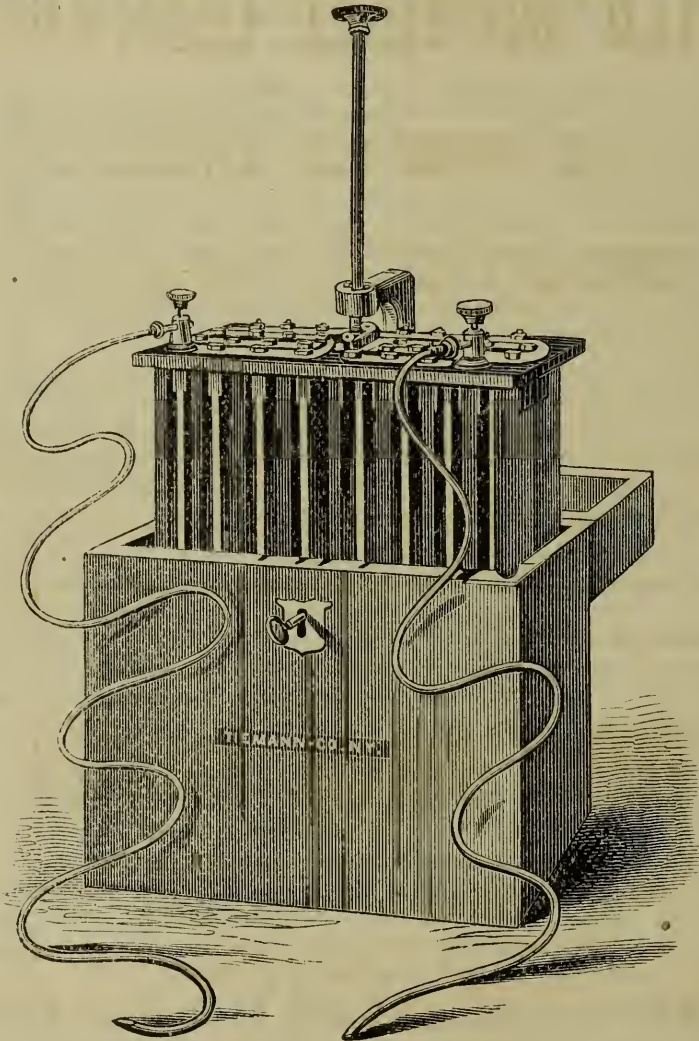
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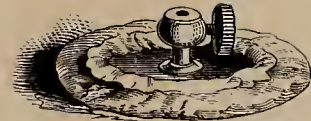
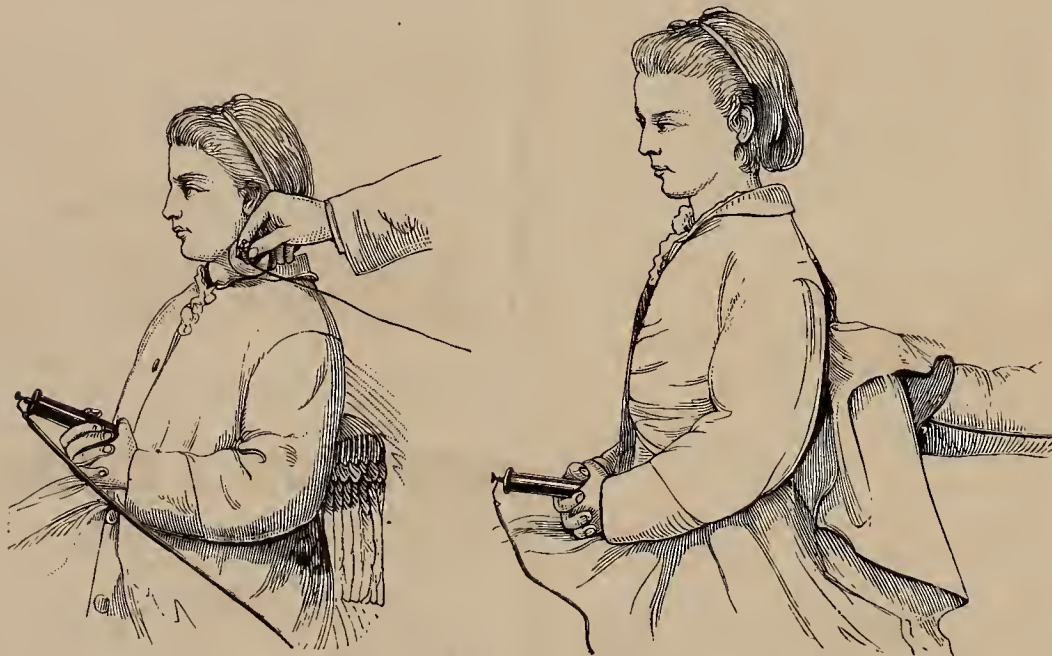
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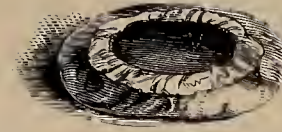




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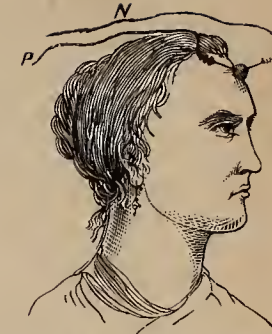
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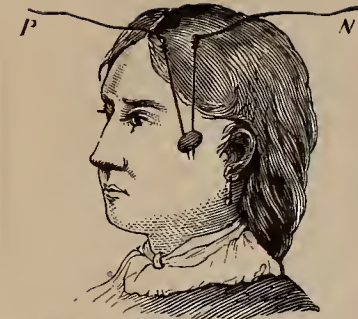
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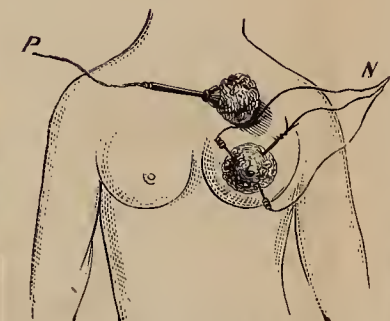
ORDINARY METHOD OF ELECTROLYSIS—CYSTIC TUMOR—BOTH POLES IN THE TUMOR.



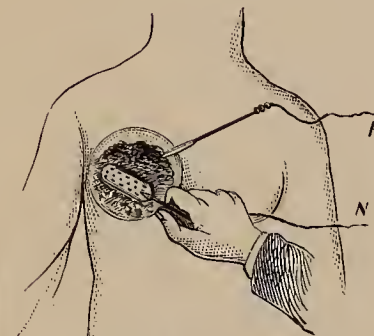
METHOD OF ELECTROLYZING THE BASE—EPITHELIOMA OF FACE.



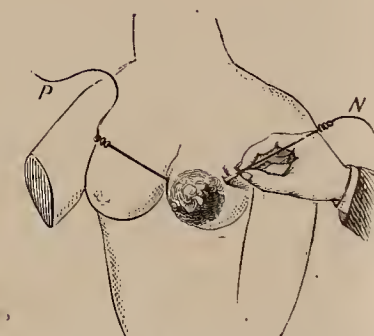
METHOD OF ELECTROLYZING THE BASE; AFTER REMOVAL OF CYSTIC TUMOR.



ORDINARY METHOD OF ELECTROLYSIS—SCIRRUS OF THE BREAST—NEGATIVE POLE IN THE TUMOR.



METHOD OF ELECTROLYZING THE BASE, WITH NEEDLE AND HARROW ELECTRODE; AFTER REMOVAL OF SCIRRUS BY THE KNIFE.



METHOD OF ELECTROLYZING THE BASE—SCIRRUS OF THE BREAST.



# ARCHIVES

OF

## ELECTROLOGY AND NEUROLOGY.

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VOL. I.

MAY, 1874.

No. 1.

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*Electrolysis and Croton Chloral.* By JULIUS ALTHAUS, M.D.,  
Senior Physician to the Hospital for Diseases of the Ner-  
vous System, London.

ALTHOUGH the electrolytic proceeding is, as a rule, not very painful, yet a number of patients think it a most disagreeable one; and no doubt can be entertained that if we could by some means succeed in rendering it entirely painless, less reluctance would be felt by a number of persons in determining to resort to it. Electrolysis is chiefly disagreeable if practiced on the face, owing to the exquisite sensibility imparted to that region by the abundant ramifications of the fifth pair of cerebral nerves; and it is unfortunately chiefly about the face that we are called upon to act electrolytically; for nævus, which constitutes probably the largest percentage of our cases, occurs chiefly about the face; and any other tumors, which are disregarded if seated in less conspicuous positions, become an eyesore to, and are hated by, their unfortunate possessors, if disfiguring that portion of our body of which people are most vain.

Various measures present themselves to us for rendering electrolysis painless, but to all of them there are considerable objections. We have, in the first place, to consider the question whether chloroform, ether, bichloride of methylene, nitrous oxide gas, or any other general anæsthetic should be used. Few phy-

sicians will object to the employment of these agents, but unfortunately most patients object very much to it; in fact, it seems to them just one of the advantages of electrolysis, that they need not undergo general anæsthesia; for if this has to be encountered, there does not appear much difference between electrolysis and the knife. Where, however, patients are willing to take chloroform, we should in most cases encourage them to do so, as much time is saved in that way; for we can, during general anæsthesia, use a high degree of galvanic power, and, if necessary, go over a very large surface.

Where general anæsthesia is objected to, local anæsthesia by sprays is the first proceeding to present itself to our mind. Spray of ether is useful where we have to do with patients who object to the pain of introducing the needles, but does little or nothing for relieving the discomfort produced by electrolysis, as its effects are too temporary. It has, moreover, the disadvantage of causing in some people a high degree of irritation of the skin, so that its repetition more than once or twice sometimes becomes impossible. Dr. J. H. Sterling, who is quoted by Beard and Rockwell,\* has recommended a mixture of one part of carbolic acid and two parts of ether, which is said to cause a circumscribed anæsthesia, lasting perhaps for about ten minutes. But this mixture has the same drawback as ether spray in causing irritation; and its villainous smell is another great objection to its use in the consulting-room, or, as our American cousins say, in the "office."

Subcutaneous injections of morphia or atropia are of no use, as they do not particularly diminish the sensibility of the face, and are inapplicable to children.

Oscar Liebreich, of Berlin, to whom the sleepless world is indebted for one of the greatest blessings, hydrate of chloral, has quite recently brought forward another allied remedy, which is called croton chloral. It is hardly necessary to say that this has nothing to do with croton oil, but is the chlorated aldehyde of crotonic acid. A drachm of this substance dissolved in water, and taken into the stomach, produces a deep sleep, accompanied with complete anæsthesia of the face and scalp.

\* Clinical Researches in Electro-Surgery. New-York, 1873, p. 35.

Irritation of the fifth nerve under these circumstances produces no effects whatever. If given in tic douloureux, croton chloral eases the pain before sleep is produced; and it has, in Liebreich's hands, never caused any unpleasant effects, although he has given it very frequently.

On reading Liebreich's account of croton chloral, it occurred to me that this might be exactly the thing required for rendering electrolysis painless. I therefore procured some of this substance, in order to make experiments with it. Croton chloral is more difficult to administer than hydrate of chloral, because it is only with difficulty soluble in water or syrup—namely, in 75 parts of the latter, and 60 parts of the former. It has also the disadvantage of having a very disagreeable and persistent smell, and a nauseous taste. It can not well be administered in pills, because the dose required is too large.

In London, pills containing one grain of croton chloral are made by the General Apothecaries' Company. Such a dose appears to be useful in tic, but has no effect whatever in destroying or reducing the normal sensibility of the trifacial nerve. I have given six of these pills at a time, and the result was absolutely *nil*. I then produced croton chloral in powder, of which I administered first ten and afterward twenty grains, dissolved in water and syrup, with the effect that, about a quarter of an hour after taking the dose, a slight diminution of facial sensibility, with a decided feeling of sleepiness was caused, which rendered the electrolytic proceeding, in one case more particularly, less painful than it had been previously without it.

My experience with this remedy is not yet sufficiently large to enable me to pronounce decidedly as to its value in the class of cases under consideration; and the object of this paper is chiefly to induce observers on the other side of the Atlantic to make observations on this point. What dose is required to produce a large diminution of trifacial sensibility, without actually sending the patient to sleep? What time is necessary for producing such an effect? And how long does the effect continue? These questions must be definitively answered by experiments on a larger scale than is given to a single observer to perform, before croton chloral can be admitted as a really useful companion to the electro-therapeutist.

[We have recently tested croton chloral as an anæsthetic for the fifth pair in a case of erectile tumor of the lip. The patient—a lady of middle life—took two doses of twelve grains each, with fifteen minutes' interval, and was made thereby quite sleepy; but a prick of the pin was sensibly felt on any part of the face. As we did not know how well she would bear chloral, we dared not give her any larger dose; and this is, as it seems to us, a practical difficulty in the use of this drug as an anæsthetic. As it was necessary to repeat the operation, we again tried croton chloral, giving sixty grains in divided doses. An hour after the first dose, and fifteen minutes after the last dose, she felt and acted like a drunken person. She sat upon the chair easily, and endured a much stronger current than she could have done had she not taken the chloral; and the operation was felt—painfully so. A mixture of water and simple syrup, two and a half grains of croton chloral in a teaspoonful, answers very well when shaken thoroughly; but it does not perfectly dissolve.—ED.]

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*A Case of Complete Paralysis of One Recurrent Laryngeal Nerve, and Partial Paralysis of the other, with Marked Diminution in Sensation in the Larynx. Paralysis of the Levator Veli Palati, and Constrictors of Pharynx. Improvement under the Use of the Constant Current, and Iodide of Potassium.* By F. I. KNIGHT, M.D., Instructor in Harvard University; Physician to the Clinic for Diseases of the Throat at the Massachusetts General Hospital, Boston.

KATE R., 23 years old, was referred to my clinic November 17th, 1873, by Dr. H. I. Bowditch. Her history obtained at the time was as follows: Father living, not strong, but has no throat or lung trouble. Mother dead; said to have died of "debility;" was subject during life to asthma. There are five children. Patient has three sisters and one brother, who have good health. She has been subject to nasal catarrh



from childhood. She says that during the winter of '72-'73 she was much "run down," and though she had no regular cough, if any thing accidentally caused her to cough or sneeze, she experienced a tightness about the face and neck; it seemed "as if the sinews of her face would break." About April, '73, she began to have a cough, which has since continued, recently with considerable muco-purulent expectoration. She has had some dyspnœa on exertion since last winter, but thinks her "breath" was never so good as other people's. During the spring she was subject to headache, which was severe at times. Hoarseness came on during the summer, and has since continued, being worse for the past two months, during which time there has been also dysphagia, and regurgitation of liquids through the nose on swallowing. She was troubled somewhat with palpitation, on exertion, during the winter of '72-'73, when she was run down, but has comparatively little of it now. She has never had any hemoptysis. She can lie on either side comfortably, but can not lie with her head very low, on account of discomfort produced in the head; stooping down to pick any thing from the floor, or a sudden motion of the head in any direction, is liable to cause dizziness. Her friends say that her face has seemed "bloated" at times. Her voice at time of visit was feeble, gruff, low-pitched, with a decided nasal quality.

*Laryngoscopic Examination:* Larynx free from thickening or any signs of inflammation, except a profuse, very thin, mucous secretion. Epiglottis erect, and normal in position; the right cartilage of Santorini stands a little higher and posterior to the left. On quiet respiration, the right vocal cord stands in the intermediate position, and the left vocal cord very near the median line. On phonation, the right vocal cord stands perfectly still, and the left moves up to the median line, and on increased effort a little beyond it, but not into apposition with the right. Both cords vibrate. The uvula is seen to deviate toward the right.

*Reaction to the Induced and Constant Currents:* On applying the induced current to the uvula, there is no reaction, but on applying the electrode between the pillars of the palate, just above the tonsil, there is considerable reaction of the muscles on the left; less on the right. Applying the electrode on the

left of the posterior wall of the pharynx, there is a powerful reaction of the pharyngeal muscles on this side; applying the electrode on the right of the posterior wall of the pharynx, there is very much less reaction.

In testing the reaction of the laryngeal muscles, I followed the directions of Ziemmsen\* in regard to the position of the electrode in the larynx. On putting the electrode of the induced current in the right sinus pyriformis, there is no motion of the right vocal cord toward the median line, only a little twitching in the ventricular band. When the electrode is placed in the left sinus pyriformis, the left vocal cord crosses the median line, and puts itself into apposition with the right. Placing the electrode over the arytenoideus transversus produced a' the same effect as placing it in the left sinus pyriformis; putting it high up just between the cartilages of Santorini produced approximation of them, but not of the arytenoid cartilages. An attempt was made to put the electrode over the posterior crico-arytenoid muscle on each side, but it is uncertain whether it was exactly accomplished; no reaction, however, was obtained from those muscles. On applying the constant current just above the uvula, the soft palate is raised upward and backward. The pharyngeal muscles react well, to about the same extent on each side, on application of this current. On placing the electrode in the sinus pyriformis on either side, there is a decided motion of the vocal cord on that side toward the median line, more marked, however, on the left. My results in testing the crico-thyroid muscles were very unsatisfactory.

There was very marked diminution in sensation, both in the fauces and in the larynx, more on the right side of the larynx. This was noticed on the first visit, gagging never being produced by any manipulations, and the larynx being touched even roughly, anywhere, except on its posterior wall, without producing any reflex phenomena, unless it was long continued; and then the cough which ensued seemed to be due more to the mucous secretion, which was profuse, running down into the trachea, than to the irritation of the instrument.

\* "Die Electricität in der Medecin." Erlangen, 1871.

On one occasion, the sound was kept resting on the vocal cords at their anterior insertion for sixty-five seconds before cough was produced.

An examination of the chest, very carefully made, showed nothing abnormal, except that perhaps the respiratory murmur was a little less distinct at the right apex, and once a single sibilant rale was heard here.

An ophthalmoscopic examination of the eye showed nothing abnormal. There was no evidence of syphilis. The patient was treated three times a week by the application of the constant current, to which, in the latter part of December, the administration of iodide of potassium was added. In the beginning of January of this year, the reaction to the induced current in the right of the pharynx seemed to be less, and there seemed hardly any reaction to the constant current applied in the right sinus pyriformis. On the 28th of January, however, a decided improvement in the reaction of the right lateral cricoarytenoid muscle was noted, as when the electrode was put in the right sinus pyriformis, there was a decided motion of the right vocal process toward the median line, not only on application of the constant but also of the induced current. The patient also reported that speaking required less exertion, and that there was less difficulty in swallowing.

A month has now past since the above improvement was noted, and the condition remains about the same; there is perhaps a little more reaction to the induced current on the right side of the larynx.

We have here a case of complete paralysis of one and partial paralysis of the other recurrent laryngeal nerve. Its cause must, for the present at least, remain doubtful. Although the patient has had some not insignificant cerebral symptoms—that is, pain in the head and dizziness, in the absence of paralysis in other parts, and considering the loss and partial restoration of reaction to the induced current, we may consider the lesion to be peripheral. The lesion is certainly not mechanical, from the products of inflammation in the larynx, for there are none. Whether the function of the nerve on either side is interfered with by compression, as from aneurism or enlarged glands, or by some affection of itself (catarrhal,

rheumatic, or direct rheumatic paralysis of Gerhardt), we have not sufficient evidence to enable us to decide.

There are several points of interest, however, in the case, although the cause of the paralysis is so doubtful.

1. The affection of both sides in a case of laryngeal paralysis evidently not functional and not mechanical.

The reported cases where there has been paralysis of both recurrents, complete at least on one side, are few in number. Complete paralysis of both recurrent laryngeal nerves has been observed by Ziemmsen,\* who reports a case which he claims to be the only one on record at that time (1868). In this case, the paralysis was supposed to be due to compression of both laryngeal nerves by cancer of the œsophagus.

Coën† reports the only other case with which I am familiar, in which there was complete paralysis of both recurrents. This occurred in a girl of sixteen, who had had diphtheria, but who also presented signs of phthisis at the apices of both lungs. The cause of the paralysis was considered doubtful.

Türck‡ reports a case which, although referred to on another page (462) as one of complete paralysis on both sides, was, as pointed out by Ziemmsen, according to the printed record, complete only on one side.

Traube§ reports a case of complete paralysis of the left recurrent, and partial paralysis of the right, supposed to be caused by an aneurism of the aorta. Ziemmsen (l. c.) also gives a case of complete paralysis of the left recurrent, and partial paralysis of the right, from an aneurism of the arch of the aorta, innominate, and right subclavian arteries (with autopsy). Bäuml|| reports a case of complete paralysis of the left vocal cord, and incomplete paralysis of the right, from aneurism of the ascending portion and arch of the aorta.

2. The very marked diminution in sensation.

Complete anæsthesia of the larynx has, I believe, never been observed, except in connection with general anæsthesia.

\* Deutsches Archiv f. Klinische Medecin, Bd. 4. p. 378.

† Wiener Med. Presse, No. 34, 1873.

‡ Klinik der Krankheiten des Kehlkopfes und der Luftröhre, 1866, p. 528.

§ Gesammelte Beiträge, Bd. 2, p. 508.

|| Deutsches Archiv f. Klinische Medecin, Bd. 2 p. 563.

Diminished sensation in case of laryngeal paralysis has been seldom noted.

Fieber\* reports marked diminution in sensation in a case of incomplete paralysis of one vocal cord, which, however, occurred in an hysterical patient during an attack of severe catarrh; after the inhalation of a tolerably strong solution of tannin, and the insufflation of alum powder, the catarrh and diminution in sensation disappeared together. The diminution in sensation in my case naturally suggested the question of an implication of the superior laryngeal nerve in the paralysis. This would not seem to be necessary, in the light of recent investigations;† and the approximation of the cartilages of Santorini, on placing the electrode over the oblique fibres of the arytenoideus transversus (formerly improperly so called), showed a reaction at least in the thyreo-ary-epiglottic muscle of which these fibres are really the prolongations (constrictor vestibuli laryngis, of Luschka), and which is supplied by the superior laryngeal nerve.

### 3. The affection of the muscles of the soft palate and pharynx.

Paralysis of the soft palate, in connection with paralysis of the recurrent laryngeal nerve, was first observed by Türk,‡ and has been since then often observed. Gerhardt§ makes special mention of it. No sufficient explanation of the connection between the two has yet been offered. Gerhardt says it is difficult to understand why the constrictors of the pharynx are not affected with the soft palate; in this case, and in another of mine now under observation, the muscles of the pharynx are affected. These are the first cases in which, to my knowledge, this has been noted. A case of Türk|| is of interest with reference to this affection of the soft palate, as, on autopsy, the paralysis of the vocal cord was found to be due to a *peripheral* disease of the recurrent laryngeal, which, so far as is known, sends no branch to the soft palate.

\* Wiener Med. Woch. No. 11, 1868 (Canstatt's Jahrb. 1868).

† See Schmidt's Experiments, "Die Laryngoscopie an Thieren," Tübingen, 1873, p. 33.

‡ Allg. Wien. Med. Zeitung, No. 8, 1862.

§ Virchow's Archiv, Bd. 27, p. 89.

|| Allg. Wiener Med. Zeitung, No. 9, 1863.

‡. The slight but decided improvement which should induce us to persevere in stimulating paralyzed laryngeal muscles for a long time.

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*Cataleptiform Paraplegia.* By Prof. BENEDIKT, of Vienna.

THIS form of disease is characterized by the motor disturbances which occur, showing themselves by the persistence of the resistance to conduction—that is, in conduction delay. The degree of resistance to conduction in the separate muscles can reach all degrees up to total absence. The most characteristic form is that in which the motor excursions are normal, but the movements are uniformly retarded throughout the whole excursion. The disease appears to affect all the voluntary muscles (including those of the eyes) of both sides of the body, and from the few cases observed by me, appears to be confined to the female sex. The same form of paralysis is observed in catalepsy and melancholia attonita. The symptoms belong, probably, to the many-colored picture of hysteria and hysteranæmia. The prognosis is absolutely favorable, judging from the few cases presented. A rapid cure is produced by powerful galvanic and also faradic currents applied to the spinal muscles and spinal nerves, the instantaneous result being astonishing. In one case where death resulted from typhus, a short time after being cured, microscopic examination revealed hyperplasia of the connective tissue. This case will be published soon in another place. Of the two observations presented, one is a case of true catalepsy.

OBSERVATION 1.—Stern Kati, age 18, teacher's daughter, admitted May 7th, 1872, says that on the 22d of April, 1872, she suddenly suffered from dizziness and headache, that she lost the power of speech, and fell down. At the same time there appeared weakness of the extremities, which was more marked in the right arm and left leg. This condition remained stationary.

*Status præsens.*—Complete aphonia when an attempt is made to speak, excepting the letter “a;” the mimic movements are even wanting, and no articulation whatever. The tongue is protruded incompletely, lateral movement of the same—elevation in the cavity of the mouth normal; mimic and voluntary motion of the facial muscles almost completely destroyed; elevation of the upper eyelids difficult; mastication incomplete and powerless; pupils normal; ringing in the ears, and a veil before the eyes; in the right arm motion incomplete, powerless and retarded—in the left arm and right leg, powerless and retarded. The patient suffers frequently from nausea, bolus hystericus, pharyngismus and laryngismus. In the left arm and right leg the cutaneous sensibility is considerably diminished; in the right leg and left arm the perception of passive motion is almost destroyed. Menses regular.

*Treatment* consisted in strong galvanic spinal-nerve and spinal-muscle currents, applied to the extremities, tongue, and larynx. She can articulate and phonate immediately, although weak and slow, and can move her extremities with much more power. April 11th.—After this (fourth) application, she can speak much louder and more distinctly. April 25th.—The patient still tires easily whilst speaking, but can scream pretty well. The power of sensation is completely restored, except the ability of localization in the left arm; this arm trembles easily. Enlargement of the left thyroid gland noticed; pulse 114;\* spinal column sensitive. From this day, treatment applied to the spinal column. Regurgitation of fluids into the mouth. The patient was treated in this manner, alternating with the previous method, and was discharged cured in the third week of June. Whilst under observation, great sexual excitement existed, bordering on nymphomania.

OBSERVATION 2.—Kaubek Kathrina, age 17, sewing-girl, admitted February 10th, 1869. Was taken ill eight days ago with convulsions from a psychical cause. A cataleptic condition was developed, during which the convulsions often recurred. The patient lost control over the greater part of the voluntary muscles, particularly the power of speech, this being

\* More or less distinct and passing signs of Grave's disease are relatively frequent in hysteria.

completely destroyed. By observing and questioning, it was discovered that the patient occupied herself very much with religious ideas, that she was often unconscious, or at least did not react against external irritations, and that her memory has certainly suffered. *Flexibilitas cerea* and *anæsthesia* not observable.

*Treatment.*—Strong faradization of the muscles, and intense galvanic spinal-muscle and spinal-nerve currents. During each application a series of voluntary movements reappeared, which were at first retarded and weak. At the same time, the psychological condition improved, so that the patient left the hospital cured on the 20th of February.

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*The Nature of Electricity.* By PROF. HENRY T. EDDY, of Princeton College.

THE enunciators of the law of the correlation and conservation of force speak of light, heat, electricity, etc., as modes or manifestations of force. In regard to some of these modes, science has been able to form consistent and mathematically exact conceptions as to the condition of that portion of space or matter affected by the manifestation; and it is of the greatest moment to all having the progress of science at heart to extend such conceptions, and to have formed in imagination some hypothesis (to be modified, remodeled, or supplanted, as facts may require) which may cover as far as possible the known facts. It appears necessary, then, to gather into a single generalization the scattered and multitudinous facts respecting light, heat, electricity, chemism, vital force, magnetism, adhesion, capillarity, diffusion, endosmosis, crystallization, solubility, etc., and we may add gravitation and the constitution of matter itself. May I be permitted, in few words, to state some of the speculations tending in this direction which have come to my notice, and especially in regard to the mode of action in the electric current? There appears to be much rubbish to be cleared from this field, owing to the prevalence of a literature



of one and two fluid hypotheses, and other theories that are mysterious and contradictory.

The great discoveries pointing toward some solution of this question appear to be the undulatory theory of light and sound, together with heat as related to both; the diffusion and volumetric constitution of gases; chemical action, especially that phase of it exhibited in electrolysis, and in compounds affected by the action of light; and to these may perhaps be added spectrum analysis.

The undulatory theory of light rests upon a pure assumption, namely, that light is propagated through luminiferous ether, a substance, if substance it be, utterly deficient in all of the properties of ponderable matter, except elasticity.

No refinement of chemical skill or ingenuity of physical manipulation has succeeded in certainly detecting its presence. Yet it is impossible for a mathematician to rise from the perusal of Airy's tract on the undulatory theory of light unconvinced of the essential truth of the assumption, so striking are the results of the investigation, and so remarkable is the agreement of theory and experiment.

Light may then be said to be a series of undulations of the particles of ether, in which, when one particle is put in motion, and describes a hoop-like orbit, it causes its neighbor particle to move beside it in a similar orbit parallel to the first, the second particle not keeping quite abreast the first. The second particle moves a third, and so on, so that a ray of light may be conceived of as a cylinder made of such hoops. If a uniform spiral be drawn on this cylinder, it will pass through all the particles of ether forming the ray. The motion of the particles of ether is then *transverse*, and not along the ray.

It appears as if one assumption as huge as this ought to be all that science could ask to account for existing phenomena. And indeed all radiance is naturally referred to some mode of propagation through this ether through which light is radiated.

The discoveries in the domain of radiant heat put it beyond a doubt that such is its nature. Such, too, appears to be the action of one electric current on another at a distance. Moreover, all immaterial action at a distance is by many regarded as necessarily partaking of the nature of an ethereal undulation.

There being no part of space from which ether is absent, gravitation is by them thought to be one of its manifestations. Modern investigation has shown that gases consist of a flight of elastic molecules, forever shot to and fro with inconceivable velocity. The law of the diffusion of gases is an exact statement of the relative velocity of the molecules of different gases. The resistance which a gas opposes to compression is the impact of millions on millions of these molecules on the walls of the retaining vessel.

In the gaseous condition of matter, science has come to recognize matter freed from the coercive restraints imposed on solids, and to a less degree on liquids, and has to look for facts indicative of the real condition of all matter. The first great fact is, that all gases are *two-volume* gases, showing us that matter exists in the state of molecules, and never as separate atoms.

The other indication most worthy of note in the present connection is the vast, active energy exhibited by so-called dead matter, from which it appears that the sporadic energy visible in chemical action is no greater than that existent and active at all times, had we but senses to perceive it. Indeed, may it not be that our perception of matter at all is conclusive evidence of its constant activity?

. It is an admitted conclusion, so far as physical knowledge or metaphysical inquiry has penetrated, that cause and effect are each dual and undivorceable. Why, then, are not action and reaction equal and apposite in all cases, be they mechanical, action or sense perception? The activity of matter is acknowledged by all, in case of ordinary combustion or incandescence, to be such an agitation of material particles as to communicate luminous vibrations to the contiguous molecules of ether. And we judge that the nature of the vibration in the material source of light does not differ greatly from that in the ether. In what respect does incandescent matter differ from other matter? In this, that in incandescence, the vibratory activity of its molecules is sufficiently heightened to emit waves which affect the optic nerve. What we mean to assert is, that there are doubtless many peculiarities of ethereal vibration, and but few of them are to be classed under the head of optical phenomena; so that the description previously given of the kind of vibration

in which light consists may be a description of only one component of the really more complicated orbit which each molecule of the ether describes.

On turning our attention to the electric current, its distinguishing peculiarity appears when we state the significant fact that under no circumstances is it possible to force a current or electric discharge of any kind through a vacuum. There is nothing else on earth impervious to a sufficiently powerful charge of electricity; but a space *in vacuo* of  $\frac{1}{100}$  of an inch separating the poles of the most powerful battery in existence will effectually put an end to the current.

A current of electricity is, then, some agitation of matter itself, and is inseparable from matter. In order to offer any explanation of this, we must again recur to the activity of matter as shown in electrolysis, a phenomenon of the greatest significance in the present connection. Electrolysis, as it is usually understood, is the decomposition effected by a battery when its two poles are immersed in a fluid in such a manner that one of the components is liberated at one pole and one at the other. This is effected by the exchange of atoms between the molecules in some line joining the poles. I shall apply the term electrolysis to all exchanges of atoms or components between different molecules in a stable compound. And the point to which we would call especial attention is, that constant exchange of atoms—that is, internal electrolytic action—is the normal condition of matter; and that when this action is rendered visible in the battery, it is but a momentary exhibition of that which proceeds eternally among its molecules.

It is shown, in the undulatory theory of light, that any given molecule of ether in a ray of light describes the same elliptic orbit successively for several millions of times, and then suddenly commences on a new orbit of different eccentricity, which in turn is suddenly changed; so an atom of any molecule is held in its orbit and kept in that molecule through the same series of orbital motion, when it suddenly becomes a part of some contiguous molecule, while its place is made good by a neighboring molecule of the same kind. Thus, the atoms of a fluid wander forever through its mass, while in a solid body the relative position of the molecules being more fixed, we must suppose

that a given atom can form a part of but a limited number of contiguous molecules.

The reason why the ordinary electrolytic action of matter has no external manifestation is, that since the action occurs with equal intensity in all directions, in any given mass of matter, the resultant of all these actions is null; but when this activity has a preponderating direction in any manner impressed upon it, then the resultant is an electric current.

We are prepared to define an electric current to be an exchange of atoms occurring in the molecules along a continuous material circuit. The chemical action occurring in a battery obeys the same laws of combination that the same compounds observe when not in a battery, and the chemical action is regarded as the cause of the current. In a single-fluid cell, the force of chemical action is at the surface of the zinc, from which the same amount of energy proceeds as in any case where an equal amount of zinc is oxidized. When scraps of zinc are thrown into acidulated water, hydrogen is freely evolved; but the energy which in the battery is rendered sensible in the form of an electric current is now transformed into heat—that is, a general agitation of the molecules of the mass. At any point in a current where the nature of the material conductor interferes with the propagation of exchange of atoms in a single direction, the same change to heat occurs. In electrolysis, as usually understood, it requires the stress of a powerful current to cause the action. So that this exchange is a kind of vibration or continuous chemical reaction, in which the excess of activity at one part of the circuit is transferred to another part of it, and thus causes an exchange along a line in a manner such as would not otherwise occur. Now, is it for an instant to be supposed that, such action as we know occurs in the fluid of the battery itself, and also in the fluid between the poles, has not occurred in the plates and wires completing the circuit? The testimony of the electric arc on this point is explicit, and puts the matter beyond dispute. Nothing is more certainly established than the fact that one electrode is built up at the expense of the other—that is, matter is torn from one and transferred to the other, whenever the current passes. It may be that the electric arc is formed of molecules of unusual

composition, the molecules of air and metal exchanging in an unusual manner, under the stress of the electric action. Certain it is that no such action can occur *in vacuo*. Unusual compounds appear for the instant to be formed also at the positive plate of the battery.

An experiment made by Prof. C. F. Brackett is of a nature so confirmatory of the theory here set forth, that I may be permitted to refer to it. Between the plates of a battery the fluid connection was a long tube in the form of an helix, and it was found that when the electrolytic action was in progress within the tube, the tube caused the same effects in rotating a magnet, etc., which is exerted by an ordinary wire helix conveying a current. A single remark further respecting the distinction between conductors and non-conductors may be useful. It is to the effect that we might expect to find compounds formed of molecules in such a manner that this peculiar directed vibratory motion would experience great difficulty in being transmitted; and that such substances would be found in larger numbers among the more complex solids than elsewhere, which is the case.

The views of the most advanced physicists and mathematicians on this subject may be thus summarized:

1. A molecule is a system of atoms.

The atoms composing molecules in all matter are in a state of constant motion, like the heavenly bodies. The orbit of each atom depends on the attractions and repulsions of other atoms of that molecule. These attractions and repulsions may be compared to the centrifugal and centripetal forces of the solar system. The molecules of fluids and gases are also in a state of constant motion.

2. All the great forces of nature, light, heat, chemism, electricity, and so forth, are modifications or components or directions given to these atomic and molecular motions. These different forces continually shade into each other, so that it is difficult to obtain one without also obtaining one or more of the others; and with all these forces the tendency is to degrade into heat.

3. Electricity, in its various forms, is simply one modification or component of or direction given to these atomic or molecu-

lar motions. It is easily changed into the other forces, especially into heat, and the same actions that generate it also generate, at the same time, heat or other forces. All or nearly all the ordinary chemical actions develop electricity, although not always in sufficient quantity to be detected or measured; and, conversely, all the ordinary batteries develop heat as well as electricity.

4. As electricity is a modification of the atomic and molecular motions of matter, it follows that it must vary in its characteristics with the nature of the substance through which it passes. Hence, we may explain, in part, at least, the distinctive characteristics of statical, galvanic, and induced electricity, and also the fact that induced currents of different orders vary with the length and thickness of the coils, and with the general construction of the helix.

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*Electrolysis in the Treatment of Strictures of the Urethra.\**

By ROBERT NEWMAN, M.D., Permanent Member of the New-York State Medical Society, etc., etc.

ALL the strictures of the urethra intrusted to my care during the last few years have been treated exclusively by electrolysis. The results from this system of treatment have been very gratifying to me, and particularly so to my patients, who were kept under observation for some time after the operation. None were suffered to relapse, and the cure has been in every instance permanent. One of the worst cases of impassable stricture which came under my notice was cured, and a No. 12 sound could be introduced by the patient himself. Fifteen months have elapsed; the urethra has retained the above calibre, and is in sound and good condition. Such clinical facts seem to warrant more than a passing notice in the records of successful surgical operations.

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The object of this paper is to explain the *modus operandi* of electrolytic treatment adapted to strictures of the urethra, and to detail a number of cases.

By asserting that I have had no failures to record, that I have succeeded in every case, I do not wish it to be understood or even implied that every other treatment is to be condemned, that all other methods or operations for strictures should be abandoned, or to express an opinion that ALL strictures *can* be cured by electrolysis.

For the present, I do not wish even to compare the different methods; each must stand upon its own merits; each mode of procedure may possess advantages, and if properly selected and applied to each individual case, may result in entire, or partial success. But having succeeded in curing some of the worst and most complicated cases of stricture of the urethra by galvanism, I certainly shall not abandon a method which possesses so many advantages, and has been successfully practiced by myself; knowing, as I do, that the treatment is rational, scientific, and reliable.

#### HISTORY AND BIBLIOGRAPHY.

The history of this operation is brief—the paucity of its literature is manifest. Crussel and Wertheimer made the first experiments, but did not succeed in establishing the operation and legitimizing it. Next, we find connected with it Middeldorpf, Jaksch, and Leroy d'Etiolles; but it seems that the methodic appliance of electrolysis in strictures of the urethra belongs to Mallez and Tripier, who have, with improved instruments, established the operation.

It is freely admitted that the use of electricity in its diversified forms, with all kinds of instruments, for the cure of stricture of the urethra, has been attempted long ago; but the method of *electrolysis*, under consideration, and its availability to cure stricture, hereafter to be more fully described, is of recent date.

After researches in both foreign and our own professional literature within my reach, I have not been fortunate enough to find more than a few scattered cases. Among the most important, and bearing directly on the subject, I find:

Mallez et Tripier, "Traitement des Rétrécissements Urétraux

par la Galvano-Caustique Chimique Négative, *Compte Rendu de l'Acad. des Sciences*. "Bulletin Thérapeutique," Mai 30. Med. 58.

Mallez et Tripier, "De la Guérison durable des Rétrécissements de l'Urèthre par la Galvano-Caustique Chimique."

Althaus, in Goeschen's "Deutsche Klinik," No. 34-36, "Heilung der Harnroehren-Stricturen durch die Electrolyse."

Keyes, "Electrolytic Treatment of Stricture of the Urethra." *New-York Medical Journal*, December, 1871.

Bautisto Campos: "De la Galvano-Caustique Chimique comme moyen du Traitement des Rétrécissement de l'Urèthre." Paris, 1871.

Dutrieux, "De la Galvano-Caustique Chimique dans le Traitement des Rétrécissements Organique de l'Urèthre." *Press. Med. Belge*, No. 25, 1872.

Mallez et Tripier, London "Lancet," October, 1871.

"Multiple Strictures of the Urethra treated by Electrolysis," by T. F. Frank, M.D., "Medical Record," February 2d, 1874, page 62.

Besides the above, we find the following two papers, not exactly belonging to the subject, still bearing some relation to it:

"Cases illustrating the Action of the Continuous Electric Current on Spasms of the Bladder, Urethra, and Ureters, by Reliquet, of Paris," "Practitioner," August 1st, 1872, page 98.

On the Detachment of Urinary Concretions from the Walls of the Bladder, "Wiener Medic. Zeitung," Mai, 1872.

#### THEORY OF ELECTROLYSIS.

Electrolysis is the decomposition of a compound body by electricity. The electricity used in our treatment of stricture is the constant current of galvanism. The body to be decomposed must be a conductor, and must possess certain elements susceptible of decomposition by the galvanic current.

Non-conductors are chalk, fat, oil, rubber, dry gases, and a multiplicity of other substances. Some are wholly, others are only slightly susceptible to the decomposing influence of the galvanic current. This knowledge is of great advantage, because it teaches that *all* strictures of the urethra will not yield alike to the electrolytic treatment. Success depends on the organic quality, form, and composition of the neoplasm of



the stricture. Blood and muscular tissues are good electrolytes, hence the inflammatory strictures readily yield to the electrolytic treatment.

Fibrous tissues are more or less decomposed by the current, and that in proportion to the elements which enter into their composition.

If the parts to be acted upon are devoid of water, the electrolytic action will be slow, because water or moisture is necessary, and forms one of the real elements of successful decomposition. Chalk being a non-conductor, it follows that calcareous strictures, which are dry and brittle in their narrow calibre, will not yield well, if at all, to the action of the electrolysis.

We will now consider the action of the two poles of the battery.

If we decompose water by electricity, we find that the oxygen is attracted to the positive, and the hydrogen to the negative pole. Now we should remember that *pure* water is not easily decomposed; but the difficulty is overcome if the water holds salts in solution; if the water contains salts, the positive pole will attract the acids, and the negative pole the alkalies and bases. Hence it is that the positive pole acts like a caustic acid, and burns like fire, which is painful, leaving a hard retractile cicatrix.

On the other hand, the negative pole acts like a caustic alkali, which hurts less during its application, and leaves a cicatrix, which is small, soft, and not retractile.

Having become acquainted with the different properties of the poles, which possess each their own specific powers, it is evident, from the foregoing, that for the immediate destruction of strictures, the negative pole must be selected.

The next important question which arises, and which is a valuable factor for successful treatment, is, What is the best material to be used on the negative pole? We should select hard metals, those that stand in no danger of being decomposed or easily oxidized; hence, platinum, gold and silver are best, but lead, tin, or brass do well—even copper is available.

If we use the latter metals, the chemical decomposition may produce a small amount of precipitate, which is a slight objec-

tion, but not a positive hindrance to the ultimate success of the operation.

The specific action produced by electrolysis in the treatment of stricture has received different names; this diversified nomenclature has produced considerable misunderstanding; and time has done little to remove the confusion and obscurity in which the action of electrolysis is still involved.

Dutrieux calls it galvano-chemical cauterization. Dittel names it a chemical galvano-caustic. I wish to add my mite, hoping to help in removing the obscurity, in which the action of electrolysis is still concealed underneath technicalities of scientific phraseology. My experience of its action, after observing it minutely in all its known relations, leads me to name this electrolytic action, "*Galvano-chemical absorption*," as I depend mainly on the *chemical decomposition* caused by electrolysis.

It seems that all who have written and experimented on the subject mean the same thing, but express it differently. This diversity in the nomenclature has provoked the criticism of the editor of that special department in Virchow's "Yahresbericht." Dutrieux, he says, depends for the action of electrolysis on the caustic effects of the negative pole, which leaves a soft and less retractile cicatrix, and wonders that Newman relies on chemical absorption as an effect of the electrolytic action!

That the same thing is meant, is evident from my previous statement, as well as from the description of the *modus operandi* by Mallez and Tripier, who lay great stress, and rely upon the chemical and not on the caustic effect, which would result from the application of the positive pole or the approximation of the two poles. Why, with such a definition, which is taken from Mallez and Tripier, the French surgeons call the action, "*par la galvano-caustique chimique*," I do not understand, but believe I have proven that we mean the same thing.

Next, I must define my term "*absorption*," as some may object to it as not definite enough, or understanding that it pertains only to the action of lacteals. But I believe I am justified in using the term, as Webster's definition of absorption is as follows: "The process or act of being made passively to disappear in some other substance through molecular

or other invisible means, as the absorption of light, heat, electricity, etc.," and such is the action exactly, as we will see hereafter.

The negative pole acts as a caustic alkali. If increased tension is used, it will destroy tissue, but mildly applied it acts as a chemical absorbent on the altered tissue, and restores the part to its normal condition. No one would think of curing a stricture by cauterization. The history of that treatment in uterine diseases has left too many painful reminiscences. The gynaecologists loudly protest against a treatment which has proved so mischievous and unfortunate in uterine diseases, and this applies equally well to attempts to follow it in cases of stricture of the urethra. Many failures have been recorded. Thus, Dittel's three cases, "Billroth's Surgery," page 174; but may not these unfavorable results be attributed to badly selected cases, such as bony or callous strictures? These are unsuitable, and are less amenable to the electrolytic treatment, for reasons stated before.

The theory on which my first experiments were made has been corroborated by an experience of some years, and proved to me that electrolysis, in curing stricture of the urethra, is of the most substantial value.

I will now consider the instruments best suited for proper application.

#### THE GALVANIC BATTERY.

A battery presenting a large surface will cauterize more rapidly and more intensely than any other known caustic. By using a superabundance of electrical current, induced by a large surface, with the hope of augmenting its sphere of action, too much inflammation is induced, destruction of the surrounding healthy tissue takes place, suppuration supervenes, and thus aggravates the disease. The current should never be strong enough in its action to lead to destruction of tissue; it should be confined to an effort to restore the affected parts to their normal condition.

The current of proper strength in its application should be confined solely to the diseased locality. This is not always easy to accomplish with the batteries at command, and the failures on record may be mainly due to their defects; one of

the most important is the want of thoroughly controlling the strength of the electrical current. I have used the Drescher batteries in all my experiments, for the following reasons :

1st. The *tension*\* of the current can be augmented gradually cell by cell, without any interruption of the current, and the patient will hardly perceive the increase of tension which can be used above the power of Stoehrer's and other batteries.

2d. The *quantity* of electricity is reduced to a point sufficient to produce the most intense action on a very limited surface.

3d. The quantity of electricity of ALL the cells can be increased or diminished at will by the screw-lifting arrangement, by which the elements can be immersed into the battery fluid to any desired depth.

The size of the elements in many batteries is far too large ; the quantity of electricity produced is too great, and there is "too much of a good thing." The electricity generated is too powerful to produce and fulfil its proper indication ; the result of all this is, that, if employed in the above way, too great a destruction of tissue takes place, and occasions great pain to the patient, who soon refuses to submit himself to a process which involves such suffering.

Another and serious fault of certain batteries is, that they can only be graded by pairs. This arrangement involves a great objection, because the augmenting or diminishing of two cells at a time alters the galvanic current and produces a sudden shock, which causes the patient pain, and a general "malaise," which merges soon into nervous irritability, besides many other serious difficulties which I noticed during my first experiments.

I therefore prefer batteries which, by their peculiar arrangements, can be graded one cell at the time, and by a rheostat can be divided into small units to overcome resistance.

\* The French writers have used the word *intensité* just as we use the word quantity. But translators have rendered *intensité* into English by the word "intensity," and have used it in the sense of tension. This mistake of the translators has brought much confusion into the subject. It is better to dispense with the word intensity and use only the terms "quantity" and "tension."

The galvanic battery I use consists of many small cells ; each cell contains two elements, carbon and zinc. The fluid in which the elements are immersed is diluted sulphuric acid and bichromate of potassa.

The catheter used for the negative pole consists of a metal bulb, to which a rod of wire is attached, and over which a flexible catheter is fixed, cut off at its extremity, and connected with the metal bulb ; a smooth and continuous surface is thus obtained.

The bulb is egg-shaped, about half an inch long, its length proportioned to its diameter. The flexible catheter acts as a perfect insulator, and at the free end the rod is connected with the copper wire from the negative pole of the battery. The catheters are made in sets of different sizes.

*The physiological effect of electrolysis on mucous membranes :* The salient point will be perhaps more intelligible if subdivisions be made.

The contact of the positive pole with the mucous lining by a metal bulb-shaped catheter causes great pain. The electrolysis thus applied feels and acts similarly to a strong vegetable acid, destroys tissue, and is not easily borne.

But if the negative pole is used with the same electrode, no pain follows the application, provided the current is not too strong ; it thus produces only a sensation of pricking and burning.

A. If a limited electrolytic power be selected, and applied by the usual method, the current is gradual and slow in its action, and we observe : 1st. The mucous lining of the urethra is often covered with an alkaline secretion. The electrolytic action coagulates it in a semi-solid mass. The same result may be observed if the albumen of an egg be submitted to the action of both poles. 2d. In the absence of this secretion, moisture only being present, a general stimulation takes place. 3d. Agitation. 4th. Lifting and loosening of epithelium. 5th. Attraction and disintegration. 6th. Coagulation of alkalies. 7th. The epithelium shrivels up ; and, 8th, Is detached and lost. 9th. Mucous lining dries, and gradually changes color from a pinkish red to white. 10th. The caustic action begins to take effect and causes slow absorption. Tissue

is absorbed, and disappears. 11th. The metallic extremity of the bougie insinuates itself in the deeper tissue, producing a depression ; an aperture is made, which forms a new passage. 12th. The electrolytic action having made a passage, the albuminous secretions on the walls of the urethra are acted upon by the negative pole, coagulating it and bearing resemblance to boiling froth. 13th. By degrees a scab is formed.

B. Electrolysis may become caustic in its action if too strong currents are used, destroying tissue, leaving a denuded surface behind, which in the healing process throws out plastic lymph, fills up the cavity, and forms solid and adherent walls.

If powerful electrolysis is used, it rapidly opens a passage ; the perforation thus made forms a scab upon the walls of the urethra.

To illustrate this physiological effect and, at the same time, the power of the battery used, I will describe here a few experiments made on dogs :

EXPERIMENT 1.—A good-sized dog was placed under chloroform, merely for the purpose of operating and observing without being interrupted by the animal's struggles. The application was made on the external mucous lining of the penis, which was pushed forward in front of the sheath.

To the positive pole of a 40-cell Drescher galvanic battery was attached a forceps, with which the lower portion of the penis, where the prostatic portion is situated, was firmly held. This prevented the penis from slipping back, and the effect of the positive pole could be observed ; the negative pole connected with the copper wire was a silver bougie, egg-shaped, the size corresponding to No. 0 wire gauge. The circuit was completed by bringing the bougie, as the negative pole, in contact with different parts of the penis. Distinct effects were produced, as described before, in the following time :

Five cells produced distinct effect in five seconds.

Ten cells produced distinct effect in two seconds.

Twenty cells produced distinct effect in one second.

When all forty cells were used, a boiling commenced immediately, smoke arose, a hissing sound was heard, a froth was formed around the point of the bougie, and a hole was produced

in a short time. The effect produced by the two poles differed widely, and could be observed as follows :

The positive pole had caused a destruction of parts in an uneven, ragged manner ; the surface looked like an ugly sore of a yellow color, mixed with gray at the margin. It simulated somewhat the ulceration of a chancroid. At the negative pole were seen only points, small in circumference, of a whitish color ; even a little was left of the pinkish hue, and there was no destruction of tissue ; a smooth surface presented, but the normal lubricating moisture had given way to a dry state. This dryness at the negative pole, and the destruction of tissue with an ulcerating surface at the positive pole, gave rise to a partial phymosis afterward.

EXPERIMENT 2.—A dog was prepared, as in the first experiment. The positive pole, by means of a forceps, held firmly the mucous lining of the penis far back, where the prostate lies. The bougie, of an egg-shaped form, connected with the negative pole, was introduced into the urethra, two and a half inches deep. Then the electrolysis was used with all forty cells at once, and continued for twenty seconds. A boiling was distinctly seen and heard around the negative pole ; at the positive pole a destruction of tissues and an ugly sore were produced, exactly as in the first experiment.

The dog felt sick, had no appetite, and could not urinate for two days. The malaise was increased by the sore and the destruction of the positive pole, which caused again an inflammation and phymosis. After two days, the obstacle in the urethra gave way at once, the plug formed by the electrolysis popped out, and the dog passed water strongly mixed with blood ; the dog made finally a good recovery.

Many other experiments have been made, and all prove the correctness of the theory explained before ; the last experiment was only made to ascertain the tolerance of a strong current as a therapeutical agent. I condemn such a method, and would not practice it on a patient.

My experience has proven conclusively that the means of curing stricture consists mainly in using WEAK CURRENTS ; and mischief may be done by strong currents, which destroy tissue rapidly instead of causing chemical decomposition.

I shall now briefly consider the

THERAPEUTICAL ACTION OF ELECTRICITY

in disease.

For convenience, it is advisable to state the different forms of electricity.

The exact action of all forms of electricity is by no means thoroughly understood, and it is hardly within the scope of this paper to advise or recommend which method or current should be adopted, or in what disease, organ, or tissue this or that form or current is to be employed. To enter into such a field of inquiry would involve researches of much labor to collect and collate statistics, and tabulate them; and such a work, however conscientiously performed, would, from the very nature of things, be defective, open to grave objection, and be subject to criticism.

But to comprehend the conclusion drawn from the theory upon which I base the success in curing strictures of the urethra by electrolysis, it becomes necessary to describe in general terms the modes and forms in which, and for what purposes, electricity is generally used.

As seen by the foregoing, the two poles differ in their action, and therefore give different results. It further appears that the poles vary in their action with the material used. For example: by a general application with sponge electrodes, a certain result is obtained; the same current, similar in every respect, will, by the use of a metallic electrode, become electrolytic.

The faradic or induced current, as a general application, with the sponge electrode, is mainly used (and even preferred) to ascertain muscular contractility. Hence it is employed in paralysis, because it vitalizes and stimulates the muscles into activity, sustains the action of the heart, impresses the circulation, and exerts a powerful influence over the motor nerves.

If the faradic current is employed with metal electrodes, or a sponge electrode as positive, and the bougie with metal bulb as the negative pole in the urethra, it prevents or cures spasmodic action; hence, is a cure for spasmodic strictures.

It appears that the two poles are identical in their action,



and manifest no significant difference; at least, it is not so marked as in galvanization.

The galvanic or constant current, as a general application, may be used with more or less advantage or benefit in all cases (although the faradic is preferred as a general tonic and stimulant), and acts as such principally on the sympathetic, motor, and sensory nerves, and its effects to equalize the circulation are very significant. But if galvanization is used with metal electrode to obtain electrolytic action, the result obtained will be widely different.

The positive pole will coagulate the blood, attract acid and oxygen; in fact, by a peculiar action, the battery has yielded an acid product, which acts as actively and produces as painful and sloughing a sore as will the most powerful mineral acid, and leaves behind a hard and retractile cicatrix on the tissue with which it has been in contact; while the negative pole will dissolve blood, augments its fluidity, attracting hydrogen, coagulates albumen, attracts alkalies, and acts as a caustic alkali on the tissues, leaving behind a small soft cicatrix, which is not retractile.

Now, the knowledge of the foregoing facts is of paramount importance, and they are all the more essential, inasmuch as they happen to be the great factors with which we should be acquainted for the intelligent application of the method under consideration.

#### METHOD OF APPLICATION.

The first thing the operator will have to consider is the pathological condition of the particular stricture he has to deal with; next, to devise a plan for his future action, select the method he intends to employ and the treatment he means to follow, what he wishes, and what he can accomplish in a single seance, and what he reasonably can effect; he must know WHEN to operate, and the time that should elapse before the operation is repeated. The patient should not be subjected to pain.

Of course no stereotyped rule can be laid down, and which should be followed by all alike; each case depends on its own inherent peculiarities, and must be treated accordingly. The successful issue of each case depends entirely on the operator's

choice of method, and he should employ that one which offers the best chances of success and which he deems the most effective.

There are three principal methods, as follows :

1st. Electrolytic action, by mild currents, from batteries united for tension, produces gradual chemical absorption (as before described). The current is gradually increased or decreased.

2d. By galvano-cautery. By reason of great intensity, this agent violently forces a passage; the effect of this powerful action is swiftly to burn its way through the impediment, the result being a firm and hard scab on the walls of the urethra.

After the employment of the galvano-cautery, the patient must be left alone, and not interfered with until the scab has come off, and many weeks must elapse before a normal mucous lining is formed, even on a healthy urethral wall. A scab thus produced firmly adheres to the walls of the urethra, and can not without danger be removed by the operator; interference would be highly reprehensible. Non-interference being compulsory, from four to six weeks are consumed before it becomes detached. If an attempt be made to accelerate the separation by instrumental manipulation, serious consequences are sure to follow.

The boundary between the scab and the adjacent healthy mucous lining is always a weak spot, and any exploring instrument used in contact with or beneath the scab might cause rupture of the urethra. The best rule I can suggest is, "Non-interference is the best policy."

3d. The third method is a mixed operation, or a combination of the former two. The passage is made by the action of a powerful electrolytic current, which may denude the surface of the urethra; the walls are kept apart to prevent adhesion. This indication is fulfilled by the introduction of the catheter immediately after the operation, and retaining it *in situ*. My predilections are in favor of the first method, and I use it because it is more desirable; and, if circumstances permit, I operate with it in preference to all others, because it is safe, and never has been followed by accidents or ill effects.

In fact, it is THE procedure here advocated, practiced, and

illustrated by cases. *It treats the stricture through mild currents by a "galvanic chemical absorption."*

The third method I only practiced when obliged to do so; that means, when the first method can not be used with good effect, then the current must be increased. Only a very few aggravated cases will need this procedure.

The after-treatment must be conducted carefully, as the retention of the catheter in the urethra may cause irritation, cystitis, and urethral fever. But even if it occasions, under very unfavorable circumstances, some inconvenience, it is preferable to the otherwise unavoidable perineal section, which, according to statistics, is dangerous. This method is particularly indicated, if the stricture is impassable and tough. The strong current may denude the walls of the urethra, and the plastic lymph thrown out will cause adhesions.

To avoid such adhesions, the catheter is retained. The new entirely flexible rubber catheter is a great improvement for this purpose, as it is less irritating and self-retaining; thereby avoiding the dangers which might otherwise follow.

The second method I never have practiced, and can not say any thing about it, but it appears to me dangerous. It is mentioned here only as a theory, the practice of which I condemn.

A modification of this galvano-caustic method has been used by Dr. Wakeman, of this city. The doctor described the method to me in this manner: He uses the same variety of battery as I do, but attaches to the bougie, which is pushed down to the stricture, both poles. Thereby both poles are united, and the current acts on the same point, the effect of which must be a galvano-caustic. Dr. W. says he has used this method with success.

To the want of method in the operator, or to the badly-selected cases, the failure and ill success of the operation may mainly be attributed. By well-directed examination, cases suitable to the electrolytic treatment should be made.

#### EXAMINATION OF THE STRICTURES.

Stricture is a pathological condition of the urethra, which, by alteration of tissue, has narrowed its calibre.

Authors who have written on this subject, and enriched by their works its literature, have named different kinds of urethral strictures, divided and subdivided them. I deem this nomenclature of little importance, and unnecessary for my present purpose. For convenience, I will, however, define the causation of the alterations found in the tissue.

The object of surgical interference is the restoration of the urethra to its normal physiological and anatomical condition, which includes power, healthy action, and, above all, its form and natural calibre. This being accomplished, the cure is completed. The method which will accomplish this gratifying result, with the least pain or inconvenience to the patient, with least interference with his daily avocation, is certainly the best.

The history of a case is always an important factor in its diagnosis. This maxim holds good in stricture of the urethra. It will often reveal its primary or remote cause, the cause will indicate to a certain extent the kind of stricture we have to deal with, and this contributes much toward a successful issue, and a great deal will be accomplished.

If this is satisfactorily done, it will aid materially in determining the method to be relied on.

For all practical purposes, we may divide strictures into three classes :

- 1st. Spasmodic strictures.
- 2d. Inflammatory strictures.
- 3d. Organic strictures.

Spasmodic strictures may occur as a consequence of irritation, venereal excesses, masturbation, excess of acid in the urine, pyelitis, diabetes mellitus, arthritis, cystitis, nervous debility, etc., etc.

I have already observed that spasmodic stricture is amenable to cure by the faradic current. This current is of much value if employed to confirm the diagnosis. But spasmodic contraction of the urethra, usually called stricture, is not a *real* stricture, and has no bearing on, or relation to, the electrolytic treatment, and is here referred to merely as a comparison.

The last two kinds of strictures are amenable to treatment by electrolysis. Both are generally the consequences of neglected acute urethritis, or the result of traumatic lesion. I have no

intention to describe in this paper the different forms of strictures. I confine myself to the delineation of the last two.

In the inflammatory stricture, the calibre of the urèthra is narrowed by the product of inflammation thrown out by exudation internal to the mucous lining; the case may be complicated by the presence of more or less granulations, whereas, in organic stricture, the calibre is lost by the pressure upon the altered parts, and heteroplasia of the deeper tissues. The knowledge of this pathological condition is a fact of much value for the intelligent and successful application of electrolysis; if this is understood, it necessarily follows that the organic strictures need a stronger and the inflammatory a milder current of galvanism, in order to effect chemical absorption. Certain facts should be inquired into concerning the history of the cases, such as the general condition of the patient, see whether inherited diathesis can be discovered, a peculiar dyscrasia, or if any complication be present at the seat, or anywhere adjacent to it. For example, if the stricture be complicated with cicatrices, if there is syphilis or tertiary symptoms. If either of these complications be present, the case is not a favorable one for electrolysis. The patient, under these circumstances needs first constitutional treatment.

Having now ascertained the history of the case, and noted carefully all its details, the investigation is still further continued by direct examination of the stricture in the following manner:

1st. By instrumental manipulation and digital touch.

2d. Exact measurement.

3d. Ocular inspection.

1st. *The digital touch.*

The exploring instruments transmit to the fingers certain sensations, which experience soon classifies, and which culminate in a highly tactile expertness. I use for the purpose a whalebone *bougie à boule*, which has a small olive-shaped head and slender neck. This adds to its flexibility. Such an exploring instrument gives, from its peculiar shape, a delicacy of touch not to be obtained by any other known bougie; it defines with professional certainty the nature of the stricture; the progress of altered tissue can be ascertained and defined by

it with a comparatively small experience, and with great certainty.

I will now divide the progress of the stricture, and for convenience will admit four stages.

Assuming that the diagnosis has been made, and the preceding means employed, in order to ascertain the condition of the stricture, certain sensations will be revealed by touch, and in order to better comprehend this, I shall compare them with some well-known materials :

1st stage conveys a feeling of velvet or velveteen.

2d    "       "       "       "       paper.

3d    "       "       "       "       parchment.

4th   "       "       "       "       cartilage.

In the normal state of the urethra, the bougie glides with comparative ease over its moist mucous lining. The skilled finger will readily detect any alteration or deviation, its comparative and relative severity, and the slightest encroachment on its normal standard will be revealed. The velvet touch represents a slight alteration only.

The *paper* touch represents the inflammatory stage ; the *parchment* touch represents fibrous tissue ; the *cartilaginous* touch represents calcareous or callous deposit, and signifies the worst form of stricture.

By the use of the olive-shaped whalebone bougie, the defects or any abnormal condition of the urethra along its whole tract is soon detected. The instant the bougie enters the stricture, a peculiar feeling is manifest to the fingers of the operator ; its penetration is announced with a great degree of certainty ; there is a peculiar grasp, " a taking hold," which is distinctly felt on entering or withdrawing the bougie.

#### 2d. *Measurement.*

In order to ascertain with certainty the exact locality, length, size, etc., of the stricture, I generally introduce into the urethra a sound as large as the meatus will admit. By this manœuvre we ascertain at the beginning of our manipulation the normal calibre of the urethra. The sound is then pushed gently forward until we reach the stricture. That being accomplished, we carefully note in inches by actual measurement the distance the first stricture is met with from the meatus. Next, we as-

certain how large a sound the stricture will allow to pass : at the same time an attempt is made to ascertain the length of the stricture. Having discovered the available sound, the exploration is continued until the whole of the stricture has come under notice. If any more strictures are discovered during the investigation, they are measured in the same manner as the first ; a note of their topography is made, and carefully recorded, because in all future operations the perfect knowledge of the localities of the impediments is of extreme importance for their proper treatment.

3d. *Ocular inspection* by the endoscope will reveal important facts, such as form and color, character, or any complication by which the case may be surrounded.

The form of stricture is not of necessity always annular ; the contraction may vary, and assume many different forms. Thus they may be irregular slits of different sizes, and in all directions, oval, round, square, triangular, and serrated—in fact, of infinite variety.

A fact of vast importance, and an extremely valuable factor in the diagnosis, is the following : When the tube of the endoscope is withdrawn from the urethra after an exploration, if the stricture is sensibly indurated, and especially if it be a slight one, the canal closes immediately behind the tube with great abruptness as it is withdrawn, a circumstance which is in striking contrast with the gradual closing observed on the withdrawal of the instrument from a healthy urethra.

After a careful and minute examination is made, and the state, size, etc., of the urethra duly noted, a plan of action and future treatment in accordance with the principles previously enunciated is concluded on, and immediately carried out.

#### THE MODUS OPERANDI.

First, the susceptibility of the patient to the galvanic current is to be ascertained ; and is accomplished in the following manner : The two sponge electrodes are grasped in the palm of the hand. The metallic slide is carefully and slowly moved onward, cell by cell. The strength of the current is then entirely under the control of the operator, and should be augmented until the patient feels a pricking sensation. The toleration

with which the patient endures the current without inconvenience indicates the tension suitable for the operation, and may be varied according to circumstances ; still it should always be in accordance with the well-known laws and influences which govern electricity.

The position which the patient should assume during the operation is a matter of slight importance ; his own convenience should be consulted. He may either stand or sit, or may lie on his back with his knees drawn upward. In my practice, the patient generally stands in front of me. Anæsthetics are not used, because I deem them unnecessary. On the contrary, I want the patient conscious, so that I may have the advantage of his statements as to the sensations experienced during the progress of the operation, which, if rightly performed, occasions no pain.

One of the bougies with metal bulb, as already stated, is now taken up ; the size to be selected depends on the method determined upon.

If the stricture is not too firm or fibrous, I generally commence with a bougie which is three or four numbers larger than I judge the stricture to be, and on the well-based supposition that the current will, through its peculiar action, absorb the stricture to such an extent that the dilatation it produces will be equal to the difference of three or four sizes.

Having ascertained by actual measurement the locality of the stricture or strictures (if there be more than one), I push a small india-rubber ring over the bougie for each one of them. This little manœuvre has many advantages. Not the least important is, that I am made aware, as soon as the india-rubber ring arrives at the meatus, that the extremity of the bulb must be in contact with the stricture.

Having the plan of the urethra through actual measurement before me, I operate with additional certainty, and beyond a peradventure as to the part which is acted upon.

The operator of some experience in this kind of manipulation is always made perfectly aware by digital touch where the sound is at any time during the operation. The bougie, well lubricated, is now connected with the cord electrode of the negative pole, and then introduced into the urethra down to the



first stricture ; a sponge electrode is attached to the positive pole of the battery ; the current is completed by placing the sponge either over the super-pubic region, the thigh, or inner aspect of the patient's hand ; I prefer the latter, because it is more pleasing to the patient, without weakening the effect of the negative pole.

The current should now be very slowly and gradually increased, one cell at a time, or still more divided by resistances, until the patient feels there is a certain strength in the current. The galvanic current should never be so great as to cause either pain or a burning sensation, because in that event the current in its action would approach the galvano-caustic, instead of the electrolytic, which is not contemplated. Generally, the power obtained from eight cells is adequate, and will fulfil all the indications, and be found sufficient to overcome and penetrate the stricture. It will be found that an application of three to five minutes will be enough to make an impression ; less time may answer for the bougie to advance and slip through the impediment.

During the whole of the operation, the bougie must be held loosely and gently in its place, against the obstruction ; all pressure or force, however slight, must be avoided. The bougie will take care of itself, doing its own work by the electrolytic power its action involves, whereas pressure would not only defeat the object and purpose of its application, but expose the patient to serious danger from hemorrhage or even rupture of the urethra.

The operation being completed, care should be taken to reduce the battery to 0 by gradually moving the slide back to the starting-point, cell by cell, and only one at a time. When the slide is returned to the point whence it started, the current should be interrupted.

It will be observed that on withdrawing the bougie electrode, there is found surrounding its metal bulb a frothy, yellowish mass, which bears a strong resemblance to coagulated albumen. This product is part of the stricture, which has been decomposed by the electrolytic action of the battery.

There are failures on record, but in my opinion this want of success is mainly due to a too prolonged or a too frequent

application of the current, and to the causes previously enunciated. The application, to warrant a successful issue in any given case, should be repeated at intervals of at least two weeks, and in some instances a longer period should elapse before I would repeat the operation. However, if all things are favorable, and circumstances gave me absolute control of the case, I would prefer a period of four weeks to intervene between the operations.

This treatment must be continued until the urethra has recovered and resumed its normal calibre, whatever this may be. As a rule, every patient may be well satisfied if his urethra admits a sound of No. 12 English, and will have no reason to complain that a stricture is troubling him. But if a large man has a normal urethra, the calibre of which corresponds to a sound No. 15 or more, our treatment with electrolysis must be continued until the size of such urethra is sufficiently restored to correspond with the normal calibre. At times I have found a normal urethra of the size of a No. 11, the meatus even a little smaller, admitting the No. 11 sound only after careful stretching, and it was clearly proven that such urethra never had been larger. In all such cases, I am well satisfied with a restoration to size of No. 11, and would not think of enlarging such a urethra any further.

The question may be raised here, whether our treatment is ever followed by urethral fever, cystitis, etc., or any other complication. To this I answer, that during the three years in which I have practiced the first method, I have never had any untoward symptom. But any complication may arise, if either the patient or the operator gives cause. Urethral fever is caused by a rough handling of instruments, or an over-exertion of the patient after the operation. Avoid the causes, and you will have no consequences. The other methods of the electrolysis heretofore mentioned may have intercurrent effects from the strong currents used, or by the complications of the disease, which no surgeon can control.

For this reason, I only recommend the first method, but the third method must be employed in certain cases, in order to avoid more dangerous means, which is the more justifiable, since Dr. Bumstead in his excellent work admits that, "Either

of the modes of treatment (of stricture) now described may be followed by rigors and other unpleasant symptoms, which are known as urethral fever, and sometimes terminate in speedy death." ("Venereal Diseases," page 300.)

To illustrate this, I will now narrate an interesting case, in which circumstances forced me to practice the third method, in order to avoid the more dangerous perineal section.

*Case 2131. Traumatic impassable stricture of nine years' standing, treated successfully by the third method of electrolysis.*—Mr. S. M. S., of Hartford, was sent to me by Dr. Storrs, of the same city, on July 22d, 1872, with the following history of a traumatic stricture. Mr. S. was in the mounted service during the war. In 1863 contracted an abscess in perineum, which resulted in a urethral fistula. In 1864, Dr. Blackman, of Cincinnati, closed the fistula. The operation was a cutting one; the wound was left open to heal by granulations. Soon a stricture of the urethra followed, which was treated by the introduction of sounds at intervals. The stricture grew gradually worse until *no* instrument could pass. For the last six weeks the urine only dribbles away by drops, and not the smallest sound or even catgut will pass the stricture. The kidneys are disturbed, occasionally congested. The urine is pretty constantly albuminous, which is occasioned by the difficulty in passing water.

For years he never emptied his bladder entirely, and the residue remaining caused cystitis; the ureters were often filled with urine, producing disturbance of the kidneys. On examination, I found that a large steel sound, No. 12, entered the meatus easily, and passed down to the seat of the stricture, which was six inches from the meatus. Whalebone bougies, catgut, and other instruments of smallest size were tried, but none passed the stricture.

Next, an examination was made with the endoscope. The large tube enters with a little difficulty a distance of six inches, where it encounters the stricture. On inspection, we see that the stricture is well formed, and a plastic exudation, like a duck's web-foot, presents a grayish white appearance, with elevations standing out like granulations; on the right side the

remnant of the opening can be seen, very narrow, irregular, congested, irritated, and bleeding on slight touch.

Next, electrolysis was used with Drescher's galvanic battery. A bougie No. 6, the end of which had a metal bulb, was introduced to the seat of the stricture, and attached to the battery as the negative pole. The current was completed by a sponge electrode in the hand of the patient. The current was kept up for eight minutes, but the bougie would not enter the stricture. Then a bougie No. 3 was substituted and passed into the stricture; it worked its way slowly until it was seven inches in the urethra. Here it could be felt distinctly that the bougie was at the end of the stricture, and it was then pushed easily into the bladder to its whole length nine inches. Hence the stricture was one inch long, from six to seven inches deep. After the operation, he felt somewhat relieved.

*August 12th.*—Battery of twelve cells for twenty minutes, with metal bougie No. 6, entered the stricture three eighths of an inch, but would go no further, or pass the whole stricture. Hemorrhage prevented further operations.

*August 13th.*—Has had a good night's rest; urine passes with difficulty and burns a little. No instrument will pass the stricture. Chloroform was administered, and electrolysis used. A steel sound No. 7, as negative pole, was introduced, and full twenty cells used for twelve minutes. At last the sound passed the stricture and into the bladder; chloroform was discontinued, and a bougie No. 15, with metal end, and the other part insulated, introduced as the negative pole. The patient was conscious, and saw how the bougie No. 15 passed through the stricture into the bladder. The bougie was slowly withdrawn under the galvanic current of fourteen cells. The patient felt no bad effects afterward, no pain. One hour afterward he passed water. He left for home in a few hours.

*September 9th.*—After last operation, he has improved and passed a steady stream of water equal to about No. 3 or 4. But within the last few days he has grown worse, the urine only dribbling away with difficulty and pain. Endoscope large tube shows an immense inflammation and irritation at the stricture, and many small granulations have sprung up. Therefore it was thought not advisable to interfere operatively at this time,

as no good result possibly could be expected under present circumstances. In order to allay irritation and gain space, urethral suppositories were ordered.

*September 15th.*—Feels better; says in five years he has not felt as well. He passes water better, and is free from irritation or pain.

*September 17th.*—His constant hard labor in his business and the travels on the railroad have excited the parts to such a degree that he has a relapse, and can not void urine, which again only dribbles away in drops.

No instrument will pass the stricture, not the smallest. My friend, Dr. W. H. Maxwell, of this city, saw him in consultation, and coincides that an operation for his relief is unavoidable; but it is not advisable here in a hotel, where our patient is without proper care, away from his friends. Consequently he went home, and on September 25th the operation was performed in Hartford, in the presence, and with the kind assistance, of Drs. Storrs, Fuller, Ellsworth, and Russell, all eminent practitioners of Hartford.

Under chloroform, another effort was made to overcome the stricture, which still remained impassable to all instruments. Then the electrolysis was used, but my usual bougies were not stiff enough, and becoming too flexible might make a false passage. Now, the only alternative was a different form of electrolysis with strong currents to overcome the stricture, or perineal section.

But as this latter plan could be pursued if the other failed, therefore electrolysis was decided upon.

A steel sound, No. 7, was introduced to the seat of the stricture, and the free end connected with the negative pole of the galvanic battery. The circuit was completed by a sponge electrode as positive pole, and held firmly on his thigh. The electrolysis was kept up with twenty cells for nearly half an hour, during which time the sound made slow but steady progress. The advance was directed with one finger in the rectum, and only guided by the anatomical relations. At last the sound could be moved within the bladder.

In consultation, the plan of the after-treatment was decided upon, of which the important point was to keep the walls of

the urethra apart, and thereby prevent adhesion. The patient was then left under the care of Dr. Storrs, to whose judicious treatment I am indebted for the final result. Dr. Storrs' notes are as follows :

Wednesday night, restless—first micturition, blood only ; second time, before daylight, a full stream. Morphine, gr. ss. every two hours.

*September 26th.*—Morphine only two doses. Pulse 120, sensibility of skin, and thirst. Urine in full stream.

*October 1st.*—Urine with more difficulty ; smaller stream and straining ; pulse 80. Catheter No. 3 passed ; then a No. 5 was left for the night. Suffering, pain, and frequent vomiting.

*October 2d.*—Catheter removed, patient fell asleep ; when attempting to urinate, the flow ceased suddenly. After pain and straining, a calculus was voided, when the urine came in a large stream, and in an easy way—such as he had not known for years.

*October 5th.*—Catheter No. 5. Easy.

*October 21st.*—Catheter No. 11. Considered well, and all treatment discontinued.

*December 12th.*—Sound No. 12 introduced by himself.

I firmly believe that the calculus voided by the urethra was encysted in the bladder near the sphincter, and that the electrolytic action loosened it from its encasement. The sudden stoppage of water on October 2d was caused by the calculus dropping into the urethra. The patient has been kept under observation, and has remained well ; only, to confirm the success, he passes at long intervals of many months a sound No. 12 into his bladder, and reports well.

The first method, as described before, I practice now almost exclusively, and consider it the only safe one. I have about thirty cases on record, of which I will mention the following in brief, as details would cause too much repetition :

*Case 2045.—Two Strictures—Complication of Syphilis.*

W. H. B., an actor of this city, came under my treatment in March, '71. Found, on examination, two strictures, at one and at five and a half inches. Had syphilis, which aggravated the strictures ; and undoubtedly this complication caused the stric-

tures to impart a feeling of cartilage, which brings them almost under the calcareous species. The patient received constitutional treatment, and a few seances of electrolysis cured the strictures. He has been heard from recently, and has remained well.

*Case 2092.—Two Strictures—Chancroid—Failure of Dilatation—Success with Electrolysis.*

R. A., hotel-keeper, came under treatment in March, '72. Had been treated in the country for stricture by dilatation, with no success. Found a chancroid in the urethra, which was treated first. The two strictures were found situated at one and a quarter and four and a half inches from meatus respectively.

*March 22d.* Electrolysis was used with a bougie No. 10, with a metal bulb as negative; positive electrode in the palm of the hand. Ten cells of the galvanic battery were used for nine minutes, and the bougie passed slowly through the strictures into the bladder.

*April 14th.* The operation was repeated with a bougie No. 12. The patient has been heard from recently, and has not had a relapse.

*Case 2098.—One Stricture, Spermatorrhœa, Impotence, Melancholia.*

*March, '72.*—R. S., merchant of Philadelphia, came to my office in an advanced stage of hypochondriasis, complaining of general malaise, spermatorrhœa, impotence, small stream of water, pain in urethra, etc. A steel sound No. 12 entered the urethra easily, but was arrested at seven inches. Sounds of smaller size were all arrested likewise at the same place. There is no doubt that a stricture exists, and at last a sound No. 7 passed it with difficulty. The trouble must exist either at the junction of the membranous and prostatic portion, or in the latter only. Galvanism was used with ten cells. Bougie No. 10 with the usual metallic end as negative into the urethra, met the same obstruction at seven inches. The positive pole was a nickel bulb, and grasped firmly with the closed hand. After five minutes of the electrolytic current, the bougie passed the stricture slowly

and slipped into the bladder. The withdrawal of the bougie was followed by a thick, gleetly discharge. It seems that this matter had accumulated behind the stricture, irritated the prostatic portion and the ducts, and thereby was accessory to creating a spermatorrhœa. On passing water, shreds came along of a thick white mass, which were the product of electrolysis. The operation has not caused any pain, and the patient traveled home without unpleasant feeling.

*April 16th.* On examination with a sound No. 10, found the stricture at the exact place; the sound passed the stricture after persistent and patient efforts.

Then the galvanism was used as before, with a bougie No. 12 as negative, and with the same result.

*May 9th.* In Philadelphia, a sound No. 12 could be easily passed into the bladder, which proves that the stricture is cured. The patient has been kept under observation for two years, and has been seen only two weeks since. He is perfectly well; has married since, and is the father of a healthy child.

*Case 2129.—Gonorrhœa and Stricture.*

*July, 1872.*—M. M., merchant, has had a gonorrhœa for four months, which has been aggravated by strong injections, which were followed by phymosis and epididymitis. On examination, found a large urethra, at one and a half inches a stricture, which permits the passage of a No. 9 sound. At five inches a soreness is encountered, which was afterward diagnosed through the medium of the endoscope as granular urethritis. After proper treatment of the complication, the stricture was cured by electrolysis in three sances, as follows:

*July 30th.*—Galvanic battery ten cells; the bougie No. 12 absorbed the stricture in five minutes.

*August 17th.*—Bougie No. 13 passed the stricture in five minutes, during which the galvanic current was gradually increased to fourteen cells.

*September 14th.*—Galvanism with nine cells for eight minutes. Bougie No. 15 passed through the whole urethra slowly.

Patient was ordered to introduce sometimes a No. 15 with an ointment, in order to overcome and heal the soreness of the urethra. The gentleman has been seen since frequently, and



during the twenty months following the electrolytic treatment, no relapse has occurred.

This is a typical case, in which circumstances permitted the treatment to be carried out, as recommended in a former part of this paper. The urethra of this patient has retained the calibre of No. 15.

*Case 2155.—Stricture and Gleet.*

*November, 1872.*—Mr. P. had gonorrhœa fifteen years ago, cystitis with hæmaturia one year ago, and since a serous discharge with diminished stream of water. Found one stricture one inch from meatus, which was cured with electrolysis in two sittings. Patient has left the city and has not been heard from since.

*Case 2162.—Gonorrhœal Stricture.*

*December, 1872.*—W. R. B., clerk, had gonorrhœa last spring. The discharge ran for five months. Last week had connection, and found on the following day a discharge. It has now run slightly for one week. Stream of water is small. Straining troublesome. *Bougie à boule* enters into a pouch at two and a half inches. Sound No. 11 encounters a stricture at five and a half inches. Therefore it seems that the discharge emerges behind the stricture, and is caused by it. Conclusion is, the cure for stricture will remove the discharge.

Two galvanic applications were made at intervals of four weeks, after which bougie No. 13 passed the whole urethra easily. The patient was dismissed January 21st, 1873, as cured; has remained under observation, and is perfectly well.

*Case 2164.—Simple Stricture.*

*December 30th, 1872.*—H. B. S., from Connecticut; defective history; has one stricture at two and a half inches, which was restored to a normal condition in one seance. On a subsequent visit, found well.

*Case 2165.—Three Strictures.*

*December 30th, 1872.*—S. J., saloon-keeper, was brought to my office by Dr. Good.

The patient has had strictures for a long time, which resist all dilatation, are tough, and cause painful micturition, with a small stream. Whalebone *bougie à boule* finds three distinct strictures at two, four, and five and a half inches, of a parchment feel.

Galvanism was applied; the sponge electrode as positive pole was pressed in the iliac region, and a bougie with metallic bulb pushed into the urethra as the negative pole. In six minutes, with the current of fourteen cells, all strictures were overcome. Immediately after the operation, he passed water without pain or difficulty. The stream was full and larger than he has had for many years. The patient has not been heard from since.

*Case 2179.—Stricture of Three Years' Standing.*

*January, 1873.*—T. G., from Missouri, has a bad stricture at five and a half inches, of three years' standing, caused by a prolonged gonorrhœa. The treatment was tedious, and was retarded by the patient's imprudence. At last the galvanism absorbed the stricture, so that sound No. 15 could be introduced easily into the urethra. The patient went home after three months' treatment, and has since reported well.

*Case 2193.—Three Strictures.*

*April 16th, 1873.*—G. S. B., from Oneida County, was sent to me by Dr. Good. *Bougie à boule* discovered three distinct strictures at two and three quarters of an inch, at three and three quarters, and at six and a half inches respectively. In withdrawing the small bougie, No. 4 remained engaged in the second stricture, which was decidedly fibrous. Strong fibrous bands held the extremity of the bougie firmly; and to disengage it was almost necessarily to rupture that stricture to a certain extent.

The electrolytic action was applied, as in the other cases, and the bougie No. 8, connected with the negative pole, passed slowly through all the strictures in five minutes. The patient reappeared two days afterward and reports marked improvement.

He says he must return home, and therefore wishes another galvanic treatment. It is against all rules to repeat such an operation after so short an interval, but necessity knows no rules.

The patient had to go home, and felt so much better after the first operation, that he desired a repetition, and promised to return as soon as necessary. Therefore an exception from the rule was made, and the galvanism applied again, with an excellent result. The bougie No. 11 passed slowly through all the strictures in four and a half minutes. The patient passed a full stream of water, and felt marked relief. Before his departure home on the next day, he came again to state that he is well, without feeling soreness or fatigue. I heard from him in the fall and he reported well.

*Case 2204.—Stricture and Gleet.*

June, 1873.—J. R., saloon-keeper. Is near his wedding. Has a gonorrhœa, which under the treatment of a druggist grew worse. Has an abscess also in glans near frenum. Has fever and pain in consequence of the inflamed urethra. After subduing the inflammation by internal means, the discharge continues. On examination with *bougie à boule*, a stricture was found at four inches. There was a contraction, a hard, fibrous resistance. Galvanism applied. Positive in hand, bougie No. 11 in urethra, as negative, soon passed the stricture. Then an injection of water brought by its return a large semi-solid white mass, looking like dead skin thrown off. This was the product of the galvanic action, the real stricture absorbed. It had an alkaline reaction, fibrous in appearance, and looked like the core of a carbuncle. There is no doubt that a former gonorrhœa had caused the stricture, behind which a pouch had formed which acted as a receptacle, and created a discharge, by which means the stricture grew worse. Now, it is natural that no remedies adapted to gonorrhœa or gleet could have stopped the discharge; but the treatment of the stricture cured the gonorrhœa. The patient felt no pain by the operation, and was easier immediately. Two days afterward, sound No. 12 passed easily into the bladder and no discharge followed. He married, received afterward a little treatment, and all went on well. He has been under constant observation, and has remained in good health.

*Case 2229.—Three Strictures.*

*September, 1873.*—Mr. E. S., New-Haven. About twenty years ago had a gonorrhœa, was treated only with medicines, had no injections, and finally recovered. Twelve years ago had renal difficulties, passed acid formations from the kidneys, but never passed calculi. Two years ago the stream of water grew smaller by degrees, and sometimes he could not void urine at all. Was treated for stricture, but was not relieved.

On examination, the *bougie à boule* encountered three strictures :

*1st.* At three and one eighth of an inch, which is overcome by rotating, and directing the points to the anterior wall of the urethra. The bougie is not caught on its return, but slips easily back.

*2d.* At five and a half inches, from which point the calibre of the urethra remains narrowed until the

*3d.* Stricture at six and a quarter inches, which only is overcome by bending into the curve, and slowly pushing and pressing forward. This last is the worst stricture.

*October 3d.*—Galvanic battery used. A No. 13 bougie used, with metal bulb as negative pole; passed through all the strictures in four minutes. The bougie, during the action of the electrolysis, was firmly grasped by the strictures and even by the prostate, and advanced slowly and by degrees into the bladder, so that the full measure of the bougie introduced was ten inches. The battery used was very weak, and therefore 20 cells were in operation. The positive sponge electrode was held in the palm of the hand. The electrolysis was kept up seven minutes in all.

*October 21st.*—Galvanic application repeated as before. Nine cells for ten minutes. The bougie No. 15, as negative, had scarcely any difficulty, and entered soon through all the strictures.

*October 31st.*—Slight galvanization. Bougie No. 15 entered easily without pain or detention. The patient passes a large stream of water. For other ailments, he is still under treatment, but the urethra has not had any relapse.

More cases could be enumerated, but as there is a similarity in many, it would only be a repetition of facts. Other cases

have been treated recently, and the record would not be so valuable. But I believe the clinical facts here recorded are sufficient basis for the theory elicited in the first part of this paper; and, in conclusion, I must repeat, that I only recommend the first method as a perfectly safe one; and for the success of the electrolysis depend mainly on the chemical decomposition or absorption by mild currents, very gradually increased and repeated at sufficiently long intervals.

145 West Forty-seventh street,  
New-York, February, 1874.

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*A Case of Hysterical Hemiplegia presenting Intercurrent Phenomena of extreme gravity—Gradual and Progressive Improvement, culminating in Complete Cure, under General and Localized Faradization.* By Professor J. L. CABELL, University of Virginia.

THE efficacy of electrical treatment in the cure of hysterical paralysis is so well established that a report of any ordinary case would not be likely to arrest the attention of one who is turning over the leaves of the medical journal in which it is found. But the following case presents so many features of interest and gravity, being in several respects parallel to Case 64, reported in Beard & Rockwell's *Medical and Surgical Electricity*, p. 388, a case which the authors characterize as "a whole clinique in itself," that it is deemed worthy of being placed on record.

Miss —, a young unmarried lady, first came under my professional notice in the summer of 1870, when she was brought by her friends to my office at the Hot Springs, in Bath County, of this State. I learned that about two years before, as the result, it was supposed, of an emotional shock, she was found in a state of coma, which lasted several days, or alternating with violent cephalalgia and delirium, lasting for two or three weeks or longer. It was soon observed that she was paralyzed on the right side, and on partial and afterward more complete recovery from the other symptoms, the paralysis remained. She had been under the care of several physicians, some of

whom had used strychnia by internal administration, but had experienced little if any benefit. Occasionally, at or near the menstrual periods, she had experienced attacks of cephalalgia, accompanied frequently with delirium, and sometimes terminating in coma.

The muscles of the paralyzed side were atrophied to an extraordinary degree, and some of them in a state of rigid shortening. The hamstring muscles were so contracted as to raise the foot, by flexion of the knee, some inches from the ground when she stood upon the sound limb. The fingers were bent at the first interphalangeal joint so as to bring the nails in contact with the skin of the palm. The toes exhibited a similar fixedness in the flexed position. Both hand and foot, but especially the former, presented the peculiar glossy appearance which is so well described by Dr. Mitchell, a condition which was also observed in the case of Beard & Rockwell already alluded to. Moreover, although causalgia was wanting, there was such an extreme hyperæsthesia that the patient habitually kept the hand inclosed in a bag made for the purpose. Some hyperæsthesia existed over the entire paralyzed surface, but it was apparently much more intense in the hand than elsewhere. The nails had been allowed to grow to a great length, simply because the operation of paring them was too painful to be borne, and generally brought on violent spasms; so that, at last, when it became necessary to cut them to prevent their growing into the flesh of the hand, chloroform had to be administered. If one, in passing by her, simply brushed against the affected side, she experienced extreme distress. Menstruation was scanty and difficult.

The patient was directed to take  $\frac{1}{4}$  gr. extract of belladonna three times a day, and to report again in a week, at the end of which time she had experienced some benefit in the abatement of the excessive sensibility of the hand, and was greatly encouraged. As she made no complaint of toxic effects of the remedy, though, when interrogated, she stated there was dryness of the throat and difficulty of vision, the remedy was continued. Some two weeks elapsed before I saw her again, when she was found to be still more encouraged by having had an almost painless catamenial period. She could now bear the

touching of her hand, the hyperæsthesia having almost entirely disappeared. It was proposed now, to subject her to electrical treatment, and to this end she was invited to come to Charlottesville and spend the winter under regular treatment at my hands. This plan was, however, frustrated by circumstances, and she was not again seen by me until the following summer, July, 1871, when I found her in about the same condition as the preceding year, except only that absolute anæsthesia had taken the place of the hyperæsthesia of that year. During the winter she had experienced an alarming attack of delirium, alternating with coma.

Electric examination showed a complete loss, in the paralyzed limb, of electro-muscular contractility and sensibility to the faradic currents of Kidder's machine. But, by the tri-weekly application of a mild current by general electrization, and a stronger one localized in the right upper extremity, after four or five applications, slight movements were produced, and gradually more decided ones under the electric stimulus. Some time later, very feeble movements of slight extent were slowly produced by the will, bringing in the fingers and gradually extending up the arm. By the middle of September, all the flexors could be brought, with difficulty, however, into feeble action. The dorsal interossei and the extensors on the forearm responded energetically to the electric stimulus, but not to her will. The triceps extensor had not acted at all. The patient was again directed to come to Charlottesville, whither she followed me in October. Nothing had been lost by the suspension of treatment for four or five weeks, but nothing had been gained. The application of the faradic current was now resumed and applied daily, except for four days early in December, when it was suspended in consequence of the extreme suffering of the patient from spasmodic dysmenorrhœa, the paroxysms of which were slightly relieved by the inhalation of a few drops of nitrate of amyl.

After all the muscles of the upper extremity had come to respond to the stimulus of volition, though very feebly, the battery was used in the same manner to the lower extremity, one pole being commonly applied to the spine or upper part of the thigh, sometimes held in the hand, the other to nerves sup-

plying a single muscle or groups of muscles. For the first few days there was little or no evidence of muscular contractility, but it was soon manifested, and the progress in this member was far more rapid than in the upper extremity. Late in December, an apparatus for overcoming the rigid flexion of the legs, obtained from Tiemann & Co., was applied, and worn daily, being only removed at night. The contracted muscles were gradually extended, and on the 11th of January, 1872, the patient, for the first time in three years, walked across the room without the aid of crutches. In the afternoon of that day, I received an urgent call to visit her immediately, the messenger adding the astounding intelligence that she was dying. Before my arrival, the most alarming symptoms had passed off, but the condition was still bad enough. It appeared that, after a very hearty dinner, she read a letter just from the mail, which conveyed distressing intelligence, and brought on an attack of hysterical delirium, merging into coma, and that while vomiting she was threatened with asphyxia. By some means, the cause of the threatened danger had been removed from the top of the larynx, and the respiration was now relieved, but there was coma, and the muscles, so slowly extended during the previous three weeks, had at once contracted to their former state. I feared that the paralysis had also returned, and that the result of so many months' patient and persevering treatment had been lost in a single instant. This, however, proved not to be the case, as will be seen in the sequel. In the course of the evening the coma passed off, and was succeeded by complete insomnia, which lasted until the night of the 15th, when she fell into a quiet sleep after gentle faradization. During this time, and for a week longer, there was almost total inability to take or retain any kind of food. At first a small piece of an orange, or a little lemonade, or the juice of one or two Malaga grapes would be swallowed, to be soon followed by nausea and vomiting; but during much the greater part of the time the associated acts in the second stage of deglutition would be met by an inverted action of stomach and œsophagus, and food, either solid or liquid, would be ejected without having cleared the pharynx. This occurred alike when the patient was wide awake and quiet, or when delirious, or when semi-comatose, and



these states succeeded one another throughout the course of this attack. On the morning of the 16th the catamenia appeared. In the evening of that day, a frightful attack of uterine colic was relieved by inhalation of nitrate of amyl and warm medicated fomentations to the hypogastrium, after which there was a very free flow, followed, in the succeeding morning, by extreme relaxation and depression, so that I was roused before morning, in the belief, on the part of intelligent friends and nurses, that she was sinking rapidly. Here was a terrible dilemma. No draught could be introduced into the stomach, or be retained there if introduced. The experiment of nutritive enemata had been tried a day or two before, with the immediate result in every case of bringing on convulsions and the instantaneous rejection of the fluid. A blister was applied to the epigastrium, and the mouth frequently moistened with a linen rag that had been dipped in fresh water.

18th.—A slight improvement, some water having been swallowed and retained. An experiment was made with concentrated beef essence, of which a drachm or two were retained. Slept well last night after faradization, but some tendency to collapse is observed this morning. To-day experienced severe pain in top of the head, which subsequently passed to right eye, and has left complete ptosis on that side.

19th.—Slept well after faradization. No depression this morning, but some nausea, which passed off in the course of the day, and was followed by hunger and great enjoyment of liquid food. Ptosis continues. Hypodermic injection of sulphate of strychnia, 1-20 gr. in solution, and faradization at night. This treatment continued daily.

23d.—Ptosis beginning to yield.

29th.—Patient can open the eye. Some atony of the urinary bladder, which, however, yields to the influence of a strong faradic current. Gradual improvement.

February 4th.—Of late, general faradization has been used as a general tonic, and to procure sleep at night. Now the localized applications are resumed, along with daily hypodermic use of strychnia.

February 25th.—A period has passed without show of the

catamenia. Otherwise the patient is doing well. The ankylosis apparatus reapplied.

*March 15th.*—Limb fully straightened, and patient walks with the aid of a light cane. No show of the catamenia. During the next few days the faradic current was applied to the uterus by means of a vaginal electrode, brought in contact with the os externum, the other electrode being applied sometimes to the lumbar spine, sometimes to the hypogastrium, and sometimes to the posterior face of uterus through the rectum. The right side, originally extremely atrophied, is now equally developed with the left, and the muscles gain in strength from day to day. The patient returned home soon afterward.

I saw her the following summer in August in perfect health. She had gained forty pounds (from 80 to 120 lbs.) and was able to walk five or six miles without fatigue. Catamenial function performed satisfactorily.

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The machine used in the treatment of this case, except during the first weeks at the Hot Springs, was the large double cell battery of the Galvano-Faradic Company.

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*Tinnitus Aurium, treated by the Galvanic Current.* By  
THOS. F. RUMBOLD, M.D., St. Louis, Mo.

MISS LENA H., æt. 22, consulted me February 24th, 1873, complaining of an excessive noise in her left ear, which, with varying but less intensity, had been of nearly three years' standing. She also gave the history of her attack as follows: that it began with "a cold in the head," followed by an otorrhœa that lasted about five months, that recovery followed domestic treatment, that before the purulent discharge had ceased, the tinnitus aurium had slightly annoyed her, and gradually increased in intensity, with exacerbations, especially at night, until the date, above given, of her visit, at which time it was almost intolerable.

The patient was robust, and with the exception only of a facial expression of suffering and exhaustion, seemed in excellent health. Examination followed, and the condition of the organ was found to be as here given; the drumheads exhibited greater concavity than natural, left more than the right. Heard the watch on right side,  $\frac{4.8}{120}$ ; left side,  $\frac{\text{contact}}{120}$ ; tuning-fork heard better on left side, and closing either meatus increased the sound of the fork, showing that there was not perforation of either membrana tympani, although it certainly did once exist.\* The air was heard to have entered the middle ear, and this seemed to have increased the hearing a little, but also to have temporarily aggravated the tinnitus. The pharyngo-nasal cavity had a dry, glazed appearance.

About one drachm of the solution of muriate of ammonia (grs. x ad aqua f.  $\frac{3}{4}$  i) was thrown up into the pharyngo-nasal cavity by means of a spray-producer. The constant current was then applied to the ear in the following manner: the ear electrode, a small piece of sponge wet in warm salt water, was placed in the auditory meatus, the other electrode in the right hand, which had been moistened with salt water; the elements were then immersed into the exciting fluid about one inch,† the anode was directed to the ear, and the number of elements were increased, one by one, until she said the tinnitus began to decrease, at which time twelve were in the circuit. The number of elements were then slowly decreased (as she complained of dizziness) down to one, and then the

\* I read a paper before the St. Louis Medical Society, in January last, stating that, since April, 1869, I had, from an injury to my own membrana tympani, observed that when there existed a perforation of the drumhead, closing the external auditory meatus *did not increase the sound* of the vibrating tuning-fork, or that of the patient's own voice.

† My battery, zinc and carbon, is placed in the cellar, and composed of sixty elements. They are stationary, and the acid containers are raised by means of a windlass attached to my table. The distance that the elements are immersed in the fluid is registered in my sight. The zincs are triangular in shape, sides seven inches, and wrapped around the carbons; one of the angles is dipped in the dilute acid (acid sulphuric one part, water nineteen parts), and in this way, beginning with next to zero, the deeper the immersion the greater is the quantity of electricity evolved. The current-selector is so constructed that the electricity can be increased in tension by taking more elements into the circuit without breaking the current.

acid-containers were lowered from the zincs, thus decreasing the quantity of electricity evolved by this element to zero. About one minute was occupied in making this application. In about two minutes the tinnitus returned with its usual degree of severity. After an intermission of ten minutes, the course was repeated, again decreasing the noise in the ear, and to a greater extent than by the first application, and lasting about fifteen minutes. Another interval passed, and again the application was made, causing the tinnitus aurium to *cease entirely* for the space of ten or twelve minutes, and it never returned with any thing like its former severity. The hearing was increased to  $\frac{1\frac{1}{2}}{20}$ . She could not detect any "opening reaction" of the anode. The cathode was never applied to the ear. Prescribed a tonic and laxative, and continued use of local medication, and the battery three times a week for three weeks, twice a week for four additional weeks, and once every eight for twelve days, until the last of May. After this period, she still had a slight tinnitus, but not noticeable during the day, unless special attention was directed to it. Improvement has continued to the present time, hearing on affected side being  $\frac{6}{1\frac{1}{2}20}$ .

Considering the severity and duration of the attack, I have regarded the results as perfectly satisfactory, and the effects as evidence that approximate recovery was mainly due to the beneficial influence of galvanism, which was expressed by immediate changes for the better. Results have been more and less marked in other cases, but I am very confident that many of my failures have been because of a limited experience. I believe galvanism to be a very valuable adjuvant, and that frequently it is the principal agent in performing a cure. I have had cases of tinnitus in which nothing else would produce a permanent beneficial effect; and, *per contra*, others in which it only caused disagreeable symptoms, that were brought to a favorable issue by local and general medication; and still others which no treatment seemed to benefit.

Of the first, I will give an instance. A teacher of phonetics in one of our public schools, Miss Lizzie A. H., æt. 23, consulted me on the 1st of September, 1873, about a very sudden and severe tinnitus aurium in her left ear, and this annoyed her to such an extent that she could not proceed with her

duties in school. During the attack, she could not understand ordinary conversation beyond a distance of five feet, unless directed to her. Watch, right ear  $\frac{7.2}{120}$ , left ear  $\frac{3}{120}$ . On examination of the ear, nothing could be found to account for the trouble. She had slightly enlarged tonsils, and pharyngo-nasal catarrh, with eustachian tube permeable on slight pressure of the air douche. The attempt to alleviate was inaugurated by excision of the tonsils; following this, a drachm of the following solution was thrown up into the pharyngo-nasal space—that is,

℞ Acidi Carbolici (cryst.) grs. xx.  
 Ext. Pinus Canadensis (Kennedy's) 3 i.  
 Glycerinæ, f. ʒ i.  
 Aquæ f. ʒ vii. M.

The middle ears were inflated during deglutition, and a tonic and laxative were prescribed. This course of local medication was repeated three times a week, for two and a half months, the effect of which was a general improvement of her health, increase of hearing to  $\frac{1.3}{120}$ , and a lessened intensity of the tinnitus; but gradually it returned with its original severity. On 19th of November, all local medication being discontinued, I made an application of the galvanic current—zincs immersed about two inches, anode to the ear, cathode in right hand. About the time that the current-selector had slowly inclosed the eighteenth element, all the noise in the ear entirely ceased. The intensity of the current was then slowly decreased to zero, as in the first case. The time occupied by this application was about one and a half minutes. There was no opening reaction of the anode, and this I endeavored to avoid. The hearing was increased from  $\frac{1.3}{120}$  to  $\frac{2.8}{128}$ . Directed her to return as soon as tinnitus was again noticed, supposing it would recur within a day or two, but it did not until the 26th. The galvanic current was applied, and the tinnitus ceased with the inclosure of the seventh element. Again the tinnitus recurred mildly on the 22d of December; on this occasion, four elements had the desired effect. There has been no return of the affection up to the present time. Her hearing has increased to about  $\frac{6.0}{120}$ .

I would not indorse treatment of aural affections without the aid of electricity, because of frequent disappointments with

its results. In nearly one fourth of my cases, it has been either a valuable adjuvant or a specific; *without it*, I could not have accomplished many recoveries most wished for by myself and the patients.

1205 WASHINGTON AVE., March, 1874.

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*Medical Jurisprudence and the Medico-Legal Society of New-York.* By CLARK BELL, Esq., President of the Society.

THERE has been no more prominent reason for that pronounced awakening of a deep and growing interest in the subject of medical jurisprudence, particularly in the two professions of law and medicine, in our own country, than the progress, conduct, and influence of certain public trials in the criminal courts toward which the public attention has been anxiously turned, and the results of which have unfortunately been at the expense of our criminal jurisprudence, in the public estimation and confidence.

Foremost among the causes that have led to this popular and to some extent just prejudice in the public mind, has been the strange and almost incomprehensible uses made—and, in some startling instances, successfully—of the plea of insanity as a defense in great criminal trials in this country.

This had grown into such an acknowledged evil, and had assumed such formidable proportions, that there existed in many minds a grave fear that our whole system of criminal jurisprudence was in danger of thereby receiving a very serious blow, which might greatly diminish popular confidence in its administration, and strike at the very foundations of our social and political structure.

It is not very long ago that the public prejudice against this defense was so great, that, notably in the Freeman case, at Auburn, N. Y., conducted with such rare courage, fearlessness, and commanding ability, by Governor William H. Seward, against a very tempest of popular clamor and obloquy, it failed, when

time demonstrated that it should have succeeded; but the records of that trial, and the review of the questions involved by the higher courts, have made it one of the leading cases in this country upon many of the most important questions of medical jurisprudence involved in that class of cases.

It was perhaps owing to the failure of that defense, in the case of this negro, Freeman, demonstrated by the autopsy to have been improperly decided by the jury, that a great laxity crept into the administration of our criminal jurisprudence, especially in regard, first, to the nature, character, and kind of evidence that was allowed to be introduced in such cases; and, second, and more especially, in the very loose and wholly unreliable evidence often allowed by the courts under the claim or pretense of the so-called medical testimony of experts.

The Medico-Legal Society of New-York is probably largely indebted for its origin and organization to a conviction in the minds of its founders of the great and imperative want here of some organized and intelligent effort, on the part of the legal and medical professions, to correct the acknowledged abuses that had so fastened themselves upon our existing system, as well as to their desire to advance the standard of medical experts from its low and almost prostrate position into something commensurate, not only with the spirit of our age and time, but which should rescue the medical expert from the public contempt into which he was in so grave a danger of falling irrevocably.

The mere possession of a physician's certificate is no evidence that a medical witness is a competent expert upon a given question of judicial inquiry. Much less is the degree of an attorney any assurance that the holder of one if on the bench is thoroughly familiar with the settled rulings, on the introduction of evidence in such cases; or that the office of district attorney or public prosecutor is, for that cause, in hands well versed and skilled in such questions, as some of our most important cases here have unfortunately demonstrated; and the field of the Society was confessedly as much within one profession as the other.

More credit is probably due, in the formation of this Society, to the medical profession than to the legal; but having com-

menced and entered upon this work, its claims are addressed with equal force and irresistible logic to each and to both.

From small beginnings, it has won its way, by continually advancing strides, into the front ranks of the useful societies of the city ; and the "Société de Médecine Legale de Paris," organized since the New-York Society was founded, has given the latter the high honor and credit of pointing them to a way which, as their recently published record shows, has been one of pronounced distinction in this field of inquiry, in that enlightened capital.

If a single subject has been herein treated as of more importance than another, it by no means follows that the Society limits its inquiries and investigations to that subject alone, or that it is held in higher estimation. All the wide realm of jurisprudence in any wise related to medical inquiry, from the field opened so enticingly to the student by Beck and his confrères, in their day, and now so much more elaborated, advanced, and improved by the later and more progressive studies of the modern writers and thinkers of our own time, down to the recent discoveries which science has made and lent to the searcher after the truth, is the broad field and true mission of this Society.

With a membership comprising some of the most lustrous names of both professions, in the city of New-York and the nation, devoted to a purpose which must favorably commend itself to the thoughtful attention of every one interested in preserving and strengthening public confidence, in the administration of the criminal jurisprudence of the land, it appeals for encouragement, aid, and assistance to the two most interested professions, not only in the city of New-York, but throughout the whole land and nation.

As an aid and accessory in the accomplishment of such a mission, the public need, at the metropolis of the country, of a library of medical jurisprudence, which should contain all works extant at least in the English, French, and German tongues, became not only a great want, but an absolute necessity.

On looking at our larger libraries, especially the law libraries of the Law Institute and the Bar Association in New-York, and the Library of the Court of Appeals, at Albany, they are found



without even the leading authors, except perhaps the latter, which has not even any thing like a fair collection.

It was decided last year to lay the foundations, under the auspices of this Society, for the formation of a library, which should not only be the only one of its kind on this continent, but which should place within the reach of gentlemen of both professions every known work upon this most interesting and important subject.

Contributions either in volumes or money were sought, and the movement thus inaugurated is on the fair road to success in the near future.

A Society, now in its infancy, has thus committed to its charge a great trust and a grave responsibility.

If it rightly comprehends its mission, and worthily accomplishes the labors demanded of it, this Society can not fail to occupy a prominent place in that field of scientific inquiry and research now opening in the domain of medical jurisprudence.

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*Hysteria and Spinal Irritation, treated by Central Galvanization.* By W. F. HUTCHINSON, M.D., of Providence, R. I.

THOSE forms of hysteria which usually are transferred to the specialist in electricity for treatment are generally, if not universally, those wherein the skill and armamentarium of the general practitioner have been long and severely taxed, without adequate result. Failure to cure these obscure types of nervous derangement, of which the origin is but imperfectly known, and wherein the pathological state can scarcely be surmised, has frequently been the termination of treatment by drugs, even in the hands of our most accomplished and skillful physicians ; and it is not a matter for wonder when they turn with sensations of grateful relief to the practitioner of a system of therapeutics which makes direct issue between the agency employed and the morbid condition, without the interference of the disturbing elements of digestion and assimilation.

In those cases of hysteria where Prout states that "the utmost duplicity and cunning may be displayed, where from mere appearances we should expect nothing but the most rigid truth," and where the patient seems given over body and soul to the evil spirits which have entered her, I have found that a persistent use of the constant current has frequently effected a cure, and has invariably relieved the more aggravated symptoms, even when the length of treatment has been so abridged by circumstances as to destroy the expectation on my part of any benefit at all. The cases which I am about to cite, it is but fair to say, have not been under observation long enough to determine the fact of cure—unless the complete relief from nervous disorder for several months may be termed such. They will, however, be retained under surveillance, and reported upon again at some future time—being residents of the city and immediate vicinity.

*Case 1.*—Mrs. B——, æt. 41, slender, brunette, and of a fine, highly-strung nervous organization, native of Kentucky. During the two years last past, this lady has lost several members of her immediate family by death, stroke following stroke at a time when she was least able to bear mental strair, by reason of the presence of the grand climacteric. While yet a mourner for her dead, financial reverses came, and in a week she was stripped of a great part of her fortune, and left with what seemed to her a mere pittance. Under these successive blows, reason tottered on its throne, and, more than once, a council determined to seclude her in an asylum, which, however, was not carried into effect, on account of the furious opposition of her friends. She then became violently hysterical, with frequent attacks of weeping, which always ended in a succession of terrible screams, often arousing the neighborhood. As these paroxysms passed off, a copious discharge of limpid urine occurred, and she became again comfortable, although weak. Occasionally she would simulate acute mania with such success as to frighten all bystanders, and would then use the most outrageously obscene language, although her whole life had been that of an exemplary Christian. There was no great amount of emaciation, and in the intervals between attacks the appetite was good and sleep normal. These inter-

missions grew gradually shorter, until from a month's length they dwindled down to three days, when, every thing else having been uselessly tried, she was, at her own request, placed under my charge. No examination was made of the generative organs, as her physician had stated that they were healthy, and I proceeded at once to the first application. Placing the cathode of a 32-cell Stöhrer galvanic battery, freshly charged, over the solar plexus, and the anode on the seventh cervical vertebra, connection was made with four cells, gradually increased to eight, then to ten, at which point the sensation of heat was marked, and the galvanic taste noticed. The current was allowed to run five minutes uninterruptedly, when the anode was changed to the vertex, with the current from two cells. This was increased to eight before any effect was produced, and was then retained *in situ* for three minutes, when the sitting was terminated. Patient remarked that she felt as if warm water was running down her spine, and that she was sleepy. After four similar applications, repeated every second day, the intervals grew longer, until, after sixteen, they were of ten days, and the paroxysms very much lessened in force. The current power was steadily increased, the highest attained being twenty cells, and the sittings *increased*, to every day, after the twelfth. From this time, the 15th of September, she rapidly grew better, until, on the 1st of November, I discharged her as cured. Until this date, April 1st, no well-marked paroxysm has occurred, and any observed tendency thereto, which was noticed twice, was promptly checked by a short and mild application, made as before. The current direction was frequently changed, and the length of sitting averaged twelve minutes. Contrary to usual custom, I found it necessary to make the applications at shorter intervals as the treatment proceeded, and have several times noticed the same marked effect. It is, therefore, my belief that the influence of so short a seance as is imperative when working about the brain and spinal cord is not usually maintained longer than twenty-four hours, as a rule—and that it is better to decrease than to increase the intervals, at the same time using less or the same power. The somnific influence, the primary effect of the current in this case, has been for some time my guide as to the direction of the flow; and

where this is not experienced, or the reverse condition, that of restlessness, is exhibited, I reverse the poles, and usually a favorable result is attained. The great differences noted by some observers between the action of the ascending and descending current have not been established by my experience; and I do not believe that any radically differing effects belong to them. In a few rare instances, as when a neuralgia or tic is located within the limits of a very small space, it has seemed that the anelectrotonic state was most beneficial; but when the poles were changed without the knowledge of the patient, the pain was dissipated in an equally short space of time as before, the only difference in favor of the anode being the less degree of pain caused by its application. This pain, however, a skillful operator will avoid; and I repeat that it seems difficult to prove any great need of care as regards the current direction.

*Case 2.*—Mrs. A. H., blonde, æt. 35, native of Rhode Island. Married for eighteen years, without children. Is stout, weighing one hundred and seventy pounds.

Patient was first seen by me during last autumn, at the request of Dr. George P. Baker, who had treated the case for several years ineffectually. Is hysterical, without any special periodicity to the attacks, which assume ordinarily the form of great depression of mind. Has much pain in the cervico-occipital region, extending down the spine as far as the first lumbar vertebra, at times very severe, and utterly uncontrollable by any drugs, excepting large doses of morphia. Appetite normal, and functions in general well performed. Dr. B. informed me that the lady had for some time been suffering from endo metritis, and an engorgement of the cervix uteri, for which he was treating her in his usual skillful manner, and which condition was rapidly improving.

This, then, was one of Romberg's cases, of which he says: "From the time when hysteria has taken root, the reflex action preponderates throughout the organism, and renders the individual more dependent upon external stimuli." Here this view was eminently true, for the lady was a pleasing and valued member of the society in which she moved, and it was only when alone that the blue devils made their *entrée*. At the

time when I commenced treatment, she was taking, in connection with local applications, little, save a dose of one of the bromides occasionally, and seemed to need some powerful stimulus. Recognizing the fact that the malady was probably chiefly dependent upon the condition of the uterus, a guarded prognosis was given, and we began with central galvanization—from the superior cervical ganglion of the sympathetic to the epigastrium—with a descending current of eight cells of the same instrument used in the preceding case. This was slowly increased to twelve, and the seances limited to eight minutes, with occasional reversals of the poles. The first two applications were followed by the same quiet, tranquil state before noticed, but unfortunately the current developed upon the back a violent urticaria, a disorder to which she had for some time been subject. A change was consequently made, and general faradization, with an exceedingly fine current, from a Du Bois Reymond machine, resorted to. This was well borne, but no relief from the pain was experienced, as when galvanism was used. I therefore returned to first principles, regardless of the skin affection. During a period of twenty days, daily applications were made, the time varying from eight to fifteen minutes, with the effect of the total abolition of the attacks of mental depression, and notable amelioration in the occipital neuralgia. In fine, she was rapidly improving, when her husband was attacked with pneumonia, and the exposure incident upon nursing him brought her down with the same disease. Most unfortunately, since that time, through an aggravated state of the uterine disease, and other circumstances beyond control, she has never been able to resume regular treatment, and the possible results are unknown. What does remain is the greater tranquillity of mind and better tone of spirits. She is more cheerful, and enjoys life, even though an invalid, better than before.

One singular result in this case was the differential effects produced upon the urticaria by the galvanic and faradic currents. The one excited the eruption, the other soothed it: a fact not easily explained, except upon the ground of reflex stimulus with the former, and the absence of it with the latter.

These two cases embody the main points presented by the

majority of hysterical patients which have come within my scope of observation, and the results of galvanism are invariably far better than those of special medication. By the latter term is meant medical treatment directed toward the morbid condition alone. In many of these cases, treatment must be chiefly empirical, from the fact that the mind diseased has greatly to be ministered unto; but I am of opinion that there are few of them which will resist a careful and judicious use of *central galvanization*.\* This system of application, entirely due, I believe, to my friend, the editor of this journal, is still so new as to demand a long series of carefully-conducted observations to fully establish its value. These will gain in accuracy almost daily, as newer and better-constructed instruments take the place of old ones. Already the Stöhrer battery, used in the preceding cases, has been discarded in favor of the beautiful cabinet Siemens and Halske, made by the Galvano-Faradic Company, which is infinitely the superior in quality of current and perfection of working; and this must, in a short time, give place to something very much better.

*Case 3.*—Mrs. M., æt. 40, native of Rhode Island. Has suffered for two years from spinal irritation in so advanced a stage as to call for medical interference, during which time she was seen by a number of physicians, returning finally, where she should have remained from the first, to the care of her family attendant, Dr. Baker, by whom she was placed under my charge.

The symptoms were nausea, great distress after meals, flatulence, and persistent insomnia. Pain was almost constant, and was of a neuralgic, lancinating character, extending from the cervico-occipital region down the spine as far as the first lumbar vertebra, and thence around the waist, giving the sense of constriction which we usually notice in spinal congestion.

Menstruation was regular, and bowels in excellent condition, considering the quantity of drugs aimlessly given by various charlatans whom she had consulted. The difficulty most complained of was sleeplessness. "If I can only sleep, Doctor, without an anodyne, I shall soon get well."

Concurring in this opinion, and believing that the case was one of general nervous hyperæsthesia induced by spinal irrita-

\* For illustrations of the method of central galvanization, see frontispiece.—ED.

tion, a careful examination was made of the column. Firm pressure with both thumbs over the transverse processes was steadily carried downward from the nape of the neck, but no sensitive spot was found. With a small rubber-tipped hammer and pleximeter, percussion was practiced upon the body of each vertebra successively, with a negative result until the first lumbar was reached, when she exclaimed, "O Doctor! that goes all through me like fire!" No amount of pressure my thumbs could make would produce this result, which a slight tap readily repeated.

Treatment was at once commenced with the same battery previously employed, in the following manner: Upon a stool, which is fitted with a copper plate in the centre of the seat, covered with a sponge, the patient was seated in such a manner as to cause the coccyx to press firmly upon the plate, to which was attached the cathodic pole cord, the anode being a carbon plate two inches square, also sponge-covered. The latter was strongly pressed against the seventh cervical, and the current from four cells turned on. No sensation being felt, the force was gradually increased to ten cells, when she felt, as she expressed it, a current as if of warm water flowing down her back as far as the painful point, and thence spreading all over and through the pelvis. The first application lasted ten minutes, with the ordinary soothing effect, and the patient was directed to abstain from her usual anodyne at bed-time, taking in its place a cup of strong beef-tea, and to return next day. Next day came, and with it Mrs. M., jaded and worn from a restless night. The same mode of application was practiced, with the addition of two or three rapid reversals of current, by means of the commutator. Next day, she reported about an hour's sleep, and, to make a short story, from this time until complete recovery from every symptom was established, a period of three months, the upward march was with a steady step, and but few backslidings. To-day, four months since I last saw the lady, her husband tells me that she continues in excellent health. No medicine was prescribed, except pepsine during the first month, and the sittings were daily, with the exception of Sundays.

In commenting upon this case, I would call attention to the facts that percussion elicited from the irritated organ a reply

which simple pressure could not call forth, and that neither anode nor cathode was located over the painful point, such proceeding having, in my hands, twice proven detrimental. It has seemed much better to allow the current to pass *through* the tender portion of the cord than to locate either its entrance or exit at this point.

It is useless to multiply examples, when all seem to tend to the same result, namely, the extraordinary success of the galvanic current in relieving and removing the maladies referred to, when properly applied, with a sufficiently long course of treatment.

In my hands, general faradization has rarely succeeded, uncombined with other remedies; and whenever cure has followed treatment, it has been the effect of the constant current. Other things equal, it would seem as if the peculiar province of the induced current is with the muscles and superficies of the body—that of the direct with the nerve-centres and deeper-seated tissues; that to relieve nerve pain, the galvanic flow is necessary, and to stimulate the skin, the faradic. That these expressions are frequently synonymous, is true; that they are always, or even in a majority of cases, thus to be accepted, does not seem to be borne out by clinical experience—at once the best and surest of teachers.

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*Some Recent Investigations into the Functions of the Human Brain.\** By ROBERTS BARTHOLOW, M.D., Professor of Theory and Practice of Medicine, and of Clinical Medicine, in the Medical College of Ohio.

THERE are three modes of investigation by which our knowledge of the functions of the brain has been advanced within a few years. Leyden, Pagenstecher, and Jolly have studied the results of pressure; Fournie and Nothnagel have ascertained the effects of limited injury of various parts of the encephalic

\* Being the substance of remarks made at the meeting of the Cincinnati Academy of Medicine, March 23, 1874.



mass, and Fritsch and Hitzig and Ferrier have demonstrated the reactions produced by electrical excitation. Opposed to the surprising results of Fritsch and Hitzig and Ferrier, are the recent investigations of MM. Dupuy and Carrville.

Although our knowledge of the functions of the human brain has been advanced by these experiments on animals, yet it remains to be shown how far there exists an analogy in function of the brain of man and that of the primates below him. Still more are we in doubt in regard to the analogies and differences which obtain between the human brain and the brains of animals in the scale below the primates.

Having had the good fortune to encounter a patient in whom an epithelioma had destroyed a considerable portion of both parietal bones, I subjected the exposed brain to various kinds of excitation, especially electrical. The results thus obtained appear to me to throw great light on the questions raised by the investigations of Leyden, Pagenstecher, Nothnagel, Ferrier, and the other experimentalists. For details of my case, I beg to refer the reader to the *American Journal of the Medical Sciences* for April. It will suffice to state here, that although the dura mater in my patient was exposed over a space two inches in diameter, her intelligence, motility, sensibility, and her general health continued at the normal. Careful examination disclosed no special impairment of the cutaneous sensibility, as respects the endowments of touch, pain, heat, and cold. The electro-tractility and sensibility of the muscles were intact. There were no defects of the special senses and no alteration of the pupils.

An excellent opportunity being thus afforded for ascertaining the functions of those parts of the brain brought within reach by an incurable and certainly fatal malady, I resolved to repeat some of those experiments which have hitherto only been made on animals. The details of these experiments having been already given in another place, I propose now simply to make some comparative statements, and add a commentary to results already published.

1. *As to the excitability of the cerebral hemispheres.* It is well known that Magendie, Longet, Flourens, and others had apparently demonstrated the inexcitability of the cerebral hemi-

spheres. Fritsch and Hitzig (*Schmidt's Jahrbücher der gesammten Medicin Band 150 s. 4, 1871*) and Ferrier (*The West Riding Lunatic Asylum Reports, Vol. 3, p. 30, et seq.*) have apparently demonstrated the electric excitability of the hemispheres. The first-named used in their experiments a weak galvanic current; Ferrier employed Du Bois Reymond's magneto-electrometer. Fritsch and Hitzig object to Ferrier's experiments, that the latter used currents of such intensity as to call into action the central ganglia. MM. Dupuy and Carrville (*Gazette Médicale de Paris, Nos. 1, 2, 3, and 4, January, 1874*) deny the correctness of the conclusions drawn from the experiments of Fritsch and Hitzig and of Ferrier. They show that even the mildest currents diffuse into the cerebral substance, and reactions only are produced when the central ganglia are reached. They hence reaffirm the conclusions of Magendie, Flourens, and others, that the cerebral hemispheres are absolutely inexcitable.

In my own experiments on the brain of the woman referred to above, I found that the dura mater and the gray and white portion of the hemispheres were insensible to mechanical irritation. Leyden had maintained that the dura mater possessed a slight degree of sensibility, but Pagenstecher (*Experimente und Studien über Gehirndruck, Heidelberg, 1871*) came to exactly the opposite conclusion. Ferrier, on the other hand, states (p. 33) that "the dura mater is so excessively sensitive that pinching it, or stimulating it by the electric current, is sufficient to cause violent movements." In my patient, movements were produced by the electrical current when the insulated needles were well imbedded in the dura mater, but they were of the same character precisely as when the needles were passed through the dura mater into the cerebral substance. In Ferrier's experiments, the animals operated upon were completely anæsthetized, to quiet all voluntary movements; but my patient, having full possession of her senses, could, of course, appreciate the pain, if any were produced by mechanical irritation of the dura mater. The movements noted by Ferrier appear to me to be due to the conductivity of this membrane, and the great aid which it consequently affords for the diffusion of the current.

The fact heretofore held as fully established, that the cerebral substance is insensitve to mechanical irritation, is abun-

dantly confirmed by my patient. She experienced no sensation whatever when the needles were introduced into the gray and white matter, until passing deeply into the right hemisphere she complained of pain in the neck. Until this point was reached (medullary fibres closely related to optic thalamus) she appeared to be unconscious of the passage of the needle through the brain matter.

When two insulated needles were inserted within a few lines of each other so that the non-insulated portion rested in the dura mater and the cortex, distinct reactions were produced when communication was made with a faradic current. A single cell of the Galvano-Faradic Company's machine was used, and the so-called "primary current" of least intensity was sent through the needles. The weakest current furnished by this battery caused distinct contractions of the extensor muscles on the opposite side of the body, including the muscles of the neck, arm and forearm, and leg. When the hammer of the induction coil was made to interrupt slowly, the muscular contractions were seen to be synchronous with each break in the circuit. The following were the phenomena observed: the head was suddenly jerked to the opposite side; the forearm and fingers were slightly extended; the foot was projected forward.

Not only were muscular movements produced by faradic excitation of the cortex, but well-marked epileptiform convulsions, confined to the right arm, shoulder, and neck, occurred subsequently to some experiments which caused considerable injury to a district of cerebral matter on the left side. It is impossible to ignore the importance of this fact. For if a lesion caused by the introduction of insulated needles should produce the same symptoms as faradic excitation, then we are entitled to regard the reactions produced by the electrical current as due to excitation of the cortex, and not to diffusion to the central ganglia.

An epileptiform seizure confined to the left side, and resulting in complete loss of consciousness, livid discoloration of the face, frothing at the mouth, and widely-dilated pupils, was produced when the insulated needles were introduced to the depth of an inch and a half into the right hemisphere, and "a pri-

mary current" sent through from one cup, the bobbin being uncovered by the cylinder for the space of one inch. This convulsion was the same in all respects, so far as to the movements in the arm and neck, as the epileptiform convulsion limited to the right arm and neck above described, in which, however, loss of consciousness was prevented by the inhalation of chloroform.

Although pain in the cerebral substance itself was not experienced, and although there appeared to be no consciousness of the presence of the needle until pain occurred in the neck, yet abundant evidence was afforded that mechanical and electrical irritation of this part of the hemispheres caused pain in the extremities. My patient complained much of pain and numbness and tingling in the right arm, hand, and leg when the left hemisphere was excited, and *vice versa*. Although a passive, lymphatic, and unexcitable creature in her normal state, she yet manifested considerable emotional disturbance when the hemispheres were subjected to electric excitation—at one time laughing freely, at another bursting into tears. How far these emotional states were accidental, and how far the direct result of the electric excitation, I am unable to determine.

The results of mechanical and electrical irritation above described are to be compared with localized diseases of the hemispheres, as, for example, an exostosis, a tumor, etc., which, by pressure or irritation, set up an hyperæmia leading to an abnormal activity of the cellular elements of the gray matter. An unilateral epilepsy or chorea may be thus produced, as Dr. Hughlings Jackson has shown in his various publications.

In the experiments of Fritsch and Hitzig, Ferrier, Dupuy and Carrville, consciousness was abolished by the administration of chloroform. In my case, consciousness was, of course, not affected in any way. We are entitled to conclude, therefore, that *the human cerebrum is not absolutely inexcitable, but that mechanical irritation and electrical stimulation do cause certain reactions, the product of changes in the cells of the gray matter*. That mere mechanical injury is, at the moment of its infliction, at once translated into consciousness, can not be affirmed; indeed, the facts are positively opposed to such a view. So far the demonstrations of Magendie, Longet, Flourens,

and others appear to be confirmed. There is, however, an obvious distinction between the immediate translation into consciousness of an injury to the cerebral lobes, and those purposive acts which are the direct product of mechanical and electrical stimulation of the gray matter.

2. *Points of the hemispheres into which the insulated needles were introduced.* After the death of my patient, I was able to exactly localize the points into which the needles had passed. Although the human brain has been penetrated by the surgeon's knife, and portions of its substance have been permanently lost, without any very obvious impairment of the functions of the organ, yet it is evident, from the results in this case, that even a fine needle can not be introduced without injury. The track of the needles was marked by a distinct line of diffuent cerebral matter. This result enabled me to exactly localize the injury done by the needles.

The needles entered on the left side, one inch from the great longitudinal fissure; on the right side, one inch and a half. The convolution penetrated is the "upper parietal lobule" of Ecker (*The Cerebral Convulsions of Man*), the "gyrus centralis posterior" of Henle (*Handbuch der Nervenlehre des Menschen. Braunschweig, 1871, p. 154, et seq.*). The fibres from this region, according to Luys (*Recherches sur le Système Nerveux Cerebro-Spinal. Paris, 1865, p. 175, Plate XXIII.*), descend to the optic thalamus and to the commissural fibres connecting the posterior lobes of the hemispheres.

3. *Summary of results obtained by mechanical and electrical stimulation of the right and left upper parietal lobules.*

These parts of the human brain have to do both with motion and sensation.

As regards motion, they are chiefly associated with the extensor muscles. (Compare Ferrier's observations on electric excitation of the tubercula quadrigemina.)

An irritative lesion, mechanical, of these parts, will cause crossed unilateral choreic movements.

Electrical excitation causes crossed muscular movements in the extensor muscles. Stronger electrical excitation gives rise to unilateral epileptiform convulsions on the opposite side.

Lesions merely irritative, mechanical, or electrical, give rise

to pain on the opposite side of the body, more especially in the hands and forearms.

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*A New Method of Treating Malignant Tumors by Electrolyzing the Base.\** By GEORGE M. BEARD, M.D.

DURING the past three years, I have treated malignant tumors of various kinds by a method of electrolysis, which I have termed *working up the base*, or *electrolysis of the base*.

*Ordinary Method of Electrolysis.*—In the ordinary method of electrolysis of tumors, the needles, insulated or non-insulated, are plunged directly into the body of the tumor. (See frontispiece.) This method, which was introduced to the profession by Dr. Althaus, of London, is very satisfactory in the treatment of certain benign growths, as erectile and cystic tumors, and goitres, and in many cases its advantages over the knife are very great.

In erectile tumors, the ordinary method of electrolysis causes the formation of a clot, which is slowly and gradually absorbed, and thus a cure is accomplished with little or no pain, and with little or no cicatrix.

In benign cystic tumors, the ordinary method of electrolysis causes decomposition of the fluid contents, stimulates absorption, causes more or less atrophy of the walls, and this way approximately or perfectly cures.

I have treated quite a number of cases of superficial and subcutaneous erectile tumors and of benign cystics by this method, and with results that have been most agreeable. In some cases, it is necessary to repeat the operation once or twice before the cure is perfected; but the pain in many cases is but slight, or can be readily controlled by local anæsthesia, and hence the operations are but little dreaded. Many of these benign tumors occur in localities where it is highly desirable to avoid a scar. Many of them also occur in patients who dread any ordinary operation with the knife, ligature, cautery, or hot needles.

In some of these cases, the results of the ordinary method of electrolysis are not only satisfactory, but really brilliant, and

\* A very condensed abstract of this paper was presented to the N. Y. State Medical Society, February, 1874.

there is no question that the method will become a permanent part of the surgery of the future.

But for *malignant* tumors, this method of electrolysis does not suffice. It will relieve the pain, but relief of pain can be obtained by simple external galvanization without any needles. It will cause a certain reduction in size, but this reduction is almost always limited, rarely exceeding ten or twenty-five per cent. In some cases, not the slightest perceptible reduction is caused, even by the most persevering use of mild electrolysis. When powerful currents are used, there must, of course, result more or less destruction of tissue near the point where the needles are inserted, and by successive operations the entire growth may be broken down, or may slough away after the operations are discontinued, and it is possible to extend the operations far into the base and surrounding tissues. Some of my first cases were treated in this way; but it is to the last degree awkward, tedious, and involves a great waste of time and force. The time thus spent on the body of the tumor is wasted time.

*Method of Operating.*—The patient must first be fully etherized. The method of operating on a *small* tumor is to first insert the needle connected with the positive needle underneath the tumor and near the border. A similar needle connected with the negative pole is inserted also underneath the tumor, and, if possible, at some distance below the base of the growth, so that the point emerges on the opposite side. The current is now gradually let on, and the strength increased until the electrolysis becomes active, as will be indicated by the yellowish form that appears at the negative pole, which becomes gradually loosened. As the action increases, the negative pole may be slowly worked from side to side, with a slight cutting motion, so as to undermine the tumor. The positive meanwhile remains *in situ*; it becomes firmly adherent through oxidation, and need not be removed until the close of the operation. (See frontispiece.)

After the tumor falls off, through the thorough undermining of its base, the base itself can be worked up in all directions with the needles, or with a harrow electrode that I have devised for this purpose. After the removal of the growth, it is well

to change the position of the poles in working up the base, so that all parts of the surface may get the benefit of the action peculiar to both poles.

If the tumor is a large one, as an extensive epithelioma, or schirrus, it is better to have it first removed by the knife. The base can then be worked up in the manner just described.

The cavity after the operation has a charred appearance.

The time required in an operation of this kind ranges between ten minutes and a half or three quarters of an hour.

Little or no pain follows the operation, although the charred appearance of the cavity that has been thoroughly electrolyzed suggests terrible agonies.

*Instruments required.*—For this method of working up the base, I have devised needles, or electrodes, that are quite different from those employed in the ordinary method of electrolysis. The needles are long, spear-shaped, double-edged, and tolerably sharp, so that a slight cutting action may be combined with the purely electrolytic action. These needles are not insulated, except in that portion that is grasped by the hand in operating. (See frontispiece.) In nearly all of these operations, I have used the zinc-carbon batteries of sixteen or thirty-two cells, and usually those of the Galvano-Faradic Manufacturing Company; and when a good deal of work is to be done in a short time, as in important electrolytic operations, no batteries are better than these. The various modifications of Daniell cells, which are so excellent in central galvanization, are not well adapted for powerful electrolysis.\*

*Theoretical Arguments in favor of the Method.*—The theoretical considerations that bear on this subject are both interesting and important. The theory of the pathology of malignant tumors and the theory of the nature of electricity are both to be considered. My own view of the general pathology of malignant growths is, that the tendency to develop them under the necessary exciting causes—the *diathesis*—is constitutional; and, like all other constitutional tendencies, the tuberculosis or the gouty, for example, is subject to the laws of hereditary descent, with all the exceptions and variations. But diathesis is one thing, disease is another. In order that

\* The reasons for this I have explained in detail in my recently published pamphlet on *Ohm's Law, and its Practical Applications to Electro-Therapeutics*.



diathesis may develop into positive local disease, it is necessary that there should be some irritating or exciting cause. The great exciting causes of malignant tumors appear to be injuries of some kind, and very likely cold and dampness. It is probable that not only the injuries that come from blows and falls, but the irritation of bad food in the alimentary tract may excite the disease; and in this way, we may perhaps explain the primary cancers of the stomach, liver, and intestines. The majority of cases of epithelioma of the lip, tongue, and face, and of scirrhus of the breast that I have seen trace their disease quite directly to some local injury, as blows or falls. In one patient, an epithelioma of the face developed in an old scar; in another patient, from a slight cut made by a razor. A man who worked in a carriage manufactory, and who kept tacks in his mouth much of the time, died of epithelioma of the tongue. A cystic of the breast in one case rapidly and directly followed a fall against a corner of a bedpost; in another case, the irritation of the corsets was the assigned cause. Dr. Stephen Smith tells me that he saw a case where scirrhus of the breast was pretty directly traceable to a blow that a lady received on her breast from her husband's elbow while turning in bed. Dr. S. T. Hubbard says that he has seen cases of scirrhus that appeared to be excited by abscesses of the breast. All such statements of patients must, of course, be received with much allowance for error and for careless observations, and yet it seems scarcely possible that so many intelligent patients—most of whom have no theory on the subject—should agree in tracing the origin of the different forms of external cancer to local irritation. Cancers of the rectum, uterus, and vagina could easily be explained on this theory, for these parts are subject to almost constant irritation; and in confirmation of this view, it has been shown by statistics that the very great majority of cases of cancer of the uterus begin in the neck, and not in the body of the organ. Cases of external cancer that are not traceable to any special injury may very likely be excited by exposure to wet or cold, and, in confirmation of this view, Professor E. Andrews, of Chicago, has shown by statistics gathered from the United States statistical returns for twenty years, that the proportion

of deaths from cancer diminish pretty regularly as we go West or South—away from the seacoast and toward warm latitudes. Making all allowance for errors in diagnosis (and when a patient dies of external cancer, at least, there is little chance for blunder), and taking into consideration, also, the facts that the stronger people go West, and there lead less confined and artificial lives than the residents of the East, it seems necessary to accept the conclusion that cold and dampness may act as exciting causes of cancer, just as they unquestionably act as exciting causes of consumption.

The analogy of consumption is quite an advantage here. The tendency to consumption—the *tuberculous diathesis*—is constitutional, and subject to the laws of hereditary descent. The disease is local, and is, in some cases at least, excited by local irritation. But the tuberculous diathesis is very different from tuberculous disease. Thousands of people with the tuberculous diathesis go through life without ever becoming tuberculous; they either escape the exciting causes, or successfully resist them. Just so we may suppose that thousands of people can go through life with the cancerous diathesis without ever developing cancer. A dozen women, we will suppose, fall against a bedpost and injure their breasts; three of the twelve develop scirrhus in the injured breasts, and the other nine, perhaps, never think of the matter afterward. The three who develop scirrhus have the cancerous diathesis; the nine who do not develop scirrhus have not the cancerous diathesis. If these three had not been injured in that way, or in some other way, they would not have had cancer; the diathesis alone was powerless to develop the disease, just as coal is powerless to make a fire until it is lighted.

The most recent pathological investigations seem to point pretty clearly to the view that cancer is a local disease, and affects the adjacent parts and the general system by actual transfer of the cancer-cells.\* The disease spreads like a fire on

\* See "A Lecture on the Structure of Cancerous Tumors, and the Mode in which Adjacent Parts are Invaded," by Dr. Woodward, Assistant-Surgeon, U.S.A. The Toner Lectures of the Smithsonian Institute, Washington, November, 1873. See also the recent and admirable discussion of the subject by Drs. De Morgan, Hutchison, Paget, and others, in the *Lancet* for March, 1874.

a prairie, in various directions, seizing those tissues on which it can best feed, and sending out patches of morbid substance far in advance of the border of the tumor. Thus it happens that cancer cells are found not only in and around a cancer, but, at a distance from it, little islands of cancer-cells appear, surrounded on all sides by healthy tissue.

We must, therefore, fight cancer as we fight a great fire, not by useless efforts to save the part already destroyed, but by drawing a cordon around it, between it and the healthy tissue, and cutting off its communication even at the expense of the healthy tissue.

If we accept these views, we must also accept the view that *cancer, whatever constitutional treatment we adopt, should be treated locally, and by some method of local treatment that acts not only on the body of the tumor, but also and especially on the surrounding tissue, and that the earlier such treatment is used, the better the prognosis.*

If we accept these views, we must also accept the view that the present method of removing the body of the tumor with the knife, and then closing the wound so that it may heal by the first intention, is precisely the method that would be adopted if it were desired to have the tumor recur. The battle-ground on which is to be fought out the question whether a cancer is to recur is not in the tumor itself, but in the surrounding tissue, and at a considerable distance from the main body of the tumor. The knife only removes the hopelessly diseased tissues that are most apparent to the senses and most accessible. But around the tumor itself, and perhaps on every side, there is an areola of morbid and semi-morbid tissue mingled with or inclosed by healthy tissue; there are tissues that are gradually and imperceptibly shading off into morbid tissues. When now we remove the tumor and close up the wound, we leave the areola mostly untouched, and shut up the cancer-cells in a soil best of all adapted to nourish them. Hence we need not wonder that the disease recurs either immediately in or near the place of removal, or that the cells wander to some distant part where another tumor appears after months or years.

The morbid or semi-morbid tissues that surround malignant tumors have been treated in various ways by caustics, in sub-

stance, by caustic needles, and by the actual and galvano-cautery. So far as I can learn from the experience of surgeons who have faithfully tried any one or all of these methods, the results are more satisfactory than the results of ordinary treatment by the knife or ligature. Dr. Stephen Smith informs me that he experimented some years ago quite extensively with the caustic needles. These were made of chloride of zinc, and thrust into the tissue around the tumor. Their effect was to destroy not only the tissues immediately around each needle, but also the tissue between them and at some distance from them. The results of this treatment were, in his opinion, which is based on quite a number of cases, more satisfactory than the ordinary treatment.

The theoretical arguments that electrolysis of the base would produce more radical results than the use of caustics are based necessarily on our ideas of the nature of the electric force and of the process of electrolysis. When electrodes connected with the two poles of a galvanic battery are inserted into the animal tissue, the vibrations of the electric force not only pass between the electrodes, but extend at a considerable distance in all directions from them. While most of the vibrations appear at the poles, very many extend at a distance from them, varying with the strength of the current and the conductivity of the tissues, and thus the nutrition of the surrounding tissues is more or less modified. In this way, it is possible that the degeneration of healthy into morbid tissue may be prevented, at some distance from the electrodes and from the median line between them.

Besides this general modification of nutrition through the chemical and other action of the current, there are two other effects that are to be considered. These effects are cauterization and destruction of tissue. Just how much these effects contribute to the results of this method of treatment, I am not yet able to determine. In a protracted operation with strong currents, the cauterization is so great as to make the base worked over present the appearance of a charcoal-pit. The hemorrhage, excepting that which comes from large arteries, is of course stopped. The destruction of tissue that takes place during the operation

is not great, but after the operation, it appears in the form of sloughing, which sometimes is quite extensive.

The destruction of tissue that takes place during the operation is the result in part of the electrolysis and in part of the cauterization, but is mainly due to the former. It should be kept constantly in mind that this chemical effect—the electrolysis—is the effect that is specially sought for in the method of working up the base, and it is probably by virtue of this mainly, though not entirely, that the permanency of the results are due.

#### PRACTICAL VALUE OF THE ORDINARY METHOD OF ELECTROLYSIS.

Although the ordinary methods of electrolysis and the processes of external electrization with moistened electrodes fail to cure malignant tumors, they are yet of a certain palliative efficacy, and may be adopted in those cases where the method of working up the base is impracticable, or when any attempt at radical cure is inadvisable.

1. The majority of cases that are attended with pain are relieved of this pain more or less permanently by the galvanic current, whether applied externally, by sponges, cloths, or metals (catalyzation), or subcutaneously by needles (electrolysis).

In some cases, the relief of pain appears during the application: in others, some time after the close of the sitting. It may last for several hours, or for several days. The galvanic current seems the more efficacious for this purpose than the faradic. A strong current is not required; indeed, may sometimes enhance the pain already in the tumor, and in some cases a too prolonged sitting may do harm. There are cases, however, where the current may be used for hours.

The power of ordinary electrolysis to relieve the pain of hopeless cases of cancer was well shown in a case of scirrhus of the breast, that was referred to me by Dr. Skene. I could not prevent the extension of the disease; but, from the application of the current, through all the experiences of several operations, she suffered but little pain, and in gratitude for that, she allowed me to experiment with her as much as I wished.

Two years ago, I was called to Bridgeport, to see, in consul

tation with Dr. T. G. Lewis, a case of malignant tumor of the abdomen, for which I advised prolonged galvanization. For several hours a day the current was allowed to run through the tumor, and the pain and distress were very greatly relieved thereby. When the patient died, a colloid, weighing 15 pounds, was found in the abdomen.

In two cases of recession of cancer of the breast to the axilla, the pain was not relieved.

In a case of epithelioma of the tongue—a patient of Dr. Burge—there was immediate, though temporary and limited, relief of the pain by the application of the galvanic current. The relief, after some of the applications, would last for several hours, and even one or two days. The patient has died of the disease, but lived long enough to demonstrate the power of the galvanic current to relieve somewhat a most serious phase of disease, and that, too, in a locality where only very mild currents can be borne.

2. The electrical treatment, both external and subcutaneous, causes more or less diminution of size in morbid growths, and, in occasional instances, tumors may entirely disappear under external electrization alone.

The cases of entire disappearance are, as we have seen, exceptional; but they are facts, none the less, and must be considered in giving a *résumé* of the present state of this department of electro-surgery.

Under either current, a tumor may go down all the way from one quarter to one half. In some cases, this retreat of the disease before the current is temporary; in the course of months or years, the morbid forces recover their courage, and again advance, but in other cases the result is quite permanent. Goitres, especially of the cystic variety, and old goitres that are not too large and too dense, can by this method be greatly reduced in size, and in some cases are entirely cured. Similarly, fibroids of the uterus can be reduced in size, and many of the unpleasant symptoms which they cause can be mitigated.

The explanation which I have to offer for the reduction of tumors under electricity is the following:

*First.* Stimulation of the absorbents, so that morbid matters are taken up into the circulation.

This result may be attained by external electrization with either current. The faradic current by its mechanical influence undoubtedly stimulates the absorbents, and thus causes reduction in the size of growths. A certain percentage of cases have been known where, under faradization alone, morbid growths of some size have entirely disappeared, and a moderate and limited subsidence of such growths, under the exclusive use of the faradic current, is a matter of frequent observation.

*Secondly.* The electro-chemical decomposition of the fluid constituents of the growths. Not only the water of the blood, but the saline solutions of all the tissues are, under the galvanic current especially, subjected to the chemical changes, acids and oxygen going to the positive, and alkalies and hydrogen going to the negative pole. The elements thus decomposed are, we may suppose, partly absorbed, and partly escape to the surface.

These chemical changes are, of course, most marked when the needles are used—electrolyzation; but there is every probability that they occur during external galvanization. When we consider that the human body is mostly fluid, we can readily enough understand why this decomposing power of the current should be an important factor in causing the reduction of tumors.

*Thirdly.* Coagulation of the albuminous constituents. Blood is coagulated by the galvanic current at both poles, and especially at the positive, as I have repeatedly demonstrated by a variety of experiments on animals, and we may believe that in a similar way the albuminous portions of the tissues are coagulated in the region near where the needles are inserted.

*Fourthly.* Actual destruction of tissue by the thermic or heating power of the current. Cauterization is not the leading factor, as many suppose, in the treatment by galvano-puncture; it is merely an incidental effect of the passage of the current through the poorly conducting human tissues, and of the chemical action evolved by the current, and is not the effect that is specially desired, and only plays an important part in those cases where very strong currents are used with prolonged applications.

#### ADVANTAGES OF THE METHOD OF ELECTROLYZING THE BASE.

1. Less liability to recurrence.

I have kept close watch of a majority of the cases that have

been treated in this way during the past three years. In the list of cases are found several epithelioma of the lips and face, and one case of malignant cystic of the neck. But one of the cases of epithelioma of the lips and face has yet recurred; although the time that has elapsed since the treatment varies all the way between three years and four months. The case of malignant cystic has not yet recurred. It is yet too early to arrange any statistics on this subject, for, as every surgeon knows, some cases of epithelioma are permanently cured by the knife, and their prognosis under ordinary surgical treatment is better than that of scirrhus of the breast, or indeed scirrhus anywhere. It is a fact of high encouragement for this method of working up the base, that the case of malignant cystic tumor, and one of the cases of epithelioma had previously been operated on by various other methods, as the knife or the ligature, and in each case there had been rapid recurrence. If the experience of the future shall confirm the experience of the past, if a larger induction shall show as satisfactory results in proportion to the cases I have thus far treated, then the question will in time be settled beyond dispute.

Some hopeless cases—notably a case of scirrhus of the rectum, and epithelioma of the vagina—I have treated by this method in order to palliate the symptoms and prolong life, and with most interesting and remarkable results. Indeed, I have been as much encouraged by the palliative effects obtained in these hopeless forms of malignant disease as by the apparently radical cures of milder cases.

It follows, from the theoretical considerations above given, and experience confirms this view, that the results of this method of working up the base will depend entirely on the *thoroughness with which the operation is performed*. If the base be but half electrolyzed, if patches of morbid tissue be allowed to remain, then there will be a recurrence in all probability, just as after other modes of operating. I have tested this in cases in which, for anatomical reasons, it was impossible to thoroughly electrolyze the base, and in all cases there was a recurrence. Better not use the method at all than use it timidly or imperfectly. The operation should not cease until the whole base of the tumor and the surrounding tissue for a considerable



distance have been completely worked up, and any enlarged glands should be treated in the same way; for although more or less sloughing follows the operation, and in that process more or less morbid tissue may be removed, yet it is not safe to trust to that, as I have found by fair trial.

If the theory of cancer on which this method of treatment is based be sound, then it is not right to assume that when a person who has been operated on for cancer develops another cancer months or years afterward, that the second growth has any direct relation to the first; it may have arisen independently, under some form of local irritation, and might have occurred even though the first one had never existed. The question may arise quite frequently whether a cancer that follows a removal—whatever method of operating be adopted—is a secondary or an independent growth.

During the past winter, a lady was brought to me by Dr. A. N. Dougherty, of Newark, with a large and rapidly-growing tumor of the scalp. Two and a half years before, Dr. Dougherty had removed a scirrhus from the breast. A German pathologist thinks he has seen the ameboid movements of the cancer-cell, and it is possible that the remains of the tumor may have traveled from the breast to the vertex; but it is, to say the least, just as probable that constant irritation of the heavy comb which the patient used had acted as an exciting cause of a separate and independent cancer, that would have appeared even if the cancer of the breast had never existed.

In regard to the prognosis of malignant tumors under this method of treatment, then these three facts are worthy of consideration:

*Firstly.* Some forms of malignant tumors are disposed to extend much more rapidly than others. Thus scirrhus spreads more rapidly than epithelioma.

*Secondly.* The rapidity with which a malignant tumor extends is very much modified by the structure of the part in which it occurs. In glandular and in soft and mucous tissues, a malignant tumor extends more rapidly than in the skin or in hard tissues. In making the prognosis, therefore, it is even more necessary to consider the *locality* of a malignant growth than its precise nature. An epithelioma of the tongue or vagina has a far

more rapid course than a similar tumor of the face. A scirrhous of the womb has a worse prognosis than an external scirrhous. All this is explained by and is in harmony with the theory of cancer above given. In soft tissues, the cancer-cells travel easier, and thus more rapidly affect the surrounding parts.

*Thirdly.* Tissues whose organization is low, or which are in a condition of degeneration, are specially disposed to take on cancerous degeneration. Thus, the breast and the womb at change of life are more disposed to cancer than earlier in life. Cicatricial tissue always invites cancerous degeneration.

2. Less hemorrhage than other methods of operating. The reason for this has already been explained—electrolysis coagulates the blood, constricts the tissues, and slightly cauterizes them. Ordinary parenchymatous hemorrhage is thus controlled in the most satisfactory manner, so that if a strong current is used, neither sponges nor styptics are required. This power of electrolysis to prevent ordinary hemorrhage in operations, I have shown in treating cases of growths of exceeding malignity.

The cauterizing and coagulating power of electrolysis is not usually sufficient to check the hemorrhage when an artery of any size has been ruptured, as I have found out by actual experience in two cases where I was operating with Dr. A. B. Crosby. I made little attempt to check the hemorrhage by the needles, preferring that Dr. Crosby should tie it, which he did.

3. Less liability to shock. I form this judgment from protracted operations made on patients in various stages of debility, and in the extremes of life, infancy and old age. I have not yet seen any effect at all suggestive of shock, after very long sittings under strong currents, even where sensitive localities were operated on. The electric current would indeed appear to be one of the very best *antidotes* to shock, and for a long time it has been known and used as a means of resuscitation.

4. It is followed by a more satisfactory healing than other operations. This fact has been observed markedly in several severe and hopeless cases, and has attracted the attention of all the surgeons who have seen the cases. (In illustration, see the case reported by Dr. Crosby, in the present number of the ARCHIVES.)

5. There is reason for the belief that the future will show that septicemia and pyemia are less likely to follow electrolysis than other surgical operations. It is more than probable that electrolyzation, like cauterization, constricts the absorbents so that they can not as easily take up pus with the circulation. I am well enough aware that years must elapse before this question can be statistically demonstrated, but it is certain that in the very many operations in the vagina, rectum, and in localities that would invite pyemia, no such result has followed. Dr. Byrne tells me that in all his operations with the galvano-cautery, no case of pyemia has occurred, and that excellent healing usually follows. Dr. Livingston, of New-York, who has had much experience with the galvano-cautery, gives me the same testimony.

6. To all these facts must be added the consideration that many patients dread the knife—without reason it may be, and without common-sense; but patients are not expected to exercise reason or common-sense—and such persons are willing to submit to electricity, however employed.

The advantages of working up the base by electrolysis, as compared with working up the base by caustic, the actual cautery, or the galvano-cautery, are worthy of study. Some of the advantages claimed for electrolysis of the base quite as truly belong, in a certain degree at least, to galvano and actual cautery and the caustic needles. All these methods tend to constrict the absorbents, and thus prevent pyemia. All of these are followed by sloughing, with whatever benefits may come from loss of tissue. Any one of these would seem to be better for a malignant tumor than the knife or ligature, when used alone. It is hardly probable, however, for the reasons above given, that the prospects of radical cure after cautery will be as good as after electrolysis.

An extended experimental comparison of their effects, in this regard, has not yet been made.

#### DISADVANTAGES OF THE METHOD.

Against the advantages of electricity, must be set these disadvantages.

1. It requires apparatus more or less bulky, and that require more or less experience in their management. Simple external

applications may be made with currents from comparatively small batteries, but powerful electrolyzation requires from 15 to 30 or 40 cells of reasonable size. Batteries for electrolysis can be made portable, or at least transportable, so that they may be taken from house to house, and moved through the different wards of a hospital.

2. Electrolytic operations frequently require more time than operations with the knife or ligature, and in some cases, the operation must be repeated.

If electrolysis produced shock, this element of time might, perhaps, be a serious one; but, inasmuch as it appears to act as an antidote to shock, and as the stimulus of the current allows us to prolong anæsthesia with safety, and, as in many of the cases where electrolysis is used, treatment by knife or ligature is contra-indicated, this objection need not deter us from resorting to it.

3. The irritative fever that follows powerful and prolonged electrolytic operations is sometimes quite severe. This fever rises to its highest the second and third day after the operation, and then gradually subsides. The parts around the tumor operated on become more or less swollen, but are not usually painful, and this swelling also soon subsides.

4. When great sloughing ensues, in very vascular growths, there may be secondary hemorrhage from blood-vessels that become involved.

There is usually no difficulty in ascertaining whether there is probability of secondary hemorrhage, either from our knowledge of the vascularity of the parts, or from tentative operations with the needles.

Looking now at the general subject of the electrical treatment of tumors, I conclude that this method of working up the base, as an addition and supplement to other means, is entitled to consideration among the surgical procedures of the future. It will not be used recklessly nor indiscriminately, nor with overweening confidence; but its indications and contra-indications will be understood both by surgeons and electro-therapists, and the result may be a positive advance in the art of healing—not so complete a victory as we would wish, but yet an important and consolatory something; and this, in time, may

prepare the way, we may hope, for further and better victories by other agents, in the generations to come.

Before closing, it is proper to state that the ordinary method of electrolysis, if thoroughly used and repeated a sufficient number of times, may run into this method of working up the base, and in epithelioma, at least, may accomplish good results. The body of the tumor may be gradually broken and destroyed; and then, in successive operations, the needles may be made to work up the base and surrounding tissue. Groh,\* of Vienna, has used this method with success in quite a number of cases of epithelioma, as well as of sarcomatous growths. I have used the same method in epithelioma, and with success. The method has, however, the sufficiently serious objection that it first wastes the time and strength of the patient on unnecessary treatment of the tumor, and is only successful in proportion as it falls back on the method of working up the base and surrounding tissue.

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*Experimental Researches in the Physiology of the Brain.*† By  
GEORGE M. BEARD, M.D.

DURING the past few weeks, I have been engaged in an extensive series of experiments on the brains of living animals. The experiments were undertaken with a threefold object in view :

*First.* To ascertain how far the phenomena first observed by Hitzig and Fritsch, and subsequently by Ferrier, were demonstrable.

*Secondly.* Whether the objections of Dupuy and Carville to the conclusions derived from the German and English experimenters, on the ground that the current was diffused, were sound.

*Thirdly.* To push the inquiry still further, and, by independent observation, to settle, if possible, some of the questions suggested by the inquiry.

\* *Die Electrolysis in der Chirurgie*, Vienna, 1871. Groh has also treated sarcomatous growths by very prolonged electrolysis, with mild currents. This method seems to have greater inconveniences, without any compensating advantages.

† A brief abstract of this paper, with a demonstration of some of the reactions, was presented to the New-York Society of Neurology and Electrology, April 20, 1874.

Dr. Geo. B. Fowler, whose experience in vivisection has been extensive, kindly consented to coöperate with me. Without his coöperation, the experiments would have been impossible. I am also under obligations to Prof. John C. Dalton, for the voluntary and unexpected favor of allowing the use of his laboratory and appliances for the experiments. Those who have personally realized the difficulties and inconveniences that attend all experimental inquiry, when prosecuted in offices, garrets, and dissecting-rooms, will appreciate the advantages that I derived from this material aid.

*Method of Vivisection.*—I have experimented on rabbits, dogs, cats, and pigeons. In all cases, the animals have been partially or fully etherized. The skull of the dog and the cat can be entered most conveniently by the trephine; the skull of the rabbit and pigeon is comparatively soft, and can be broken up and cut off in pieces by a bone forceps more easily and more rapidly than by the trephine. Only in rare instances was the whole of the top of the skull removed; generally I was content to expose a quarter or half of one side of the brain; then, if the animal retained its irritability, the other portion could be removed after the portion of the brain first exposed had been experimented on. The advantage of this cautious procedure was that it avoided the risk of losing the animal from hemorrhage or shock before any experiment could be made, and also economized the cerebral irritability, which is always more or less impaired by long and free exposure.

The annoyance from hemorrhage is great, though less than I anticipated; it is greatest with dogs and cats, and least with rabbits and pigeons. The blood pours out from the sinuses freely and rapidly, and threatens to destroy the animal, but by the patient use of sponges wet in cold water and cotton-wool, the hemorrhage could be gradually controlled. We lost no animal by hemorrhage; in this respect, we were more fortunate than Ferrier. No animals were killed by the anæsthetic: ether was used, and used freely. In other experiments where chloroform was used, I frequently lost animals, and was unable to resuscitate them by electricity. The worst hemorrhage appears over the cerebellum where large sinuses meet.

The dura mater was removed, and in some cases the pia ma-

ter. The removal of the pia mater does not seem to be necessary for the accuracy of the experiments.

The length of time that the brain retains its irritability after considerable hemorrhage, and the shock of the operations, is surprising. Not only cats, who are noted for their vitality, but rabbits were kept alive for from one to three hours.

*Instruments employed.*—In order to give the greatest possible localization and accuracy to the experiments, I devised what I call a scissors electrode (see frontispiece), modeled after a pair of shears. One arm of the electrode is for the negative and the other for the positive pole. Both arms are insulated to within a millimetre of the point which is tipped with platinum. Where the arms cross each other on a pivot, there is a thumb-screw arrangement, by means of which the arms can be adjusted and kept fixed at any desirable distance from each other, from six inches to one millimetre. By this instrument, which, as will be seen, is very convenient, it is possible to give the utmost possible localization of the current, and to reduce the diffusion, if not to a minimum, at least to a very small amount. I have also used my current-reverser in these experiments. This instrument I have elsewhere described. It consists of a hard-rubber handle, in which the metallic connection is such that by simply pressing on a screw, the direction of the current is reversed. The handle is provided with two needles insulated to their points, and so constructed and arranged that they can be brought very close together or separated half an inch or more.

I used both of these instruments, and both answered well; either will localize the current all that it can be localized. Sometimes, but not always, I used a hydro-rheostat interposed in the circuit.

I experimented with both the galvanic and the faradic currents. I used the faradic machine of Kidder and of the Galvano-Faradic Manufacturing Company, and the 8, 16 and 32 zinc-carbon-cell batteries of the Galvano-Faradic Manufacturing Company.

#### CONCLUSIONS.

The conclusions at which I have arrived, after many experiments, and a fair consideration of all the objections that have been used, are these:

1. *The living brain responds to electrical irritation, faradic*

and galvanic, by various and more or less defined muscular movements.

2. *The brain does not respond to electrical irritation everywhere to ordinary currents equally; some portions do not respond at all, and others respond with reactions that uniformly differ from each other.*

The objection advanced by MM. Dupuy and Carville, that the diffusion of the current destroys the value of researches of this kind, and that the reactions take place, not through the surface of the brain, but through the extension of the current to the central ganglia, is met by the following considerations:

*First.* The quantity of electricity that is diffused is but a very small fraction of that which appears at and between the electrodes. This is proved theoretically from the established principles of electro-physics, that electricity will seek out the best conductor, and, other conditions being the same, take the shortest distance between the electrodes. The platinum points of my electrodes are incomparably better conductors than the cerebral substance or even warm blood, and the distance between them with my scissors electrode or current-reverser is not more than one or two millimetres.

That the current is diffused more or less in all these experiments, I have proved by placing the electrodes at a little distance from the external muscles that move the ear of a rabbit when the brain is exposed, and putting on a strong current; the muscle contracts mildly, although none of its fibres lie directly in the track between the electrodes. To make this experiment successful, a current of considerable strength is needed, and the tissues must be pretty well covered with blood. I have proved diffusion also by placing the galvanoscopic frog a little distance from the poles, when decided contractions are observed when the current is interrupted—the faradic current being more diffused than the galvanic. This diffusion I have seen take place not only on the exposed brain, but on the liver, intestines, and other viscera of living or recently killed animals, and on the muscles of the dead human subject.

The galvanoscopic frog is, however, an electroscope of exceeding delicacy; it indicates the presence of currents that not only will not produce ordinary muscular contractions, but will



not perceptibly affect a delicate galvanometer. I took a Bradley's tangent galvanometer, and placed the ends of wires connected with it at various distances from the poles when a current was running. The needle did not show the least deflection, although a current from a small fraction of a single cell is sufficient to deflect it. It is evident, therefore, that the diffused currents which so agitate the galvanoscopic frog are of the very feeblest character; when to this fact we add the further fact, that these reactions of the brain are usually produced only by currents of some strength, and only when the electrodes are placed on certain tolerably circumscribed centres, and are not produced when the electrodes are placed outside of these centres, we are forced to concede that these centres are realities.

*Secondly.* The same reaction may occur from the irritation of localized injuries to the brain as from the irritation of the electric current. Dr. Bartholow\* found that the woman on whose brain he experimented exhibited in one instance the same phenomena from the effect of injuries produced by the needles as by the current.

By a very interesting and remarkable coincidence, I had an opportunity to study the brain of a living human being—a woman—in February of the present year. The lady, a patient of Dr. A. N. Dougherty, of Newark, had a cancerous growth on the top of the head, which was not supposed to have seriously affected the skull, and therefore removal was advised. On making an incision around the growth, it was found that the skull was most seriously affected, and was, indeed, like thin ice, and gave way before the touch of the knife. It was found necessary to at once close the operation, but before deciding to do so, Dr. Dougherty asked me to assure myself of the condition of the skull by examination with the finger. In making the examination, I pressed the finger against the exposed brain, on the left side, and there followed a convulsive movement of the right leg of the patient, similar to that which I obtain from electrization of the brains of animals. In closing the wound, some pressure was occasionally made, when the same movement of the leg appeared. For obvious reasons, I did not try electrical irritation, although I terribly wanted to do so. After the

\* Am. Jour. of Med. Science, April, 1874. See also his commentary on the case in the present number of the ARCHIVES.

wound was closed, I again observed that slight pressure, and again the muscular movement appeared. I think that the arm was also affected, but was not quite sure.

3. *The centres for the muscles of the mouth, face, neck, and legs appear to be in the anterior and middle portion of the brain. Superficial irritation of the different parts of the cerebellum causes nystagmus; this is easily shown. Irritation of the tubercula quadrigemina causes opisthotonos, as is easily shown. Irritation of the hippocampi causes no visible reaction.*

If the brain is sliced off, reactions can be produced by irritation of the portion exposed.

4. *The brain, in respect to these centres, is symmetrical, and is indeed a double organ.*

This symmetry of the brain, in respect to these centres, is easy of demonstration. With the same strength of current, the same method and locality of application, irritation of the right hemisphere causes movement on the left side, and *vice versa*.

5. *There is in the brain of a rabbit, in the posterior part of the middle third portion, about a quarter of an inch from the median line, a spot in each hemisphere that seems to be a centre for jumping and leaping movements.*

When the brain is irritated at this point on the surface, or one or two millimetres below the surface, by a strong current, the rabbit gives a vigorous, spasmodic jump forward or upward, and sometimes off the table. This leap or jump is sometimes made with such force as to knock down any small objects that come in its way. The animal usually stays stock still when it lands; it stops as suddenly as it starts. Sometimes, however, general convulsive movements appear as the animal lies on the floor; but these soon subside, and, what is most strange, little or no exhaustion follows the violent performance.

I made the discovery of this centre the very first day I experimented, and all of us were astonished by it. Since then I have several times demonstrated these phenomena.

In order to get this extraordinary reaction, it is necessary to *hit just the spot*, and to use a current of considerable strength.

None of the European observers, so far as I know, have observed this peculiar and striking reaction. Nothnagel, of Freyburg, has, however, obtained the same reaction in the same part of the brain by the introduction of small needles.

At the time when I first made this observation, I knew nothing of Nothnagel's experiments with needles.

When, now, we consider that this reaction occurs from the irritation of no other part of the brain; that it does not occur when the tubercula quadrigemina just below it are irritated; that, in order to produce it, just such a spot must be touched; and that, according to Nothnagel, the needle alone will produce it when the brain is not exposed, and the animal not etherized—when we consider all these facts, we have a pretty strong case against the theory of diffusion.

*Experiments on a Pigeon.*—I experimented on a pigeon also, and found that when the electrodes were applied to the brain, and a strong current was used, the eyelids moved, the head was turned to the right, and in certain localities there were distinct movements of the wings and legs. Ferrier states distinctly that he found no reaction, from even strong currents, in the brain of a pigeon. It is quite certain that the brains of pigeons, and probably also of birds in general, are less irritable than the brains of dogs, cats, rabbits, and of human beings.

*Degree of Irritation necessary.*—I generally used currents that were perceptibly but not painfully felt when applied to the cheek; at least a current of that strength was generally sufficient to produce the reaction in rabbits on first exposure. After longer exposure, stronger currents were needed. Cats seemed to need stronger currents than rabbits, and dogs yet stronger currents. In the first dog on which I experimented, the whole power of the faradic machine caused only a slight movement of the leg of the opposite side. When voltaic alternatives were used with my current-reverser, a milder current would produce the reactions.

To the contrivances for measuring the current, I gave no attention, for the reason that too many unknown and varying factors enter into the calculation.

*Differential Action of the Currents and the Poles.*—In regard to the differential action of the faradic and galvanic currents in producing these reactions, I may say, as the result of considerable experimenting, that either current will answer to demonstrate all or nearly all the centres.

The galvanic current has the advantage of being less diffused

than the faradic, and is, therefore, better adapted for precise investigations. It has, however, this disadvantage, that it decomposes the brain, producing hernia cerebri, and thus impairs and complicates its irritability.

The differential action of the anode and cathode, with feeble currents, I was not able to demonstrate to my full satisfaction. So far as I could determine, the anode with a feeble current is more effective than the cathode, as Fritsch and Hitzig have claimed, but I am not yet entirely clear on this point. My experiments were usually made with the anode and cathode close together, and I found it difficult to get a good indifferent point for placing one or the other.

*Other Forms of Irritation.*—I tried the application of ice, and also of needles heated to redness, on the surface of the brain, and plunged into it, but produced no reaction. In the case of the living human brain, pressure certainly caused a reaction, similar to that produced by electrization. It is not impossible that if the brain were but very little exposed, and no anæsthetic were used, ice or heat might produce a reaction. On the exposed brains of the animals, moderate pressure caused no reaction.

*Theory of Cerebral Physiology.*—The theory of the physiology of the brain which I have to offer, and to which I have been, as it were, forced by these experiments, is, that *these irritable points are complex in their functions, and, either from the surface or deeper portions of the brain, send fibres to both sides of the body.*

I observed, to my surprise, in the first experiment, that when the electrode was plunged a little distance into the brain and strong currents were used, the movements appeared *on the same side of the body.* In some cases, also, both sides of the body appeared to be affected, either simultaneously or in quick succession. There seemed to be a difference in the effects of superficial and deep irritation. In some of the experiments, I touched the tips of the electrodes lightly on the surface of the brain; in others, I plunged them into the brain an eighth of an inch or more, according to the thickness of the gray matter. Ferrier confined his experiments to superficial irritation, and on that account, I suppose, did not observe the fact of the complexity of these centres. These complications are most apparent when the

brain has become somewhat disorganized by long galvanic irritation. Fritsch and Hitzig observed that the results were different with strong and feeble currents, and Ferrier found that strong irritation of the tubercula quadrigemina caused movements on the same side.

This theory of the complexity of these centres harmonizes not only with the results of my experiments, but also with the known facts of cerebral physiology. Thus it is established that the brain can suffer enormous injuries of one side or of both sides without serious impairment of function; and, as Brown-Sequard has pointed out, paralysis may occur sometimes on the same side as the lesion.

The different layers of nerve-cells would appear to be susceptible to different degrees or kinds of irritation, so that an injury or disturbance that affects those cells that preside over one side of the body may not affect those that preside over the other side, and *vice versa*. It would appear as if the majority of the cells in each hemisphere presided over the opposite half of the body, and a small minority presided over the same side. This minority is affected only by exceptional forms of injury. By this theory of cerebral physiology, the different parts of the brain can, to a certain extent, act vicariously, and assume each other's functions. Thus one hemisphere can do the work of both when one is destroyed, and a large loss of cerebral substance in certain localities may not always be seriously felt.

I observed, over and over again, in these experiments, especially on rabbits, that when the brain became disorganized by long irritation, and particularly when it was decomposed by the galvanic current, the reactions became much confused, and the centres of movement were difficult to localize.

I close these observations with two suggestions :

1. We see the necessity for frequently revising the experiments and conclusions of even the ablest scientists.

In all our works of physiology and electro-therapeutics, it has passed into a maxim that the brain is inexcitable by electricity. The earlier physiologists—Magendie, Flourens, and so forth—were but little familiar with electro-physics, and it is probable that they used too feeble currents, or did not suffi-

ciently expose the brain, or allowed the animals on whom they experimented to become too much exhausted by hemorrhage before trying their experiments. I can easily see, in the light of my own studies of the subject, how easily these mistakes could have been made.

2. This line of experiment does not promise to solve the great problem of all the ages—the exact physiology of the brain. It is a step in advance, and an important step, but yet only a step, from which, it is to be hoped, we may rise to a higher standpoint and a clearer vision. The question of cranioscopy, or phrenology, it leaves where it found it, with perhaps a stronger and more definite presumption in favor of the theory to which modern cerebro-physiologists are tending, that different parts of the brain have different mental functions.

It is dangerous to make predictions in science, especially of a negative sort, but the probabilities are that this method of research will soon reach its limit, beyond which it can not go, and where it must be supplemented and reinforced by other and perhaps very different measures to wrest from Nature her great secret of the physiology of mind.

The finer details and confirmations of these experiments must be worked up by many observers with carefulness and patience, and the result will be reached but slowly, and through much toil and chaff and discouragement.

As it was in the beginning of knowledge and is now, so probably it must ever be as Tennyson, in "Locksley Hall," has almost sadly written,

" Science moves but slowly, slowly, creeping on from point to point."

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*A Case of Scirrhus of the Rectum, treated by Electrolysis.* By A. B. CROSBY, M.D., Prof. of Anatomy in Bellevue Hospital Medical College.

MRS. L——, aged 60, a lady of a nervous, but, on the whole, of a healthy temperament, came under the care of Dr. Beard, November 7th, 1871. For three years, she had been suffering

from a tumor of the rectum that caused a severe stricture, and was clearly of a malignant character; such, indeed, had been the opinion of the large number of physicians and surgeons who had seen the patient. Bougies were frequently inserted, and various remedies had been tested, among others condurango, which the patient thought afforded some relief. On examination, it was found that the growth extended about three inches up the rectum, forming a hard ring and a stricture so narrow in the upper portion as hardly to admit the end of the index finger. The patient was tormented with flatulence, and the distress in the region of the tumor and of the nerves that supplied it was very great. The pain in defecation was severe, and the passages were small and very frequent. She was able, however, to go about the house more or less, and occasionally rode out.

Dr. Beard began treatment by localized galvanization externally by various forms of rectal electrodes. By these applications, there was a decided and grateful relief of the pain and of the flatulence. This relief continued so long as this method of treatment was used. The size of the growth did not diminish under this treatment, and for that reason it was decided to try the effect of an electrolytic operation with the needles.

A rectal tumor of this size and extent had never been treated by electrolysis with the needles so far as I could ascertain, and it was thought best to make the first application mild and short, confining the operation to the ends or protuberances of the growth near the anus.\*

January 7th, 1872, I ruptured the sphincter with the assistance of Dr. Reese and Dr. Ostrander, who administered ether. Dr. Beard operated with zinc-carbon battery on these protuberances by the ordinary method of electrolysis. The usual small needles were used. The operation was followed by some irritative fever, but the patient, on the whole, bore it excellently, and the whole growth was relaxed so that the passages were easier. Three weeks after the operation, the patient was very much better, and went round the house.

\* Groh speaks of a case of malignant tumor of the rectum near the anus and of slight extent that he treated by needles with temporary relief.

March 18th, electrolysis through the base of the tumor was performed with a thirty-two-cell zinc-carbon battery of the Galvano-Faradic Manufacturing Co., and long cutting needles. The needles were devised by Dr. Beard for this special operation, and have since been used for other cases when it is desired *to work up the base* and effect a large surface.

The operation, which lasted forty minutes, including intermissions, consisted in inserting one needle connected with the positive pole into the body of the growth, while the negative needles were run through the base and made to *work around* the inside of the rectum as far as it was deemed prudent to go. The growth was completely removed in this manner, and with very little hemorrhage. The entire thirty-two cells were employed, and the patient was kept under ether for two hours. Irritative fever followed the operation for five days. The pulse went up to 120. There was some flatulence and pain in the abdomen, but no positive tenderness. There was considerable urethral irritation and dysuria, and the urine was drawn by a catheter.

In a few days, the patient was able to discharge large and well-formed fæces. For about a month, there was some discharge from the rectum, but no symptoms of pyemia or of peritonitis or of cellulitis that might be feared from so formidable an operation.

From May to June, there was but little pain in the rectum comparatively, and the patient was able to walk about and to go out.

For relief of pain during the entire course of treatment, hypodermic injections of atropine and morphine were used, and suppositories of belladonna, and the rectum was frequently washed out by astringents.

May 15th, the patient rode out with comfort, and she strongly hoped that the relief would be permanent; but there were signs of a recurrence of the growth, increasing stricture and induration, and the fæces gradually became smaller.

It should be remarked that the application of the current *far up the rectum* with long, insulated electrodes, before the last operation, had so far improved the semi-paralyzed condition of the bowels (to which the frequent impactions of the fæces were due) as to make the passages far more frequent and natural.



During all this time, I was in the habit of introducing sponge tents of good size about every week or ten days. The immediate effect of these tents, which were generally left in overnight, was to cause great irritation, painful urination, and some constitutional disturbance for two or three days; but their effect in dilating the passage was quite satisfactory. The sensitiveness of the parts was so great that etherization was used whenever the tents were introduced or removed.

Being called away July 1st, Dr. George K. Smith was called in, and suggested the use of ox-gall injection to soften the fæces. This suggestion was acted upon with good results.

The patient, who was subsequently seen by Dr. Colton, gradually grew weaker during the excessive heat of the summer, and died October 27th, 1872, apparently from exhaustion.

*Remarks.*—The important features of this case in its electro-surgical aspects were these :

That this growth was malignant was evident from the history of the case and all the symptoms, and was established by the microscopic examination of Dr. Spier. I am disposed to believe that if the tumor had been in a position where it could have been more readily reached, and where the *whole* growth and *the adjacent parts* could have been thoroughly electrolyzed, the results would have been very much better. As it was, it seemed unjustifiable to interfere too seriously with the gut lest we might destroy it and produce recto-vaginal fistula.

The stricture extended upward, about three inches above the anus, and ranged from three fourths of an inch to an inch in breadth.

It was only at one point anteriorly that it extended higher than three inches. At this point, a little indurated tissue could not be removed without endangering the recto-uterine pouch of the peritoneum.

Whatever, then, might have been hoped in case the removal had been absolutely complete, it was certain that the disease must continue to develop in this particular case. Anatomically, three inches of the rectum—that is, that portion within the perineum—may be safely removed by the knife even. In the above case, the spear-pointed electrodes brought away a large annular mass of scirrhous when the operation was performed.

This was followed, a few days later, by the separation of a large annular slough, and the rectal wall was left soft and free from disease, except the small, indurated spot that extended above the floor of the pelvis and could not be safely removed. It is a fair question, whether, if the operation had been done earlier, radical improvement might not have followed.

Another point of interest in the case was the fæcal impaction. After the second operation, the patient complained of a tumor in the left groin, which was tender, and had existed many months, preventing her from lying on the left side. An examination satisfied me that it was due to fæcal impaction. I consequently removed by the scoop, and injections carried through an anal tube high up, an immense quantity of hardened fæces, evidently long retained. Under this manipulation, the tumor disappeared, and the patient for the first time in many months was able to lie on the left side.

The persistent distention of the bowel had, however, evidently partially paralyzed the muscular coat of the intestine. The result was the accumulation of platus, and almost entire inability to force a stool. Gentle currents of electricity carried through the iliac region soon restored the muscular tone of the bowel, and relieved the patient's pain.

A point of practical convenience was seen in the method adopted to reach the stricture.

I first completely ruptured the sphincter ani, so as to induce complete relaxation. A piece of two-inch lead pipe, about two inches in length, with a handle soldered on one side, made an excellent speculum, which was pushed up to and brought the stricture fully into view.

Through this, Dr. Beard was enabled to carry the spear-shaped electrodes through the stricture with ease and certainty, and move them freely around the circumference of the bowel.

This case showed, what I have witnessed in other cases treated by electrolysis, no primary shock.

The irritative fever which followed was very marked for some days, but there was no primary disturbance, either of temperature or pulse.

The removal immediately by the electrodes and secondarily by sloughing of so much tissue necessitated free granulation.

The repair which followed was unusually rapid. In fact, in this, and in other cases treated in the same way, I have been impressed with the fact that proliferation is very rapid after electrolysis.

It is greatly to be hoped that experience may show such a modification of cell action by electrolysis as may possibly retard or prevent the return of malignant growths.

Experiments in this direction are certainly full of interest.

In this case, the granulating surface healed rapidly and completely. We anticipated, independently of any recurrence of the disease, decided contraction of the cicatricial tissue.

To obviate this tendency to closure, I resorted to sponge tents, which when expanded were two inches in diameter. At first, these were used without much pain, but as the contraction increased and the scirrhus returned, the patient required an anæsthetic and morphia when the tent was used.

There is no class of cases more distressing than stricture of the rectum ; usually the patient dies from complete stoppage, or life is prolonged by colotomy. In the present case, the bowel was kept pervious until the end, and the operation of colotomy was never required.

Death resulted in this case apparently from general exhaustion.

Electrolysis did not save the patient's life, but it was more efficient than any [plan of treatment I have seen adopted in these most distressing cases.

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*The Cabinet Battery.* By GEORGE M. BEARD, M.D.

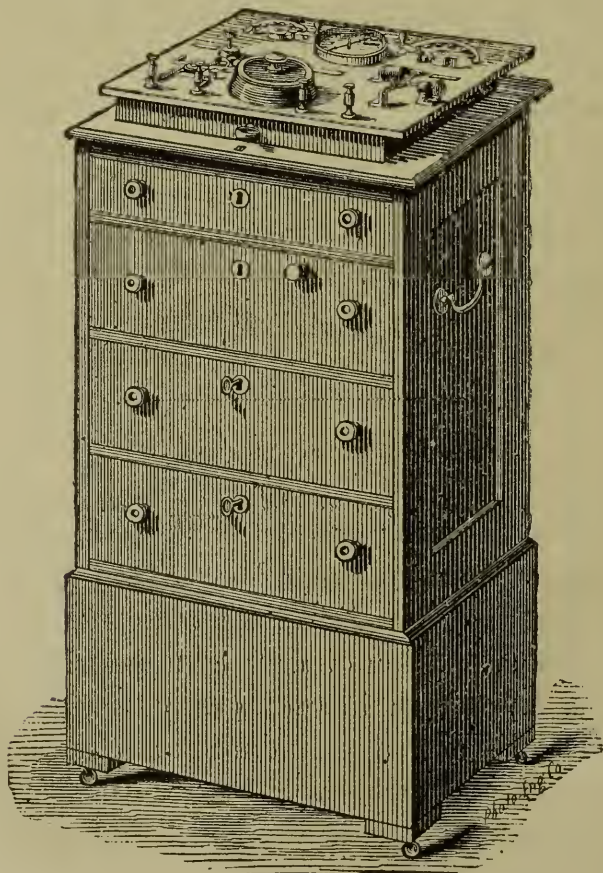
A LITTLE more than a year ago, I suggested to Mr. Bartlett, of the Galvano-Faradic Manufacturing Company, the possibility of arranging a combination of sixty or more Siemens & Halske elements of moderate size, in such a way that all the cells and all the connections and appliances should be contained in a small movable desk or bureau.

The suggestion was made in the belief that all the supposed

or real advantages of the combination of large cells that are usually placed in cellar or basement, and connected by wires with the operating-room, could be secured at far less trouble by a simple, convenient, and accessible arrangement, and that many of the difficulties connected with removal and cleaning and overhauling could be reduced to a minimum.

In the roughest possible manner, I drew a general plan of a bureau with drawers and cover, and further suggested that it would be well to have a current-selector and current-reverser, a rheostat and galvanometer interposed in the circuit, and that the appliances should be on a plane surface at the top, and that the drawers containing the cells should be so made that they could be easily taken out whenever it became necessary to inspect or replenish the battery.

I thought little more of the matter until November last, when the Company called my attention to the fact that they had completed the Cabinet Battery, which is represented in the following cut.



The cabinet battery is so simple that a very brief description of it will be sufficient:

The Siemens & Halske cell is merely a modification of Daniell's cell; it consists of a small cylinder of glass, attached at the bottom to a cylinder of porcelain. In this cylinder is placed a coil or ribbon of copper and a little water. Outside of this cylinder is a cylinder of zinc, and the space between it and the outer glass jar is sawdust on the top, and at the bottom powdered papier-maché, packed closely and wet with water slightly acidulated with sulphuric acid. The object of the sawdust and papier-maché is to hold the fluid and prevent spilling, and to make the action of the battery gentle and uniform.

The cork is placed in the cylinder so as to prevent mingling of the outer and the inner cell. These cells, like all modifications of Daniell's cell, are very constant—that is, they give a steady and uniform current, and can be used for a long time without recharging. It is necessary now and then to drop a little water into the inner cylinder, to make up for the loss by evaporation, and to put in a little sulphate of copper; this, however, can be very easily done by pulling out the drawers and removing the corks. Each cell is about the size of an ordinary tumbler.

There are three drawers, each containing twenty cells. The upper drawer is for electrodes. The metallic connections of the cells are made at the back part of the drawer, and completed when the drawer is well pushed in. On the top of the bureau are the current-selectors, by which one cell or sixty cells can be brought into the circuit; the current-reverser, the short coil galvanometer for indicating the presence and direction of the current merely, and the hydro or water rheostat for gradually increasing or diminishing the strength of the current.

The water rheostat is the perfection of neatness and convenience, and is differently arranged from any that I have seen. The water is contained in a small case or cup, with a glass top. By turning a small brass disk, connected with a brass lever, a small or large area of the water can be brought into the circuit. Besides all the appliances for the galvanic current, the cabinet battery also provides the faradic current; a Lechanché cell in the upper drawer is connected with a continuous coil and

interrupter on the right hand of the top of the bureau. The faradic current can be increased or diminished by pulling out or pushing in a metallic rod in front of the top.

The advantages of this cabinet combination are these :

1. *It is very easily moved and managed.* The whole cabinet containing sixty cells, the electrodes, connections, etc., for both currents, and the cover to place over the top, is but 38 inches high, 17 inches wide, and 13 inches long. It is placed on castors, and can be easily moved from one ward of an hospital to another ward, or about the room by one person as easily as an ordinary centre-table. The combinations of Daniell's cells are generally placed in the cellar, and the apparatus throughout is permanently fixed, and when the physician wishes to change his office, the labor of resetting of the battery is very great. This combination, by taking out the drawers can be transported from one house to another as easily as any bureau, the drawers of which are filled with heavy goods.

Although the battery will probably go for years without thorough overhauling, yet occasional inspection and refilling will be required, and can be very easily performed.

2. *It gives a constant, uniform, and steady current, and is therefore better adapted for the treatment of irritable and sensitive conditions than the small cells of the ordinary portable batteries.*

This advantage it shares with all modifications of Daniell's battery. The explanation of the constancy and steadiness of the current from these combinations of Daniell's cells is found in the fact that, on account of the feebleness of the solution and the interposition of the porous cell, the chemical action is slow and uniform, with no interruptions, nor even variations. In the single zinc and carbon cells, the solution is very strong, and the chemical action very vigorous ; the plates are rapidly polarized ; the density of the solution, and with it the internal resistance of the battery, is continually changing, as a result of the vigorous chemical action ; and consequently the strength of the current is not only diminished after a protracted use of the battery, but *it varies from moment to moment.* The potential quantity of electricity may be the same in a combination of single zinc and carbon as in a combination of Daniell's cells,

may even be far greater; but there is a great difference in the rapidity with which they evolve it. For short work, such as is required in powerful electrolytic operations, the single zinc and carbon cell is far preferable to the Daniell, for the reason that the quantity of electricity it generates in a short time, say half an hour, is very much greater than a similar number of Daniell's cells would generate in the same time. This cabinet battery is, therefore, not a good battery for powerful electrolysis, and I never attempt to use it in any important electrolytic operations; in experimenting with it, I find that it causes but a very feeble decomposition of iodide of potassium or chloride of sodium. It could not, indeed, be otherwise. In electrolysis, as everywhere, force answers to force; the amount of chemical action outside of the cell—electrolysis—must be proportioned to the amount of chemical action *inside* of the cell. In the Daniell cell, the chemical action is very slow and feeble, and the electrolysis it causes is slow and feeble, but it is constant and steady. It does not give out so much electricity in an hour as the zinc and carbon cell, but it continues to give it out long after the zinc and carbon cell is exhausted. Two men have each a thousand dollars. One spends recklessly and rapidly and extravagantly, and in a few days is penniless; the other spends regularly and slowly and uniformly, one dollar each day, and makes his thousand dollars last a thousand days. The single zinc and carbon cell makes an extravagant battery; but, in electrolysis, extravagance is needed; and, besides, the solution can be removed from the plates, so that no action can take place while the battery is not needed. The Daniell cell makes an economical battery, since it spends slowly and regularly, even though it be kept constantly immersed, hence its advantage in the treatment of the neuralgic, hysterical, and the nervously exhausted, who, in some cases, at least, require to be treated with feeble, mild, steady, and painless currents. The current from the Daniell cell is less powerful than the current from small and active cells, for the reason mainly that it is more uniform.

The notion entertained by some that these] large double-cell batteries send a larger quantity of electricity through the body than small cells, is at war with Ohm's law, and has no founda-

tion in experience. The resistance of the body is so great, in comparison with the internal resistance of the batteries, that it makes but little difference in regard to the quantity of electricity that flows through the body, whether the cells are large or small.\* As a matter of fact, the small single zinc and carbon cell, or even the ordinary Smee cell, gives more quantity of electricity for a short time than the large Daniell cell.

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*Complete Hemiplegia followed by Rapid Recovery—Probable Embolus.*† Report of Case by Prof. SAMUEL G. ARMOR, M.D.

THOMAS ANDERSON, aged 34; occupation, "longshoreman," and native of Finland; was admitted to the hospital, March 30th, 1874. He has always been healthy; gives no history of syphilis, acute cerebritis, or cerebral tumor. For several weeks, however, previous to his attack (which was two days before his admission to the hospital), he suffered from more or less headache, and while at work on the date of his attack, he was *suddenly stricken down* with complete paralysis of the right side.

When admitted to the hospital, he was unable to move either right arm or leg; mind in a semi-stupid condition; deglutition somewhat difficult, and stomach irritable. At the time of his admission to the hospital, the paralysis of motion was complete; but slight movement could be produced by tickling the sole of the foot. The muscles of the eye and face and tongue were undisturbed, as were also the muscles of the neck and trunk.

The patient gives the history, it will be seen, of a *sudden stroke*. He suddenly fell to the ground, bewildered and stupid.

At the end of the third day after his admission to the hospital (five days from the attack), he began to show signs of improvement; could draw up his limb, raise his arm, and grasp with considerable power. His mind at the same time improved

\* See my recently-published pamphlet on Ohm's law, and its practical application to electro-therapeutics.

† Long Island College Hospital Reports, Brooklyn, N. Y.



in about equal proportion. His recovery was rapid. Within ten days from the time of his attack, his recovery appears to be perfect.

An interesting question arises as to the etiology of such cases. Are we to infer, from the brief duration of this case, and the completeness of recovery, that the paralysis was functional in character? If not, what was the nature of the intra-cranial lesion? The suddenness of the attack and the completeness of the paralysis might lead to the inference that the hemiplegia was produced by *clot* in the brain. But the subsequent history does not carry out this supposition. Is it not more probable that the paralysis in this case was produced by the plugging of one of the cerebral arteries before reaching the circle of Willis? The anatomical relations of the seat of an embolus may be such that a *collateral circulation* may readily take place, thus accounting for the rapid recovery following the sudden seizure, with symptoms similar to those following *cerebral clot*. The treatment of the case could have nothing to do with the recovery; for, beyond a saline cathartic, the patient took no medicine.

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*Faradic Anæsthesia.* By Dr. A. TRIPIER, of Paris.

UNDER the influence of a galvanic current, continued or interrupted, or a succession of shocks of induction, one often sees disappear, at least momentarily, severe pain. From this fact, we derive the suggestion whether electricity is not an anæsthetic agent.

Without delaying, at this time, with the preconceived ideas which have directed the primary attempts, we will first examine the facts.

Francis, a Philadelphia dentist, appears to be the first who practiced faradization of the teeth, in order to render their extraction less painful. The negative reophore of a magneto-faradic apparatus was attached to the forceps, or to the key, while the patient held in his hand, on the side where the ex-

traction was to take place, the positive reophore. The tooth was extracted shortly after the application of the key or forceps, which closed the circuit of the apparatus employed. Feeble currents were used, and are recommended as even preferable to powerful ones.

The example of Francis was instantly followed by several in America. Then this manner of operating was introduced into France by A. Preterre, who applied it in the hospitals, before numerous witnesses. Shortly after, these experiments were repeated, with almost unvarying success, in the hospital of Morel-Lavallée, with the co-operation of Bygrave.

While American dentists employed the magneto-faradic apparatus, Morel and Bygrave made use of the volta-faradic (electro-magnetic) apparatus, which was preferable, by reason of the regularity of its action, and because the rapidity of its intermissions was independent of the intensity of the currents. They used, however, to comprise in the circuit the wires of two helices of an apparatus of Legendre and Morin, and drawing out the graduated tubes, used too strong currents, which detracted from the value of their experimentation.

Faradic anæsthesia has been tried with varied success in other operations. Morel-Lavallée has, without exciting pain, opened abscesses with a bistoury attached to one of the reophores of a volta-faradic apparatus, the other reophore connecting with a neighboring healthy part. Fonsagrives has tried the same experiment with the same results. Nélaton, with conditions one would have supposed analogous, has not been equally successful.

Morel-Lavallée included a tumor between two moist excitators, and was able, during the passage of the current, to open the tumor in the ordinary manner, without suffering on the part of the patient. He added that, on applying the two excitators on the skin, a short distance from each other, it was possible to prick the soft, intermediate parts quite sharply without awakening any unpleasant sensation. The tactile sensibility, however, remained intact, and permitted perfect consciousness of the needle traversing the skin. The same thing takes place in the extraction of the teeth, and I have often proved that when

there was *no pain* caused by the operation, there was a very lively perception of the removal of the tooth.

Notwithstanding these facts, well attested by numerous published proofs, the practice has nearly fallen into disuse. This failure has been caused by two facts—first, the series of failures, and afterward the insufficiency of the theoretical explanations, which have not been able to correct the errors of procedure whence sprang the failures.

The failures have often been owing to the use of a defective apparatus. Finding myself, one day, at the house of a dentist, who, after having been one of the most ardent propagators of the faradic extraction, had completely renounced it, I asked to see his apparatus of induction. It was a magneto-faradic apparatus, whose circuit offered a solution of continuity. It is certain that its failure dated from the day when the instrument, being out of order, they had, nevertheless, continued to make use of it.

On the other hand, a current too strong is generally used, substituting a violent pain for another nearly equivalent. Patients and surgeons must have found that simply change of the pain was not sufficient difference to change the manual of operation. The given explanation of the apparent anæsthesia was, besides, of a nature to confirm all these apprehensions.

These explanations were all equally unsatisfactory, and the least truthful of all was that, on account of strength of current too often employed, the absence of pain of extraction was due to the fact that the pain caused by faradization was so much stronger that it overpowered it, proving the aphorism, *Duobus laboribus simul abortis, vehementior obscurat alterum*.

The hypothesis of a true anæsthesia, and that of the distraction caused by the *mise en scène*, have also been put forward, but they can not be sustained in presence of the examination of facts.

The instantaneous anæsthetic effect, if there is anæsthesia, would not permit us to hold more seriously the hypothesis of Edward Robin, who attributes the anæsthesia to the deoxygenation of the blood by the currents. On that basis, it would be slowly and by continual currents that anæsthesia would be produced, but the effect is, as a matter of fact, instantaneous, and obtained only by induction currents.

Not being able to admit that the fact of extraction of teeth without pain, which I have often witnessed, is not real, I occupied myself with the explanation, and tried to find the cause to which must be attributed the failures. The first point was, on my part, the subject of a communication to the Academy of Sciences (October, 1869). I give it here :

Two conditions preside over the perceptions of our sensations: *First*. The sensitiveness of a nerve upon the ramification of which act all the outside influences. *Second*. That of the cerebral centre, which presides over the phenomena of consciousness.

All the rational attempts to suppress pain in surgical operations have been dependent upon one of these two conditions, seeking to abolish, in a manner more or less lasting, by intoxication or by physical action, the functions of the nervous centres or those of the terminal extremities of the nerves. The inhalation of chloroform fulfills the first of these indications. The local influence of an intense cold has often been used to fulfill the second. It is in order to act as the cold does—that is, to benumb the nerves—that the electricity has been tried as an anæsthetic agent.

The suddenness of the anæsthetic effect and its immediate disappearance after the operation would not permit me to attach it to any of these mechanisms. But keeping account of the instrumental condition in which my attempts had been made, and those of which I had been a witness, and comparing some anæsthetic facts, voluntarily provoked, with similar facts, accidentally observed in certain pathological conditions, I found myself led to propose a new explanation of the phenomena of electric anæsthesia.

It does not appear to me necessary, in order to have the benefit of anæsthesia, to abolish the formation of the impressionable organs, or of the organs affected by the sensation. It is sufficient to give the same nerves several sensations to transmit simultaneously.

I have observed (*Annales de l'Electrotherapie*, January, 1864) a fact to which I have already several times called attention in my lectures—to wit, the coincidence of the analgesia, or abolition of sense of pain, with spontaneous pains,

that the sensorium brings back to the analgesic part. This coincidence, paradoxical in appearance, appears to me able to be explained by a lesion of the centre or of the nervous trunks, determining a painful state which causes an error of perception and locates the difficulty in the periphery. The analgesia of the periphery could be explained then by a fault of perception, admitting that the nerve transmitted the impression whose origin was nearer the centre, to the exclusion of the one whose point of departure was farthest. The cases in which these peripheric analgesias cease with a spontaneous pain prove that this sometimes happens.

Formerly I have noticed (*Manuel de l'Electrotherapie*, 1861), on the occasion of the faradization of the prostate, that the presence alone of a sound in the urethra caused the patient a painful sensation, which disappeared as soon as that sound gave passage to a succession of induced currents.

Similar facts presented themselves in women of whom I faradized the posterior wall of the uterus. The excitator placed in the rectum caused accidentally a sensation of uneasiness, which disappeared as soon as the currents passed. In the absence of the verbal testimony of patients, one is sometimes warned of this sensation by the contractions which interfere with the placing of the sound. If, at this moment, the circuit is closed, one is soon warned of the cessation of sensation, which is owing to the presence of the sound, by the ending of the reflexed phenomena, and by the ease with which one can suddenly operate.

Comparing these facts with those related as examples of electric anæsthesia, I give to-day my conclusion, that when one irritates several points of a sensitive nerve, the transmission of the various impressions to the perceptive centre is not made with equal facility; that the action exercised on the nearest central point is alone transmitted to this one, or, at least, is transmitted more easily than the others; that it abrogates or lessens the perception of the original peripheric impression.

In the preceding cases, where faradization intervenes, the peripheric impression comes to the level of the dental nerve, at the level of the mucous urethra and the mucous rectum, whilst, on account of the conductibility of the tissues and the

dispersion of the currents, a portion more or less considerable of the same trunk of the nerve finds itself reached by the oscillations of the electric current. The transmission of the shock produced in the trunk of the nerve opposes itself then to the transmission of shocks felt upon its division.

This theory renders a good account of the facts observed of anæsthesia, and particularly of the conditions which ought to prevent the admittance of a true anæsthesia: to know instantaneously the useful effect and its immediate cessation. It explains also how the action produced not being a *substitution*, it was useless to have recourse to powerful currents to determine it.

Let us pass now from theory to practice, and see how the failures can be explained.

I will not stop at the cases, in which the apparatus not giving any current, failure has resulted.

How has one departed from the primitive practice, to which one owed complete and evident success, in trying to perfect it with inexact theoretical views!

With the view of *benumbing* the peripheric expansion of the nerve, where the current had been applied to the locality as exactly as possible, one of the poles is applied to the tooth, and they have put the other on the angle of the mouth. In this manner, we can act well upon the peripheries of the nerve, but we also act upon its trunk by the diffused currents, which go through the arms, the mass of the head, and necessarily affect the nerves in the neighborhood of the centre. Giving always to the nerve two sensations, to transmit simultaneously, the temptation was to confide them, if not at the same points of the nerve, at least at some points too near, or even to localize the electric sensation in a point farther from the centre than the extremity of the dental nerve.

There is, finally, another cause of failure, to which I would call attention.

If we have too well localized the positive excitation, we can not always localize the negative excitation. This one must act clearly upon the nerve, and not risk to lose itself in the neighboring tissues. For this, it is necessary that the tooth be well grasped, for it is by it that the current must reach the

nerve, and that the conducting instrument which seizes the tooth has no contact with the neighboring tissues. If the instrument touches tissues which are better conductors than the dental tissues, these give passage to the currents, and the nerve will gather a derivation altogether insufficient.

Practical experience confirms this theory, and faradic anæsthesia is quite efficacious when it is used with an instrument which seizes well the tooth, and has good contact with it. It is more or less a failure when the instrument has contact with the gums. Excellent for the teeth, which give a good hold to the forceps, it is often unsatisfactory when it is applied to roots, which the forceps must seek inside the gums.

Electric anæsthesia does not then deserve the neglect into which it has fallen. Used with a good apparatus, with a suitable positive contact, with the negative contact well localized, it gave excellent results for operation which can be very rapidly executed.

In the extraction of teeth, the positive contact will be established in the hand by a piece of charcoal covered with sheepskin. It is well to employ a volta-faradic apparatus (electro-magnetic) with a moderate current, and to save the sensibility, giving the preference to the large wire coil.

## MISCELLANEOUS NOTES.

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### *New-York Society of Neurology and Electrology.*

THE present New-York Society of Neurology and Electrology is an outgrowth of the Electro-Therapeutical Society of New-York, which was organized November 20th, 1871. The object of that society was "the study of electricity in its relations to therapeutics." Although a number of valuable papers were read before that society, and although some of the meetings, to the few who regularly attended them, were interesting and instructive, yet the society never attained a large membership, and did not succeed in inspiring any great enthusiasm. The meetings of the society were held at the residences of the members.

In the Fall of 1873, the question was raised whether it would be well to meet less frequently, four or five times a year, and thus maintain the existence of the organization for the half a dozen or so who were really interested in it, or to enlarge the scope of the society so as to include the study of the nervous system in health and disease.

The difficulty in the attempt to make a success of the Electro-Therapeutical Society consisted in the fact that there were so few specialists in that branch. Although electricity is so widely used in therapeutics, yet there are probably less than a dozen real specialists in electro-therapeutics in the country.

After deciding to enlarge the scope of the society, the question of name caused considerable discussion at two successive meetings. Electrology is comparatively a new word; though entirely legitimate, it is, we believe, not yet introduced into medical dictionaries. Neurology is an old though not much used term, and has long been recognized in our lexicons.

The Electro-Therapeutical Society was formally dissolved at the meeting in November, 1873, and the New-York Society of Neurology and Electrology was formed, a portion of the mem-



bers of the old Electro-Therapeutical Society constituting a nucleus. The object of the society, as stated in the Constitution, is "the study of the Anatomy, Physiology, Pathology, and Therapeutics of the Nervous System, and of Electricity in its Relations to Physics, Physiology, and Therapeutics." A number of our most prominent and enthusiastic neurologists and electrologists were invited to join; nearly all accepted, and many of them have entered upon the duties of the society with great zeal and earnestness. The society was formally incorporated in January, 1874. The meetings, which are held in the College of Physicians and Surgeons, have been well attended, and a large variety of papers, subjects, cases, and specimens have been presented, some of them of exceptional value and interest. It is probably right to say that no other special-society has succeeded in so short a time in attaining so high a position.

The following is the list of officers for 1873-1874, and of resident and corresponding members:

President, Meredith Clymer, M.D.; Vice-President, Austin Flint, Jr., M.D.; Recording Secretary and Treasurer, Alfred L. Carroll, M.D.; Corresponding Secretary, John J. Mason, M.D.; Executive Council, Austin Flint, Jr., M.D., John C. Dalton, M.D., D. B. St. John Roosa, M.D., E. G. Loring, Jr., M.D., George M. Beard, M.D. The President and Corresponding Secretaries are members *ex-officio*.

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RESIDENT MEMBERS.—W. P. Ackerman, J. W. S. Arnold, Fordyce Barker, George M. Beard, Charles S. Bull, John

Byrne, Alfred L. Carroll, Clement Cleveland, Meredith Clymer, T. B. Corbally, John C. Dalton, John H. Douglas, W. H. Draper, N. B. Emerson, Austin Flint, Jr., John W. S. Gouley, A. McL. Hamilton, George G. Hopkins, James B. Hunter, A. Jacobi, Edward G. Janeway, Jr., Frank P. Kinnicutt, Edward G. Loring, Jr., William T. Lusk, John J. Mason, T. H. McBride, John Moore, U. S. Army, Robert Newman, H. D. Nicoll, H. D. Noyes, James J. O'Dea, C. Inslee Pardee, Ralph L. Parsons, John G. Perry, William M. Polk, Charles T. Poore, A. D. Rockwell, D. B. St. John Roosa, Lewis A. Sayre, E. C. Seguin, Samuel Sexton, Gouverneur M. Smith, J. H. Sterling, F. R. Sturgis, Gilbert H. Swezey, J. Theus. Taylor, G. Van Bibber, S. Oakley Vanderpoel, Charles T. Whybrew, Leroy M. Yale.

CORRESPONDING MEMBERS.—T. Clifford Allbutt, Leeds, England; Julius Althaus, F. E. Anstie, London; Roberts Bartholow, Cincinnati, Ohio; H. Charlton Bastian, London; J. Keating Bauduy, St. Louis, Mo.; J. Warburton Begbie, Edinburgh; Moritz Benedict, Vienna; Claude Bernard, Ch. Bouchard, Bourneville, Paris; H. P. Bowditch, Jr., Boston; Rudolph Brenner, St. Petersburg; W. H. Broadbent, London; J. Crichton Brown, Wakefield, England; John Charles Bucknill, Rugby, England; J. L. Cabell, University of Virginia, Va.; W. B. Carpenter, London; John B. Chapin, Willard, N. Y.; J. M. Charcot, Paris; J. Lockhart Clarke, London; George Clymer, Washington, D. C.; J. Solis Cohen, Philadelphia; W. J. Conklin, Dayton, Ohio; George Cook, Canandaigua, N. Y.; E. Cyon, St. Petersburg; F. C. Donders, Utrecht; Emil Dubois-Reymond, Berlin; G. B. Duchenne, Legrand Du Saulle, Paris; Pliny Earle, Northampton, Mass.; W. Erb, Heidelberg; Albert Eulenberg, Berlin; David Ferrier, London; Edouard Fournier, Paris; N. Friedrich, Heidelberg; Carl Frommhold, Prague; Wm. Tennant Gairdner, Glasgow; John P. Gray, Utica, N. Y.; Sir William Gull, Bart., London; H. Helmholtz, Berlin; G. Heyem, Paris; Edward Hitzig, Berlin; Edward R. Hun, Jr., Albany, N. Y.; J. Hughlings Jackson, London; John D. Jackson, Danville, Ky.; C. Handfield Jones, London; A. D. Kellogg, Poughkeepsie, N. Y.; Axel Key, Stockholm; Thomas Laycock, London; \*Ch. Legros, Paris; D. F. Lin-

\* Deceased.

coln, Boston ; J. Luys, Paris ; W. H. Mason, Buffalo, N. Y. ; H. W. Maudsley, London ; Moritz Meyer, Berlin ; Theodor Meynert, Vienna ; S. Weir Mitchell, Philadelphia ; Julius Nicolaysen, Christiania, Norway ; John W. Ogle, London ; E. Onimus, Paris ; William Pepper, Philadelphia ; James J. Putnam, Boston ; Ch. Bland Radcliffe, J. Spence Ramskill, London ; Isaac Ray, Philadelphia ; J. Russell Reynolds, London ; William Roberts, Manchester ; J. Rosenthal, Erlangen, Bavaria ; N. Rosenthal, Vienna ; W. Rutherford Sanders, Edinburgh ; W. H. Octavius Sankey, Cheltenham, England ; Moritz Schiff, Florence, Italy ; \*Max Schultze, Bonn ; Herbert Tibbets, London ; A. Tripier, Paris ; Daniel Hack Tuke, Falmouth, England ; Thomas Harrington Tuke, London ; J. Batty Tuke, Edinburgh ; S. G. Webber, Boston ; W. C. Wey, Elmira, N. Y. ; C. Westphal, Berlin ; Samuel Wilks, London ; J. Janvier Woodward, Washington, D. C. ; Jeffries Wyman, Cambridge, Mass. ; Rudolf Virchow, Berlin ; A. Vulpian, Paris.

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*The New-York Neurological Society.*

STIMULATED by the efforts of the Electro-Therapeutical Society to arouse professional interest in the department of electro-therapeutics, a number of physicians made a similar attempt to inspire the profession with enthusiasm in the department of nervous diseases, and in March, 1872, they began the organization of the New-York Neurological Society.

The attempt was not entirely successful. They encountered the same great difficulty as their friends in the Electro-Therapeutical Society, that the profession "cared for none of these things." The society existed only in name, and never held any regular meetings. Nearly all of those who were enrolled as its members are now members of the New-York Society of Neurology and Electrology.

Recently, the society has been reorganized, and already has

\* Deceased.

a large number of members. Its regular meetings will be held on the first Mondays of the month. The complete list of officers and members has not yet been prepared.

This rapid growth of interest in young and despised specialties is without a precedent in the recorded history of the human race. Six months ago, when we were writing the first prospectus of this journal, there was no successful society, and no journal of any kind in New-York, successful or unsuccessful, devoted to these themes.<sup>1</sup>

The Neurological Society was in a state analogous to the asphyxia of new-born children, and the Electro-Therapeutical Society, though alive, was living at a poor, dying rate, and seriously debating the question whether it had better cut its own throat, and end the agony at once, or try to revive its fading energies by transfusing some neurology into its veins. The latter experiment was carefully and thoroughly tried, and in a moment, as though by a miracle, the society rose to its feet, bounded into lusty life, and is now among the strongest of the strong.

In the course of three or four months, the Neurological Society began to take breath, and has already made up for the two years that were lost by suspended animation.

An interesting and amusing feature of the excitement is that, by the majority of the profession, the two societies are confounded. Some think there is but one society, and others, who attend the Neurological, suppose that they are attending the New-York Society of Neurology and Electrology. Some of the members of each society attend and participate in the meetings of the other.

Meanwhile, our Chicago friends have entered the field with their handsome and ably-conducted journal, and among all parties the best of good feeling prevails.

And thus these two specialties, electrology and neurology, which are so closely connected that we may well call them the Siamese Twins of Science, having been long snubbed or ignored, suddenly wake up to find themselves famous. Already they are being admitted to good society, and great folks even pause to bow to them on the street, condescend to ask the hon-

or of an introduction, and are glad to be seen in their company.

That all this present excitement will be permanent can not well be believed; the wave must surely recede a little, though the tide, we may be assured, is all the while rising. If this intense activity should continue without abatement, neurology and electrology will swallow up all other specialties, and general practice as well. All our animal electricity will be spent in the use of electricity; we shall exhaust our brains in the study of brain, and have no nerve left for the cure of the nervous.

Those who espoused the cause of these specialties when humble, and shared their wretched crusts; who have nursed them and watched them while "mewing their mighty youth;" who, in the full faith of their sound and healthy maturity, have borne with the weaknesses, and follies, and extravagances of their immaturity, and who, for their sake, have suffered despising, obscurity, and persecution, may, in this rapid, almost precocious development of their *protégés* into manhood, take just pride and satisfaction.

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#### *Chromated Lead as an Electro-negative Element.*

GEORGE BEARDSLEY, of Brooklyn, has patented the discovery of chromated lead as a substitute for carbon in the battery. The recognized disadvantages of carbon are that it is easily broken, that it absorbs gases, and that it does not conduct as well as could be wished. The position of chromium in the series of elements would indicate that it would be a superior electro-negative; but *pure* chromium, in the metallic state, can not be obtained. That lead makes a good electro-negative has long been known. Mr. Beardsley covers lead with powdered chromium, just as silver is covered with powdered platinum. The result is a flexible, light, neat, not easily breakable electro-negative, which can be used as a substitute for carbon, for platinized silver or copper, in the ordinary galvanic batteries.

Its apparent advantages are these :

1. It conducts better than even the best carbon. Hence it gives more electro-motive force.

2. It gives a steadier and more enduring current. According to General Abbott, of West-Point, who has experimented extensively with this and other elements, trying them by the most elaborate tests, the current from a battery of which the chromated lead is one of the elements, not only maintains its strength, but actually increases in strength during a pretty long use, while the ordinary Smee and zinc-carbon batteries diminish very markedly.

3. It is less friable than either platinized silver or carbon.

Platinized silver, as every one knows, is liable to be injured by the mercury in the Smee cell.

To these advantages, it may be added that chromated lead is quite inexpensive. It may be used with sulphuric-acid solution, with bichromate of potash solution, or with sal ammoniac that is employed in Leclanche's battery.

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*Latest Modification of the Cod-Liver Oil Emulsion.*

WE have several times called attention to an emulsion of cod-liver oil and phosphoric acid. The last report of the Utica Insane Asylum contains a formula for an emulsion that has long been in use in that institution, and to which our attention was first called by Dr. Andrews. We have experimented considerably with various modifications of the original prescription. The latest formula, and one that suits us better than any other, is the following :

(Jamaica rum seems to cover the taste better than sherry wine, which has usually been employed.)

℞ Cod-Liver Oil, ℥ iv.  
Glyconin, ʒ ix.

Glyconin is made by thoroughly triturating glycerine and yolk of egg, equal parts. Add to the glyconin thirty drops of the essential oil of bitter almonds ; then add the oil to the gly-

conin *very slowly*, drop by drop, stirring vigorously all the time. The success of the emulsion depends on the thoroughness with which this task is performed.

Then add—

Jamaica Rum,  $\zeta$  ii.

Dilute Phosphoric Acid,  $\zeta$  ss to  $\zeta$  i.

The average dose is one tablespoonful after meals, being regulated mainly by the phosphoric acid.

The above combination is a most excellent brain and nerve food. If properly prepared, it does not separate, keeps for a long time, and is rather agreeable to the taste. If need be, pyrophosphate of iron can be added, or strychnine, or Fowler's Solution. We have used it especially in hysteria and allied affections, and in organic diseases of the nervous system it is also valuable. Consumptives frequently take it in preference to cod-liver oil. As cod-liver oil has a somewhat unpalatable name, it is sometimes better, in prescribing for nervous patients, to call this the phosphoric emulsion. The fishy odor can not be entirely neutralized; but for those who are not familiar with cod-liver oil, neither the odor nor taste of this emulsion, when well made, suggests the presence of the oil.

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*Excursion Tickets to the American Medical Association.*

THOSE who wish to attend the next meeting of the American Medical Association in Detroit, and who desire excursion tickets, may communicate with Dr. Robert Newman, who has the matter in charge. The price of a ticket from New-York to Detroit, and return, via Erie Railroad, to Buffalo, will probably be about \$22. They are good for thirty days.

## GLEANINGS FROM FOREIGN JOURNALS.

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*Further Observations on the Physiology of the Brain*, by Hitzig.—In Berlin Med. Psycho. Gesellschaft (*Berliner Klin. Wochenshft.*), December 29th, 1873, Dr. Hitzig read a paper entitled "Further Observations on the Physiology of the Brain." The investigations are a continuation of the already published experiments reported in connection with Dr. Fritsch upon the "Excitability of the Hemispheres." In his report, he discusses at length the following points, of which we can only give the headings:

1. The different action of the poles.
2. Condition of the brain in ether and morphia narcosis.
3. Concerning the irritability of the brain in apneæ.
4. More positive knowledge concerning the position of the centres.

After some discussion, Dr. Hitzig made the following remarks: "In the beginning of October of this year, I read a treatise by Dr. Ferrier, of London, which was, for the most part, a repetition of experiments made by Dr. Fritsch and myself. Ferrier's conclusions are very different from the results we obtained; but he has not confirmed his theories; nor has he, in other opinions, which appear to be new, given to us the credit of being the first investigators. The most important difference in the two theories is that while, according to us (F. & H.), only one part of the brain, the parietal, is excitable, according to Ferrier, nearly all the convolutions are excitable. I consider Ferrier's experiments somewhat negative, for he has found the same centres very differently located in brains anatomically so similar as those of cats and dogs. In fact, the conclusions of Ferrier, inasmuch as they confirm our view, are erroneous, as I have demonstrated by a repetition of his experiments. The error of the author consists in the fact that he uses the induced current, an entirely useless method of irritation. He also used it too strong, and thereby produced branch currents (*Stromschleifen*), which penetrated to the ganglia at the base of the brain. There is no possibility of localizing such a current to circumscribed spots."

Dr. Hitzig closed by saying he would publish more elaborate observations on this subject in the *Archiv of Reichert and Du Bois Reymond*.

V. B.

*MM. Carville and Duret on the Physiology of the Brain*.—In *Société de Biologie (Gaz. Médicale, January 10th)*, M. Carville presented, in his name and that of M. Duret, a paper entitled, "Critique Expérimentale des Travaux de MM. Fritsch, Hitzig and Ferrier."

After reviewing experiments made by Magendie, Longet, and others on the



cerebral hemispheres, they refer to the late experiments of Fritsch, Hitzig, and Ferrier. They consider, of the two series of observations, those of Ferrier to be more exact, as he used very feeble induced currents, and Fritsch and Hitzig, in their experiments, used the constant current. One objection, however, is made to Ferrier's observations, "that, however feeble the current may be, is it not possible that it diffuses itself over the white matter of the brain, instead of being, as he claims, localized in the convolutions?" Does it not penetrate some distance, following the white fibres perhaps, to the corpora striata or to the crura cerebri? They think it strange that an author whose observations are otherwise made with so much care, should not have anticipated this objection, and that he should have proved by experiment that these very feeble currents were absolutely localized between the two electrodes. It was to ascertain this fact that MM. Carville and Duret commenced a series of experiments, which they report to the Society. Their apparatus consisted of two parts: First, "Appareil Excitateur," where the current is generated; second, "Appareil Récepteur," to receive the current if it should be diffused beyond certain points. The "Appareil Excitateur" was an induction apparatus, the current of which could be easily graduated. The electrodes used were carefully insulated, only exposing a metallic surface at the extreme points. The "Appareil Récepteur" consisted of a highly sensitive galvanometer, with two insulated copper wires attached to the coil of this instrument. Each wire ended in a platina point, carefully insulated, so that only the extreme end should have a metallic surface. Platina was used, as there is less liability of chemical action. The connection of the "Appareil Récepteur" being placed upon a convolution, and the electrodes of "Appareil Excitateur" being applied at different distances, from one to five centimetres from the platina points, it was observed that the galvanometer was invariably deflected. This experiment only proved that the current was diffused over the surface of the convolutions. The insulated platina rods were then introduced into the substance of the brain to a depth of from two to twenty centimetres. There was always a deviation of the galvanometer, but it was uncertain where the metallic points were introduced to a depth of twenty centimetres. After many such experiments on the brains of animals recently dead, and also on living animals narcotized by "intra-veneuses," injections of chloral hydrate, they came to the following conclusions:

First. That faradic currents, however feeble, are diffused over the surface of the brain from one point to another.

Second. That this diffusion is caused by the current being conducted by the liquids and substance of the brain.

Third. That faradic currents, however feeble, can not be localized in the gray substance, and that they are diffused more or less deeply, following the course of the adjacent white fibres.

MM. Carville and Duret promised that, at the next meeting of the society, they would present more experiments upon the localization of currents.

At a meeting of Société de Biologie, January 3d, M. Dupuy read a paper, in which he referred to the experiments of MM. Carville and Duret, and the interest which they had excited in the society. He said he would, in this communication, give the results of his observations in a similar series of experiments which he performed in the laboratory of Professor Vulpian. M. Dupuy arrives at the following conclusions :

First. "That the results of Ferrier's memoir should not be accepted, as he did not take the precaution to find out if the electric currents (faradic) which he used in his observations were not diffused in the brain. With the aid of a galvanoscopic frog, I was enabled to establish with certainty that these currents are diffused, and consequently we can not pretend to have shown that the cortical substance of the brain is excitable by electricity."

Second. "That we can not localize, as Ferrier proposes, this or that convolution as being the nutritive or functional centre of this or that nerve, for when the animal experimented on is *completely* under the influence of ether, irritation by electricity of the convolutions does not produce muscular contractions ; although upon the same animal, and by the same current, direct irritation of a branch of the sciatic nerve (previously laid bare) causes a contraction of muscles to which it is distributed."

At the same meeting, MM. Carville and Duret presented a second report of their experiments, which is very long and exhaustive. They bring forward the following conclusions :

First. The cortical substance of the hemispheres is not excitable ; it is insensible and does not contain special motor centres.

Second. The effects produced by faradic currents are the effects produced by direct excitation of the corpora striata and crura cerebri, as the currents penetrate to these organs.

Third. These results can not be attributed to any reflex action.

Fourth. Complete anæsthesia, that prevents these effects, does not in the least change the condition of the cortical substance, and it only acts by the diminution, more or less pronounced, of the excitability of those parts of the brain known to be excitable.

V. B.

*Electrical Irritation of the Brain of a Monkey.* — In the *Berliner Klinische Wochenschrift* for February 9th, 1874, Dr. Edward Hitzig relates the "Results of Electric Stimulation of the Brain of an Ape."

He very much wished to operate upon the brain of an ape, on account of its great similarity to the human brain, and its dissimilarity to that of all other animals, and compare the results of experiment with those upon other animals, as performed by himself and Fritsch.

Having procured an ape from the Zoological Garden in Berlin, in the presence of several physicians and professors, the experiments were performed.

The left half of the cranium was opened with the loss of a very little blood, and the ape allowed to recover from the etherization before the stimulation was applied.

He wished to ascertain, first, on which parts of the surface of the brain

those points exist the irritation of which, by *weak currents*, is responded to when the brain of the dog is operated upon. Second, the examination of the remaining parts of the surface. The results were as follows: All the centres could be found again in the anterior median convolution, so that they occupied the whole surface from the longitudinal fissure to the fissure of Sylvius. Commencing at the top, about three millimetres from the longitudinal fissure, the centre for the hind-extremities was found; then, about seven millimetres in a lateral direction, the centre for the fore-extremities; nearly seven millimetres further to the left, the centre for some of the nerves of sight, and six millimetres distant from this point, and close to the fissure of Sylvius, were centres which governed the motions of the mouth, tongue, and jaws.

He was able to induce co-ordinations of the muscles of the anterior extremities, so that the motions resembled very closely voluntary acts, such as pronation of the arm, extension and spreading of the fingers, etc.

The electrodes applied a little more toward the front of these centres, induced retraction of the ear and closing of the eye; and moving the electrodes laterally from right to left, besides the motions of the ear, contractions of the masseters, and even motions of the eyes, took place. And applying the inducted current immediately above the fissure of Sylvius, the mouth opened wide. In this neighborhood, points were found which induced retraction of the corners of the mouth, motions of the tongue, and the muscles in front of the neck (*sterno hyoid*, etc.).

Close to the centre for the fore-extremities, is a centre for rotating the head from right to left.

The parietal regions proper and the frontal lobes did not respond to weak currents, and strong ones were not tried.

Behind the posterior median convolution, all reaction ceased soon with powerful currents; in the upper part of the posterior median convolution, strong currents caused general and irregular contractions of various muscles; but separate motions could never be distinctly localized as in the anterior median convolution.

Under these circumstances, he says, "I do not hesitate to declare the anterior median convolution to be the real motor portion of the cortex of the brain; especially so, as almost all the muscles of the body could be set in motion from out this part, in this single experiment."

He thinks his views, as previously expressed, in regard to the sensitive parts of the human brain being in the parietal region, and an increase in the bulk of the human brain to be chiefly based on a greater development of the frontal lobes, as being perfectly established. It is only necessary to compare the medial edge of the hemispheres in order to recognize the marked development of those parts of the brain of the ape which are situated in front of the sensitive zone, while the region behind it appears rather less than more developed.

On the other hand, the most sensitive parts are *not*, as he presumed, in the posterior, and to some extent in the anterior median convolution, but

are all in the latter. And, according to this experiment, it would at first seem that no analogue can be found on the dog's brain, for the posterior median convolution; but the arrangement of the convolutions are different in the two animals, and a close study of these clears up much of the apparent discrepancy.

The results also show that the centre for the muscles which man uses for speaking is in the ape directly on the front edge of the Sylvius groove—that is, on a place in direct proximity to the one which is generally injured in aphasia of man.

In the light of this experiment, a case of abscess of the brain, which I described in the third volume of the *Archiv für Psychiatrie und Nervenkrankheiten*, gains a new and increased interest. You can see, from the diagnosis, that the small abscess is exactly located at the centre (close to the fissure of Sylvius) which governs the motion of the mouth, tongue, and jaws; that the muscles, artificially unnerved, from this point were first seized with spasms and afterward became paralyzed; that these spasms, without becoming general, expanded in the same order in which the centres are located, after each other, toward the median line, in a manner that only the point remotest from the abscess—the one for the leg—remained unaffected.

In view of this perfect accord between the experiments of nature on man with the artificial effects on the brain of the ape, you will agree with me if I consider this experiment as a more valuable one than criticism might generally regard it to be.

G. B. F.

*Icterus Catarrhalis treated by Faradization of the Gall-Bladder.*—Prof. Gerhardt (*Berliner Klin. Wochenschrift*, No. 27, 1873) says that some time since, he recommended faradization of the gall-bladder in cases of Icterus Catarrhalis. Further experience has proved to him that this treatment is followed by good results. The position of the gall-bladder can be easily determined by percussion. After its position is well marked out, one electrode from a strong secondary current should be placed over it, and pressure exerted in the direction of the spinal cord. The other electrode is placed upon the back at a point horizontal to the position of the gall-bladder. With a strong current, there is great contraction of the abdominal muscles. After repeating this operation several times, the jaundice decreases to a marked degree. Prof. Gerhardt reports two cases, in both of which the area of dullness of gall-bladder was well made out, and was much reduced by the application. In two days, bile-colored stools and a decrease of the jaundice were noticed. No other medication was used.

V. B.

*Electrolytic Treatment of Naso-pharyngeal Polypus.*—Dr. Paul Bruns (*Berliner Klin. Wochenschrift*, August 11th, 1873) refers to the fact that he has before called attention to the treatment of Naso-pharyngeal polypi by electrolysis. He now reports another case of a very large growth of this charac-

ter which was removed entirely in eleven sittings. The advantages of this plan of treatment are, that there is no fear of hemorrhage; that it is only moderately painful (?); that it is not dangerous; and, finally, that there is no tendency to renewal of the growth.

The patient, thirty years of age, had suffered for sixteen years from nasopharyngeal polypus, which had grown gradually, and now entirely closed the right nostril and projected into the mouth. A 32-cell Frommhold battery was used in the operations. In nine operations, needles were used at both poles, one being introduced into the tumor by the right nostril, and the other by the mouth. Only six elements were used in this method. Two more applications were made with the needle attached to the negative pole, the positive being held in the hand. Ten to twenty elements were used in these operations. With three to four days' interval between each operation, the growth diminished gradually. Four weeks after the last application, no signs of the polypus were found upon careful examination, and only a small spot of ulceration remained to be healed.

V. B.

*A Case of Saturnine Epilepsy and Mania.*—Prof. M. Leidesdorf (*All. Wein. Med. Zeitung*, November 4th, 1873) reports a case of saturnine epilepsy and mania. A painter, aged 25, had suffered in former years from lead colic, and had lately been troubled with trembling in extremities.

Eight days before he was brought to insane asylum, he had in rapid succession eight epileptic attacks, which left him in an unnatural and excited state of mind. In this condition, he was brought to the asylum, and he showed to a marked degree all the physical signs of lead-poisoning. Patient was very unreasonable, and most of the time crawled over the floor, making the motions as if he was painting it. The case was diagnosed lead encephalopathy.

On the third night after his reception, epileptic seizures of five or six minutes' duration came on, and continued at short intervals. The pupils were much dilated, and would not react to the stimulus of light. The patient became comatose, the epileptic attacks increasing in violence; the pulse gradually became imperceptible, and death took place on the fifth day after his reception into asylum.

Post-mortem twelve hours after death. Brain was found to be anæmic, but beyond this the most careful microscopical examination failed to find any thing abnormal in that organ. Chemical analysis of kidney and brain revealed, in former, lead in small quantities, and in the latter traces of lead salts.

V. B.

*On the Action of Some New Remedies.*—In Berlin Med. Gesellschaft (*Berliner Klin. Wochenschrift.*, December 1st, 1873), Dr. Gustman read a paper "On the Action of Some New Remedies." He said that, in conjunction with Dr. Eulenberg, he had made some experiments with amyl nitrite. After describing its appearance, he said it had been used in form of inhalation for angina pectoris, hemicrania, and some

cases of epilepsy with great success. In experiments upon frogs, it was administered by inhalation, and also subcutaneously. It was observed that it acted by paralyzing the nerve centres, first and most potently the brain, in less manner the spinal cord, and, lastly, the peripheral nerves. The symptoms of poisoning by this way are total loss of motion and sensibility, of reflex excitability, and, lastly, of excitability of peripheral nerves.

After giving a long account of diabetes mellitus, produced by amyl nitrite, he gives directions for its therapeutic uses. From three to five drops on a handkerchief, and inhaled, will in less than half a minute bring on intense suffusion and feeling of heat in face, and at same time a sensation of dizziness, which symptoms, however, quickly disappear, without leaving any unpleasant effect. The suffused condition of face sometimes remains for a few minutes. The happy result of use of this agent in angina pectoris is probably due to the fact that it relieves the existing spasm of the vessels. Its use in hemicrania has also been followed by good results, particularly in those cases where the affected side looks pale in comparison with the rest of face. Dr. Gustman ends his paper with the hope that amyl nitrite may be the subject of further therapeutical investigations. V. B.

*The Influence of Fright on the Origin of Disease.*—Dr. O. Kohts (*Berliner Klin. Wochenschrift.*, April 16th, 1873) has an interesting paper, on "The Influence of Fright, during the Bombardment of Strasburg, on the Origin of Disease." Dr. K. says that emotional excitement has long been recognized as a cause for many diseases, and that this origin of chorea and epilepsy, especially in children, is not at all uncommon. Other morbid phenomena arise from fright, though less frequently, such as icterus, palpitation of heart, Basdow's disease, hair suddenly becoming gray, etc. In the Polyklinik of Strasburg, the author had the opportunity of seeing many cases of disease brought on by fear and fright during the bombardment of that city. During thirty-one days and nights, the bombardment was kept up. The number of balls, shells, etc., thrown into the city was 193,772, or 6249 every day, 269 every hour, and 4 to 5 per minute. After the surrender, there were but two houses in the city uninjured. The inhabitants sought refuge in cellars, and suffered the greatest privations, besides being under the constant influence of terror and fright. Among many cases which the author gives as arising entirely from this sudden emotional excitement, the largest number are classed as nervous diseases, tremor, paralysis agitans, aphasia, paraplegia, etc. The three following cases are most interesting:

*Tremor.*—A woman, age 51, was greatly terrified by a shell bursting near her, and was immediately seized with vomiting, and soon afterward with trembling over whole body. This tremor has continued until now, 1873. There is marked loss of muscular power, and uninterrupted tremor, which can not be controlled by the will, and which is greatly increased by voluntary movements or excitement.

*Tremor and Aphasia.*—A man, age 56, was suddenly frightened, sprang from his bed, and was unable to speak a word. Was soon seized with

trembling in extremities, which condition has persisted up to present time, 1873. Tremor is increased by excitement, and by making voluntary movements. There is also right hemiparesis and gradual dementia.

*Paralysis Agitans.*—A woman, age 61, suddenly greatly terrified, was seized with trembling in right half of body, which gradually became more violent. At present time, 1873, trembling is increased by voluntary motion, and there is marked loss of muscular power in affected side. V. B.

*A Case of Universal Anæsthesia.*—Prof. Schüppel (*Archiv der Heilkunde*, Leipzig, 1874) gives a very complete and lengthy report of a case of universal anæsthesia. The patient, a man 42 years of age, had profound anæsthesia of skin and muscles of nearly the whole body, and yet did not suffer any great disturbance of co-ordination. Twenty-two years ago, the patient had a severe attack of fever, and during convalescence he suffered much from pain, redness, and swelling in his lower extremities, which symptoms would come on suddenly and soon disappear. Within a year he commenced to feel sensations of numbness, formication, etc., in his fingers, which were soon followed by loss of sensation. In consequence of numbness of fingers, he would often burn and wound himself, only being made aware of the injury by the scar or bleeding. Gangrenous inflammation followed an injury to right index finger, and it was amputated without the slightest pain. With his eyes open, he had no difficulty in performing every motion with his arms and hands, when with eyes closed he could not tell the position of his hand, whether it was flexed or extended. Six years ago, he commenced to notice same symptoms in his lower extremities; his feet felt numb and asleep, the ground did not feel natural when he walked. This condition continued to develop, and now he can neither walk nor stand in the dark. When in bed, as long as he had a light, he was conscious of his position and situation, but in the dark, when lying on his back, he felt as if he was suspended in the air, and could not determine his position. The bowels seemed also to be influenced, as he could only have a movement by aid of drastic purgatives. The electro-muscular contractility remains intact, yet he can not feel the strongest faradic current. On some parts of his face and throat, he could feel the prick of a pin. During the last year, he has become much worse, and walking is much interfered with. He has full power of voluntary motion in his arms, as long as he can follow them with his eyes, but in the dark, or with eyes closed, he is more helpless than ever before. Patient died, May 10th, 1873. Post-mortem revealed many and interesting pathological lesions. The brain was normal, but the pathological changes in the spinal cord were extensive, embracing the medulla spinalis and the posterior and lateral columns. Central softening had taken place, and a cavity, filled with serum, extended from the first cervical to the first lumbar nerve. The lower half of the cervical portion of the posterior columns was entirely destroyed, and could not be recognized at all, and the upper half, although it still retained its consistency, was in a condition of gray degeneration, and made up of a connective tissue mass.

In the dorsal region, the posterior columns were much atrophied. The lateral columns were normal from medulla to second cervical nerve, but the remaining portions showed a sclerosed condition to a greater or less extent. Dr. Schüppel could not establish any pathological changes in the peripheral nerves, particularly those distributed to the tactile papillæ being examined with great care.

V. B.

*The Reduction of Enlarged Glandular Tumors by Powerful Interrupted Farad'c Currents.*—Dr. Moritz Meyer (*Berliner Klinische Wochenschrift*, 1874, No. 10) speaks of the reduction of glandular tumors by *very strong* faradic currents, *interrupted* by a current-breaker. The tumor is broken up by the *mechanical* influence of the current, and sometimes becomes perceptibly smaller after the operation. A persevering treatment has a permanent effect in reducing, though not in entirely destroying, the tumor. He reports two cases treated in this way.

[We have treated a case of goitre partly by this method, alternating it with electrolysis, and the reduction has been more rapid than in any other case that we have treated by electricity. We did not see the immediate effects of which Dr. Meyer speaks, but we are inclined to believe that it aided the electrolytic treatment.]

G. M. B.

*The Treatment of Insanity by Electricity.*—Dr. G. M. Beard (*London Journal of Mental Science*, October, 1873) says that it is not as well recognized as it should be that in diseases of the brain and spinal cord, where the mind is seriously affected, the electrical treatment is also indicated, just as in diseases of the same organs when the mind is not affected. In some of the asylums of England, United States, and Germany, electricity is now and for some time has been used as an adjunct to other remedies for the treatment of different forms of insanity; but with a few exceptions, the treatment is not systematically carried out, and, partly through ignorance of the methods of application, partly through want of sufficient medical assistance to supervise the necessary details, the results have not been entirely satisfactory, and the cases have not been fully recorded.

We should except from these remarks the Alabama Asylum for the Insane, where, under the superintending of Dr. Bryce, both currents of electricity have been used in the treatment of the patients for the past two or three years.

Dr. B.— has corresponded with Dr. Bryce on the subject from the first, and has at different times given suggestions in regard to the methods of application, which suggestions have been carried out so far as possible for the already overworked officers of that institution.

Under date of February 17th, 1873, he gives the general results of his observations in the following language: "We like it: find it beneficial in most cases, valuable in a majority, and indispensable in certain forms of hysterical insanity, in primary dementia, and neurasthenia."



The failures in this as in other branches of electro-therapeutics are, in fact, the logical result of want of familiarity with the management of batteries, of incorrect ideas on the differential action of the currents, and the general action of electricity on the body, and deficient technical skill in the details of the applications.

For those who are beginning to use electricity, or are contemplating its use in the asylums for the insane, these general suggestions may be of service: 1. Let it be remembered always that electricity, in any form—Franklinic, Galvanic, or Faradic—when applied to the body, acts as a *stimulating tonic with a powerful sedative influence*. It is an agent for *improving nutrition* in any condition, local or general, where improvement in nutrition is required.

The order and degree of its effects depend largely on the method and manner of application, and on the constitution and disease of the patient to which the application is made.

2. That in insanity, the brain is not the only part of the body affected. Excluding those cases of insanity produced by reflex action from the digestive and pelvic organs, there are very many cases where the spinal cord and other parts of the central and peripheral nervous system suffer as an effect of the disease of the brain.

While these remarks may seem but commonplace to experienced psychologists, and while the fact of the relation of diseases of the brain to diseases of other parts of the body is continually recognized, when other remedies are employed, still, in the application of electricity, some experimenters have acted on the theory that the *brain alone should be treated*. Those who act exclusively on this theory will not gain great victories over insanity by electricity. Some of the applications should be made in such a way as to bring the whole central nervous system under the influence of the current, and local diseases associated with insanity as a cause or effect should receive local treatment.

The central nervous system is best brought under the direct influence of the galvanic current by the method of central galvanization. The method may be varied by galvanization of the brain, cervical sympathetic, pneumogastric and spine; but the method of central galvanization is easier, safer, and more effective. In cases associated with debility, and especially in those forms of insanity dependent on neurasthenia or nervous exhaustion, general faradization answers a good purpose, and may with great advantage be used alternately with central galvanization or localized galvanization of the nerve centres.

3. The first tentative applications should be very mild, and the strength of the current and the time of sitting should be gradually increased as the patient proves himself able to bear the treatment.

In some cases of disease of the brain, the patient is exceedingly susceptible, and must be treated with great delicacy; but such susceptibility is not of necessity the result of the disease; it would probably appear in the same

patient, however afflicted. In other cases of disease of the brain, the patient may be extraordinarily tolerant of electricity, and this tolerance may be the result of the pathological changes in the brain, or it may be simply the peculiarity of temperament that would appear in any disease, or it may be the result of both factors.

Electricity may be used in almost any form of insanity, by whatsoever name it may be called, when sedative or tonic effects are indicated. In our experience, the best result has been obtained in hysterical insanity, in mania, and in melancholia dependent on change of life. Dr. Bryce speaks encouragingly of the effects of this treatment of primary dementia.

Two or three special suggestions, of a practical nature, are given officers of asylums :

*First.* Do not attempt too much at once. A few cases—two or three—carefully treated, and assiduously watched for a number of weeks, will teach us more of the details of the applications and of the general effects of electrization than a hundred cases carelessly treated, and abandoned before the treatment has been well tried.

*Secondly.* Do not judge of the value of electricity, as a remedial agent in insanity, by the extreme results—either success or failure. The first two or three cases treated by electricity may yield so brilliantly as to suggest a doubt whether the other methods of treatment may not be dispensed with ; or they may be so utterly obstinate as to confirm and clinch all previous skepticism on the subject. Either conclusion will be wrong.

*Thirdly.* Do not judge by the immediate effects after the applications exclusively, but watch for the *permanent* effects that are observed after weeks and months of treatment.

It is well and necessary to take the pulse before and after the sitting, to see whether it is made feebler, calmer, or stronger by the treatment. The immediate effects should be studied, but they should not be the exclusive guides to treatment. A patient who at first reacts badly may in time be made to react kindly. The unpleasant symptoms that follow the first application may be the result of overdoing the treatment : the currents may be too strong, or the sitting too long ; and even when proper caution is used, time may be necessary to educate the patient to a proper tolerance of electricity.

## NOTICES OF BOOKS.

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A TREATISE ON MEDICAL ELECTRICITY. Third Edition. By JULIUS ALTHAUS, M.D. Longmans, Green & Co., London.

Among the physicians of Great Britain who use electricity in medicine, Dr. Althaus has long held the leadership.

This third edition of his systematic treatise on medical electricity is by far the best of his writings. It contains all the more recent researches in electro-physiology, a brief statement of some of the points of electro-physics that apply to electro-physiology and electro-therapeutics, and an assortment of medical and surgical cases treated by electricity. It goes over a very wide field, and discusses all the subjects of which it treats with conspicuous and characteristic fairness. All the recent researches of American as well as European observers, up to the date of publication, receive appropriate and intelligent consideration. Of all the European writers on electro-therapeutics, Dr. Althaus is the fairest and most exhaustive. Others have given more attention to some one department than he, but he is at home in nearly all the departments of electro-therapeutics. The present edition is superior to its predecessors, not only in its greater thoroughness and in its recentness, but also in the method of presentation. The style of the author has clearly improved with experience; there is greater vigor and positiveness than in his earlier writings, and the candor is in no way diminished. The arrangement of the book does not wholly suit us. We think that if the matter, as it now stands, were cut up into sections and frequent chapters, it would be more readable, and much easier of reference. For a German audience, this is a slight matter, but for the average American physician it is important. The American wants every thing broken into bits that he can seize and hold in a moment; he wants something that he can read while falling down-stairs.

In the section on apparatus, the author gives a fair and full survey of a large number, of European and American workmanship, and it is interesting to note how closely the improvements and modifications of the past years in the different countries resemble each other. Physicians and manufacturers, in all lands where electricity is used as a remedial agent, have met with substantially the same difficulties, and have tried to overcome them by similar processes, and in some instances have arrived independently at the same results.

The method of general faradization is accurately described and illustrated.

By the German authorities, this method has from the first been received with interest and appreciation, and more recently with enthusiastic approval. Dr. Beard's method of central galvanization is also fully described. Dr. Althaus states that he used some years ago one process in this method—that is, the negative pole at the epigastrium, and the other pole on the spine, and was discouraged by bad results. His mistake was in using the current too strong, or in having the bad luck, to which all of us are liable, of getting hold of temperaments for which electricity is contra-indicated. With just and proper caution, central galvanization can be used on the aged invalid, or on the infant in its mother's arms.

We may here remark that the use of electricity in the form of general faradization and central galvanization as a powerful constitutional tonic in cases of hysteria, nervous exhaustion, insanity, chronic alcoholism, rheumatism, now so widely and increasingly in America, both among specialists and general practitioners, is but little known in England, and has but recently become appreciated even in Germany. The ideas and practices of the German school of electro-therapeutists come nearer to those of the Americans than those of any other country, and in time the two will be pretty nearly identical.

Dr. Althaus has considerably enlarged his chapters on electro-diagnosis, and has some remarks, valuable, though not to us entirely satisfactory, on insanity. In the section devoted to surgery, the ordinary method of electrolyzing malignant and non-malignant tumors is discussed, and illustrated by a variety of cases drawn from many sources. In this department, Dr. Althaus is a pioneer, for which he does not always receive credit. The method of working up the base is not referred to, and galvano-cautery is not so fully treated as we could wish. The chief defect in the electro-therapeutical portion of the work is in diseases of the skin. All he has to say on this subject is contained in a single sentence, in which he speaks of the successful experiments of Dr. Beard in the treatment of eczema, prurigo, and so forth.

This is true so far as it goes, but it hardly does justice to the subject. Some of the most interesting and brilliant results obtained by electricity are found in certain diseases of the skin, not only by central but by local treatment, and with both currents.

The work is provided with a good index, and we can earnestly commend it to all those who have not yet obtained it as more thoroughly up to the times than any other work on the subject now before the profession.

THE ELECTRO-CAUTERY IN UTERINE SURGERY. By JOHN BYRNE, M.D.  
Wm. Wood & Co. 1874.

In the special department of uterine galvano-cautery, Dr. Byrne has had larger and more successful experience than any other surgeon. He has not been content to rush blindly into the use of the galvano-cautery without preliminary study and experiment, but has sought to understand the physical principles on which galvano-cautery rests; and more than that, has

attempted, with success, to simplify and improve the apparatus required especially by the gynecologist.

The most recent form of apparatus that he has devised, and which is illustrated in the present work, is a marvel of compactness; and for a light, portable galvano-cautery, is far superior to any other. Those who make a large use of the galvano-cautery, like those who make a large use of galvanic and faradic electricity in medicine, will probably require, or, at least, find it convenient to have, two kinds of batteries, the stationary and the portable.

Portable galvano-cautery batteries have the same disadvantage as portable galvanic batteries for medical use; that is, they require frequent filling and cleaning, for the same reason that a small stove must be replenished with fuel oftener than a large one. This small battery of Dr. Byrne can, however, be emptied and filled without difficulty; the operation of charging it is a brief one for him who understands it, and in a protracted case the fluid could easily be changed during the operation.

Here we may remark that no one should attempt to use the galvano-cautery who is not willing to pay the price—that is, hard study and long experimenting, until the battery and its management become as familiar as the management of other surgical appliances.

The bane of this department, as of every other department of electrotherapeutics, medical and surgical, is the notion that it requires no brains. This notion is passing away with the evolution of science and the slow advance of civilization, but it has not utterly departed, and will not probably for many years. Of all the sciences, Electrology, in all its relations, is the most difficult; it calls for the highest and largest powers of the human mind. When fools recklessly enter it, with the rashness that only ignorance can inspire, they bring away little but the fruits of folly.

Those surgeons who have the requisite skill and general experience in operative surgery, and who will take the time and endure the toil necessary to acquire the principles and practice of galvano-cautery, will meet substantially with the results claimed in this treatise. Those who despise electro-physics, and are unwilling to experiment, and who suppose that the beginning and the end of galvano-cautery is to get a battery, will neither command success nor deserve it.

The question of the comparative advantages of cauterization in uterine surgery is one that professed gynecologists must determine; but if cauterization is to be employed at all, the galvano-cautery battery gives us the best means of generating and controlling the heat.

TREATMENT OF NERVOUS AND RHEUMATIC AFFECTIONS BY STATIC ELECTRICITY. By Dr. A. ARTHIUS. Translated from the French by J. H. Etheridge, M.D. Chicago: W. B. Keene, Cooke & Co. 1874.

We have read this book with much avidity, and we are compelled to say that it has disappointed us. We are glad, however, that the work is trans-

lated, for it may, perhaps, have this effect—to stimulate some young men of culture and genius to solve the problems that it suggests.

The incompetency of Dr. Arthius to write on medical electricity is shown in the following extract from the preface :

“Dynamic electricity (meaning the faradic and galvanic currents), as we shall show in this work, is often dangerous, rarely efficacious. The number of diseases it can cure is very limited. Produced by the chemical decomposition of metals attacked by powerful acids, it carries with it into the organism enough of their original elements to frequently cause great trouble. Nearly always, the patient dreads it, and receives it only with reluctance.”

The above sentences contain four radical errors. The ignorance of the author in the department of the history of electro-therapeutics is profound. He seems to have seen only the older works, and mostly those that appeared in the French language. Dynamical electricity is only dangerous when in the hands of dangerous men. The single accident that happened to Duchenne has never been repeated, although thousands of patients are daily treated by galvanization and faradization of the head.

The great question to be decided is this: Has static electricity any therapeutic advantage over faradic and galvanic electricity? This problem, Dr. Arthius does not, we are sorry to say, help us to solve—does not even point out the way of solving it. He states, but does not demonstrate. The fact is, that this use of static electricity, like the use of electric baths, can never be introduced into science until it is proved that it has sufficient therapeutic advantage over the various methods of faradization and galvanization to counterbalance the inconvenience that attends its use. Such a demonstration can only be made by one who is familiar with the whole subject of electro-therapeutics, and who, by long and intelligent experience in the application of this agent to diseases by the various methods, has become capable of making a just comparison between the effects of galvanism and faradism, and the effects of static electricity.

That the author of the present work, by his method of “fluid bath,” as he terms it—which is simply charging the patient, sitting on an insulated stool, from an ordinary frictional machine, by means of a metallic rod that touches his neck—does obtain sedative and tonic effects of a decided character, in a wide variety of diseases, we do not dispute. The only question is, can he relieve or cure where a skillful use of galvanism or faradism would fail? That question he does not answer. It is not enough to say that a patient has taken dynamic electricity from some one before trying static electricity. It is needful to state who made the application, and by what method.

It is not unreasonable to suppose that static electricity might relieve neuralgia better than dynamic electricity; we have long suspected that it might have some such advantage, but there is no demonstration of any such advantage in the present volume. The author claims as much as possible for static electricity, but he claims no more for it than is in this coun-

try every day obtained by the various methods of faradization and galvanization. It is the misfortune of Dr. Arthius to be familiar only with localized faradization, which, as we all know, is but the alphabet of electrotherapeutics. We wish that some specialist would take hold of this question of the differential therapeutical action of static and dynamic electricity, and submit it to some scientific tests, and, if possible, solve it for ever.

*The Chicago Journal of Nervous and Mental Disease.* Edited by Dr. J. S. JEWELL; Dr. H. M. BANNISTER, Associate Editor. Published at 57 Washington st., Chicago.

The first number of this journal appeared in February of the present year. The impression it gives at first sight is most favorable. The articles it contains, original and selected, are of great value, and are thoroughly up to the times. We wish the enterprise the best of good fortune. All who wish to keep up with the advance of neurology will find this journal a valuable assistance.

The second number for April more than fulfills the promise of the first. The effort of these enterprising physicians to establish a scientific and scholarly journal in this specialty is a noble and courageous one, and it should find abundant reward.

*The Sanitarian.* Edited by A. N. BELL, M.D. Published at 234 Broadway.

This most excellent and very much needed journal is now in its second year. The editor deserves great credit for the enthusiasm and energy displayed in starting and conducting this enterprise. The number of those in the profession who feel a strong interest in sanitary science is far too limited; but among these are some of our ablest intellects, some of whom have already contributed to the columns of the *Sanitarian*.

*The American Journal of Insanity.*

The youngest journal in the country to the oldest in an allied department—greeting!

*The American Journal of Insanity*, under the editorial charge of the officers of the Utica Insane Asylum, has been so long known to the profession that it needs no good words of ours. We call attention to it here because we feel that it is not sufficiently appreciated by the profession at large. Every number contains articles of value to neurologists in general, as well as to those who give their lives to the treatment of insanity. The officers of the Asylum have not been content to prepare official reports of the expenses and give the statistics of admission and departure, but are trying to improve their noble opportunity for pathological research and therapeutical experiment. We only wish some one of the assistants of that institution could have the time to make himself familiar with the electrical treatment, and could have the opportunity, undisturbed by other routine duties, to thoroughly test on a large scale the electro-therapeutics of insanity.

*Le Matériel de l'Electrothérapie—Galvanisation.*

*Théorie de la Pile Voltaïque d'Affections Douloureuses.*

*Les Aliénés et la Législation.*

*Application de l'Electricité à la Médecine et la Chirurgie.*

*Lesions de Form et de Situation de l'Utérus.*

The above are the titles of monographs sent to us by Dr. Tripier, of Paris. Dr. Tripier is one of the most laborious and successful of workers in the department of electro-therapeutics. All his writings are suggestive, and his larger treatise on medical electricity was at one time the most thorough work on the subject. Of the above-mentioned works, that on the application of electricity to diseases of the uterus seems to us of the highest interest and importance. Dr. Tripier has been at work in this special study for several years, and his researches have not received the attention they deserve. We hope to have an article from him on this subject in the next number of the ARCHIVES.



## EDITORIAL.

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THE project of establishing a journal specially devoted to Electrology and Neurology is not with us a recent conception. As far back as 1868, we had canvassed the subject, but it seemed to us that the profession were not yet prepared for it, and that if issued then it would be too far in advance of the needs of the time.

Every journal that professes to lead must, to a certain extent, educate its audience; it must train up a body of patrons who shall support it, and be in turn supported by it; but if started too early in the growth of a science, it may fail for lack of sympathy, and perish in its early infancy. The abler and the more scholarly it is, the greater its peril, for its supporters will be all the fewer, and the class whom it might influence will be so far below it that it can not reach them.

These three facts are now clear: *first*, that nervous diseases have increased with enormous rapidity during the past half century, and that, under the stimulus of the railway, the telegraph, and the printing-press, they are yet on the increase in all the great centres of civilization; *secondly*, that electricity, rightly used, is fast becoming known to scientists as the most potent of all remedies for nervous diseases; and, *thirdly*, that the study of electricity, in its relation to both medical and surgical disease, is evolving into a science at once complex, fruitful, and exacting.

While the number of exclusive specialists in Electrology or Neurology is yet quite limited, the number of those who are specially interested in these themes is already quite large, and is every year becoming greater. Only here and there can we find an electrologist or neurologist, and yet every physician who aspires to even a moderate position must strive to know something of nervous diseases, and every physician or surgeon not

wholly past the time for thought and action is contemplating with wonder if not with faith, the steady and rapid march of electro-therapeutics.

To meet the wants of both these classes—the specialist in these branches and the general practitioner who seeks to learn from the specialist—will be the aim of this journal. These two classes, falsely supposed to be antagonistic, it will introduce to each other, and, it is believed, for the good of both. That this end may be attained, we must ask, on the part of all, a certain forbearance. A part of the articles and selections in each number will be written by specialists and for specialists, and a part will be for the student and general practitioner. By this standard, let it be judged. The aim will be to have in every number a variety of papers to suit the wide variety of interests it represents. As no one man could prepare all the papers for a single number, so no one man can expect to be equally and specially interested in every paper; the table must be served, not for one guest, but for all.

A large number of the very ablest living authorities in the departments of Electrology and Neurology in America and Europe have already pledged themselves not only formally but enthusiastically to write for this journal; and some of these have already fulfilled their pledges in the present number, and others are even now at work on articles for the next issue. The best cerebral force of the world is now turned in the direction of Electrology and Neurology, and we are resolved that these pages shall have the benefit of it.

A number of professional friends, whose kindly feelings have been often shown, and for whose judgment we have not a little respect, have expressed the wish that the ARCHIVES might be a quarterly. Our reply has been simple and clear. We would rather grow than die. Better to begin as a semi-annual and rise to a quarterly, than begin as a quarterly and sink to nothing. Aside from the question of support, the materials for a journal of this kind are not rapidly gathered; elaborate and original researches are not made in a day, and can only be recorded by intervals.

The aim will be to make the ARCHIVES largely an organ of *original* experience and research; and only a limited portion

of the space will be given to gleanings from other journals. It will aspire to be an authority in the departments to which it is devoted, and hopes to become a permanent power in science. The task thus set before us is by no means easy; but in this world, nothing that is really good for any thing is easy. If this journal shall fulfill the hopes of its founder and friends, it will not be through chance, but because of the time, energy, and patience that shall be given to it.

Our experience in scientific literature, both of a general and a special character, will not allow us to expect that the entire human race will rush to the office of this journal and enroll themselves as its subscribers. We do, however, expect, and do frankly and earnestly request and urge, those who have at heart the interests of the sciences of Electrology and Neurology, who wish to raise these branches to that high position to which their great importance entitles them, and who seek to obtain and to impart scientific and practical information on these themes, to sustain this enterprise by their subscriptions, their contributions, and by their personal influence.

There is, we believe, no question that the advances which the science and art of medicine are to make during the next quarter of a century are to be very largely along the line of Electrology and Neurology; our purpose is to have this journal always at the head of the front column.

We here desire to express our earnest thanks for the letters of encouragement and sympathy, many of them unsolicited, and from those to whom we are personally strangers, that, since the first announcement of our enterprise, have from every quarter poured in upon us. If, amid the pressure of varied and complex duties, it has been physically impossible to reply to these kindly communications, the authors may yet be assured that their words of compliment and cheer are none the less appreciated. We trust that the journal may be worthy of their confidence and their hopes.



# ELECTRICAL INSTRUMENTS, FOR PHYSICIANS AND SURGEONS.

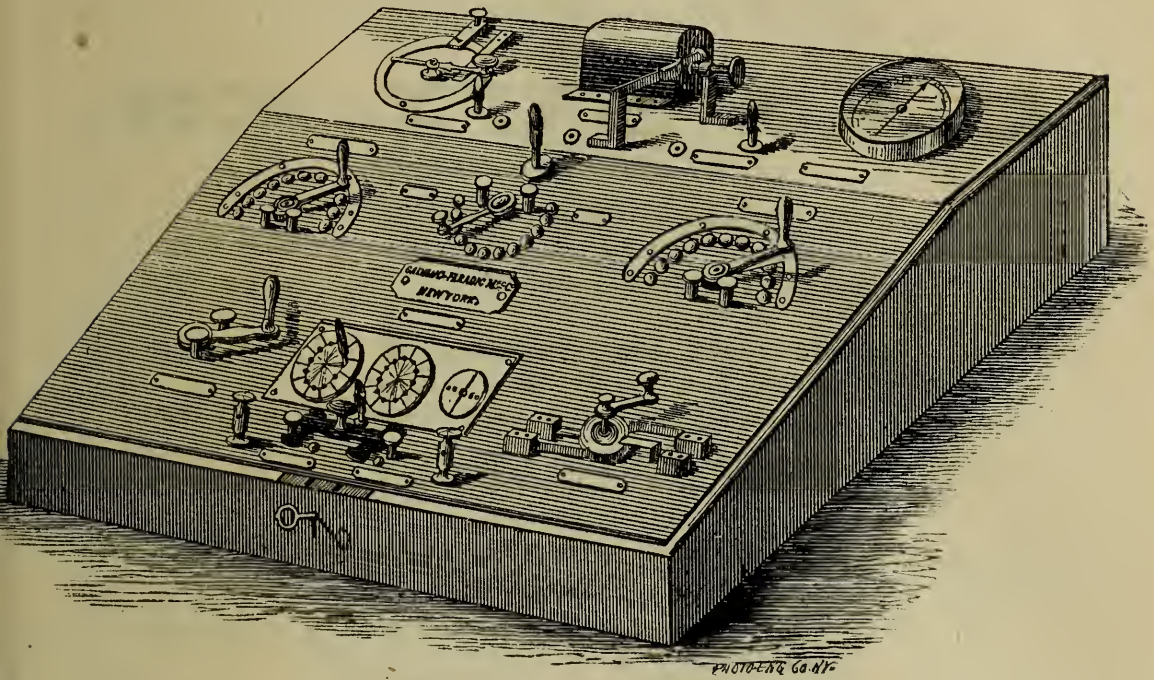


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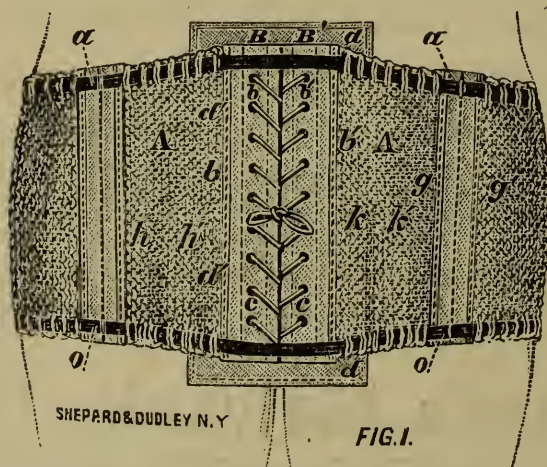
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# ARCHIVES

OF

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## ORIGINAL COMMUNICATIONS.

I.—*Disorders of Nutrition and Displacements of the Womb, and their Treatment by Faradization.* By DR. A. TRIPIER, of Paris.

A SOFT, movable organ, exposed on all sides to a variety of accidental pressures, is necessarily liable to displacements and deformations which are well known. I will not specify them here. Displacements and deformations bring on, at first, purely physical derangements which give way to mechanical treatment. The signs of such disorders have been at all times understood thus, and treated by purely mechanical means. It will be stated further on what physiological means I succeeded in substituting for this mechanical treatment.

On the other hand, the great vascularity of the womb, and the changes of circulation which its functions involve, occasion frequent disorders of nutrition, upon which I deem it necessary to enlarge in order to show how they were affected by the treatment to which I subjected them.

The old treatment of displacements neglected an important point of the question. They affected disorders occurring in the position and form of the womb, but, instead of relieving the disorders of nutrition which inevitably complicate these derangements, they aggravated them.

Now the causes and effects of these difficulties of nutrition, alternatively and according to circumstances, play so important a part in all ordinary diseases of the womb, that I think it necessary to dwell upon their immediate results, although I will spare the reader their remote and ordinary causes.

I will speak to-day only about the *simple disorders of nutrition of the womb*, those which are the immediate or future result of transient or chronic anomalies of the mechanical conditions of circulation.

It is useless to insist here upon the various causes of these circulatory anomalies; it will suffice to point out their direct mechanism.

In every tissue circulation consists of the in and out-flow of the blood. Let us suppose that the passages which facilitate the reflux are free, then the blood will flow out easily. The excessive afflux of the blood will bring on hyperemia, its insufficient afflux will result in local anemia. Let us suppose, now, that the return of the blood is obstructed through some functional or organic cause, which may be transient or chronic; in that case hyperemia will become congestion, and anemia is changed into stasis.

Congestion comprises one of the conditions of *inflammation*. Suppose that the others do not exist; in that case the congestion would be of short duration, and its immediate results would differ from those of stasis; its distant results will be the same, only intensified. These consequences are the flowing of a plastic fluid among the organs specified, which after a time will become organized.

In my first work upon the question which is the subject of my present article, I called this condition by the name of *Conjunctive Hyperplasia*.\* I wish thereby to do away with unimportant but accredited objections which have been raised by the name of *obstruction*, applied to ordinary disorders of nutrition of the womb. But this vague expression, *obstruction*, is decidedly preferable to a more definite term, to specify a condition of which the character varies according to its duration.

We may indeed class under this head the series of anomalous

\* *Conjunctive Hyperplasia of Contractile Organs in the Treatment of Obstructions and Displacements of the Womb, and Prostatic Hypertrophia.*

conditions of nutrition comprised between *recent congestion* and *chronic stasis*, conditions which time will aggravate and change into each other, not arbitrarily, but according to a fixed process.

Finally, the confusion which might arise from the reunion of all these different phases of the same disease under one title, is justifiable when from pathogeny we pass to therapeutics; in fact, *chronic stasis* and *recent congestion* yield to the same treatment.

*A priori*, two processes seem to clear an obstructed passage. The first is to produce anemia periodically and at short intervals; the other, to clear it by bringing on transient hyperemia.

I think it my duty to point out here the possible use of *local anemias* in cases of congestion, not because I would recommend them from personal experience, but because they are the representatives of physiological practices which have not yet entirely fallen into disuse.

Repeated local emissions of blood tend toward that end without attaining it. The congestion which is cured by the application of leeches to the womb, will very soon be followed by another congestion.

The most favorable result which might be obtained from local bleeding, and I do not think that this has ever been managed with sufficient skill to insure certain success, is to hasten the moment when *congestion* is changed into *stasis*.

But although local emissions of blood are impotent, we must not condemn all methods which claim to clear obstructions by means of repeated anemias. Continuous galvanization promises to attain this object, and there are other parts of the body, besides the womb, where it has been successful. If, then, I can not indorse the treatment of congestions or stasis of the womb by *anemiation*, it is at least a method which I wished to point out and set apart, being very willing to admit that it may cure *recent* obstructions, that is, congestive obstructions. It is, on the contrary, by producing transient hyperemias that I treat obstructions.

Having formerly made a trial of faradization in a case of encysted hydrocele of the cord, I noticed that the pulsations of the spermatic artery, which are imperceptible in the normal condition, became quite apparent during faradization, remained

clearly perceptible during the whole operation, and ceased directly it was over.

General faradization of any part of the body causes a hyperemia, which is limited, as to its duration, to the time during which the currents of induction are continued.

On the other hand, in the muscular organs the process of nutritive disassimilation is only performed during and through contraction.

To cause contractions is therefore a means of hastening languid nutrition, and of preventing and even removing obstruction.

Such are the reasons which justify the application of primary currents into the womb.

The object of the operation is to cause a transient hyperemia, which cures soonest and with most certainty stasis and even congestion.

The advantage of faradization over hydropathy consists in the precision and rapidity with which it accomplishes its object, producing with certainty and immediately a more abundant hyperemia, which can be arrested at pleasure and without fail, whilst the hyperemia produced by hydropathy requires more time, is only with difficulty contained within bounds, is impossible to maintain up to a proper degree for any time, is uncertain, does not always last long enough to produce the desired effect, or does not cease entirely, and thus results in congestion.

With the greatest prudence this accident can not always be averted when treating delicate subjects or with certain diatheses.

Finding in faradization a convenient means of producing uterine contractions, I sought then to localize these in one of the faces of the organ so as to avail myself of the isolated contractions of this face to straighten or bend in the opposite direction the displaced or bent womb. Thus have been remedied orthopedic troubles, produced by mechanical disorders, while obstruction was overcome by the greater activity given to processes of nutrition.

In a recent publication I discussed the question, which forms

\* Handbook of Electro-therapeutics, 1861, p. 283.



the subject of this article, with all the developments upon which an already long practice of faradization enabled me to enlarge. I will sum up here the operation and *modus operandi* contained in that memoir.

The electric or voltaic apparatuses of induction used in the treatment of disease, are all constructed on the same plan, notwithstanding their apparent variety. They all consist of two superposed spirals; the one giving extra currents of ordinary tension; the other, primary currents of great tension. The necessity of giving passage to the current of a weak motor in the wire of the helix of extra currents caused it to be made heavier and shorter than the wire of the inducing helix, and necessitated this construction of the apparatus.

Much has been said about the different properties of these two currents.

The difference between the physiological reactions which they produce depends necessarily upon the physical differences which they present. These consist in two points. Without taking into special account their intensity, which can always be graduated and kept within the desired limits by more or less convenient means always on hand, it will be understood at once that the extra currents and primary currents of the ordinary practice differ in *direction* and tension.

Whilst extra currents may have the same direction, the currents which are developed in the inductive coil have alternately reversed directions.

As to tension, the relative size and length of the wires of the two coils cause the extra currents, although in greater quantity, to have a weaker tension, whilst the currents of the inducing coil, though in lesser quantity, have always considerable strength.

Which of these differences, continuous or alternating direction, strong or weak tension, greater or less quantity, correspond to the differences observed in the reactions of organism subjected to the influence of extra or inducing currents?

To ascertain this I had a voltaic apparatus (an electric apparatus) made with movable helices, in which several helices, covered with wires of different sizes, could be used at pleasure either as secondary or as primary current, the various inducing

circuits being closed over batteries the electro-motive powers of which were in relation with their resistances. (See report made to the Academy of Sciences, 1860.)

I observed then that with almost equal tension and intensity the immediate effects of the currents on organism were the same, whether they were given in a continuous or alternately reversed direction. The more marked effect of the extra currents of the ordinary apparatus upon contractility must then be explained thus : whilst passing over the thick and short wire they had less tension but more quantity than the secondary currents developed over a long and fine wire.

Provided that wires of different sizes and lengths be used, the therapeutic effects might be obtained exclusively from secondary currents. The possibility of graduating gently, without jerk or break, from zero to any given maximum, currents which are developed in movable circuits, would be an inducement to use, for certain delicate applications, these currents to the exclusion of stationary helices.

In fact, when in any ordinary apparatus the central core of soft iron is entirely covered by the graduating copper tube, the currents preserve a minimum intensity insignificant when applied to the locomotive apparatus, to muscles and nerves, but sufficing to produce painful sensations in the beginning of most of the operations on the viscera. In order to lessen the minimum intensity, gradulators consisting of a column of water have been used.

As our experiments lead us to consider as quite immaterial, in a therapeutic point of view, whether the currents be continuous or reciprocating, and to attach great importance to the facility with which they can be graduated between the greatest limits, and to the intensity of the currents of any tension, I had made, for my own use, an apparatus on wheels, similar to that of Siemens, and having a set of bobbins with graduated resistances.

The graduation of the secondary currents is effected by the sliding of the coil in which they are produced ; this coil, independent of the primary current and the central core of soft iron, can be distant enough to give negative effects, and then be graduated so as to cover it completely.

The maximum intensity of the currents being the same as in stationary helices, the minimum may be zero, and the transition from zero to the maximum will be effected as gently as may be desired. A set of movable induced bobbins covered with wires of varied sizes and lengths, permits to modify the tension of the currents, according to the nature of the applications.

I had recently a portable model made of such an apparatus (Fig. 1). Without ceasing to operate with an independent pole, when it is permanently set up, it comprises for applications to be made at the house of patients, or on journeys, a battery of Gaiffe with chloride of silver, allowing no vapors to escape, and producing no moisture.

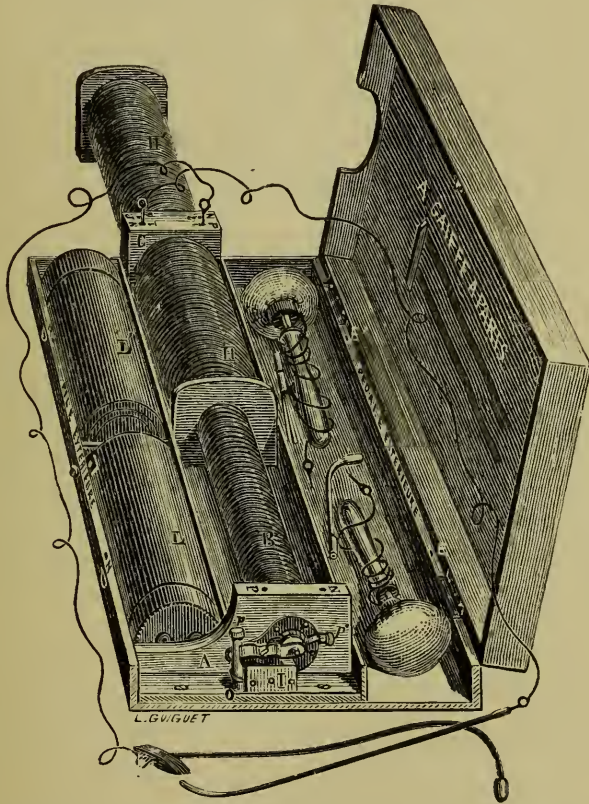


FIG. 1.—ELECTRO-VOLTAIC APPARATUS OF THE AUTHOR. L L, battery of two pairs with chloride of silver. When the apparatus is working with an independent pole, the electrodes are inserted into D D on the left side of the box. B, primary current attached to a cross-bar of wood. P N, polar extremities of the current.

I, breakpiece regulated by a jointed lever, *p*, which can be bent to *p'*. In *p* the current is open; in *p'* it is bent sufficiently to close the current over the vibrating spring.

H H', coils of secondary wire, wound upon the same cylinder on both sides of the block C, from which the currents which are developed on it can be taken.

P N pass the currents of the helix H with the heavy wire; by reversing the cylinder, P N pass the currents of the coil with fine wire.

The excitors, by means of which the applications are made, are intended to be carried into the rectum, into the bladder, into the cervical duct of the womb, or to be applied to the abdominal walls or the loins.

The *rectal* excitor consists in a metallic olive on an insulated mandrel, of which the curve reproduces as nearly as possible the concavity of the sacrum.

The *vesical* excitor is a strong probe of soft iron, covered with an insulating coating to within  $2\frac{1}{2}$  centimetres of the extremity. The metallic part, which is to be applied to the postero-inferior portion of the bladder, is slightly bent.

The *uterine* excitor consists in a more slender probe, also insulated. It is best to have two; one straight, the other curved toward the extremity. The first is more easily introduced in cases of *retroversion*, the second in those of *anteversion*. When the circuit is to be formed externally, buttons of carbon covered with moistened doeskin are used. Two of the processes of uterine faradization admit of much more numerous applications, and must be described: they are those which are applicable to cases where there exists anteversion or anteflexion, or retroversion or retroflexion.

*Recto-Uterine Faradization.* Fig. 2. Its object is to localize more particularly contractions in the posterior face of the womb, to remedy anteversions and anteflexions.

The patient being placed on her back, as if for the examination with the speculum, her seat extending a little beyond the chair, the curved uterine excitor is placed in the cervical duct of the womb.

The rectal excitor is then put in its place, its concavity downward. The olive is then caused to pass over the sphincter ani, pushing it then farther in and down toward the left.

When the olive has reached the bottom of the concavity of the sacrum, the probe is turned so that the top of the concavity of its curve looks upward, so as to bring the olive into juxtaposition with the posterior wall of the womb. The movement of rotation can not be effected without meeting with resistances which can be sometimes overcome easily, gently; sometimes abruptly, according to the impression which they give to the hand that directs the probe.

It seems as if the rotation would be easiest toward the left, but the arrangement of the intestinal walls is such that the fewest obstacles are generally encountered toward the right.

During this whole manœuvre, the extremity of the excitor,

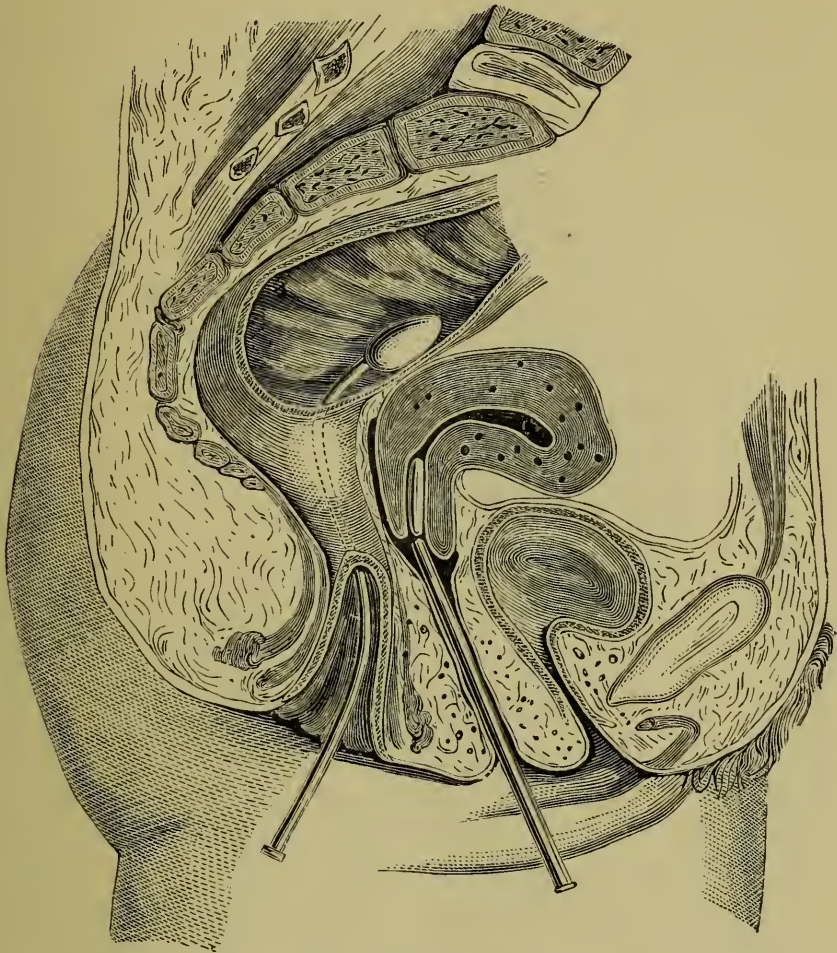


Fig. 2. Recto-uterine Faradization applied in cases of Anteflexion of the Womb.

in the right hand, must be maintained in as elevated a position as possible; it is only when the curve of the instrument has been brought into parallelism with that of the sacrum, that the hand will be lowered, while slightly pushing, so as to send the olive upward toward the wall of the womb.

However, it is only when faradization has commenced that this latter movement should be enforced, so as to give it all the force it ought to have to make sure of an efficacious contact.

The uterine excitor is put into communication with the negative reophore; the rectal excitor with the positive.

During the operation, the rectal excitor should be turned so as to bear more and more on the posterior wall of the womb.

One hand should at the same time slightly compress, with a downward motion, the hypogastric regions. The patient can be entrusted with this care.

*Vesico-Uterine Faradization.* Fig. 3. Its object is to localize contractions in the anterior face of the womb, to remedy retroversions or retroflexions.

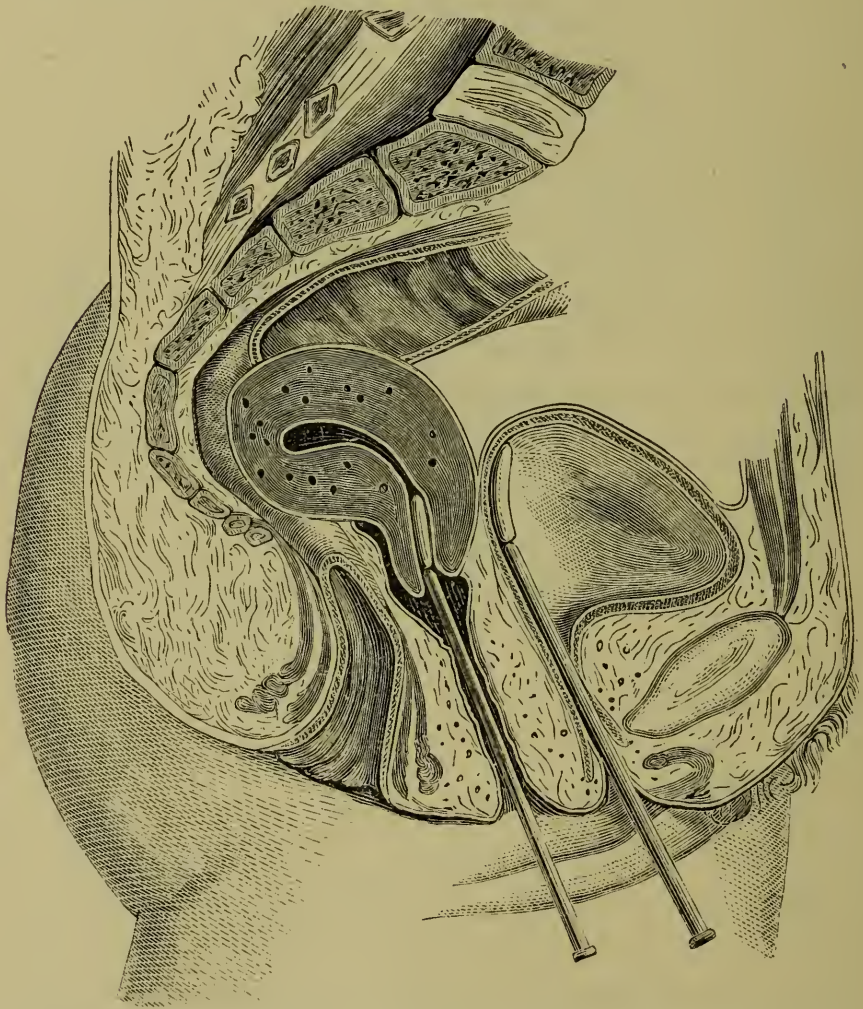


Fig. 3. Vesico-uterine Faradization applied in cases of Retroflexion of the Womb.

The patient lying on her back, as for the examination with the speculum, the straight negative uterine excitor is introduced, then the vesical positive excitor.

The vesical excitor is introduced exactly like an ordinary probe. At the moment when the operation commences, and at that moment only, the extremity held in the hand is raised so

as to bring the other one in contact with the anterior face of the womb.

These two processes are much more efficacious in cases of displacements, and I use them almost exclusively. Various difficulties (rectal hemorrhoids or vesicles, virginity, excessive nervousness on the part of the patient, etc.) have, however, led me to other means, which I should recommend, for the most part, as a "pis aller" (when you can't do any better).

In the simple obstruction of displacement, use *abdomino-uterine* or *sacro-uterine* faradization, by means of a probe introduced into the uterine duct, the circuit being formed on the abdomen by carbon buttons, or on the lower part of the loins by a rather large silver plate, covered with moistened doeskin.

Most physicians to whom I have shown uterine faradization content themselves with either of these processes, using them even in cases of displacements. A great number of comparative experiments have proved to me in the clearest manner that the results obtained thus are very inferior to those of faradization by means of two probes.

Very prompt results are also obtained, in cases of obstruction, by *recto-vesico-uterine* or by *recto-vesical* faradization. But for these two processes the help of an assistant is required. The second is applicable to virgins.

This is also the case with the *sacro-sus-pubic* faradization—positive button on the lower part of the loins, negative button on the pubis; it has often to be applied to young girls suffering from amenorrhœa.

I will only mention here the *abdomino-rectal* and *abdomino-vesical* processes, etc., which answer but very imperfectly, and can be allowed only on account of the obstacles which prevent a more rational treatment.

Among the processes which have rendered me some service, I will lastly point out:

1stly. *Bi-inguino-uterine* faradization, useful in cases of falling of the womb. It is effected by means of two positive inguinal buttons attached to a bifurcated reophore and a negative uterine probe.

2dly. *Bi-inguino-vaginal* and *vagino-uterine* faradization, in which the vaginal excitor is a solid speculum. These are very

useful in cases of laxity of the womb, especially with women who have had many children.

The pain caused by faradization of the womb is of two kinds. At the commencement of the operations the patients have a pricking sensation, which shows the influence exercised over their general sensibility; after a time, the length of which varies according to the degree of inertia of the organ, pains are felt in connection with the contractions; these pains are very different from the first, which they cover partly or even entirely, according to their force.

Women who have had children compare them usually to the first pangs of childbirth; seldom to the shock communicated to the womb by the movements of the fœtus during gestation. This last feeling is due, either to a slight deviation on the abdominal wall, or to some other accidental cause, and not to the contractions of the womb.

The pain caused by the contractions of the womb is not much minded; moreover, it ceases immediately after the operation, to give place to a feeling of relief and comfort, and a second operation is generally not much dreaded.

Although the diagnostic *metritis*, which is generally passed over too lightly, has seldom stopped me, I have never observed consecutive pains, attributable to faradization, nor any thing resembling an inflammatory process.

I have been obliged to reduce the duration of the operation to five, then three minutes. Of course, contraction must be obtained, but the muscular labor must not be continued so as to fatigue the patient. In each individual case, the feelings of the patient indicate at any time the progress that is made.

There are never any contractions at the very beginning of the operation. Until they appear, the intensity of the current is gradually increased, but in such a way as to produce a continuous current. As soon as the contractions commence, the intensity of the current is only increased at long intervals; but it must be kept up without being much augmented.

In cases of severe chronic obstructions, it is more difficult to obtain contractions. At the first operations, I sometimes obtained them only at the end of five minutes, or even more. During the following operations, they appeared sooner; on an



average, at the expiration of one minute. They are then continued for about two minutes.

At what time of the month is the treatment most efficacious? I prefer to commence the series of electrizations of each month on the fifth or sixth day after the cessation of the menses. It ought to be commenced sooner only in cases of necessity, and I continue them up to the following period.

During the first month, the operations ought to be, if possible, daily. During the following months, they must be less frequent, the interval being longer or shorter, according to the indications.

If it is a case of *version* without *flexion*, I perform, during the second month, three operations a week; during the third month, two a week, and then cease entirely, unless there are complications which necessitate longer treatment.

In cases of *flexion*, the treatment is longer, but the operations need not be as frequent. The healing of the uterine tissue on a level with the bent point is the condition on which depends the cure. But this can not heal rapidly; it requires so much the more time when the rupture is complete. It is useless, in that case, to hasten the straightening of the bent part. That is why the operations ought to be less frequent, but of longer duration.

It has often been said that pregnancy would cure a displacement. This is one of the phenomena, true in theory, but seldom met with in practice. However, as the thing is possible, and moreover as the womb, not fully reversed, is in a position favorable to the operator, I think it best to commence the cure as soon as possible after childbirth—that is, immediately.

Fever is, in general, a counter-indication of faradization.

I object positively to the wearing of pessaries or hypogastric belts.

Though I prefer that the patients, when resting, should assume a horizontal position instead of sitting down, I yet do not absolutely require it. I even persuade them to walk immediately after the operation. The general benefit which they derive from exercise is permanent, whilst the fatigue will soon pass off. If the fatigue should have been too great, the incon-

veniences which might follow it would disappear during the next operation.

One peculiarity, to which I would call the attention, is the increase of leucorrhœa or muco-purulent discharge after the first operations. It would be a mistake to consider this an increase of morbid secretions. This phenomenon can be explained by the greater facility of excretion. The womb, when obstructed, and more or less inert, empties with difficulty; when bent, the difficulty is still greater. Under the influence of the contractions, it empties its contents, and may continue to do so for some days. This discharge may be mistaken for an increase of catarrh; but this is not the case, for after a few operations, when the organ has somewhat recovered, the flowing diminishes considerably, without any special remedy being used to stop it.

The cure of displacements is less hopeful if there exist, as is often the case, adhesions which hold the womb in a wrong position.

When the obstinacy of a case of displacement indicates, after two or three months of treatment, that an obstacle of this nature exists, I do not persist, but am content with the relief already obtained through the cure of obstruction. This relief, with most patients, is equivalent to a cure.

The use of electricity, in the treatment of displacements and obstruction of the womb, is limited to the cases specified in this paper. In most cases, these means are sufficient. In some, however, it is well to add to them other agents, borrowed from the materia medica, or to have recourse to electric treatment of a different nature. But the difficulties which require these additional remedies arise from accidental complications.

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II.—*The Elements of Electro-Therapeutics.* A Series of Letters addressed to Inquiring Practitioners. By GEORGE M. BEARD, M.D.

MR. HAMERTON, in the introduction to his very suggestive work, "The Intellectual Life," says that he has chosen to put

his thoughts in the form of letters to various inquirers, although, as a matter of fact, precisely such inquiries had never been made of him, and he had never written precisely such letters.

In like manner, what I have to say of the elements of electro-therapeutics, I shall here present in the form of a series of letters in answer to inquirers, although I have never, in any letters I have written, ever used the precise language in the precise order here given.

From the beginning of my experiments in the realm of electro-therapeutics, I have been in the habit of receiving and answering many and various letters from practitioners at a distance, who have not the opportunity to take a course of private lessons, or even to have a personal interview with one who has given special attention to this branch of science. These letters have had a very wide range, from the simplest and most concrete questions of practice to the most abstruse and abstract theories of physics. They have also illustrated nearly every grade of culture and ignorance, in this special department at least; and if all that I have received could be collected, they would, I think, give a not very inaccurate panorama of the doubts and queries, skepticisms and beliefs of the profession in relation to practical electro-therapeutics, medical and surgical.

These letters have none of them been preserved, nor have the replies to the inquiries in them, and even if both letters and replies were all on file, I should not care to use them here. Sufficient for the present purpose that letters substantially like these I have been and am continually receiving, and replies substantially similar to those that will be given here I have been and am continually giving.

The advantages of the epistolary mode of giving information are its ease, its familiarity, its vivacity, and its freedom from the restraints of systematic treatises; for even the most gifted and cultured minds are oftentimes so constituted that they receive and retain truth when given in a desultory and rambling manner far better than when it is reduced to system and fortified by logic. The attempt to exhaust any subject is itself exhausting, and few there are who are not affected thereby.

The queries I shall imagine are mostly of a practical sort from practical physicians, and they will be answered in a practical manner; and as to questions of physics, the aim will be to show their practical bearings in the relief of pain and the cure of disease.

LETTER I.—TO A PHYSICIAN WHO WRITES TO KNOW WHAT DISEASES ELECTRICITY IS GOOD FOR.

DEAR SIR: You ask what diseases electricity is good for. This question is a very frequent one, and yet it is hardly fair; for it is impossible to answer it without going back of the question itself to a prior question—What is the *place of electricity in the materia medica*? If this question be rightly answered, then your question—what diseases is electricity good for?—will, in the minds of physicians who are familiar with diseases, answer itself.

If any one should ask you what quinine is good for, you would say that it is a tonic and anti-periodic, and is useful when tonics or anti-periodics are needed, and without reference to the name of the disease. You would say that quinine is not exactly a specific for any one disease, although it is, for most temperaments, the best single remedy we have for intermittent fever. You would further insist that it is indicated—individual idiosyncrasies excepted—in almost every conceivable form of debility. On the strength of these propositions you would declare that to give a list of all the diseases for which quinine had been successfully used, would be a waste of force and an insult to the intelligence of your correspondent.

Similarly I reply in regard to electricity. The action of electricity is far more complex than the action of quinine. I have been accustomed to define it in its medical relations (without reference to its use in surgery) as a *stimulating, sedative tonic*; for, according to the method in which it is used, it is capable of stimulating, sedative, or tonic effects. Its primary effect is stimulating; its secondary and permanent effects are tonic, and are to be classed with the effects that come from ocean and mountain air, sea-bathing, phosphorus, and active and passive exercise. These three orders of effects run into each other, and it is quite difficult in some cases to differentiate

them. But such differentiation is not usually necessary; for the majority of cases that need tonics also need sedatives, and there are many that need also stimulation.

The primary effect of an application of electricity is stimulation, and this effect is the one that is most apparent to superficial observation. Hence it is that, in the minds of many experts in localized electrization, the stimulating effects have, so to speak, veiled and overshadowed the sedative and tonic effects, and so they have fallen almost unconsciously into the very narrow and incorrect notion that electricity is a stimulus and nothing more. This error, which has widely prevailed in Europe, is still working much mischief to the cause of electro-therapeutics. The astonishment and skepticism with which the announcement I made in 1866 that electricity was a *tonic* was received is yet fresh in my mind, and those who were more or less experts in electro-therapeutics were the most skeptical.

The idea that electricity is capable of tonic and sedative effects, having fought its way like all new truths against ignorance and opposition, is now so widely received that it may be regarded as an accepted fact. It is formally stated by Althaus, in the third edition of his work, and, if I may judge from my own experience, is but rarely disputed in professional conversation.

Accepting, then, this truth, that electricity is a stimulating, sedative tonic, we have the general indications for the use of this agent in medicine. Wherever stimulating, sedative, or tonic effects are called for, there is the place for electricity. It matters little what name is given to the disease—it may be hysteria, or spinal irritation, or neuralgia, or chronic eczema, or paralysis, or rheumatism, or severe neurasthenia—the condition of the system is the one thing needful to know; the name of the disease is useful mainly for convenience of description, and in no sense as a guide to treatment.

True enough, there are some diseases that yield more readily to electrical treatment than others; but this difference is to be explained by the difference in pathological state more than by the names, for the names of diseases are but rarely derived from their real pathology.

Hence we see the advantage of a thorough knowledge of

diseases for the electro-therapeutist. He who knows most of the general pathological state from which symptoms flow, will be the most intelligent in the use of electricity.

LETTER II.—TO ONE WHO WISHES TO KNOW WHAT KIND OF A BATTERY HE OUGHT TO GET.

DEAR SIR: Your inquiry is perhaps the most frequent one that I am called upon to answer. The question of battery is at once the first to be asked, and of the least importance of all the questions that arise to the mind of an inquirer in electro-therapeutics.

I can best answer the query by an illustration. Suppose that, after long delay and deliberation, and without any previous experience in real-estate matters, I had at last decided to buy a house, and should write to you to ask you what kind of a house I had better buy. What would be your reply? I judge that if I were a stranger to you, your letter would read somewhat in this way:

I shall be most pleased to give you all the aid in my power in the selection and purchase of a house; but in order that my advice may be intelligent, it is needful for me to know more about your circumstances, your plans, and your tastes than I now do. A hut or a palace will answer for a residence, and between these two extremes there are all grades, to suit the many grades of poverty and wealth, of humility and ambition. There are houses for large families and houses for small families; houses for winter and for summer; they are made of brick, of wood, and of stone, and all are useful; all are more or less satisfactory as homes, though, of course, there is very much to choose between them, provided the question of expense is not considered. If you will have the goodness to tell me how much you intend to invest in a house, how large your family is, whether your taste is exacting or not, I may be able to give you suggestions that can be utilized by you in your selection.

In analogous strain, I reply to you in regard to the choice of a battery.

If you will tell whether you have had any experience with electricity, and how much you now intend to use it, whether mostly in medical or surgical cases, how much you are prepared to spend for a battery, and whether you want to use it in the office only, or out-doors as well—if you will enlighten me on these points, I can reply to your question with tolerable definiteness.

Times have greatly changed in the matter of batteries. It is now as difficult to get a very poor battery as formerly it was to get a very good one. If you shut up your eyes and go ahead, you will stumble on one that very likely suits well enough your purpose. The rivalry of instrument-makers is quite fierce, and it has, I am glad to say, redounded to the advantage of electro-therapeutics.

If you purchase a battery that suits you, you may very likely become attached to it, even though it be quite an ordinary affair—just as you may cherish a home that makes you happy, even though it be very humble.

It is better, in almost all cases, to begin with the simpler and not too expensive forms of batteries, and to work up by degrees into the more complex forms. You can add to your stock of batteries from year to year, if you enter deeply into this subject, just as, with an increasing family, you make from time to time additions to your house.

For my own part, I use a large variety of batteries, made by different manufacturers; in selecting which one to use in any case, I am governed by a variety of considerations, which may be brought up in subsequent correspondence.

It is a great comfort and convenience, and in some cases is indispensable, to have large, powerful, and more or less expensive batteries; but if your means are limited, or if you hesitate to invest largely in an experiment, I may say, for your consolation, that some of the very best results I have ever had have been obtained with feeble and inconvenient appliances. The most happy and useful people in this world are not always those who dwell in palaces. As a house can not make a man, so a battery can not make an electrologist.

Finally, I beg you to banish for ever from your mind the

notion that the beginning and the end of electro-therapeutics is to get a battery.

Much also in regard to the selection and care of batteries may be learned from our stoves and other contrivances for warming a house. If I were to ask you what kind of stove I ought to get, you would reply that every thing would depend on the special purpose in view. To send heat through all the rooms, some sort of furnace in the cellar is needed. To supply a large quantity of electricity for all the manifold uses of the office, a large battery is required. To heat a small bed-room, a fire-place is sufficient. To treat many cases that call for mild currents, a battery that gives but little electricity will answer.

If you buy a small stove, you do not expect it to keep a fire as long as a large stove, and you will replenish it oftener. If the fire in your range gets low, you do not always make up a new fire, but you open the draft and put on more fuel; if your battery is weak, you can increase its strength without entirely refilling it, by simply pouring in (through a funnel) more of the exciting liquid.

If the weather is cold, and you need the greatest possible amount of heat, you order all the ashes taken out, the stove well cleaned, and a fresh fire to be made; if an important electrolytic operation is to be performed, you pour out the old fluid of the battery, clean the plates, and put in entirely new fluid.

The modern theory—which is simple and clear, even if it is not demonstrable—reduces light, heat, and electricity to mere molecular motion; forms of force that obey the same general laws, very closely related to and liable to be transformed into each other. All our stoves and lamps probably generate more or less electricity as well as heat and light, and it is certain that our batteries generate heat with their electricity.

Batteries, like stoves and lamps, are simply contrivances for generating force, and all force represents molecular change.

It is as impossible to get a battery that will run for ever without care or cleaning, as it is to get a stove or lamp that will for ever give light and heat without shaking down the ashes, trimming the wick, and at proper times putting in a fresh and liberal supply of oil or coal.



LETTER III.—TO A PRACTITIONER WHO HAS A VERY OBSTINATE CASE OF CHOREA, AND WISHES TO KNOW WHETHER ELECTRICITY WILL BE GOOD FOR IT.

DEAR DOCTOR: You say that you have a case of chorea in a little girl that is awfully rebellious; you have hurled all the well-known drugs at her—as zinc, iron, arsenic, phosphorus, and the like; you have frozen her spine with ether-spray; you have prescribed rest, and you have prescribed exercise by turns, and yet the poor child shakes and shakes as bad as ever.

You ask whether electricity offers any hope. I reply that electricity offers no hope for any disease; electricity never yet cured a patient, and probably it never will. By proper and varied applications of electricity at the hands of the practiced physician, or under his direction, and sometimes, also, at the hands of the purest empiric, diseases have been and are relieved and cured, and chorea among them. But electricity is a dumb force of measureless power for harm or good, according to the way in which it is used.

When cases of long-standing and obstinate chorea are treated by central galvanization, galvanization of the spine, and general faradization with mild currents and short applications, carefully and faithfully, they will almost always recover in the course of a few weeks.

Sometimes the improvement is very slow, and the friends of the patient wax disheartened; then suddenly, perchance, improvement begins, and goes on to recovery. Sometimes, again, there is very little improvement for a month or six weeks, and then, after the treatment is abandoned, rapid recovery takes place. Observe that I am here speaking of the more obstinate forms of chorea, that have for weeks and months held out against the seductions of arsenic and iron; the lighter and briefer forms may, as you well know, recover in five or six weeks.

Local faradization of the shaking limbs will not accomplish much in chorea; hence it is that those who have restricted themselves to this method, have expressed the opinion that electricity is of no value in chorea.

The disease is central, and needs central and general treatment.

LETTER IV.—TO ONE WHO ASKS WHETHER IT IS RIGHT TO USE INTERNAL MEDICATION AT THE SAME TIME WITH ELECTRICAL TREATMENT.

DEAR DOCTOR: Certainly. Why not? Electricity is a force, not a drug. It is given outside, while medicines are given inside. When an electric current goes through the body, it leaves no substance in its track; it simply changes the molecular arrangement of the tissues, and the powerful and varied stimulating, sedative, and tonic effects of electrical applications are the result of these molecular changes. Electrical treatment is therefore fully compatible, not only with internal medication, but also with any other form of outward application.

But more than this is true; electrical treatment is greatly aided by internal treatment, and *vice versa*. Better relief and cure follow the combined use of internal and external tonic medication, than from their use in succession.

For how, I ask, would you go to work to get a stump out of the ground? Would you hitch up a single horse and let him pull without stirring it until he was all tired out, and then take him off and hitch on another until he in turn was used up, and so on until all your horses were panting in the stable, while your stump was as firm in the ground as ever? Would you not rather hitch on three or four horses at once, and make them pull at once, with a long pull, a hard pull, and a pull all together, until the stump was hauled clear out?

Just so should you wish to raise an exhausted nervous system. It is oftentimes a waste of force to try the various tonic remedies *in succession*, for each one fails, leaving the patient as deeply sunk in weakness and despondency as ever. But join together zinc and phosphorus, hygiene and electricity, and let them pull together, and your patient may be rapidly brought out.

Electricity works in harmony with all other tonic and up-building influences. Your iron and your phosphorus, your cod-liver oil and your arsenic, may all fail when used alone, but when electricity is added, the work may be done.

(To be continued.)

III.—*The Effects of Lightning-Stroke on the Nervous System*  
By BYRON W. MUNSON, M.D., of Amity, Ct.

THE summer of 1870 was remarkable for prolonged drought, and, when rain did come, there were terrific thunder-showers, the electric discharges being more vivid and destructive than in the memory of the proverbial "oldest inhabitant."

Unfortunately for myself, I was one of the first to be shocked by the aerial batteries, and therefore will relate the case first. I may premise by stating that my physique is first-class, readily recovering from many severe trials. The nervous system is best illustrated by the remark of a person who was present during the first surgical operation I ever witnessed (I was fifteen years of age): "Nerves! he haint got any."

During the afternoon of August 4th, 1870, while making some slight repairs to my carriage-top, the first shower of the season came up; being quite occupied, I did not, as I usually do, watch the events of the electric phenomena. Suddenly, however, I was conscious of the explosion of a luminous body immediately in front of and between my feet, which happened at the time to be separated a foot or more, and felt myself falling. A thought, "There! my pistol by some means has exploded, and the bullet has passed through the abdomen and spinal column"—followed instanter by remembering where the pistol was, in the house, and simultaneously by "I'm struck by lightning and am not killed." By this time I was upon the ground, exerting a considerable will. I turned over and proceeded to get up; in doing so, I noticed a small board performing rather eccentric movements for a board of its size; also that my legs wished to get up before the rest of my person did. Attempts at locomotion developed a tendency of said legs to emulate the hinder extremities of the genus *Ranæ*, and came near propelling me through space in an undignified manner. I was conscious at this time of burning sensations in the lower bowels and extremities, and that the flexor muscles were prone to contract, requiring considerable will-power to keep them from so doing. On entering the house my wife informed me that I was pale, and that the explosion was awful, and the yard full of sparks; she had not dared to look out, fearing she should see my corpse,

etc. Removing my clothing, I found the plantar surface of the left foot blistered for about one third of its extent ; the right foot, very much redness and some swelling ; a track from the internal malleoli to the pubes, convergent upon lower border of the hypogastric region, the track preserving no uniformity in its width, but fully as broad as my hand in the thighs, and under each pocket still wider (in one pocket was a rubber and gold compound pen and pencil, and in the other a rubber-cased cork-screw).

The redness was very similar to that produced by sinapisms, but the pain was greater. There was no treatment, for in a few days the redness and pain disappeared.

Investigation showed the track of the bolt was from the vane-staff, which it splintered, diagonally through the side of the loft of the carriage-house, into the loft, through the floor, down by the side (despising all the iron-work) of the carriage-top, between the hinder wheel and side, through the "reach-braces," to the point of explosion or dissipation. The board whose eccentric movements I have spoken of was the vane ; it was mounted upon a wooden staff by means of an iron spindle, and had for a pointer a large spike, and was about eighteen feet from the ground. The time of the whole affair, until I regained my feet, can be easily inferred ; it was not many seconds.

The first after-effect, I think, was debility, nervous and muscular. I noticed that I could not endure an amount of work without great fatigue, that previously I should have scorned the idea of its having any effect upon my muscular system. The next thunder-shower that came up, I felt an unaccountable timidity that was utterly disgusting to myself. I had to force myself into an exposure to the shower. This cowardice continued for some time, but when the spring showers (1871) came, the fear of the lightning had gone. Other nervous symptoms not so evanescent were, insomnia, inability to prolonged mental labor (study), loss of appetite (?), irritability—in short, nervous prostration. The effect upon the nervous system easily explains the muscular derangement. In this condition, or rather this condition progressing, I continued until May, 1872, when, other things conspiring with this, I was forced to give up active practice, and retired to the hills of Connecticut, where I engaged in hunting,

fishing, farming, and a limited practice. I made a study of regular habits, a simple diet (consisting largely of milk), active and prolonged exercise in the pure air, and the result of this course, followed for a couple of years, has been most gratifying. I have in a shooting gallery scored 119 points in a possible 120, which speaks for itself for the nervousness. I can study without going to sleep, or that excessive mental fatigue experienced for the period of nearly three years. In fact, I am myself again.

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Other cases that I have seen presented the same general characteristics. At the instant of receiving the injury some were rendered unconscious. Those who were unconscious, invariably presented a dark-blue, smoky appearance of the skin, and were usually brought to by a pailful of cold water as a douche. The ulterior effects were like those of my own case, more or less in degree. In some, nausea is excited by an approaching thunderstorm, others have vomiting, micturition, diarrhœa. Some (females) have experienced various generative functional disturbances affecting menstruation diversely. "I was regular as a clock," or "I used to have no settled time until I got hurt by the lightning," is the usual reply to questions directed to such patients.

One male patient, who had severe pains in the leg whenever a storm arose, was present at a time when I was using the battery on another patient, and as his leg pained him badly, he wished me to try the battery upon it, "to either take some of the c——d lightning out of it, or else put more in." Actuated by a mischievous desire to see him hop, I gave him nearly the full strength of the battery, and succeeded admirably. A few days thereafter, happening to meet him, I was told that that leg was "just as warm as the other one, and hadn't ached a bit." Nor has it since (some six months).

[The above cases are of special interest as illustrating a temporary and traumatic form of the disease to which we have elsewhere given the name *astraphobia*, or fear of lightning.—ED.]

IV.—*Cases of Hydrocele. Recovery under Electrolytic and Galvano-caustic Treatment.* By T. F. FRANK, M.D., Titusville, Pa.

UNDER this head I will relate a few cases of hydrocele, out of a number which have come under my care during a period of four years, the time of my residence in this city, with the confession that I possessed no data, when I undertook the first operation, as to an established superiority of electrolytic treatment in such cases over the ordinary surgical methods employed, except successful results of the former in the dissolution of other tumors.

*Case 1.*—J. D. P., Sr., of Rauseville, Pa., aged 65 years, applied to me, June 15th, 1871, for the treatment of a left hydrocele. The tumor was of enormous size, extending along the cord to the inguinal canal, and of such circumference that walking, and even a sitting position, was accompanied with a great deal of discomfort to the patient. He had been operated upon some time previous to his visit to my office by Dr. Biger, of Cleveland, O., for a radical cure by the ordinary methods, with stimulating injections, but without success, and he now desired to be treated by electrolysis.

This practice was comparatively new and little thought of by surgeons in this section, and much skepticism was exhibited as to any good results from such an operation in the case of Mr. P., and attempts were even made to frighten him lest he should lose his testicle if not his life.

Under such circumstances, and with the opposition I met in the adoption of my treatment, it was natural to show some hesitation, and when I finally undertook the operation, a degree of timidity prevailed on my part; for on its favorable issue depended a good deal of my future success in practice.

The old gentleman being self-reliant, finally urged the operation, 'despite any contingency, and I made the first attempt July 2d, 1871. A pair of platinum needles, insulated to within half an inch from their points, and connected with the positive pole of a galvanic battery, were introduced into the tumor, and the sponge-covered negative placed over the groin. For reasons heretofore explained, I brought only such current-

intensity to bear during this operation as I felt sure would do no harm, if no good. Ten cells produced a burning sensation under the negative pole, the positive remaining inoffensive. After twenty minutes' time the needles were withdrawn and the operation ended.

In two weeks, thereafter the patient presented himself with an apparently normal testicle, and stated that the fluid from the sac had gradually been absorbed by the system, none having escaped through the needle-punctures, and that he felt sure of a cure from this operation.

No interference being required after such result, I advised a few days' delay for developments, requiring an occasional visit to my office.

He remained free from annoyance, and no fluid accumulated in the sac up to August 15th; but shortly thereafter a slight enlargement became perceptible, which rapidly increased, till October 4th, when it had reached its former size. Without delay I operated again, and in the same manner as before described, and with the same results, save that the fluid returned in a shorter time than formerly.

Fifteen attempts had been made during a period of six months (as on the two former occasions), and sometimes the fluid would disappear, while at others it dribbled away through the needle-punctures.

*April 1st, 1872.*—Patient was annoyed by the size of the tumor and the chafing it produced upon the neighboring tissues, and expressed a desire to try a more heroic plan for the next operation. All other preparations being equal, as upon former operations, two non-insulated gold needles connected with the positive pole of a galvanic battery were inserted into the tumor, and the current-tension gradually increased till twenty cells were in action. This caused considerable pain through the tumor and to the back, with a burning sensation under the negative at the groin, but he endured it during half an hour.

I saw him about four hours after the operation, when nothing unpleasant had occurred.

The next day I was telegraphed to visit the patient at Rauseville, and upon my arrival found the tumor hard and painful,

without fluctuation in any part of it, and the needle-punctures looked as when charred by the actual cautery.

Dr. Follett of that place had already employed the necessary means to control inflammation, and nothing remained for me but request the continuance of his treatment.

Upon a second visit a week later, I found the patient much improved. The tumor was only half its former size, and somewhat yielding to pressure, without great pain, and general appearances promised a favorable issue.

In the fall of 1872, I met Mr. P. in New-York city, and examined him with Dr. A. D. Rockwell, and found the parts in question with no indication of a return to former difficulties.

The gentleman now resides in Jamestown, N. Y., where I saw him September 5th, 1874, in the enjoyment of good health.

*Case 2.*—Wm. S., aged 34 years, a resident of Alleghany County, N. Y., called upon me September 14th, 1872, for the treatment of a hydrocele on his right side. It had been twice unsuccessfully operated upon for a radical cure by his family physician, and the patient was determined to try electrolysis, of which he had some favorable impression.

Being previously informed by him that his stay in this city could not be of long duration, I at once resolved upon my course of treatment.

I anæsthetized him by ether, and then inserted, by means of a curved needle through the scrotum and tunica vaginalis, and out again through the same tissues, a thin platinum wire so that the points of insertion and exit came about half an inch apart, and secured the wire-ends by means of a loopholder to a cautery battery. I next inserted two platinum needles, insulated to within a short distance of their points, and connected one with the positive and the other with the negative pole of a newly-charged intensity zinc and carbon battery, into the fluid of the sac, about one inch apart from each other, and allowed thirty cells to act during ten minutes. Immediately after the withdrawal of the needles and the partial evacuation of the fluid by means of a trocar and canula, I cut with the platinum wire, made hot by the cautery battery, through the



intervening portion of tissue. The balance of the fluid escaped through this opening; no coagulation having taken place from electrolysis.

After the recovery from the anæsthetic, I ordered the patient to remain quiet at his hotel, and wait for results. I saw him occasionally during five days after the operation, and at no time did he complain of more than a slight pain at the seat of the cut and along the cord, and the testicle was somewhat tender to the touch.

He left the sixth day after the operation for his home, and when last heard from, in December, 1873, had had no return of the hydrocele.

*Case 3.*—Alfred M., aged 22 years, by occupation a machinist in one of the manufacturing establishments in this city, consulted me November 12th, 1872. He had a hydrocele of his left testicle. The fluid had been drawn at different times for temporary relief. Its return now so soon followed the evacuation, he could not work at his trade, and I determined to operate for radical cure with electrolysis and galvano-cautery.

When the ether was presented to him, his courage failed, and I deferred the operation.

*November 14th.*—He returned more determined, and I anæsthetized him at once. The operation was conducted precisely as in Case 2, and resulted equally favorably. He went to work the next day after the operation, and to this date, September 21st, 1874, has experienced no return of the enlargement.

I have operated a few times during the past two years in other cases, without inconvenience to the patients, but have not been able to ascertain the results, as all were cases out of the city.

Whether the additional excitation of the membranes by the cautery to electrolysis will prove an essential feature for the cure of hydrocele, I am not prepared to assert. It has done remarkably well in the two cases above reported, and as the majority of my patients come from a distance, I am justified in adopting any measure which promises the desired effect from the first operation.

Drs. Geo. M. Beard and Robert Newman, of New-York, had assured me that in some cases they succeed equally well with electrolysis alone.

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V.—*Municipal Law, and its Relations to the Constitution of Man.* By R. S. GUERNSEY, Counselor-at-Law, New-York City.

POSITIVE local municipal law is in itself an object merely of peculiar obligation and concern, and in its immediate application is a matter of confined and limited interest. But there is a general jurisprudence which has no local boundary, and as the administration of government and law is, as Blackstone says, greatly assisted by the other sciences, an extensive and familiar acquaintance with the general jurisprudence, institutions, and history of other countries must be had before an accurate distinction can be drawn between these great and fundamental principles which, being deduced from the general nature of man, will be found to be diffused over all mankind, and are not subject to substantial alteration by any change of time or place, and with respect to which there is, as Sir William Jones says, “a striking uniformity among all nations, whatever seas or mountains may separate them, or how many ages soever may have elapsed between the periods of their existence.” Laws grow out of man’s nature, and hence develop by friction and experience, which arise by contact with each other, and also in relation to external objects. We will by observation find that there is a geographical distribution of law as well as of animals and plants. This distribution is caused by the variation of the wants and impulses of the physical, mental, and moral nature of man, and by the density of population, occupation, etc., and all of them are affected by the geographical location, climate, soil, face of the country and productions of those inhabitants who make or influence the enforcement of municipal laws. Statute law may be considered as the reflection of the aggregate of men (a community or government) of the nature and the wants and needs of its parts, and its growth and use is a struggle for a harmonious adjustment of internal

relations to external relations. It may be said of laws, as of constitutions of governments, that they grow but are not made. All the laws of any one municipal system taken together appear to be more of an *art* than a *science*, but when viewed relatively to each other they will show themselves to be based upon scientific foundations, dependent upon facts and their relations to each other.

As to what laws are common to [all mankind, can only be accurately determined by comparative jurisprudence—by selecting and classifying those which are common to all nations, ancient and modern, under any and all circumstances of history, in all climates, and of every race of men. This is the proper mode of ascertaining what the law is when viewed as a science.

There are in the world now about six hundred separate legislative bodies or sources of statute law, being more now than at any previous period in the history of the world. All these laws have the elements of human nature in them. After deducting from all of them that which particularly concerns the manners of the people, their constitution of government, and their forms of procedure, there will remain the real principles of justice and injustice as applied to the various actions and relations necessarily arising in the intercourse of man, and upon which the foundations of human society must rest.

Municipal laws relate to the casual varieties of circumstances as well as to the permanent attributes of the human character, and are evolved from both of them, and consequently may be as various as the wills, fancies, and prejudices of those who enact them. But “the great system of jurisprudence, like that of the universe,” says Sir William Jones, “consists of many subordinate systems, all of which are connected by nice links and beautiful dependencies; and each of them, as I have fully persuaded myself, is reducible to a few plain elements.” The moral sense within us, however perverted it may be, is the origin of all law, and every government that has existed was instituted for the purpose of securing the real or imaginary rights of individuals. All municipal laws prescribe what is right and prohibit that which is wrong. All rights are divided into rights of persons and rights of property, and all wrongs are either public or private. Remedies are for the protection or

enforcement of a right, or for the prevention or redress of a wrong. Punishment is for the prevention of wrong, and is thus distinguished from redress. Procedure is the means by which remedies are obtained and punishment meted out. All of these exist in principle wherever there is municipal law. The only difference in the laws of civilized and savage nations, in ancient and in modern times, is the variety and extent of the details of these principles according to the *idea of the law-making power as to what is right and what is wrong!* Civilized nations omit from their laws that which is purely religious, and only adopt the moral principle so far as it is deemed necessary to protect the rights of persons and to preserve the community—the latter being considered as belonging to the rights of persons and the rights of property, for without it neither would be preserved. This is the science of government, and the ideal of civil and political liberty. Blackstone says: “That constitution or frame of government, that system of laws is alone calculated to maintain civil liberty which leaves the subject entire master of his own conduct, except in those points wherein the public good requires some direction or restraint.” Religious freedom must be consistent with this. The utilitarian maxim of civil liberty is “the greatest good to the greatest number.” When, for any reason, a law is enacted, and it is too odious to be enforced, or is deemed impracticable by the community, it is either repealed or annulled by non-user; and when a law is required by the wants or necessity of the community, it is either enacted by statute or adopted by custom, and upon this judicial decisions are founded, and thus laws grow in accordance to the manners and customs of a community. The two most notable examples to us of this rule are seen in the growth of the Roman civil law and the common and statute law of England; though similar in many respects, they are two of the most stupendous and wonderful systems of jurisprudence that can be conceived.

When the complete history of the common law is written, it will show that the many parts of it which are similar to the civil law, were not borrowed from it, but are of independent growth. The digests and codes of Justinian was the first attempt to reduce municipal law to a complete science, fully

adapted to the highest state of civilization in all its details, and it was eminently successful, and is a remarkable vindication that municipal law is a science. All the laws of Christian communities are founded upon one or the other of these two systems.

These laws and customs are or may be materially affected or changed by conquest, or by an inundation of foreign inhabitants or new ideas, and thus become differentiated.

The rules of "natural selection," and the "survival of the fittest," are, however, the main foundations of all municipal laws, however varied and inconsistent they may seem to a casual observer. But he who bestows on the subject the proper kind of consideration, to a somewhat comprehensive extent, will contemplate it as originating in the first principles of nature and society—that is, man collectively—ever modified by circumstances, yet ever constant to certain principles; ever changing its particular direction, yet never swerving from its general and inevitable objects—the happiness and protection of the community and its members.

There is a striking similarity in the prohibitory portion of the penal or criminal law of all nations, ancient and modern. This may be regarded as the natural moral law.

Morals are more intimately related to legislation than will at first view appear from modern law-makers. In all of the great religions that have had a marked influence upon the history and education of mankind, ancient and modern, will be found much which some modern Christian nations now regard as belonging only to legislation. Among these may be mentioned the marriage relations, and, in some instances, sanitary regulations. The latter is always found more or less as part of the religion of nations that inhabit torrid climates, and marriage still retains the religious *character* which it has from the beginning of history.

Max Müller says that the sacred books of the whole human race are founded upon and comprised in eight religions, to wit: Mosaism, Christianity, Mohammedanism, Brahmanism, Buddhism, Zoroastrianism, and the teachings of Laotze and Confucius; and in these (excepting Christianity, which was founded on

MOSAISM) we will find incorporated nearly all the municipal laws that mainly govern the people where the particular religion prevails. Ancient law derives its very life and force from religion. But modern municipal law is fast becoming distinct as a science, from religion as a faith or a sentiment. In many of the Oriental countries, their laws are still, as formerly, united with their religion.

Auguste Comte was mistaken, however, in asserting that *duty*, and not *right*, should be the starting-point of all municipal law, and *all* be defined and regulated by legislation. This is peculiar to ancient religions and laws, and is a restriction upon civil liberty. Rights are direct and indirect duties, defined, and necessarily made absolute by legislation, for the protection of the community; while duties, as such, are relative, and hence belong to religion, or the moral principle, and their explanation or enforcement should be left to the effects of civilization, and be defined by the religion of humanity, and be enforced by public opinion. Religious freedom should be consistent with civil liberty.

Christianity has more of the elements of a high type of humanity in it than any other religion; therefore it is the truest religion, and its principles have been and will therefore be progressively understood in the direction of the needs and requirements of humanity in its various relations, and its principles must therefore be regarded in the foundation of the municipal law of all civilized nations.

The Roman civil law undoubtedly reached the nearest to perfection for the highest state of civilization of which mankind, in a community, is capable of reaching, so far as it relates to man and his relations to his fellows, in "the protection or enforcement of a right, or for the prevention and redress of a wrong." As proof of this, its principles are now being more and more ingrafted into the municipal laws of all civilized nations.

All municipal laws relating to civil rights and wrongs are approaching, in substance and effect, those of the Roman civil law, which is nearly perfect, because it has been the longest maturing in the most civilized nations.

So long as mankind are being born into the world, so long

will there continue to be a variety of them in weakness and in strength. They lack experience and judgment, and consequently need direction and restraint, and will therefore require law and religion to regulate and protect them.

There always has been, and will always be, a continuous "irrepressible conflict" between the constitution of man and the external objects by which he is surrounded. His physical wants are almost as difficult to determine with exactness as those which belong to his mental or moral nature. The senses have their illusions not less than the intellect and the heart, and there is almost as much controversy about the useful and the hurtful as there is about the just and the unjust. The advance in civilization is tending toward the utilitarian hypothesis in law, hygiene, and religion.

I hope that, at some future day, I shall be better qualified and able to give a more luminous and extended view of this great subject.

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VI.—*The Influence of the Climate of Colorado on the Nervous System.* By CHARLES DENISON, M.D., Denver, Col.

TO THE EDITOR OF THE ARCHIVES OF ELECTROLOGY AND NEUROLOGY : In attempting to comply with your request, only lately received, I must explain that the field of investigation you propose for me is so new, and also, from a seeming conflict of data, so difficult, that the time to which I am limited is too short, even had I nothing else to engage my attention.

Besides, I confess to an ignorance of the subtle forces to be considered, which, perhaps, ought to preclude my attempting such an article as you desire for your estimable journal.

You have elsewhere very pertinently asked, "Shall we wait until our knowledge becomes absolute before we reveal it? Does it not rather become those of us who are seeking truth, as often as may be, to take account of stock of our discoveries? Is it not well now and then to take an inventory of our ignorance, and see how little we know?"\*

\* "Atmospheric Electricity and Ozone." Popular Science Monthly, Feb. 1, 1874.

As I would answer these questions in the affirmative, I will gladly try to contribute the *little* I can in answer to your queries, hoping at a later date to furnish the profession, and a large class of their patients (consumptives), more valuable information of this climate and its *peculiar adaptation* to the needs of special classes of invalids.

#### GENERAL NATURE OF THE CLIMATE OF COLORADO.

Colorado covers such a large and various area, including an unexplored region to the west, the Rocky Mountain range, about a hundred miles wide, running through the centre, and the broad plains to the east, that we wish to be understood as referring in this paper to a belt of land, say thirty miles wide, lying north and south, along the eastern base of the Rocky Mountains, and including the foot-hills, unless some other locality is specified.

This region is interesting, for much of it can be irrigated (which is almost a universal necessity out here) by the streams which flow down the mountain cañons. It is here the bulk of Colorado's population is, and may be expected to be.

This belt of land is about 6000 feet above sea-level at the north, a little more than 5000 at Denver, 8000 on the Divide, thirty miles south of Denver, and some less than 5000 at Pueblo, in the valley of the Arkansas river, over a hundred miles south of Denver, from which point the elevation gradually increases to 6000 feet at Trinidad.

Opening into this belt of land are rugged cañons, the only passes to parks and points of interest in the mountains.

These parks are extensive elevated plains, surrounded by lofty mountains, and interspersed with hills of no small dimensions for a less mountainous country.

The southernmost is the San Louis Park, which includes an extensive valley of the Rio Grande, at an average elevation of about 7500 feet, in which is the new town of Del Norte. The next to the north of this is South Park, with an average elevation of 9000 feet, in the west of which, beautifully nestled under the mountains, is the little town of Fairplay and several mining towns. Still farther to the north-west is a collection of



valleys called Middle Park, the streams of which are tributary to the Colorado, which finds its way to the Pacific.

The average elevation of this "Park" is 8500 feet.

In one of these valleys are some hot sulphur springs, which are of a temperature of from 110 to 116 degrees, and I judge will prove beneficial in eradicating constitutional taints of blood. North and east of this are North and Estes Parks, of nearly as great altitude, the latter noted for its rugged scenery.

The average elevation of the whole territory is about 6500 feet. The Rocky Mountain range, the backbone of the American continent, reaches its highest elevation in Central Colorado, the passes over it, both to the north and south of us, being lower and less difficult; while in this part of the territory they have an elevation of 11,000 to 13,000 feet, the peaks reaching from 13,500 to over 14,000 feet above sea-level.

The climate of these mountain regions compares unfavorably with that of the plains to the east during the colder portion of the year; while in summer, the cooler and bracing atmosphere of the mountains is a grateful relief to those who are enervated by the continuous warmth of the plains.

The soil of the plains along these mountain-slopes is a dry, sandy loam, the washings for centuries from the mountainous regions beyond. It is chiefly of an alkaline nature, and sometimes the deposit of alkali is considerable, affecting vegetation and drinking-water. The products of the soil, especially the cereals, are remarkable for their richness. The wheat of Colorado is unsurpassed.

The plains are covered with a short, fine, prairie grass, which cures as it grows. On this cattle feed all the year round and seem to thrive. There are no trees except on the banks of streams, on the Divide, or those cultivated by irrigation. The pine forests on the Divide are in pleasant contrast with the apparent barrenness of most of the region east of the mountains. In the mountains timber is abundant, especially yellow pine and spruce, which grow between the altitudes of eight and eleven thousand feet.

There are four remarkable features of this climate which distinguish it from the eastern part of the United States, and make it a most desirable change for certain classes of invalids.

These are its altitude, with the increased amount of atmospheric electricity and ozone due to the same, a large proportion of clear days, a small relative humidity of atmosphere, and a small annual rainfall. The wind does not blow here as much as one would expect in such a light, airy region. Usually before a storm, however, the mountain breezes swing down upon us in playful gusts, and at times the commotion is quite general, constituting a *wind*, or, more properly, a *dust* storm, which may last from one to five hours. There have been four of these ("right smart" ones, the Westerners would say) during the past year.

It is generally understood that a rise of about 300 feet in altitude gives one degree colder temperature. Did this rule hold strictly here, this climate would be colder than it is. Among other causes of a considerable difference (in our favor for the colder portions of the year) is chiefly to be mentioned our inland location, and the protection of the mountains on the west.

The average temperature of this immediate vicinity is about the same as that of New-York city, Southern Pennsylvania, Central Ohio, Indiana, and Illinois; but it does not seem so cold, because of the dryness of the air, the small amount of snow, and the usually sunny days. The nights, when people are indoors, are generally cold in winter, and during the rest of the year much cooler than the days. This diurnal variation, which is here about 15 degrees between the temperature at 2 P.M. and that at 7 A.M. or 9 P.M., increases with the altitude; as in this rarefied atmosphere the intensity of the sun's rays increases with each decided elevation, while the capacity of the air to retain the heat thus imparted proportionately decreases. So that, on the tops of our highest mountains, as a Signal Service observer on Pike's Peak informed me, the heat of the sun at midday is "almost scorching," while the thermometer after sundown is in the neighborhood of zero.

This climate, then, is only "the most equable of the Western Hemisphere" when compared with others *of the same altitude*. Let those who think an equable temperature is the all-important element of a healthy atmosphere, stay near the sea, where the air at night can hold fast its heat as well as its moisture. To such, the results of the experiment made by the own-

ers of the Mammoth Cave in Kentucky will prove useful. In the *equable temperature* of this dungeon they imagined was the panacea for the unfortunate consumptive, and the reputation of that *health-resort* would become world-renowned.

I shall never forget the dismal aspect of those cold stone houses, erected down in that abyss of darkness. Here, in this *extremely equable* climate, I was informed over a dozen unfortunate consumptives were domiciled. Of course they all suffered for it. One died in the cave, and four more within four weeks after they were brought out. It is strange how similarly foolish thousands of invalids (or their advisers) are throughout our land, who house themselves in dungeons of man's construction, pining away to consumptives' graves, when there is plenty of invigorating air and life-giving sunshine "lying around loose," if they will only go where it is.

The sunshine of this inland region is one of its greatest boons for the consumptive, too little appreciated by many who seek health among us.

No less important, especially to those whose respiratory organs are at fault, is altitude, which is here a happy medium for the majority of such patients, while the same may be easily varied to any desired elevation.

A most important element of a healthy climate is the relative humidity of its atmosphere. Indeed, from a somewhat extended study of the subject, my conviction is strengthened that this element is the most essential ingredient of the *consumptive's home*, since from a low ratio of humidity a large proportion of sunny days and a large amount of rainfall can be inferred; for had there been much rain or cloudy weather, the air would have been near "saturation," and the *relative humidity*, which is the percentage of saturation, would have been affected thereby.

In this connection, I must object to the extravagant statement some have made, that "the atmosphere is entirely free from humidity." We are not *quite* so badly off as that.

Such a report would not seem so ridiculous coming from south-western Arizona; but here, if the hydrometer ever indicates zero, *i.e.*, if there is not enough evaporation in the

air to affect it, it is only occasionally for two or three hours in the warmest and most enervating part of the day.

Below is a weather report for the past year, which has been kindly prepared for me by P. J. Huneke, U. S. Signal Officer, stationed at Denver.

	Maximum temperature.	Minimum temperature.	Average daily temperature.	Average daily humidity, per cent.	Total rainfall or snowfall, reduced to water.	Prevailing direction of wind.	Clear days, <i>i. e.</i> , number of days on which sunshine prevailed throughout.
1873, October.....	86°.0	1°	45°.2	51	0.73	S.	22
“ November...	71°.0	1°	40°.6	43	0.16	“	20
“ December...	59°.0	5°	22°.4	59	0.53	“	21
1874, January.....	62°.0	7°	31°.5	51	0.84	“	16
“ February.....	52°.0	9°	25°.1	61	0.53	“	18
“ March.....	62°.0	12°	36°.0	60	0.49	N. E.	19
“ April.....	83°.0	14°	43°.1	54	1.70	S.	17
“ May.....	92°.0	29°	62°.0	42	2.43	“	19
“ June... ..	98°.5	40°	70°.0	41	1.21	“	20
“ July.....	102°.0	51°	76°.1	42	3.35	“	18
“ August.....	96°.5	51°	73°.0	44	0.68	“	18
“ September...	92°.0	34°.6	59°.0	44	1.34	“	22
Monthly average..	79°.6	17°.55	48°.7	49.3	1.17	S.	19 $\frac{2}{3}$

This very accurate table speaks for itself. I will only add, that during September there were thirteen days in which not a cloud was seen in the sky. There are no regular dews, night-dampness, nor fogs in this climate, which fact greatly strengthens its claim as an excellent one for *out-door life*. This I consider is its pre-eminence.

#### THE IMMEDIATE EFFECTS OF THIS CLIMATE ON THE NERVOUS SYSTEM.

So various and complicated with organic disease are the nervous symptoms and idiosyncrasies of those who seek health in this resort, that the immediate influence of the climate on simply “nervous patients” can not be very positively stated. Much, however, may be inferred from the average experience of new-comers. This, of course, depends on the elevation first gained.

Suppose we take that of this vicinity, between five and six thousand feet above sea-level, and ask, How would a dose of

this atmosphere affect the inhabitants of your city? Let us compound the prescription.

Our air is about a fifth lighter than yours. Your pressure to the square inch is 15 lbs. ; ours about 12 lbs. Your nitrogen, at sea-level, weighs 414 grs. to the cubic foot of air, and ours 331 grs. at 5900 feet above sea-level. Say that oxygen here bears the same relation to nitrogen as with you (if our future experiments corroborate the analyses of our air made by Prof. Mallett, of the School of Mines at Golden, a small difference in our favor will be shown, *i.e.*, a little larger proportion of oxygen to nitrogen), then we are under the necessity of breathing one fifth more air here than you do, to get the same amount of oxygen. But this is not all. Scientists agree that the proportion of electricity in the atmosphere increases with altitude. Dr. Jarvis, of Portland, Ct., suspects it stands relatively to oxygen in something like an inverse ratio. However this may be, we shall most gladly receive any positive knowledge about this and that other poorly understood element of our atmosphere, "ozone," scientists or our government will furnish us. Any way, we must add one fifth more atmospheric electricity, on account of the increased amount of air to be breathed ; and then there is the *excess* ("positive electricity") which prevails in these dry regions. We ought, perhaps, to make some allowance for that. We must now attach some importance to that *something* in our atmosphere, call it ozone if you will, which is especially stimulating to the heart, brain, and nerves, on a bracing, cool morning, which, I fancy, in winter is irritant to mucous membranes, and perhaps will account for much of the catarrh our army surgeons have remarked as prevailing in cold weather at great elevations. Then lessen your relative humidity by about one third, and increase your proportion of sunny days by about the same amount, and you have our atmosphere at the base of the Rocky Mountains.

Now let every body in your city commence to breathe this atmospheric stimulant, and would you not expect a various as well as a remarkable effect?

You would conceive that the atmospheric pressure, lessened by one fifth, would ease the imperative necessity to breathe a

fifth more air to get a requisite of oxygen. You would expect this great change to call upon the heart for increased action. Respirations would be first faster and then fuller. The nervous system, alike stimulated, would sympathize in this general activity, unless a bewildered or dreamy state of mind should ensue, as is sometimes the case. With all this quickening of the processes of life, the calling of the blood into new parts, and the active capillary circulation resulting from the lessened atmospheric pressure, waste and repair of tissue would be both quickened and made more complete. The appetite and digestion would respond to this new call, and a fresher, quicker life be inaugurated. Then, with the electric influences combined, there would be an exhilaration akin to intoxication. Such, indeed, is often the first effect of this stimulating atmosphere. As a friend queerly expressed it, when we were out riding on a bracing and sunny December morning, "This light air makes me feel just as religion does a young convert." But all are not alike happily affected. While asthmatics rejoice in a liberty to breathe freely again, and incipient consumptives delight to expand their lungs with a soft and bracing air which gives them hope of a renewal of their tenure of life, the sudden change would prove too great for not a few. Among these are to be mentioned, those having any organic disease of the heart; those having advanced phthisis, after the stage of softening, or when the patient is deprived of more than a fourth of his breathing capacity; and patients with pulmonary lesions who are of a decided hemorrhagic diathesis.

These classes are mentioned here because the accompanying nervous symptoms are usually aggravated by decided and sudden change in elevation. For many, not enumerated above, a gradual rise should be recommended.

The most marked effect of this climate on the nervous system is the relief from asthma, which, I conceive, often takes place immediately through the mechanical influence of the lessened atmospheric pressure on the respiratory apparatus.

I think this is due to the mechanical effect of altitude, because, though this dry inland air, containing little vegetable matter, may have much to do with it, yet there seems to be a certain elevation for each individual sufferer where he experiences

marked relief from his distress. To the majority it is on the plains, while some first experience relief two to four thousand feet higher, in the mountains; and where there is more moisture and vegetation quite as abundant, the growth of forests being much more so. To illustrate, a young lady came to Denver, last summer, who had had asthma since she was two years old, but did not get relief here. Her parents thought to try the mountains, and on the way to Idaho her dyspnoea disappeared. During the several weeks she remained there, she was free from her trouble. On returning to this city, however, the old disease came back, and she suffered here as before. More instances might be given in illustration, especially of those who, having obtained relief here, undertake to return East only to get asthma again at the Missouri River.

Another immediate effect of the altitude in a few newcomers may be a slight congestive headache, on account of the increased rapidity of the circulation; though headaches generally are not so frequent here as in the East, especially "sick headaches." By these temporary headaches the mountain fever is not meant, though they are sometimes improperly so called. The true mountain fever is a later effect, and not so frequently met with. It is a continued fever, unless aborted in the beginning, having regular stages, but slow in its progress. There are chills and remissions, and generally associated with it some hepatic congestion. The headache and shock to the nervous system are sometimes considerable, though the prognosis is very much more favorable than in the typhoid of the East.

Generally speaking, I do not think the influence of this climate on nervous patients is salutary, unless their symptoms are associated with other dyscrasia which such a climate would benefit.

Those to whom an electrified atmosphere would be useful, who would be helped by the use of the positive electrode in the East, might look for benefit here; but nervous symptoms alone, due to an abnormal irritability, or over-excitation of any set of nerves, generally might be expected to be aggravated in this electric air. The case is different when those symptoms are dependent on some malnutrition which the change to this

invigorating climate will rectify. A marked change in elevation, as from the East to this country, has generally a salutary influence on that class of over-worked brains which, in the intensity of political, professional, and business life, is quite numerous nowadays.

Especially does this appear to me the case where, from too severe mental activity, the circular fibres of vessels within the cranium seem to have been overtaxed, and in consequence a passive congestion ensues. In these the influence of a lessened atmospheric pressure, *gradually increased*, is in such marked contrast with the effect of a much greater atmospheric pressure, as shown in the congestion of cerebro-spinal tissue, quite evident in the "caisson disease," that relief might be confidently expected. In this improvement, the lessened tension on the cerebral circulation is, of course, greatly aided by new scenes, out-door life, and absence as well as distance from harassing cares. From what has been written of the stimulating or electric nature of this atmosphere, it would be apparent in what manner some sensitive organizations might be influenced by this, for them, too stimulating atmosphere, among whom neuralgias and congestive headaches would prevail. I have in mind half a dozen ladies living in town, whose nervous systems were well balanced before coming to this country, who have here occasionally suffered with ill-defined neuralgia, mental distress, nervous headaches, etc.

#### THE PERMANENT EFFECTS.

The permanent effects of this climate on the nerves are usually salutary. With the exceptions already stated, no unusual abnormal conditions of the nervous system are to be noted in the average of those who have become acclimated; for then the influence of elevation is not very apparent.

As might be expected, with the generally quickened processes of life, the nervous system is in harmony.

Diseases generally are more prone to assume an acute character. The action of remedial agents is also more marked, and the physician really has much less to do with his patients,



among the same number of people, than in a denser atmosphere. (Not an extra lucrative field for doctors.)

In this connection it is to be mentioned that the injurious effects on the brain and nervous system of alcoholic stimulation are sooner felt, and with more intensity, than on the seacoast. Quite a marked effect, too, is on the sexual passions.

Though the first comers in this far West, who, when crossing the plains, drank the alkaline water, and worked off their surplus vitality in their active out-door life, thought differently, it is concluded (especially among those who live luxuriously in the city) that this passion is generally stronger than where most of our people formerly lived. The remarkable number of little children, and the financial prosperity of prostitution in this young city, would seem to have some bearing on this statement.

Quite generally, I believe, females are more affected by these climatic influences than males.

Uterine disorders are not infrequent, especially at greater elevations, where menorrhagia and abortions are apt to occur.

A peculiar result, probably of the dryness of this atmosphere, is some falling out of the hair, which is quite generally complained of; too generally, at least, to be ascribed to any personal idiosyncrasy.

In this quickened life which pervades every part of the human system, the demand to supply the waste of tissue would seem to be increased, and so it is. Generally speaking, people who live here enjoy a continuous good appetite; especially is this the case among hard workers, who thus are able to keep up their accustomed vigor of body or mind. Mountaineers, and excursionists who are much in the mountains, acquire the habit of naturally conserving their forces on account of the thinness of the air, and instinctively move slowly, while an ability for continuous motion has seemed to be greatly due to the large amount of food consumed. This increase of appetite, together with the greater activity of the respiratory apparatus necessitated in climbing among the mountains, accounts for much of the benefit to the general health obtained by those who journey mountainward in the summer. If the nerves are easily tried in this country, they

are as easily refreshed; for nowhere is sleep so sound and restful.

This is greatly insured by the usually cool nights, and the freedom with which windows may be kept open, which is more essential in an atmosphere so thin as ours. Consumptives and convalescents from debilitating diseases are generally able here to get the tranquil sleep which is so essential for restoration to health.

As to the capacity for muscular toil in the ordinary daily routine of business life, not much difference is noticed between the lowlands and our highlands, because, I suppose, the intervals of rest are fully equal to the needs of the system.

Until the lungs become sufficiently expanded, and one is used to this light air, walking may be somewhat difficult, but afterward it is rendered quite as easy and more invigorating than at a less altitude, except, as before intimated, one naturally graduates his speed to the capacity of his inspiration.

But for continued muscular exertion, I can not think the capacity here is as great as it would be in a denser atmosphere. It is said that horses can not be made to trot quite as fast here as in the East. A better illustration of this opinion, however, was presented to me last July. I was called up at night to see a professional walker, whom I found utterly prostrated, having symptoms of threatened congestion of the brain. He was trying to walk sixty-four consecutive hours without food, and though they fed him beef-tea "on the sly," and much of his walking was a fraud (he never paid his doctor's bill), he completely gave out the fifty-fifth hour. It is my opinion that, with the aid of his faithful friends, he could have made a better speculation of it "down East."

How is the capacity for "cerebral" toil "affected by this climate?" This is a more difficult, and, I consider it at least, an open question. Opinions differ so much, and you know it is rather hard to get us to acknowledge we are not as smart mentally as we used to be. Besides, the solution of the question is greatly influenced by the fact that so many of us came here for considerations of health, in nearly all of whom an improvement in the mental capacity would be expected with the restoration of health.

I thought to settle this question by the opinions of the clerical profession, and therefore called on ten of the principal clergymen in Denver, and wrote to four in the mountain towns, propounding the following questions :

1st. Former residence, and time they had lived in Colorado ?

2d. Does their capacity for mental toil differ from what it was before coming here ?

3d. Is concentration of mind as easy here as near the sea ?

4th. Any nervous symptoms they could attribute to this climate ?

The result of this investigation may be summed up as follows, though it should be noted that the inquiry was quite new to all. Three had noticed, especially at first, that the results of their mental efforts in the same time were less satisfactory to themselves than formerly. Four could accomplish more mental work here in the same length of time, one of whom had lived in Mobile, Ala., and thinks the difference is markedly in favor of this country, this climate being more like New-England in this respect.

Five thought their minds were more active here than where they formerly lived. Three, to make a fine distinction, thought, *ceteris paribus*, concentration of mind would be a little easier in a denser atmosphere. Four thought they were more nervous here, two of whom were somewhat troubled with sleeplessness during their early sojourn in Colorado.

Two noticed their wives were more nervous (prone to headaches and neuralgias) than in the East.

With these exceptions, the answers to the questions indicated that the capacity for mental toil was unchanged ; concentration of mind was as easy here as near the sea ; and they could not attribute any nervous symptoms to climatic causes.

Appended is a synopsis of four answers received from mountain towns which are two to four thousand feet higher than Denver.

Rev. Francis Byrne, Nevada.—Former residence, Mississippi ; Boston, thirteen years ; West-Indies, twenty ; Rocky Mountains, seven ; capacity for mental toil much better than in debilitating climate of the West-Indies ; concentration of mind easier here than in Boston or West-Indies ; has no peculiar

symptoms of nervousness attributable to this climate ; noticed that " females suffer from nervous debility, owing, in a great measure, to home confinement and domestic duties ;" health, during residence in Colorado, always excellent, so is always prepared for any official duty.

Rev. D. E. Finks, Fairplay.—Former residence, New-York State ; lived here fifteen months ; capacity for mental toil not materially changed ; health good, and so can do more mental work here ; concentration of mind unchanged ; no nervous symptoms.

Rev. H. B. Gage, Central City.—Former residence, Ohio ; lived in Colorado four years ; here " mainly on account of health ;" noticed no difference in ability for mental application, except " am more often nervous ;" exercise, if at all violent, causes increased respiration and pulsation, and consequently a lassitude incompatible with mental toil.

Rev. Albert Miles, Caribou.—Been in this country two and a half years ; came here " most dead " with chronic pneumonia ; right lung half hepatized ; has improved all the time ; can accomplish more mental as well as physical work than before coming to Colorado.

I called on Prof. Chalfaut, Principal of the Denver Academy. He has been here two years ; was failing in health East ; " lung trouble ;" friends thought he would not get through the winter ; has considered himself well since coming ; vigor of mind good, and can accomplish more mental work than East ; the children in his school are remarkably well developed physically and mentally. They are capable of as much mental work as are children near the sea, but " more restless under restraint."

Now, as to this question of the relative capacity for cerebral toil, the improvement of health accounts for much increased mental vigor. (Most of our residents look well, and of ruddy complexion.) I prefer to express my opinion as follows : With the same good health, I think I could do difficult and protracted mental work easier in a denser atmosphere. I do not expect to see very profound logical treatises emanate from much greater elevations than this. Please consider the above statement an apology for any imperfections in this communication.

In closing, the following question suggests itself: What will be the influence of this stimulating (more than "tonic") climate on the average longevity of permanent residents?

Although the processes of life are more rapid here, they may also be said to be more perfect, and consequently the destructive tendencies of the over-civilization of our age are more surely counteracted. Therefore, while the average lifetime of our people would be increased, we might expect to meet fewer persons here who had passed the Biblical limit of "three score years and ten."

DENVER, October 9, 1873.

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VII.—*On the Treatment of Vomiting by Electricity.* By FREDERIC D. LENTE, M.D., of Cold Spring, Member of the Council of the New-York Neurological Society.

VOMITING is one of the most troublesome, and often intractable, symptoms which we encounter in the management of disease; not seldom a direct, and frequently an indirect cause of death. Among children, its management is particularly annoying and perplexing, their delicate stomachs often rejecting obstinately both food and nourishment, setting at defiance our most reliable remedies, and rendering futile our best-directed efforts. Sometimes it may fairly be considered a disease of itself, as in sea-sickness; sometimes it converts a physiological process, as pregnancy, into a pathological one of the gravest character. Sea-sickness alone, though generally considered only a temporary annoyance, is rendering miserable the lives of thousands of travelers at all times. But it is sometimes the indirect cause of death, and now and then a case occurs in which we may fairly attribute the fatal result to the direct influence of this malady. My colleague at the Hudson River State Hospital, Dr. Kellogg, informs me that he saw a relative die from it on board ship; and a relative of mine would have died, in all probability, had he not been on his father's vessel, which made for the nearest port on the coast, and put him ashore.

Any remedy, then, which claims to be more effective than all

others against so serious and intractable a complication, whether it be the result of actual disease of the stomach itself, or from irritation of the pneumogastric nerve, or from ordinary reflex action, as when it occurs in pregnancy, uterine inflammation, etc., must challenge the attention and interest of every member of the profession, whether his investigations and practice lie in the direction of the nervous system or not. Such a remedy I believe to exist in *electricity*; and, without waiting to accumulate a large number of cases, in order to establish conclusively the grounds of my belief, I offer a sufficient number to enlist the interest and co-operation of my professional friends in the further prosecution of the study of this particular application of a remedy which is so rapidly gaining popularity in the profession.

Other experiments may have been previously made in this direction. If they have, the profession generally are in ignorance of them. Drs. Beard and Rockwell are the only writers, so far as I am aware, who allude to this subject, and they seem to place no reliance on it, never having tried it themselves. They allude, in their excellent treatise, to the experiments of a French physician, who applied *atropia* to the epigastrium, and then the electrode of a battery, merely to facilitate the absorption, with the alleged effect of relieving the nausea; which relief was probably entirely due to the electricity.

In a letter just received from Dr. Beard, he informs me that, so far as he knows, there is nothing published on the subject, except the reference in his book. In the next edition, just about to appear, he alludes to my experiments. The only item which has ever attracted my attention is a very short paragraph in the *Richmond and Louisville Journal*, several years ago, with no signature, merely stating that, if electricity (the *kind* or mode of application not stated) be applied to the epigastrium, it is *impossible* for the patient to vomit. This anonymous and unauthenticated statement may prove to be, with very few exceptions, correct. A reporter of Bellevue Hospital practice, not connected with the institution, recently made the statement that the obstinate vomiting of puerperal fever had been successfully treated there by electricity. Dr. Young, then one of the resident physicians, informs me that he thinks it was

only tried in two cases, and at his suggestion, after witnessing its marked effects in some of my cases, while assisting me, some months ago.

With these introductory remarks, I give you, Mr. Editor, the promised cases in as few words as is consistent with their full appreciation :

*Case 1.*—This case was the first in which I tried electricity for the relief of obstinate vomiting, and has already been before the medical public (*N. Y. Medical Journal*, March, 1874) as an illustration of the effect of repeated hypodermic injections of quinine.

I was called to her, December 9th, 1873, by Dr. Murdock, because, having exhausted all his resources for her relief, he considered her case desperate. Had been confined two months before (Dr. Farrington, of Bellevue Hospital, in attendance), had lost a large amount of blood both before and after delivery, and was much prostrated, never having enjoyed good health. She subsequently had a succession of mammary abscesses, by which her strength was still further reduced. At the same time she was suffering from malaria, which eventually developed into a virulent and obstinate attack of intermittent fever, of which one of the most prominent symptoms was obstinate vomiting, with a watery diarrhœa, efforts at vomiting being always attended by a discharge from the bowels. On this account, nutrition could neither be effected by mouth nor rectum. The most careful and skillful attention to food, as to quantity, quality, and interval, on the part of her physician, with an equally judicious selection of all the known remedies, including small and repeated doses of iced champagne by means of the siphon tube, failed to afford more than temporary relief; and, for twelve hours previous to my visit, she had been unable to retain a tea-spoonful of ice-water on the stomach for three minutes, and had attempted nothing else. Her pulse was 125, extremely soft and feeble. Temperature in mouth, 104°. As a forlorn hope, I recommended the application of the induced current of an ordinary electro-magnetic battery. With a wet electrode over the spine (*semilunar ganglion*), I used my hand as the other electrode over the epigastrium, with a wet folded napkin interposed, and used a very mild current, owing to her

extreme weakness. After the lapse of fifteen minutes, I requested Dr. M. to give her three ounces of a mixture of equal parts of lime-water and milk, which she had abandoned days before as worse than useless. Within two or three minutes, she called for a vessel, and said she must vomit, although implored to lie still and resist the effort. She made several violent but ineffectual efforts, and finally fell back exhausted; all the while my hand, conveying a stronger and stronger current, was kept steadily applied to the epigastrium. One electrode was now carried from the spine below to the seventh cervical vertebra, and the current was continued for thirteen minutes longer, at the end of which time, as there was no nausea, it was discontinued.

*Afternoon.*—Same day. Patient has neither had nausea nor diarrhœa, although she has taken regulated doses of beef-tea and brandy, both by mouth and rectum. Dr. M. applied the electricity at noon, as a precautionary measure.

*December 11th.*—Two days after. No return of nausea or diarrhœa. Dr. M. applied the current in the evening on the 9th, and not since.

*December 13th.*—Doing well. Increasing nourishment, and relishing it. Bowels constipated since the application.

*December 18th.*—Patient has been so well that the usual prophylactic hypodermic dose of quinine was omitted, and to-day she has *malaise*, fever, and *vomiting*. Dr. M. gave a large hypodermic injection of quinine, and applied the current as before, with equally prompt relief.

*December 25th.*—No recurrence of nausea, although the malarious trouble continues. She can now even retain the quinine on the stomach. She subsequently recovered her health entirely, and never vomited again.

*Case 2.*—This case also appears in the article above referred to, and is one of great interest, without reference to the symptom for the consideration of which it is again introduced to the profession.

I am indebted to Dr. Murdock, with whom I saw the case in consultation, for the following notes. I will preface them by the statement that she had been kept alive for months only by the most assiduous attention on the part of her physician and



friends; sometimes subsisting for days<sup>v</sup> only on iced champagne and small doses of brandy, neither the stomach nor rectum being able to retain any other nutriment.

*December 10th, 1873.*—Has had more than usual nausea lately, so as only occasionally to be able to retain even a table-spoonful or two of lime-water and milk. To-day, from the great success of faradization in the case of Mrs. C., I used it for twenty minutes, with wet electrodes, from the seventh cervical vertebra to the epigastrium. She felt better after the lapse of a few minutes, and I gave her half a tea-cupful of lime-water and milk, which she retained with ease. I left her quite free from nausea.

*December 11th.*—Stomach has felt better, since yesterday, than for many days before. Has retained every thing. Repeat electricity. From this date, faradization was repeated three times a week, and she had no return of vomiting whatever until ten (10) weeks later, when it occurred in the course of a sudden and fatal peritonitis. She had passed through two menstrual periods, in the mean time, without vomiting, which had not occurred before for two years. Her diarrhœa was also checked.

On December 29th she had an attack of malarial fever, and passed through it without vomiting, which she had never done before. On January 5th she took, by mistake, from fifteen to twenty grains of powdered alum, and did not vomit it.

*Case 3. Vomiting and other serious Symptoms complicating Menstruation.*—Mrs. C. B., 43. Has suffered from uterine disease and disordered menstruation for many years, but very much relieved for the last five years. For some months has suffered from pain over a small spot just to the left of the lower dorsal region of the spine. Her catamenia now due. Last night, January 2d, 1874, was attacked by nausea and retching, and pain in epigastrium, extending upwards under the *sternum*, and severe dizziness. The nausea was succeeded by vomiting of frothy mucus, and, for some hours before I saw her, she was blind for a portion of the time. She was in bed, with the head low, pulse feeble and slow, countenance anxious. Applied the interrupted (faradic) current, one electrode (wet) to the middle dorsal region, and my hand conveying the current from the other to

the epigastrium, with a wet folded handkerchief interposed. Within ten minutes she was much relieved; no nausea, pain almost gone, and vision much better. The hand was then placed on the painful spot in the side, and the pain was promptly relieved. It was changed to the vertex. Here she could only endure the weakest current. The head-symptoms were much mitigated, but some dizziness continued. *Séance* lasted twenty minutes.

*January 4th.*—Much better. No head-symptoms, no nausea. The nausea did not recur, although she had a recurrence of severe pain, and other symptoms, for some days, connected with suppression, and only relieved when the latter was relieved by the application of the *galvanic* current to the *cervix uteri*.

*Case 4.*—Mrs. M. P., a very delicate woman, aged 30, the subject of severe chronic bronchitis, and nursing a baby; sent for me in a great hurry, March 29th, 1874, with the message that she was “all stuffed up, and could not breathe or lie down.” Found, on visiting her, that the difficulties were caused by *myalgia* of the left side of chest and left shoulder. Had been blistered and burnt by sinapisms with no relief. The faradic current relieved her entirely in fifteen minutes. For weeks she has been suffering constantly from nausea; to remedy this I applied the current to the epigastrium and over the solar plexus for a few minutes. This single application relieved her nausea entirely, although the recurrence of the pain required a reapplication of the battery to the affected parts.

*Case 5.*—A. D. This is a case of pyonephrosis in a young girl who had, on March 13th, 1874, been reduced almost to a hopeless state of debility, with malarious fever superadded to her serious organic disease. The two had, for some time previous to this date, induced such a degree of nausea and disgust for food, that, in spite of medicines and variations of food innumerable, and change of air, could only be mitigated for short intervals. Her pulse was 130, and very feeble. She has also an obstinate diarrhoea, for which she is using opium suppositories daily. (In her case opium does not affect the stomach.) Her urinary secretion has also diminished lately. To-day, passed the faradic current from the *solar plexus* (wet

electrode) to the epigastrium, applying the current to the latter with my hand, a wet cloth interposed; then passing the hand over the tumor and all painful parts of the abdomen, and over the unaffected kidney, to stimulate increased action.

*March 14th.*—Much better. Has retained all her food; only once, when she took some tea, did she vomit, and the nausea did not continue. Pains almost entirely relieved. Has had the first natural passage from the bowels for some weeks. Repeat electricity.

*March 17th.*—Nausea entirely relieved. Feels better, and actually relishes her food a little. Bowels in a natural condition without any opium. Electricity applied daily. Sleeps much better. From this date her condition improved in every way, and the electricity was discontinued.

*Case 6.*—Mrs. K., 63, bilious colic and sick headache.

Patient has suffered for several years with periodical visitations of this character, and has usually been relieved by hypodermic injections of morphia. Called to her April 2d, 1874. Attacked at bed-time, last night, after drinking a glass of cold water, with epigastric pain. Mustard was applied with some relief. Towards morning, the pain increased, and she could not lie down; the pain extended to back and shoulders, and she commenced vomiting, getting rid of food taken the evening before. Various remedies, including opiates, were tried in vain, as she could retain nothing on her stomach. She now retches constantly, and the epigastric pain and headache are intense. Pulse slow and feeble. Applied the faradic current, one sponge over the solar plexus and one over the epigastrium. Bore the full power of a Kidder battery without feeling any uneasy sensation. *Almost immediately* she breathed easier, and appeared somewhat relieved. In four minutes she was decidedly better. But she complained of the headache, and vomited a bitter yellowish fluid *while the current was passing*. I now changed one electrode to the seventh cervical vertebra, retaining the other over the epigastrium. Very soon the nausea subsided, the headache was much relieved, and *within ten minutes all uneasy sensations* had vanished. I left her as well as before the occurrence of the attack, except debility. She never recovers permanently from these attacks in less than three days; accord-

ingly, there was a recurrence of the symptoms the succeeding day and the day after, each attack controlled by the usual hypodermic injection, because neither I nor my assistant had time to employ electricity.

*Case 7.*—Mrs. L. P., 28. This was a case of malarious vomiting; the symptoms, with the exception of this, had been relieved by the hypodermic injection of quinine. The vomiting and retching were very distressing, and had resisted various anti-emetic remedies. With Gaiffe's small battery applied the faradic current from solar plexus to epigastrium for twenty-five minutes. The next day, June 29th, 1874, there was no recurrence of the nausea, although she was jaundiced, constipated, and had irregular chills.

*Case 8.*—This was a little boy of six years, to whom I was called in August, 1874, for a violent attack of vomiting and purging connected with a malarious attack. The fever and purging were controlled with but little difficulty, but the vomiting resisted all the usual remedies, and the greatest care in regulating his food, which it was difficult to get him to take. Finally, I applied the faradic current from the lower dorsal region (solar plexus) to the epigastrium, using my hand, as usual in delicate subjects. After fifteen minutes I gave an ounce of lime-water and milk as a test. He retained it, although previously not able to retain a tea-spoonful. The next day he had only vomited once, although a violent attack of fever has supervened. Is taking a moderate and regulated amount of nourishment. Had no recurrence of the vomiting, and made a good recovery.

*Case 9.*—This was a baby, nine months old; had been suffering for several weeks with summer complaint, of which vomiting was a troublesome complication. In the absence of his medical attendant I was called in. He could retain neither food nor medicine in the smallest doses. Applied the faradic current for sixteen minutes from the back to the epigastrium. Was obliged to use my hand, and only the feeblest current, on account of the struggles of the child. The day following there had been no nausea, and all food and medicine had been retained.

*Case 10.*—This was a case of vomiting in a feeble woman

aged 42, complicating chronic Morbus Brightii, under the care of Dr. Murdock, to whom I am indebted for the following notes.

*March 24th*, 1874.—Among other troublesome complications are extreme nausea and persistent vomiting, so as very nearly to preclude all food or medicine for some days past. To-day used the faradic current for twenty-five minutes with complete relief. Gave a half cupful of milk-punch while the current was passing, which she retained without difficulty.

*April 13th*.—Only once has the vomiting recurred, and then from imprudence in eating; a *séance* of thirty minutes relieved her.

*Case 11*.—Dr. Murdock's case and notes. Mrs. P. "Intense nausea and vomiting from the combined effects of severe *migraine* and the hypodermic injection of morphia. Applied the full strength of a Kidder's battery. Patient could not feel the current at first, and the nausea seemed to be increased. She soon began to feel the current, and then grew easier. Within twenty minutes the symptoms were relieved." Subsequently this patient had the application, under precisely similar circumstances, on several occasions, sometimes with as prompt relief, sometimes with only partial relief. (L.)

*Case 12*.—Vomiting, apparently from the effects of an opiate. Case reported by Dr. Murdock. Mary F., 6 years, attacked last evening, March 30th, 1874, with violent and long-continued convulsions. Relieved by opiates and the inhalation of chloroform. Is suffering to-day from intense nausea, which has not yielded at all to the ordinary remedies. I then tried faradization. She was restless, so that I could only give a weak current for twenty minutes. This completely relieved her nausea, and she drank cold water freely and retained it.

*March 31st*.—I learn that she vomited once soon after the electricity was discontinued, and once afterward during the night, but none since, and she is much better.

*Case 13*.—Reported by Dr. Murdock. A lady, aged 65, long afflicted by dyspepsia and other ailments, attacked April 5th, 1874, with severe pain in epigastrium and vomiting, which did not yield at all to ordinary remedies. Pulse only 36. For the relief of the pain and vomiting also, I tried the faradic current of a moderately powerful battery for half an hour; but she

could only feel the current slightly at times. Vomited several times while the current was passing, but only when she could not feel it at all. Pain and vomiting subsequently yielded to the hypodermic injection of morphia.

*Case 14.*—I was called to this patient, a very feeble woman, March 30th, 1874. She was suffering from the most intense supraorbital neuralgia, attended by violent vomiting and continuous nausea. Gave a hypodermic injection of morphia and atropia, and applied the faradic current to the back and epigastrium as usual. The nausea appeared to be relieved in five minutes. Continued the application fifteen minutes, and repeated the injection. Returned an hour after and found that the pain was relieved, but the nausea had returned. Did not repeat the electricity.

*Case 15.*—Mrs. I. K., an extremely feeble woman, has always suffered very much, during her pregnancies, from nausea, dyspepsia, and vomiting throughout the last six months, and attended by *quasi* labor pains, which, during the last two pregnancies, required the almost daily use of McMunn's elixir of opium, the only preparation she could take. It has been considered very problematical by several physicians who have watched her case for some years, and by me also, whether she could go through another pregnancy safely. I had warned her, in case of conception, to call me as soon as her bad symptoms should occur, and not to use any opiate, as I had determined to try the effect of electricity unaided by any other remedy. To-day, March 26th, 1874, she informs me that she is *enceinte* three months. Has been away from home, for change of air, and comes back with the nausea, vomiting, neuralgic pains in head, neck, etc., to which she has before been a martyr. She is now suffering from aggravated dyspeptic symptoms, vomiting all solid food taken; feels so much exhausted that she keeps her bed-room upstairs, and can not get down. Applied the faradic current for twenty minutes from nape to epigastrium.

*March 27th.*—Much better; down stairs and about the house for a couple of hours. Took a good meal, and has retained it. Repeat application.

*March 29th.*—Still improving. Retains all her food, and has increased the quantity.

*April 8th.*—The application has been repeated daily, and with excellent effect. For two or three days past, however, she has not felt the decidedly tonic effect which she at first experienced, and has some oppression at epigastrium after meals, and can not lie down for an hour or two. To-day commenced “general electrization” (faradic current) for twenty minutes.

*April 9th.*—Much better; could lie down and sleep immediately after meal yesterday. Has eaten more to-day than usual, and has felt no inconvenience from it.

*April 19th.*—The application was continued, at first, every day; now every second day. Much stronger, no indigestion to speak of. The electricity was continued in this manner for two months, and patient went through her pregnancy and confinement without difficulty.

*Case 16.*—W. H. L., 48. *Sept. 30th*, 1874.—Called to patient to-day, and find that he has been suffering from ill-health for some two or three weeks. Has now fever of the typho-malarial type, attended by intense headache, nausea, and vomiting. Has not been able to keep any food on the stomach. Applied the induced current from a Gaiffe battery from the nape to epigastrium, and from the lower dorsal region of spine; whole *séance* twenty minutes. Felt the good effect on head and stomach within five minutes. Drank part of a tumblerful of milk, and would have taken more if allowed.

*Oct. 1st.*—Has vomited but twice, although he has taken his nourishment regularly, and notwithstanding an increase in his fever. Has no nausea. Repeat application fifteen minutes.

*Oct. 3d.*—Took some cathartic pills soon after the last application, and some hours after the vomiting recurred, and continued until his bowels were moved by a dose of Epsom salts, since which the nausea has subsided. His temp. is  $105\frac{1}{2}^{\circ}$ .

*Oct. 5th.*—Dr. J. C. Young, of Bellevue Hospital, saw the case to-day, and reports his temp.  $106\frac{1}{2}^{\circ}$ , and that his stomach retains every thing he takes, and he has no nausea.

*Case 17th.*—R. T., 32. Has had almost constant fever, Oct. 2d, 1874, of the regular intermittent type for some days. Dr. Murdock yesterday gave a hypodermic injection of morphia for relief of violent headache, and large doses of quinine. He has now no fever or headache, but when he sits up he has

vertigo, and when he stands, this increases, and he invariably vomits. Applied the induced current from the nape to the epigastrium for fourteen minutes. Within four minutes he felt his head "decidedly stronger," as he expressed it; and, at the end of the *séance*, could walk about with no inconvenience whatever, except a feeling of weakness.

*Case 18th.*—Miss S. S., 35. *July 3d, 1874.*—Has been laboring under intermittent fever of an irregular and obstinate type for some days; the prominent and most painful symptoms being headache, nausea, and vomiting. I have tried various remedies for vomiting, with but slight relief. Applied, to-day, the induced current of a Gaiffé battery from the nape to the epigastrium, and from the lower dorsal region (solar plexus). The nausea was rather increased than relieved after a *séance* of twenty-five minutes.

*Sept. 27th.*—Ever since last date patient has kept her bed almost all the time, and has been an almost constant sufferer from nausea and vomiting; has had an irregular form of fever most of the time, and taking various remedies for its relief. Has also more or less neuralgia. By the aid of anti-emetic remedies, and iced champagne in small and frequently repeated doses, she has managed to keep a little nourishment on her stomach; but her strength is much reduced. After the unsuccessful essay with electricity, I did not repeat it until yesterday, when, failing with every thing else, I gave it a second trial, and with a more satisfactory result. A *séance* of twenty minutes, part of the time from the nape and part from the lower dorsal region. She drank beef-tea and retained it, and has continued to do so. Repeated the application for fifteen minutes.

*Oct. 5th.*—Is sitting up, and has had no recurrence of nausea and no fever. Takes eucalyptol for the latter with good effect. Is gaining her strength.

*Case 19.*—Mrs. F. L., 43. In good health, while menstruating, was attacked last night with intense nausea and vomiting without any obvious cause, also with one loose and copious alvine dejection. Tried various remedies, external and internal, with no relief. I gave a goblet of warm water, hoping to rid the stomach of undigested food. But, although it produced a thorough evacuation of its contents, the nausea and vomiting



continued. I then applied the induced current for twenty-five minutes from the nape to the stomach and from the solar plexus; also on the top of the sternum, where she complained of "a lump." She did not feel relieved, materially, of the nausea, but the vomiting did not recur, and she feels well this morning.

These are not *selected* cases, but comprise *all* in which I have made use of electricity for the relief of nausea and vomiting.

I have not had occasion to use the remedy for sea-sickness myself, but have no doubt of its efficacy, and have advised numerous persons to try it. I have not heard of the result, except in one case; and, as the patient has not yet returned from Europe, I can not give a very satisfactory report. But I learn, indirectly, that the lady who tried it, and who always suffers terribly from the slightest motion of a ship, and even from that of an open boat on the river, was completely relieved. I feel confident that this will prove to be our most valuable resource in cases of sea-sickness; also in the vomiting which frequently follows anæsthesia, and which is not only distressing and prostrating, but which endangers the success of the most skilfully performed operations on the eye. I have, of late, been so successful in the prophylactic treatment of this form of vomiting, that I have not had an opportunity to try the effect of electricity. This consists in giving from 20 to 30 grs. of bromide of potassium three times a day for two or three days previous to that on which the operation is performed. I have also tried this in one case of expected sea-sickness, and apparently with good results.

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VIII.—*Description of a Portable Medical Battery devised by Prof. George W. Rains, M.D., of the Medical Department of the University of Georgia.*

THE description and discussion of the battery as originally constructed were given in the *Scientific American*, September 28th, 1872. The present one—which may be properly called a *portable galvano-faradic* instrument—is a considerable improvement, not only in the arrangement of the battery itself,

but also in having an attached faradic machine, with the changes or interactions between the two instruments.

Thus, in place of the portable galvanic battery alone, it is now constructed to contain a faradic portion in addition, both being contained in the same box, which is about the size of the No. 4 faradic machine made by the Galvano-Faradic Company, of New-York city. This faradic portion is contained in a separate box of thin metal, which may be nickel-plated, which fits in one end of the battery-box, and can be easily lifted out and used by itself; when in place within the battery-box, it forms one end of the space occupied by the battery; it is of full power, and constructed essentially the same as those usually supplied, but in a more compact form, to economize space. One of the sides of the faradic box has a hinge at the bottom, which allows it to be dropped down when the top is removed, after being taken from the larger or battery-box; this permits the easy withdrawal of the inclosed cell to renew the exciting liquid, as also to inspect and arrange any portion of the working parts.

The actual dimensions of this faradic instrument, complete, are  $6\frac{1}{2}$  inches high,  $6\frac{1}{2}$  inches deep, and  $2\frac{1}{2}$  inches broad; hence it forms a light and very convenient instrument for physicians' use. When in position it forms an important auxiliary to the galvanic battery, having four separate uses. First, to give the usual faradic current; second, to act as a current-breaker to the constant galvanic current of the battery; third, to give the constant galvanic current when required, through its connection with the battery; this is done by simply stopping the vibrating portion by turning a screw near its upper end, which is thus pressed against an elastic slip of metal which connects with one pole of the battery; fourth, by adding its own graduated current to the interrupted battery current whenever it may be desired. The whole of these changes or currents are passed through the same two sponges or electrodes without interrupting their application. Passing a galvanic interrupted current through the same pair of electrodes through which a faradic current is at the same time passing has, it is believed, never before been accomplished.

The physician thus, whilst using the same pair of electrodes,

can, without stopping action or changing connections of the electrodes themselves, apply the faradic graduated current, or by touching an index obtain the interrupted galvanic current in addition to the faradic, or the former interrupted current alone by shutting off the faradic, or the constant galvanic current by turning a screw. Thus are had four different actions, with great facility of passing from one to the other without change of electrodes.

The necessary connections with the battery are made simply by pushing the faradic instrument into its place within the battery-box, when the proper connecting parts come into metallic contact, and the whole is ready for service. On the outside of the battery-box, opposite one end of the faradic portion, is a small switch, by the movement of which the faradic alone, or the interrupted galvanic, or the latter together with the faradic currents, are brought into service. The movement of the switch itself simply brings the faradic or the faradic and interrupted galvanic currents into action, but the faradic can be shut off by closing over the coil the outer metallic tube, which leaves the battery current alone in action.

The galvanic battery has 49 separate cells of hard rubber, each one being  $\frac{1}{8}$  inch square and  $2\frac{1}{2}$  inches deep; these are all attached together by cement or paraffine, forming a small trough  $6\frac{1}{2}$  inches square by  $2\frac{1}{2}$  inches deep. This trough rests on a thin sheet of metal  $6\frac{1}{2}$  inches broad, bent upwards on each side, rising up a little above the edges, thus forming a kind of stirrup into which the trough rests. The upper edges of this stirrup have at the middle parts two small rods or strips attached, about three inches high, having each a hinge-joint, so that when the trough is lifted upwards by their aid the upper portions of the rods may be bent outwards on the edges of the battery-box to support it, the battery thus being brought into action.

The battery-box is 5 inches high to its top cover, which is  $1\frac{1}{2}$  inches deep inside, making the interior height or depth from top to bottom  $6\frac{1}{2}$  inches; the exterior dimension is 7 inches if made of wood  $\frac{1}{2}$  inch thick. It has a sheet of thin copper about 7 inches square, which slides into its place on two metal strips attached to the sides and lower edges of the box, thus

forming a movable bottom which can be easily drawn out at the end, permitting the trough inside to rest on the table free, and from which the battery-box can be lifted, leaving the trough by itself resting within its stirrup. This copper plate can be conveniently used as a foot-plate electrode.

The trough can thus readily be removed at any moment, for filling with fresh liquid, without disturbing any other part of the instrument. This filling is done by first taking it out of the stirrup, and, after pouring out its contents, placing it into a basin or dish, and filling all the cells at one operation by pouring the liquid into the trough, which, when entirely full and running over, is tilted up at one side at a considerable angle to discharge a portion from each cell. If the cells were left entirely full, the electricity of such high tension would be conducted over such surface and lost. It follows, likewise, that the top edges of the cells should be dry; this is quickly accomplished by pressing on the top of the trough two or three thicknesses of absorbing paper.

This trough is now removed from the basin, wiped clean, and placed in its stirrup; the battery-box is now placed over it and pushed downwards until it touches the table; the copper plate is then inserted to form the bottom support, and the trough is ready for service. The operation of removing it from the box, emptying its old contents, renewing the liquid, and returning it into position, scarcely takes more time than emptying and filling a single cell of the ordinary battery.

The metal elements of the battery are attached to a hard rubber plate  $\frac{1}{2}$  inch thick, resting on the upper edges of the body of the box, or rather inserted so as to have its top surface even with the edges; when the top of the box is thrown back, this plate forms a top or cover to the lower portion immediately over the trough, having the faradic instrument on its right and pressing up against it. This hard rubber plate has 49 rectangular holes,  $\frac{1}{2}$  inch by  $\frac{3}{8}$  inch dimensions, through which the elements are passed, projecting  $1\frac{1}{2}$  inches beyond the under surface, directly over the centres of the cells below.

The zincs are somewhat longer than 2 inches,  $\frac{1}{2}$  inch broad, and  $\frac{1}{8}$  inch thick; the platinum strips are  $1\frac{1}{2}$  inches long by  $\frac{1}{2}$  inch broad, made of sheet-metal like those employed in Grove's

battery; these strips are curved lengthwise to give them stiffness, and at their nearest points are  $\frac{3}{16}$  inch from the zincs.

The strips of platinum and the zincs are united by tinned copper slips in the form of the letter U inverted; the platinum is soldered to one extremity of the slip, which latter is then dropped into the holes in the hard rubber plate; one extremity with its attached platinum through one hole, and the other extremity through the adjacent hole. The amalgamated zinc is dropped into this latter hole, and is pressed up against the tinned surface of the copper by a wedge of hard rubber 1 inch long,  $\frac{1}{2}$  inch broad, and  $\frac{1}{4}$  inch thick at the end, tapering to a point. Before putting in the wedge, the next copper slip with its platinum must be in place, when the wedge will come in between the zinc and copper with its platinum, and thus separate the metals and hold them firmly in position; the copper slip at its junction with the platinum has a ledge or projection  $\frac{1}{16}$  inch thick, to meet the tapering form of the wedge.

By continuing this process the whole of the elements, arranged in a series, will be firmly fastened to the hard rubber plate; this, by means of two projecting pieces of metal fastened to the sides, can be lifted from the battery-box at any time to examine the condition of the elements. The first copper slip, when the plate is in position, presses against a tinned copper wire, which thence is let into the material of the battery-box, extending to the first button in the front of the box opposite the faradic instrument, against which the switch presses in obtaining the interrupted galvanic current, etc., the centre of the switch being connected with an electrode.

The hard rubber plate being in position, as also the trough below, the latter is lifted up by means of the two attached rods which rise above the plate, one on each side; when sufficiently elevated, the rods are bent outwards at one motion, thus retaining the trough in place, which operation immerses the elements, and the galvanic battery of 49 elements is ready for use.

It remains to describe the manner of bringing the battery, cell after cell, into action. The cheapest method is to have a small hole in each copper slip; if now the wire end of the first electrode be inserted in the first hole of the series, and the cor-

responding end of the second electrode be inserted in some other hole, all the intermediate elements will be brought into action, and those only. If the second electrode has two wire terminations in place of one, by inserting the second wire in a hole before the first is removed, the action of the battery varies gradually without interruption, until as many cells are brought into service as may be desired.

A more convenient arrangement will now be described. A square plate of hard rubber,  $6\frac{1}{2}$  inches square and  $\frac{3}{16}$  inch thick, has 49 small holes, corresponding to the copper slips, made through it for the insertion of a like number of thin copper wires. The ends of these wires are formed into short open coils  $\frac{1}{8}$  inch diameter and the same in length; when the plate with these coils is placed on the top of the battery-plate, these coils rest on the tops, respectively, of the copper slips.

To retain it in position, four wire pegs at the corners pass into the corresponding holes in the copper slips; the plate is then pressed down into place; it is thus readily removed when access to the zincs is required. The wires from the coils, after passing through the plate, pass along its upper surface until arriving at the circumference of a circle, 5 inches in diameter, marked out on the plate; these wires are then bent upwards, and pass through equidistant holes in a corresponding circle of a second plate, of the same material but of less thickness than the former.

The two plates are now united by cement or paraffine, forming a single solid plate; the wires are now cut off, leaving projecting ends which may be coiled into small flat coils. A traversing index passes entirely around this circle, resting on each wire in succession; if this index is connected at its centre with the terminal of the second electrode, whilst the first is connected to the first element of the battery, any number of elements may be very conveniently brought into service by moving the index. In the battery-box the centre of the index is connected to the elastic slip of metal against which the vibrating hammer strikes, which will presently be described.

In forming the connection between the battery and the faradic portion of the instrument, one pole of the battery is connected with an elastic slip of metal fastened, insulated, to

the upper part of the faradic instrument, and against which the vibrating hammer strikes. At each stroke the current from the battery passes through this strip into and through the hammer, and thus on to other connections, not necessary here to describe, to the terminal of the second electrode; the first electrode battery-connection has already been described. At every movement of the hammer the battery current is made and interrupted, causing each time a galvanic shock at the moment of making.

In the act of making the battery current by such means, the hammer leaves the platinum point connecting it with the elements of the cell of the faradic instrument; a faradic or induced shock from the coil is then given; thus, two very different shocks may be given at each movement of the hammer—one a faradic, the other the interrupted galvanic.

The complete instrument is contained in a box about 10 inches long,  $7\frac{1}{2}$  inches broad, and 7 inches high; if made of vulcanite it would be somewhat smaller.

The best method of renewing the zincs is to place a plate of wood or rubber on the top of the trough, of such thickness that it will nearly touch the platinum strips when the zincs are absent. Remove then the wedges, which will allow the zincs to drop on this plate; then remove the trough, take away the old zinc remains, and place the trough back in its place; drop a newly amalgamated zinc into each opening of the battery top plate; the upper ends of the zincs will now project slightly above the top plate, their lower ends resting on the plate of wood covering the trough. Put in the wedges, pressing them down in their places, which separates the zincs from the platinum strips and keeps both firmly in position.

The battery is now ready for service after the plate of wood has been removed from the trough; the whole operation may not take five minutes of time. If the worn zincs are taken out and replaced inverted, they will last some six weeks in daily service; the trough requires filling about once in two weeks when in daily use. The platinum strips cost ten dollars, but never require renewal; the cost of the zincs is quite small, less than fifty cents for the entire set.

The terminals of the electrodes are attached to the faradic

instrument, being most convenient in making the interior wire connections.

The power of the battery, or the combined quantity and tension, is about equal to 20 Grove's cells in ordinary action, or equal to that of the 32-cell battery made by the Galvano-Faradic Company of New-York, *when the currents are passed through great resistances*, as through water, or portions of the human body, such as tumors, etc. The actual quantity of electricity which passes through such resistances, from the 20-cell Grove, or 32-cell battery, or the 49-cell portable battery, is very small indeed, not exceeding, in fact, what is supplied by a single element formed of two wires of zinc and platinum of small dimensions, when connected by a short copper wire; the enormous resistance of interposed matters not metallic, effectually shutting off nearly all of the current that would freely pass through short thick wires.

In the foregoing description of the Portable Galvano-Faradic Battery, little is said relative to the construction of the faradic portion, because the construction of faradic instruments is familiar to all. The one used in the portable battery has but the primary coil. This coil has a thick copper tube passing over it to regulate the strength of the shocks. If the secondary current is desired, it is easily obtained by simply substituting a second coil in place of the copper tube. No advantage is perceived in using secondary currents; the primary coil being of larger wire, its currents have more electricity, and if its wire is sufficiently long, any strength of shock can be obtained.

A pole-changer or reverser was originally a part of the instrument, but it was found more convenient to have one directly connected with the electrodes, and thus nearer to the patient than when attached to the battery.

#### NEW HAND ELECTRODE FOR GENERAL FARADIZATION.

The human hand being recognized as the most comfortable of all electrodes to the patient in the application of electricity in general faradization, as well as in many other cases, I devised a sponge electrode, some three years since, to take its place; recently I have improved it to a degree that renders it available in place of the hand in nearly all cases, having almost



the same flexibility and conducting power. It is constructed as follows: A piece of sheet-rubber as thick as a card, or rather somewhat thicker, of an oval form, about the size of the palm of the hand, is prepared. A coil of small copper wire, the coil being about  $\frac{1}{8}$  inch in diameter and 24 inches long, is itself wound into a flat open coil,  $2\frac{1}{2}$  inches outside diameter, leaving the two ends to project beyond some 4 or 5 inches. This flat coil is sewed to the central portions of the piece of rubber, the two projecting ends being brought together, side by side, and of course extending some distance, 3 or 4 inches beyond. Over this flat coil a flat soft piece of fine sponge is sewed to the piece of rubber, entirely around the edges of the sponge, which should be somewhat smaller than the piece of rubber. The projecting ends of the coil are now fastened permanently to the usual wires of electrode connections; the exposed ends of the coil beyond the sponge must be covered with thin sheet-rubber or other non-conducting material.

The above electrode is perfectly flexible in all directions, is of excellent conducting power when the sponge is moistened with a little salt water, and is not liable to wet the clothes of the patient. It is best to have the wire of the coil nickel-plated to prevent the action of the salt on the copper.

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IX.—*Galvanism in Ocular and Aural Affections.* By W. SEELY, M.D., Cincinnati.

I HAVE no doubt that the constant current has received its share of attention from oculists, as it certainly has from aurists, but as yet very little of the experience gained has been put before the profession.

From the data furnished by my own experience, I am far from being able to summarize an opinion, hence I simply propose to state a few impressions and experiences in regard to the current.

I use the Brenner apparatus (Siemens and Halske's modification), as made by Krüger and Hirschman, of Berlin, attached

to thirty cups. It is only seldom that more than ten cups are needed, or can be borne.

Of course this special apparatus was designed for the ear, and, as will be seen when I come to speak of that organ, I regard the interposition of "resistances" as a very important element.

With a few exceptions, my experience with the constant current in the ophthalmic department has been confined to muscular affections.

#### NEURITIS AND NEURO-RETINITIS.

From some trials of the current upon the eye, it has been said to influence the circulation of the papilla, and hence the inference has been drawn that it might be of service in neuritis. To place an exclusive reliance upon such a remedy, even if Benedikt's theory of the cause is correct, seems to me very hazardous. Benedikt regards the congestion of the papilla due to a trouble in the sympathetic, as the result of a cerebral process.

Even if the theory were to be accepted, something must be done to remove the results, even though galvanization is resorted to to remove the cause.

In all such cases there is a wide field for the imagination to roam in, and the hope of obtaining any satisfactory statistics on this point will certainly be long deferred.

#### AMBLYOPIA THE RESULT OF SUPPRESSION OF THE IMAGE OF ONE EYE BY THE BRAIN, AS IN SQUINTERS.

It is only quite recently that I have tried the effect of the current in amblyopia from the above cause.

It strikes me now as very strange that it should not have earlier occurred to me, for we have a pure nerve affection to deal with. A month ago I operated upon a patient, to correct a slight divergent squint. The squinting eye, in the best light before and subsequent to the operation, could only make out Nos. 23 and 24, Jæger's test type. After a short application of the current, No. 18 was easily read. On the second visit the following day, for the current, the patient could even make out words in No. 17. After a short sitting words in No. 13

could be made out with No. 10 convex glass, which glass, for the first time, seemed to assist in seeing. Heretofore the patient, who is an intelligent young lady, would say the glass only made things look brighter, but aided little in separating the letters. The vision is now so good, that all objects in a room are quite distinctly seen. After these two trials I was obliged to simply give the patient a glass with which to exercise the eye, until she is able to come to the city again.

Without detailing cases in which no thorough test has been made, I would suggest that those who have an opportunity give squinters a trial before an operation is undertaken, for noting the effect upon the vision and on the muscle.

#### EXOPHTHALMIC GOITRE.

I am not at all convinced that even this disease, which is so confessedly a disease of the sympathetic, can be even benefited by galvanization of the sympathetic. My experience with the current has only embraced three cases. Such cases are numerous enough, but the patients are told that nothing can be done, hence but few apply to the oculist except in inordinate protrusion.

I am aware that favorable reports have been made of the galvanisation of the sympathetic in exophthalmic goitre, but I am, myself, unable to report any thing favorable.

#### ATROPHY OF THE OPTIC NERVE.

My experience in atrophies of the optic nerve has been limited, both as regards the primary and secondary forms.

Until recently I have treated such cases by the hypodermic injection of strychnine, and only in a few of these instances have I been able to resort subsequently to galvanism. In passing, I may state that I have never been able to see the *slightest beneficial result* from the hypodermic use of strychnine in any form of ocular trouble, nor have I ever seen a patient so treated who had received any benefit.

I would hesitate in giving so strong a statement if the treatment involved any special skill in its proper accomplishment, as the authority for it is so high.

The results of galvanism in all atrophies with me, so far, have been *nil*.

## COMMOTIO RETINÆ.

In Vol. VI., No. 17, April 25, 1874, of the "Clinic," I reported two cases of commotio retinæ treated by the current, which, from the remarkable result, will certainly bear a repetition.

To quote from the record: "The very striking recovery, and not the character, of my cases is the inducement, however, for me to put them on record. The artificial leech and blisters have been recommended to equalize any disturbance in the circulation, either present or to follow, but it seemed to me that there could be no possibility of any disturbance in the circulatory balance, (1) because the eye could detect none by the most careful and prolonged comparison with the opposite sound eye; (2) none could be reasonably expected, for one case was not seen till the fifth day after the injury, the other not till the third day."

If any analogy, as Prof. v. Græfe once remarked, exists between a "commotio" of a nerve of special sense and a paralysis of a motor nerve, as, for example, the temporary paralysis of an arm from resting the head on it in sleep; then it seemed to me that the hypodermic use of strychnine was not exactly indicated.

Excluding, then, these different remedies, I concluded to try first the effect of the constant current.

My first patient, a German girl for whom I had prescribed glasses two years ago on account of hypermetropia, said that while splitting a piece of board with a hatchet a splinter struck her on the lower lid, and that after she could open the eye she found she could not see with it.

When she presented herself five days after the accident, being finally convinced that the sight was not going to return of itself, I found the skin of the lid unbroken, and as she complained so little of the injury itself, I suspected the eye might have been blind before the injury, and she had only then found it out.

On referring to my case-book, the record showed that each

eye had been examined when I prescribed the glasses, so such a supposition had to be abandoned. She could barely distinguish light. (The record shows she could about tell where the window was, though there is an interrogation point after the statement.)

I applied the Z pole of my Siemens and Halske battery (using 10 cups) to the neck, and passed the other over the closed lids for about a minute, and removing it she quickly remarked, "It's all right now, I can see." Putting on her glasses, she read Nos. 7 and 8 Jæger quite readily. I applied the current again, when she read No. 1.

She came back the following day, saying her eye was not so well. I again applied the current, and told her to return the next day. She said, on her third visit, that she thought she was about well, but I gave her a short sitting, after which I did not see her until she came in, in about ten days, to ask for her bill, remarking that her eye was as well as ever.

My second case was a boy about twelve years of age, who was struck upon the eye with a top.

When he presented himself, I found him unable to follow my lighted taper, though he seemed to be able to tell when it was close in front of his eye. The reflex action of the pupil, as in other cases, was good, and an ophthalmoscopic examination revealed no changes in the fundus.\* I applied the current in the same strength and manner as in the first case, with almost the same brilliant result. No. 10 Jæger was easily read, and the next day, before trying the current, No. 6 J. A second sitting was quite sufficient to restore perfect vision.

Of course one of two things must have restored the vision in these cases, either the current or the pressure of the electrode. Some one may be ingenious enough to explain *how* the latter operated, if the cause, and we have not only the old treatment done away with, but even the simple one by galvanism superseded by the still simpler one of pressure.

This report was the means of bringing one patient from In-

\* I was unable to get a very clear statement from either patient in regard to the phosphenes. After a patient explanation and many trials, I was really but little the wiser. And this has not been an infrequent experience, although the matter seems simple enough.

diana, who had lost one eye by an accident similar to the one happening to my first case. I found an exquisite atrophy of the papilla and absolute blindness. At the patient's earnest solicitations I made a few applications of the current, but of course without any effect, though the patient insisted that he could tell where the window was. A careful examination convinced me that no change had been produced. In addition to this case, which, as I have said, came to me from hearing of my published cases, I have seen and tried the current on one other with the same negative result.

There was *pure* atrophy of the nerve in both, and no other visible trace of injury. I presume every one who treats diseases of the eye has met with a case or cases where atrophy of the papilla has followed from concussion.

When I come to give my experience with the current in affections of the ocular muscles, I feel relieved from that sense of wanting to beg the reader's pardon which one has when speaking of nerves of special sense.

#### MYDRIASIS.

Five years ago I treated a patient from a Southern city for mydriasis of the right pupil, with no attendant paresis of accommodation.

Long-continued use of physostigma was of no service.

While passing through the city a few months since, he called to get some additional advice about glasses, and I persuaded him to remain and have the dilatation of the pupil treated with galvanism. The applications were thoroughly made for four days, but I was unable at the end of that time to see any effect. Whether a longer course would have been of service or not, I am unable to conjecture. I see that Professor Erb has found cases of mydriasis very obstinate, while Dr. Driver remarks, "the cure is often surprisingly quick." It is certainly an affection in which one would be led to expect favorable results from the use of the current.

#### PTOSIS.

In January, 1874, a river pilot applied to me for left ptosis, associated, as an examination showed, with slight paresis of the superior rectus.

I galvanized the muscles at intervals for several months, always increasing the ability of the patient to raise the lid, whose free margin extended about half way over the pupil, to even beyond the sclero-corneal margin; but by the next sitting it was entirely lost.

Strangely enough, before I made an operation for the permanent relief of the ptosis, which was done in July, I found the patient no longer had double vision. So the paresis of the ocular muscle was entirely relieved by the current.

#### PARALYSIS OF THE OCULAR MUSCLES.

Among the various cases of paralysis of the ocular muscles thus treated, was one in which the little patient, a boy of five, fell upon a stick that cut the lower lid and paralyzed the inferior and internal recti muscles, the eye standing far upwards and outwards, producing a peculiarly frightful stare.

The case was brought to me for an operation, about three months after injury, he having but little ability to converge the eye. I insisted upon a trial first with the constant current, a process strongly opposed by the father, since "they had already tried electricity." Even after the first sitting, I could see the most marked increase of control over the paralyzed muscles. After six sittings the eye could be brought about straight. The treatment was then interrupted for six weeks, when there was still considerable divergence remaining, especially for the distance.

I made four more applications in a little over two weeks, and saw no more of the patient for three months, having been assured by the parents in the mean time that the eye was straight, a fact I was able, by an examination, to confirm.

#### INSUFFICIENCY OF THE INTERNAL RECTI.

I am constantly in the habit of using galvanism in the treatment of insufficiency of the internal recti, and find the greatest difference in the ease with which patients read. The question, however, of the treatment of this want of balance in the ocular muscles will scarcely allow any decision as to the rôle

galvanism is capable of playing ; at least, my experience has not afforded me sufficient data.

I have in almost all cases used it simply as an aid when prisms have been adopted, or convex or concave glasses, the patient being hypermetropic or myopic with attendant insufficiency. Of course in such cases I am not able to say what could have been accomplished with it alone. I think others, who have used the current under similar circumstances, will testify to very satisfactory results.

I have at present an exquisite case of insufficiency of the internal recti in a boy of fourteen or fifteen, who, before I began the use of the current, would see objects double at any distance. I had used the current for four months, when he saw single up to within two and a half feet. After an intermission of two months, the power of convergence had even increased a little, and at present he can make the proper convergence up to within twenty-seven inches, an improvement going on all the time, though now he is wearing weak prisms with the bases inwards. After assuming the prisms (not ordered by myself), a trial without the current soon showed the immense benefit of the current in not only the infinitely greater ease with which he could read, but also in the increase of the time.

At the termination of each sitting he is able to see single as close as the object can be seen.

#### SPASM OF ACCOMMODATION.

The current seems also to have a very marked effect upon spasm of the accommodation.

I have had children unable to see more than the large E of the test-types, who, after one application, could read No. 20 at twenty feet, showing perfect vision. Many of such cases are hypermetropes who have strained their eyes in school without the proper assistance of glasses.

I now never prescribe concave glasses without first having tried the current to bring out all the vision the eye possesses. In many of the cases I have examined where glasses have never been worn, I have found considerable *apparent* myopia, which was readily relieved by the current.



It has seemed to me a good field for examination, as such a condition is by no means simply relieved, and in a city so gloomy as ours, with the public-school buildings limited in their facilities for light, the question assumes startling proportions.

After excluding the results of the wonderful faith patients have in such an application, and the various sources of error, I am confident that the constant current has not as yet taken the position in ophthalmic practice that is justly its due.

There is the most sublime state of contradiction, incredulity, and faith in regard to the results of the current in this department.

One authority of the highest order will report the most astounding results in a nonchalant manner; while another, equally high, coolly says, "My own trials have been wholly negative in their results."

The verdict of the aural surgeons at Dresden was almost unanimous that its value was rare and limited.

I long since gave up all hope of producing Brenner's formulæ, and I think very little doubt now remains that the secret will find but few discoverers.

That the acoustic will respond to the current, there is the best authority and every reason for believing.

I perhaps may as well state at the outset, that my attempts thus far have been rewarded by more "hopes" than "practical results."

The application of the current in ear-diseases entails so much time and patience, that a settlement of the question of its true place in aural therapeutics seems most difficult. That wonderful results have been reported from its use ought not to surprise any one, since similar surprising ones occur from other methods of treatment.

For example, I once took a dispensary case before the class to illustrate mechanical dilatation of the Eustachian tubes. The patient (about twenty-eight years of age) was excessively deaf, only hearing conversation in the loudest voice quite near the ear. Her own voice was very much changed; the conducting-power of the cranial bones very much reduced, closing the meatus making no difference in the distinctness with which the fork was heard.

As the patient had been deaf for about fifteen years, I concluded from all the symptoms that the nerve was involved ; but after introducing the cat-gut into the tubes, the patient remarked, "I can hear all you say now," though I was only speaking in an ordinary tone. The test with the tuning-fork showed the greatest difference in the length of time it could be heard, as well as in the distinctness.

Mr. Hinton gives in his book a case that occurred in Dr. Cassels' practice in Glasgow, in which the cochlea in a semi-necrosed state was removed entire from the ear. The hearing power for the voice before its removal "was very bad, and the watch not heard on contact ; after it, however, the hearing for conversation was improved, and the watch distinctly heard off the ear (about half an inch), and very loudly when held in contact with the auricle." Mr. Hinton details, immediately after this case, some experiments he made upon a patient to determine whether any hearing power remained after the loss of the cochlea, and says, "I inferred, therefore, either that there remained some power of hearing on the right side (the side from which the cochlea had been lost), or that the meatus of one ear facilitates the passage of sound to the nerve of the other." If, then, we have to do with so mysterious an organ, we certainly should not be surprised at even a Brenner formula.

In fact, there are many incontrovertible results now on record from the most accurate observers, to show that the acoustic can be reached and influenced by the current. It is, however, true that the number of those who have obtained negative or inconclusive results are in the majority.

Notwithstanding Prof. Moos's "conclusions" in his article on "The Diagnosis of Complete Paralysis of the Auditory Nerve" (Arch. Ophthal. and Otol., vol. ii., No. 1), I had the opportunity for treating a case of *absolute* deafness resulting from brain syphilis, and availed myself of it.

The patient was a woman of forty, whom I had treated several years previous for specific iritis, and who subsequently was treated for brain trouble diagnosticated specific. During the treatment the patient had convulsions, was paralyzed, etc., and finally it was discovered that she was totally deaf. Several

months after her recovery from the general trouble, she came to me to see what could be done in regard to the deafness.

I found her totally unable to hear the vibrations of the large tuning-fork (Politzer), either resting upon the cranial bones, or with the handle in the meatus.

I was unable to use more than ten cups, one electrode in the hand, the other pressed upon the tragus. The treatment was made three times a week for a month, gradually throwing in the 2100 resistances three times during each sitting. At the close of the thirteenth sitting, on applying the tuning-fork, the patient remarked, "I hear the sound now."

At the end of two weeks I found, after introducing 1100 resistances, and changing the current, the tinnitus, of which she complained a great deal, would cease.

As the treatment progressed, the tinnitus could be perfectly silenced even with two cups and seventy or eighty resistances, but always to return after the current ceased, no matter how gradually I would diminish the number of cups and resistances.

The experiments were always conducted with the patient's back to the apparatus.

The treatment was continued altogether about ten weeks, when the patient ceased coming.

The change produced was the ready ability of the patient to hear the tuning-fork through the cranial bones and in the meatus. Of course the discouraging point was the very slight, if any, improvement after the first month, but during the latter part of the time there were some symptoms of renewal of the brain trouble.

That some changes had taken place, the patient's face and tone were sufficient proof. When the fork was placed upon the ear, while at first the face remained dull, and the reply in a drawling tone was, "No, I don't hear any thing," the face at length would brighten up on the application of the fork, and the reply would come quickly, "I hear it now." I had no opportunity to renew the applications.

The benefit, if it could be called such, of the "resistances" was very marked, for only by their use could the tinnitus be controlled. I have used the current in quite a number of

cases of deafness from cerebro-spinal meningitis in children, but as yet with nothing but negative results. I might perhaps except a single case, in which the child seemed benefited, evidenced chiefly by its not only retaining what power of speech it had, but having also a slight increase of it.

The treatment was continued over a year in a very irregular manner.

It would, after the treatment had been instituted for some time, grow impatient if the tuning-fork was placed upon the head when not vibrating, while if set in motion it seemed to listen, though, as it never said any thing about hearing it, I concluded it simply felt the vibrations.

I presume each man's experience is of some value in the table from which the sum total is to be formed. Of course the important question in the aural department is, Is galvanism of service, and if so, under what circumstances? It seemed for a long time as if the question was, "Are Brenner's formulæ true or false?" Fortunately, the principle is of more consequence than the man, and a seemingly so rational therapeutic agent will certainly command attention until its true place is far better understood than at present.

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X.—*Chronic Alcoholism.* By GEORGE M. BEARD, M.D.

*Chronic alcoholism* I would define as a *chronic disease of the nervous system, usually functional*, though it may lead to structural lesions, excited by *long-continued use of alcoholic liquors*.

I use the term *functional* in the sense in which it is commonly employed, to describe a morbid state that is not revealed by coarse or well-recognized pathological conditions. I would prefer the term *aneuric*, which, by its derivation, means disturbance or weakening of nerve, since it expresses the condition as nearly, perhaps, as we can now get at it; but this term I have but recently devised, and it has not yet passed into professional language. In the earlier and milder forms of the disease, it is probable that neither the microscope nor the spectroscope could reveal any lesions. If any exist, they are probably too delicate and refined for any of the senses to discover, even

with all the resources of modern research at our command.

Other parts of the body, and notably the liver, may be affected injuriously by alcoholic liquors, as everybody knows; but the term chronic alcoholism strictly applies only to the nervous system, although the bad effects of alcohol may be, at the same time, experienced in other organs. A patient suffering from chronic alcoholism may suffer also from cirrhosis of the liver, but that disease of the liver is not a part or symptom of the chronic alcoholism; it is rather a *co-existing disease* induced by the same exciting cause. Chronic alcoholism is, then, distinctively a *nervous* disease, and as such let us study it. The leading symptoms of chronic alcoholism, by which it is usually recognized, are these:

1. Insomnia.
2. Vertigo.
3. Headache.
4. Tremors.
5. Hallucinations.
6. Difficulty of breathing.
7. Mental and muscular debility.
8. Mental depression.

To these general symptoms may be added a large number of special nervous sensations of an abnormal though very vague character. Thus there may be aching, and weakness, and heaviness of the eyes, and photophobia, that make it impossible to read long without pain. There may be a slight difficulty of hearing, and speech may be affected to such a degree as to become slow, thick, and uncertain. Creeping chills pass over the surface of the body, especially down the spine. A feeling as though an army of imprisoned ants were crawling just underneath the skin and trying to find their way out, is sometimes experienced by this class of patients. Instead of crawling ants buzzing bees may be felt on or beneath the skin. Numbness, or a sensation of numbness so slight as not to be detected by the æsthesiometer, may be felt in the hands or feet, or, what is more common, may be developed by slight pressure, as on the branches of the sciatic nerve in sitting, or in the branches of the ulnar nerve when the elbow is rested on a chair or table. Ab-

normal cold or heat may be felt in extended surfaces, or minutely localized. Pricking, stinging, and many other subjective phenomena of an indescribable character are realized. The spine at certain points may be very tender. The disease does not always stop with these indefinite and comparatively trifling symptoms, but may advance until fixed paralysis of motion or sensation, or of both, appears; muscular contractions, with rigidity, may ensue, and all these symptoms may be complicated with or followed by insanity. Even when positive insanity does not occur, the mind usually suffers, and in various directions. Besides the great depression that sometimes suggests suicide, the memory becomes feeble and illusive, and cerebral control is perceptibly weakened.

Now, in surveying this wide group of symptoms, we see clearly—and this is one cardinal thought I would seek to impress—that there is in them nothing distinctive or pathognomonic: any one of these symptoms, or any number of them, or all of them in any possible combination, may arise in a nervous patient who has never tasted alcohol. Any one who inherits a nervous temperament is liable, under any exhausting influences, to suffer from any or from all of these symptoms. They are, indeed, more frequent among total abstainers or very moderate drinkers than among the intemperate. Cerebro-spinal fever and sunstroke have for their sequelæ symptoms very much like these in every feature excepting the hallucinations, as I have elsewhere shown in a recently published paper.\* All of these symptoms in every possible combination are found in hysteria, and in neurasthenia, and other affections allied to hysteria. If a number of patients should present themselves before me, all suffering from the symptoms above described—one hysterical, another simply nervously exhausted, another who had been prostrated by heat weeks or months before, another who had experienced an attack of cerebro-spinal fever, and another a victim of chronic alcoholism—I could not determine by the symptoms alone which was the alcoholic patient.

Among the graver results of chronic alcoholism, are alcoholic epilepsy—which is more curable than ordinary epilepsy—conges-

\* Archives of Scientific and Practical Medicine, No. iv.

tive mania that may terminate in dementia, also general paralysis, melancholia, and mania. According to Dagonet,\* microscopic examination of the cerebro-spinal system in cases of severe chronic alcoholism, discovers atrophy and hardening of the brain substance, effusion in the ventricles, thickening of the lining membrane, granular or fatty degeneration of the nerve elements and vessels. Amyloid corpuscles are also found. Lancereaux regards all these pathological changes as analogous to those that take place in the liver—that is, that they simply indicate fatty degeneration.

In making the diagnosis, there are three considerations to guide us :

1. The history of the case. If it can be found that the patient is now or has been a very free drinker of any kind of alcoholic liquors, and especially if he has had, at any time, acute alcoholism, or delirium tremens, we are right in at least suspecting that we are dealing with a case of chronic alcoholism. It is not necessary that the habit of hard drinking should *immediately precede* the chronic alcoholic symptoms. One may break off the habit of drinking and not enter into the sufferings of alcoholism before months have elapsed. Marcet reports a case of a man who had abandoned the custom of hard drinking two years, and then the nervous symptoms came upon him like a strong man armed.

2. Finely organized nervous temperaments are less likely to suffer from chronic alcoholism than the coarsely organized, and those in whom the nervous temperament does not predominate. At first view this is inconsistent, if not paradoxical ; here is a disease, all the symptoms of which are nervous symptoms, which is caused by alcohol, a substance that directly affects the nervous system, but which is not so frequent among the very nervous as among those who are of a coarser and harder fibre. This paradox is not peculiar to chronic alcoholism ; it appears in other nervous diseases with which alcohol has little or nothing to do—as spinal congestion, locomotor ataxia, progressive muscular atrophy, apoplexy with hemiplegia—all of which diseases, as I judge from long opportunities of studying

\* Annales Médico-Psychologiques, May, 1873. Quoted by Blanford in The London Medical Record, August 13, 1873, p. 510.

them, are more common among those who are rather tough and hardy, and if not of a coarse organization, at least not of the finest. I explain this anomaly in this way: Constitutions that are specially nervous are also specially sensitive, and impressible to any good or evil influences; they feel and show the effect of any agent acting on them speedily and in various ways, and thus give warning from afar of coming danger. Thus the nervous man is able to foresee the evil and to hide himself, while the sanguine, the lymphatic, and the bilious pass on and are punished. The nervous man can not, if he would, commit the excesses of the sanguine and the phlegmatic, for nature kindly and constantly warns him in time; headaches, indigestions, and general nervelessness are in him excited by even moderate indulgence; hence he is obliged to desist from or to diminish his potations before chronic alcoholism has had time to get firm hold of him. There are in our land, above all others, thousands and thousands of hysterical women and hypochondriacal, neurasthenic, brain-working men, who can not take a glass of ale, or porter, or of any kind of wine without paying the price by flushing of the face, headache, and general wretchedness, that take away all temptation to repeat the experiment. The sanguine-lymphatic temperament may be likened unto a staunch and sturdy merchantman, which makes long and perilous voyages, and runs the constant risk of foundering or shipwreck. The nervous temperament may be likened unto a swift and delicate yacht, too fragile to encounter rough seas, and so it never goes far enough to get into danger. Again, the nervous man may be compared to the sensitive-plant, which shrinks at the slightest touch, and thus saves itself from harm; while the sanguine-lymphatic temperament is like the giant oak, which rises defiant against the sky, but, by its very height and extent, is liable to be prostrated before the storm.

*Causation.*—The great *exciting* cause of the disease we are considering is the *long-continued use of alcoholic liquors in relative excess*. Any liquors that contain alcohol may excite the disease, but raw spirits are, of course, the worst, especially when habitually taken on an empty stomach. It is *alcohol* mainly, and not the adulterations contained in alcoholic liquors,



that excite this disease ; and here, by a kind of chance, I seem to be in accord with those who are violently opposing and unscrupulously misrepresenting all that I have written on the subject of temperance. Most of the adulterations are either harmless or comparatively so, or, at least, in the quantities in which they are used have less marked effects on the nervous system than alcohol. Excess, I need not add, needs to be qualified by the term relative, since what is excessive for one man is normal for another.

I would specially insist on the significance of *civilization as the great predisposing cause of chronic alcoholism*. Alcohol alone, in quantities however great, seems to be powerless to produce this disorder unless it acts on a nervous system previously made susceptible by in-door life and nerve-exhausting influences, such as the printing-press, the telegraph, and the railways that are peculiar to our modern civilization. It is not necessary that we should become excessively nervous, but that we should become considerably so, before alcohol can produce chronic alcoholism. In this view I am justified by the fact that we have no clear evidence from history that chronic alcoholism as a disease has ever appeared among the savage or semi-savage peoples, who are the grossest abusers of alcoholic liquors ; and it is far more frequent now than it was among our ancestors of but a few generations back, who indulged in intoxicating drinks to a degree that seems to us past belief. There never was a time in the recorded history of modern civilization when, in proportion to the numbers, there was so little use of alcoholic liquors among the respectable classes as now ; and there never was a time, probably, when there was so much of chronic alcoholism among these very classes ; indeed, it is but recently that attention has been called to this disease, and we may justly believe that its increasing frequency has compelled our scientists to give it attention. The Anglo-Saxons are by nature a race of gluttons and drunkards (although by grace and culture the better portion have become temperate and gentlemanly), and the climate in which the English, Americans, and Scandinavians live is one specially calculated to foster the habit of inebriety, and yet the alphabet of drinking is something that we have yet to learn. Why, there are tribes in Africa and in

the islands of the Pacific who are drunk almost from birth to death; their normal condition is to be drunk as with us it is to be sober. You are all aware that a century or so ago it was the custom among our ancestors, especially in Scotland, to celebrate every distinctive or trifling event—births, funerals, weddings, barn-raising, house-warmings, and so forth, to infinity—with profuse imbibing of strong liquors. Now among certain savage tribes this custom still prevails in most disgusting enormity. The East-African “drinks till he can no longer stand, lies down to sleep, and awakens to drink again.” Reprove an Angola negro for being drunk, and he will reply, “Why, my mother is dead,” as if that were excuse enough. In our land the sight of a man who has been wounded and scarred in a drunken brawl is by no means common, save among the very lowest orders; but in certain regions of Africa there are whole tribes, nearly all of whose members are thus disfigured. The truth is that this whole habit of intemperate drinking is a survival of savagery; it is a projection of barbarism into civilization, and, like other savage survivals, it is gradually disappearing among all those classes where civilization really prospers. It is true that all savages in cold or hot climates are not intemperate, but that is because they can get nothing to drink. The North-American Indians were generally sober, but for the same reason that the inmates of Sing-Sing are sober—they live under a rigid prohibitory law; but open a cask of rum before a hundred Indians, and in an hour you will have a hundred drunkards. And yet, notwithstanding this enormous excess of savages, there is no evidence that I can find that chronic alcoholism prevails among them; injured they must be by their prodigious potations, but probably not through any form of nervous disease. Among all barbarous people insanity, hysteria, neuralgia, insomnia and nervous dyspepsia, and all other functional nervous diseases, are either rare or utterly unknown. Chronic alcoholism is one of a large number of diseases for which we have to thank the nineteenth century. It seems to increase as the habit of drinking diminishes; formerly any amount of drinking would not cause it, now it may follow excesses comparatively slight.

*Race.*—In a paper on “*The Cosmic Law of Intemperance,*”

which I published last year in reply to the Report of Dr. Bowditch, of the Massachusetts State Board of Health, I have considered the relative influence of climate and race on drinking customs, and what I then said need not here be repeated. In the same paper, as also in my work on "*Stimulants and Narcotics*," I have given the authorities for my statements and conclusions. Granting that in the long lapse of ages, in the slow evolution of humanity—through we know not how many millions of centuries—race is a *result* of climate; yet in appreciable historic time, that is, within the past three or four thousand years, race rises everywhere, more or less, superior to climate, and, within certain limits, prevails over it; and this habit of drinking is one of the features in which the dominance of race seems prominent. Most strikingly this is illustrated by the history of the Hebrews. This peculiar people have gone out through all the world and their descendants to the very ends of it, under all climes, and in the presence of all forms of alcohol, and yet chronic alcoholism is very rare among them, if indeed it can be said to have with them any existence. They are not abstainers; they drank the wines of their native Palestine, they drank the beers and wines of Germany and America; there is no other race that so universally drinks, there is no other race that is so universally sober—they drink but are not drunkards; but there seems to be in their nervous system some subtle and never-failing transmissible force or quality, as much a part of their constitution as their physiognomy or avarice, which, mightier than climate and stronger than all temptation, enables them to take coals in their hands without being burned, which can always say to alcohol, under all its disguises, "Hitherto shalt thou come but no further, and here shall their fiery power be stayed."

There are no other people who have gone into all climates to the extent that the Jews have, and yet retained so successfully the habits of temperance. The Italians and Spaniards are much less disposed to chronic alcoholism than the more northern nations. In recent times the disease seems to have been increasing in France, where formerly it was uncommon. But the race above all others predisposed to this disorder is the Anglo-Saxon. It is, indeed, in England and America, and

among the Scandinavians, that attention was first and most earnestly called to this disease.

*Climate.*—In regard to the influence of climate, independently of race, my researches seem to show that the disease is most frequent in temperate and cold climates. The habit of excessive drinking is not confined to any climate; it most abounds in the tropics and in the coldest regions of the North; but between the temperate and the tropic regions there is what I have termed the “temperate belt,” which embraces the southern part of the north temperate and the northern part of the torrid zone, and in which all round the globe there is less intemperance than in any other inhabited region either north or south of it. This belt includes Spain, Italy, Southern France, Turkey, Syria, Persia, North Africa, Southern China, and Mexico. The excessive drinking of hot or of even warm climates induces disease of the liver, but not chronic alcoholism, at least among the natives. The chosen home of this disease, so far as we now know, is the belt including Sweden, Great Britain, and the United States; concerning Russia I have no information. It is a noteworthy fact that not only alcoholic liquors, but coffee also, can be used more freely in warm than in cold climates. In a most interesting way this is illustrated in our own country, where the Southerners of the respectable class drink far more freely than their Northern friends of the same class, and show it less. Moisture and dryness, and probably also atmospheric electricity and ozone, and especially *the alternations of heat and cold* in the northern part of the United States, are factors that give us a partial explanation of the unparalleled nervousness of the Americans, and also of the great prevalence of chronic alcoholism among us, in spite of the fact that in our better classes there is more of total abstinence than in any other civilized nation. The air of California is exceptionally dry, and nervous diseases are alarmingly frequent there, and the effects of inebriety are of the most serious character, even in the wine-producing districts.

*Sex.*—All authorities, I believe, concur in this, that alcoholism is more frequent among males than females. Out of 938 cases of chronic and acute alcoholism observed by Magnus

Huss, Rayer, Bang, and Hoegh-Guldberg, only 34, or about one in 27, were women.

The explanation I would offer is two-fold: *First*. Women are more temperate than men. Among the higher and middle classes the difference between the sexes in this respect is enormous. Among the lower orders, and particularly among the worst ranks of our foreign population, and among prostitutes of every race, this difference is less striking. Sad cases of inebriety among women, even of some education and culture, do occasionally fall under the observation of the practitioner, but even in our fashionable luxurious circles they are so infrequent as to excite surprise as well as pain. And among the so-called middling classes—the families of our educated lawyers, physicians, and merchants, and the better portion of agriculturists—feminine intemperance is almost unknown. An eminent physician of this city, who for many years has had a very large practice in our most fashionable homes, tells me that he had seen but two cases of intemperance among his educated female patients. I can recall but three or four cases that have been brought to my attention among the higher classes, and none of these have been under my care for chronic alcoholism. Chronic alcoholism is a masculine disease. Freedom from it is one of the compensations for being born a woman.

*Secondly*. The organization of civilized woman, and notably of the American woman, is so sensitive and impressible that it can not bear alcohol, nay, even does not usually desire it, and only very rarely can carry its use to an excess sufficient to excite alcoholism, acute or chronic. We have seen already that nervous temperaments are less disposed to the disease than the sanguine and the lymphatic; in women the nervous is the predominant type. Very few of our finely organized American women have any desire to drink, and those who do have such desire are but rarely able to drink enough to induce symptoms of chronic alcoholism.

*Age*.—About the prime of life, between 37 and 42, seems to be the time when the symptoms of this disorder oftenest appear. The habit of drinking to excess is almost always formed earlier than this, but months or years are necessary, as a rule,

to so exhaust the nervous system as to excite the symptoms of the malady of which we are speaking. The period between 37 and 42 is a critical period in life, especially in civilization. Then, and frequently earlier, the creative capacity of the mind reaches its maximum;\* the nervous system, which has hitherto been growing and strengthening, and has been mighty to resist all assaults, is either stationary or begins its slow decline; and, as a natural result, the excesses of youth and early manhood of every conceivable form, gathering momentum through long years, overcome the resistance of the wearied nerves, and we have functional or even structural disease, and sometimes sudden death. During the past few years several of the most prominent and promising physicians of New-York have been taken away at this period. Statistics on the subject can not well be obtained, but the illustrations that come under general observation are deeply suggestive. There rise before me as I write the names of Byron, of Raphael, of Mozart, of Pascal, of that bright genius Fresnel, all of whom were taken away about this period. Marcet, in his work on chronic alcoholism, mentions 41 as the time when the disease is most likely to appear, and says that the youngest patient that came under his treatment was 18 years old, and the oldest 75.

*Occupation and Personal Habits.*—In-door life seems to predispose to this disease. Active muscular work in the open air is, generally speaking, an antidote of a most potent character to the evil effects of stimulants and narcotics of every kind. Men who in the army and in camp could drink coffee by the quart, pour down whisky by the glass, and smoke and chew all the day, find that on return to peaceful and confined callings, they must curtail indulgence or suffer most sadly. Occupation of any kind, mental or muscular, helps the nervous system to resist the action of alcohol; even brain-workers, who live in-doors nearly all the time, are, other conditions being the same, less disposed to alcoholism than muscle-workers. Absolute indolence invites this, as it invites many other diseases.

Personal habits in other respects than that of drinking must

\* See my pamphlet on "The Relation of Age to Work."

of course be taken into our estimate. Sexual excesses, extravagant intellectual exertion, emotional excitements, and free indulgence in tobacco, all may help to predispose the system to alcoholism.

*Prognosis.*—The prognosis of the disease, if the habit of drinking can be overcome, may be regarded as favorable as the same symptoms induced by other causes ; in other words, the majority of the cases under proper treatment will recover or greatly improve. Here, as in all functional nervous affections, much depends on the mental organization of the patient. The great element in character that is required, the one thing needful, is *grit*. In this, as in every other difficult task on which men enter, the issue is determined by pluck more than by any other single quality. Lack of will-power is, indeed, one predisposing source of chronic alcoholism ; he who can not command his passions drinks till his nerve-force is burned out of him ; and one sad effect of this malady is to drive out what little will it finds in the man. In the treatment of this disease, as in the treatment of hysteria, neurasthenia, and the milder phases of insanity, he who has a sufficiency of will may snap his fingers at the druggists and laugh the doctors to scorn. Among all the allies of medical treatment, hygiene, society, and native physical stamina, I count this element of will the strongest ; without it we can do little or nothing, with it we can do almost all things. In giving this prominence to force of will, I do not overlook the fact of the necessity of other important qualities, and notably of the reasoning faculties, and it is a further advantage if reason and will are not antagonized by a too liberal endowment of the emotional qualities. Success and failure in life generally are the results of a combination of qualities acting with a combination of circumstances ; and in the attempt to cure an alcoholic patient it is a large advantage to have a strong, resolute character to work on, and to work with us, and to supplement the weak forces of medicine and hygiene.

If the habit of inebriety clings to the alcoholic sufferer, our task is, of course, quadrupled, for here we have not only to replenish exhausted nerves, but to prop up the failing will, which, if it were strong and healthy, would be our most potent

ally. The poor man must wade through the Slough of Despond ; he must crawl up the Hill of Difficulty ; he must even enter the Valley of the Shadow of Death ; and if by good fortune we succeed in getting him on the Delectable Mountains, we have no certainty that he will long remain there.

This whole subject of the relation of character to disease is too profound and too wide-reaching to be here discussed. I only suggest the query whether it has not been and is not too much overlooked in our prognosis of treatment of all nervous diseases. One reason why women are more hysterical than men is, that they have relatively less reason and less will than men. Dr. Ray, whose authority is of the very best in such matters, says that intellectual and cultivated lunatics in our asylums recover more rapidly and more surely—in a word, have a better prognosis—than the stupid and uncultured ; and this view corresponds with and confirms my own researches in the biography of insane geniuses. If I mistake not most seriously, very few indeed of our most richly endowed natures ever become the victims of chronic alcoholism, or ever apply for admission to our inebriate asylums. Men of wild and wondrous imagination, I am quite aware, brilliant and wayward geniuses like Burns and Poe and Byron, have sold themselves into the slavery of alcohol, and have died in their chains. But poetic imagination is not the highest part of human nature ; it is rather a second-rate faculty, great but not the greatest, midway between the passions and emotions below, and the reason above ; a faculty that rises and grows without culture in the mind of the child long before reason has declared its presence ; a faculty that reaches its richest and most precious development, not in civilization but in barbarism ; the one intellectual attribute of the savage and the slave ; a faculty which, like passion and emotion, is checked and curbed in the atmosphere of high culture, and hence attains its greatest brilliancy and influence in the comparative infancy of mankind, and has waxed less and less active, less and less potent with the advance of the race.

Men whose minds are thoroughly balanced, who have large reason and profound scientific genius, the true princes of the earth, almost never become grossly intemperate, and if they do fall into such evil courses they readily recover. One could



scarcely conceive of a Goethe, a Humboldt, a Newton, a Spencer, or a Darwin in an asylum for inebriates. The sum of the whole matter is that one of the very best remedies for and preventives of chronic alcoholism is found in *character*.

*Treatment.*—This disease should be treated—as analogy and experience both show—on the same general principles as the same symptoms coming from other causes. The cardinal need is to improve the nutrition of the central nervous system. The really good remedies at our command to accomplish this are not numerous; but they are potent and mighty for the upbuilding of broken-down nervous systems. The leading remedies on which we are to rely are these :

1. *Preparations of zinc and phosphorus*—notably the oxide and phosphide of zinc, the so-called chemical food, Horsford's acid phosphate, and so forth. Of these remedies the oxide of zinc has the oldest reputation, and it is really a remedy for this affection of great and peculiar power. Marcet claims to have cured the majority of his cases by this remedy alone. Zinc, like phosphorus, calms the fretted nerves and induces sleep, which is a great want in these cases. I should like to see phosphorus, and especially the form known as phosphide of zinc, in doses of from  $\frac{1}{20}$  to  $\frac{1}{5}$  of a grain in a pill form, tried thoroughly in chronic alcoholism. Phosphorus is nerve-food, and ought to feed the exhausted brain of the chronic alcoholic patient as well as that of the hysterical or the sunstruck. The oxide of zinc is given in powder, dry on the tongue, or in water, or in the form of pills, but pills may become hard and difficult of absorption. Among the laity, it has long been the custom to treat inebriety by oxide of zinc in increasingly large doses, several grains three times a day, until both nausea and vomiting are caused. They aver that in this way the desire for drinking is destroyed, that thus they can lay the axe at the root of the tree, and extirpate both the disease and the exciting cause of it with the same weapon. I wish that the officers of our asylums would test this claim and see how much there is in it.

2. *Electricity in the form of central galvanization and general faradization, varied with galvanization of the brain, the spine, and the cervical sympathetic.*

Electricity used by these methods, in the hands of those who are familiar with electro-therapeutics, is something more than a stimulant merely—it is a *tonic*, a means of improving nutrition inferior to none other, in some respects superior to any other. I have used it in a number of cases of chronic alcoholism, sometimes with other remedies, sometimes without them, and with most satisfactory results. It allays nervous irritability, produces sleep, excites the appetite, and increases the capacity for muscular or cerebral toil. To use it successfully in cases of this sort, it should be used warily, with just discrimination, and patiently, and, above all, with that combination of caution and confidence that can only come from enlightened experience. In some of the insane asylums of this country and of Europe, electricity has long been used with advantage, particularly in cases of hysteria, hysterical insanity, in primary dementia and neurasthenia, and it would, I am sure, be a great gain if all our inebriate asylums could introduce the scientific use of this agent.

3. *Fat*, in the form of cod-liver oil, cream, and the fat of meat.

Cod-liver oil I give in an emulsion of yolk of eggs with phosphoric acid and bitter-almond water, a combination that I first learned of through my friend Dr. J. B. Andrews, of the Utica Asylum, and which I have variously modified.

4. Counter-irritation over the tender vertebræ and at the back of the neck. Very small and narrow blisters frequently repeated best accomplish this purpose, and when so used counter-irritation does much good and no evil.

I will illustrate these views by two or three cases.

Less than a year ago a gentleman of middle life [consulted me for many of the worst symptoms of chronic alcoholism. For six months he had drunk nothing intoxicating, and yet his sufferings from the effects of previous excess were very great. He had all or nearly all the symptoms, and had tried nearly all nerve-calming and nerve-feeding medicines except oxide of zinc. I advised him to take the oxide of zinc, beginning with one-grain doses, and in connection with it to take a course of electrical treatment. He was obliged to return home before there was a chance to give him even a single application of

electricity. Six months afterwards, when I had forgotten the circumstance, the same man came into my office and told me that the oxide of zinc had cured him.

*Chronic alcoholism of several months' standing; congested condition of the whole central nervous system; paralysis with painful muscular contraction; hallucinations; impairment of memory; difficulty of seeing; numbness of the hands; hyperæsthesia of feet. Recovery under central galvanization and galvanization of the muscles, combined with ergot and cod-liver oil emulsion and oxide of zinc.*

Mr. S., a young man of dissolute habits, I first saw in consultation with Dr. Teller, May 5th, 1872.

The patient, for three months, had been confined to bed from the effects of excessive drinking. The semi-membranosus and semi-tendinosus muscles of both legs were contracted to such an extent that he could neither walk nor stand, and could not get out of bed without assistance. These contractions were sometimes painful, and there was considerable aching in the legs. The bottoms of the feet were exceedingly hyperæsthetic, so that when general faradization was tried once or twice they could not be kept on the copper plate with comfort. When he attempted to stand, or was held up with assistance, the contact with the floor caused pain.

The legs were both reduced in size, and the electro-muscular contractility of nearly all the muscles was diminished.

Both hands were numb, but not profoundly so. *Muscæ volitantes* annoyed him, and there were slight hallucinations.

The eyesight was so much weakened, that across the room he could scarcely distinguish the color of flowers, and could read with ease only large type. The memory was so much impaired that he forgot from day to day the treatment that was used, and how it affected him; on that account it was difficult to ascertain what method of application was of most service.

There was sometimes a slight difficulty in urination. A certain degree of mental depression accompanied all these symptoms.

All the symptoms pointed clearly to a congestion of the brain and spinal cord with exhaustion, a result of the alcohol,

and in this congestion the retina probably shared, although the ophthalmoscope was not used.

There were tender spots on the spine, especially on the dorsal and lumbar region.

*All these symptoms were precisely such as may arise from chronic congestion and exhaustion of the brain and spinal cord from any cause whatever.*

The treatment I prescribed and used, was central galvanization, which the patient bore well, with the internal use of fluid extract of ergot in one drachm to two drachm doses three times a day, alternating with the cod-liver oil emulsion.

That the ergot did good was clear from the fact that it relieved, usually in the course of an hour or two, the aching in the legs. The same effect was observed after central galvanization. Localized faradization of the paralyzed legs was tried. Currents strong enough to contract the muscles irritated the patient, were quite painful, and aggravated the symptoms.

Oxide of zinc, in doses from one to three grains, was tried for a time, and then abandoned for ergot.

*June 10.* The patient was in every way better, but the muscular contractions continued; these were now treated by stable galvanization with mild currents.

*July 18.* Hands are well of their numbness, and are stronger; muscles are less contracted.

*July 20.* Could almost straighten his legs, and could walk with assistance into another room.

*August 15.* The patient could walk out, and was in a condition to return to active employment. After his recovery, the patient confessed to me that even during the treatment he had managed, by stealth, to get his drinks of whisky.

In closing this paper, I may, by way of recapitulation, briefly compress the ideas which I especially seek to enforce in these propositions.

1. Chronic alcoholism is a disease of the nervous system, usually of a functional or aneuric character, though it may lead to structural changes, insanity, and death.

2. The grand predisposing cause of the disease is civilization, which, by its constant brain-work and flurry and in-door life, brings the nervous system to that state of susceptibility where

alcohol, when acting on it for a long time, can excite functional disturbance.

3. Of the other predisposing causes, race would rank first, climate second, and the masculine sex third; then would follow age and temperament.

4. The disease is to be treated on the same general principles as the same or similar symptoms produced by any other exciting cause besides alcoholic liquors.

The great object should be to improve the nutrition of the central nervous system. Aside from all proper hygienic influences, such as out-door air, intellectual and muscular employment, good and abundant food, which, of course, are assumed to be necessary for all nervous patients, the best remedies we have at command in modern times, for improving the nutrition of the nervous system, are preparations of zinc and phosphorus; electricity, especially in the form of central galvanization and general faradization; fat, in the form of cod-liver oil, and the fat of ordinary food; and lastly, mild counter-irritation. Agents that palliate and relieve, like bromide of potassium and hydrate of chloral, mono-bromide of camphor, and so forth, have their mission in acute alcoholism, and to a certain extent in the chronic stages; but our aim should be higher, that is, to restore physical and mental manhood, which can not usually be done by mere palliatives.

I am quite conscious that in traversing so wide a field, I have touched on departments in which many of my audience have had noble chances for study, and I should be the last to expect that all the views I have expressed, or rather have suggested, should meet with absolute approval. In accepting the invitation of your president\* to present a paper before you, it occurred to me that this subject discussed in this way, however mistakenly or imperfectly, was best of all fitted to collect the best experience of your best men on the great questions that have drawn us here.

\* This paper was prepared originally by the request of Dr. Parrish, President of the American Association for the Cure of Inebriates.

XI.—*The Relations of the Nervous System to Diseases of the Skin.* By L. DUNCAN BULKLEY, A.M., M.D., New-York.

ALTHOUGH the neuro-pathology of the skin is yet in its infancy, it may not be unprofitable to take a retrospective glance at what has been accomplished in this direction, and, from a survey of the facts which appear to be demonstrated, form conclusions, as far as possible, of the influence of the nerves in the causation of other lesions than those actually proved to be thus connected.

In our study, when speaking of skin-disease in general, we exclude, of course, those affections, of a purely local character, as the parasitic and those arising from the action of irritant agencies, whether chemical, mechanical, or caloric, while with regard to the neoplastic formations, as lupus, syphilis, cancer, etc., any general remarks must be taken only in the broadest sense, namely, that all nutritive changes are dependent ultimately upon nerve-influence.

Our remarks will fall under the following heads:

1. Microscopic anatomy of the skin, with special reference to its nerve-elements.
2. Physiological considerations pointing to nerve-origin of certain skin-diseases: *a*, normal; *b*, experimental.
3. Pathological observations showing the same, of four kinds: *a*, eruptions directly consequent upon peripheral wounds of nerves; *b*, eruptions attending lesions of conducting nerves; *c*, eruptions accompanying brain and spinal disease; *d*, idiopathic nerve-lesions found *post mortem* in nerves supplying diseased skin.
4. Résumé and deductions.

1. Let us first, then, look at the anatomical grounds for supposing a dependence of any skin-diseases on nerve-influence. The richness of the nerve-supply of the skin can be best appreciated by remembering the acute sensibility possessed by every part of the integument, so evenly and perfectly distributed that the finest cambric needle, or the infinitely smaller and far more acuminate sting of an insect, can be nowhere introduced without causing a sensation of pain. This abun-

dant innervation is derived from the plexus of nerves ramifying in the papillary layer, corresponding to the capillary network, and consisting "partly of coarse fibres and also of others fine, smooth, and varicose, with numerous nuclei. From this plexus single nerve-fibres ascend toward the rete mucosum, which sometimes run first for a distance beneath it, and then, turning suddenly, enter the mucous layer. Others reach the papillæ, subdivide within it, and mount between the cells of the rete Malpighii. In favorable specimens the nerve-fibres are readily seen entering the mucous layer and ending there in knob-like distentions, at the height perhaps of the third row of cells. Also, in the more external layers of the rete, Langerhans asserts that he has seen a number of bodies, stained violet in chloride of gold, each of which sends a prolongation downwards and several outwards toward the horny layer. He thinks the former are connected with the deeper nerve-fibres."\*

This distribution of the terminal portions of the nerves among the cells of the rete has been verified by Podcapaëw † and Eberth‡; and Dr. Palladino§ has traced non-medullated nerve-fibres running into the deep epithelial layers of the lip of the horse, where they terminate by free extremities; and finally, Colasanti|| has followed them among the epithelial cells lining the sebaceous glands. Cohnheim and others have seen the termini of nerves between the epithelial cells of the cornea; Elin, Boldyrew, and others in the mucous membrane of the palate, larynx, vagina, and elsewhere.¶

Besides these non-medullated fibres we have those which are medullated, which end in the Pacinian corpuscles and those of Meissner, the former of which appear to be the organs of the special sense of touch, as they are most abundantly developed in those parts possessing most of tactile sensibility, namely, the palms and soles, especially on the last phalanx of the

\* Stricker's Manual of Histology. New-York, 1872, p. 552.

† Schultz's Archiv, v. 4, 1869.

‡ Arch. für mikroskop. Anat., 1870, vi. 2.

§ Lancet, March, 1874.

|| Lancet (Am. ed.), Jan., 1874, p. 45.

¶ Henle, Handb. des system. Anat. des Mensch., 2d edit., 1873. Bd. II., Lief. I., p. 18.

fingers. Langerhans has recently,\* by means of osmic acid preparations, declared these tactile corpuscles to be made up of a great number of single cells, which are characterized by the delicacy and small amount of their cell-substance, while the nerve-elements are distributed among them in all parts of the organ. Also, that the peripheral cells are everywhere in contact with the surrounding tissue, and that the corpuscle can not, therefore, be regarded as surrounded by any distinct limiting membrane.

The bearing of these histological observations on our present study is as follows: Much, if not all, of the nerve-influence in skin-diseases has been often supposed to depend simply upon the *capillary changes* induced by vaso-motor nerve-action or want of action, namely, hyperæmia and anæmia,† whereas the intimate connection we have mentioned as existing between the cells of the papillary layer, rete, and epidermis, and the termini of the nerves among and within their cells, would point clearly to some influence exerted directly on the former by the latter, and this the normal development in health, and the neuropathic changes in disease. This we emphasize as the ground and foundation of much that is to come hereafter, namely, that this very intimate association of the terminations of the nerves with the cells composing the skin, would seem to indicate that they, the cells, were under direct nervous control, possessing self-existent powers, capable, under proper nerve-stimulation, of absorbing just enough nutriment to maintain their proper relations, while under perverted control they, the cells, take on morbid action. In giving prominence to this method of nerve-influence we by no means deny the very important part taken by the vaso-motor nerves as well, which is evident in the erythematous redness forming a large element of many skin affections, which capillary disturbance is likewise seen experimentally in the production of artificial eczema. But, as we shall see hereafter, simple vaso-motor derangement

\* Max Schultz's Arch., 1873, p. 730. Archives of Dermatology, Oct., 1874, p. 61.

† J. S. Jewell: The Chicago Journal of Nervous and Mental Disease, Oct., 1874, p. 426.



alone is insufficient to produce the pathological changes found in many diseases of the skin.

Tomsa\* has further shown that, within the papillæ, the nerves form a network, with nuclear developments, part of which network is applied directly to the capillary loop.

2. Having found now, in the enormous nerve-supply, extending even among the individual cells of the skin, anatomical reasons for the just expectation that the nerves have much to do with normal and abnormal cutaneous ceal-action, we come to consider the physiological grounds of the same. Dr. Mitchell, in his well-known admirable work,† has entered quite fully into this subject, and we shall have occasion to make use of his researches, as we shall, later on, refer to his wonderfully well elaborated pathological considerations and cases. The recent work ‡ of our talented friend, Dr. Oscar Simon of Berlin, on the localization of skin-diseases, we shall also lay under heavy contribution, referring likewise to that of S. Samuel, on the trophic nerves.§

Our physiological inquiries will be presented under the following heads: 1. The mode of production of these lesions through nerve-influence, whether (*a*) by the vaso-motor nerves, that is, through the influence of contraction and dilatation of blood-vessels, or (*b*) by the action of special trophic nerves. 2. The results of experimental section and irritation of nerves. 3. Arguments drawn from the regional distribution of nerves, and the corresponding cutaneous appearances. 4. Reflex nerve-influence.

The physiological arguments against a sole vaso-motor origin of the lesions observed in the skin are great. Speaking with reference to this subject, Mitchell || says, "If the vaso-motor nerves were alone responsible for the existence of all the lesions which follow nerve-wounds, it would be reasonable to expect always to meet with some rise or fall in temperature. Such,

\* Archiv für Dermatol. und Syph., 1873, I. Heft, p. 55.

† Injuries of the Nerves and their Consequences. Philadelphia, 1872.

‡ Die Localization der Hautkrankheiten. Berlin, 1873.

§ Die trophischen Nerven. Leipzig, 1860.

|| Loc. cit., p. 34.

however, is not the case, and I have frequently met with profound trophic changes unattended by thermal perturbations, and the same remark has been made by other neuro-pathologists;" and he is unwilling to admit that vaso-motor nerve-lesions have any other share in the production of the tissue-changes which may follow nerve-wounds than merely to prepare the ground for their production by other more direct agencies. Complete section of the nerves produces but little nutritive change in the parts supplied, and Brown-Séquard remarks\* that "it is certainly true, as maintained by Virchow, that nutrition and secretion, normal and abnormal, can be carried on without the intervention of the nervous system; but this does not at all prove that that system can not interfere, for good or for evil, in nutrition and secretion in the various tissues and organs" Mitchell has watched many cases where a limb or part of a limb was completely separated from neural influence, and failed to see any inevitable consequence except general atrophy, with usually muscular contractions, and a sallow, unhealthy look of the skin, which is apt to become scaly and rough. The nails grow as usual, perhaps a little more slowly, and the hair is commonly unchanged. We will see hereafter the striking contrasts following a perversion of nerve-influence resulting from injury and disease.

Experiments on the sympathetic have likewise failed to produce any true lesions of the integument. Section of these nerves causes a dilatation of the vessels by paralysis, and galvanization contracts them. Weber and Mitchell have attempted to bring about trophic changes in the face by irritating and partially wounding the sympathetic, but the efforts have uniformly failed, "nor have like experiments, such as Lister's, upon the sympathetic nerves in the limbs of the frog, been any more fortunate."†

While experimental physiology demonstrates that the mere withdrawal of nerve-influence is not followed by the changes of disease, pathology abundantly proves, as we shall see later, that *nerve-irritation* is followed closely by such, and herein is

\* Lectures on the Diag. and Treat. of Functional Nervous Affections. 1868, p. 21.

† Injuries of the Nerves. Phila., 1872, p. 32.

the reason why these lesions are not produced artificially, namely, because the necessary and continued excitation is not practiced, as has been noticed by Charcot,\* Vulpian, Couyba,† and others.

But the nerve-relations of skin-diseases, as observed in the regional distribution of certain cutaneous lesions, are at the same time interesting and instructive.

The simplest form of change in the skin dependent on nerve-influence is sudden alteration in color of the face, from the flushing of excitement, shame, or passion, to the blanching of fright. And these same changes, unquestionably dependent upon relaxation and contraction of the capillaries in obedience to vaso-motor influence, are observed to follow, in a reflex manner, upon stomach and intestinal action—flushing after eating, and pallor attending nausea or great pain, being pathological states due to the influence of the great sympathetic ganglia near these viscera. We have also certain of the glandular structures affected on these and similar occasions, as the tears and saliva in mental disturbance, and the cold sweat of fear and anxiety; but whether these are dependent directly upon nerve-influence, or are secondary to the capillary action, can not be stated. Another form of transient alteration of the skin occasioned by nerve-stimulation is the *cutis anserina*, where the skin becomes roughened by a sudden contraction of the minute muscles attached to the hairs, in response to the action of cold, and also from mental disturbances.‡

Akin to these are the pathological states of erythema and local sweating, which have been observed to occupy the tracks of certain nerves; the former, erythema, having been observed principally in connection with injuries of nerves, will be spoken of more fully hereafter. We will here notice some of the facts connected with local sweating. Débrousse-Latour § gives the following as observed by Ollivier: A man, aged 76, had had zona with rebellious neuralgia for a year, which occupied

\* *Mouvement Médical*. 1870.

† *Des troubles trophiques consécutifs aux lésions traumatiques de la moelle et des nerfs*. Paris, 1871.

‡ Simon: *Die Localization, etc.* Berlin, 1873.

§ *Des Suers locales*. Paris, 1873, p. 30.

the sixth, seventh, eighth, and ninth intercostal spaces of the left side. The right side was affected with a local hyperidrosis while the left remained perfectly dry, the secretion being worse when the pain was most severe. Notta \* noticed unilateral sweating in a considerable number of cases of trigeminal neuralgia, and decided unilateral redness of the face in eight out of one hundred and twenty-eight instances of the disease. Local sweating following nerve-injury will be mentioned later.

Nor do the phenomena of general excessive sweating point any less to the nervous system. Wilson † mentions having seen a number of severe cases where a profuse perspiration was preceded by a feeling of faintness and oppression at the epigastrium. Hanfield Jones ‡ regards the profuse sweating during sleep in phthisical, rachitic, and other invalids as resulting from a vaso-motor paresis due to debility.

The sensations of itching, burning, and pain accompanying eruptions, as also the states of hyperæsthesia and anæsthesia, are all nervous. Certain affections of the skin are confined entirely in their primary character to these manifestations of nerve-suffering, until scratching develops an artificial disease; thus, pruritus of the genitals, the general pruritus of pregnancy, and also the pruritus hiemalis, which Dr. Duhring has recently so fully described, § attacking generally the thighs, buttocks, and legs, also less commonly the arms and trunk, all appear to be true neuroses, unconnected primarily with any structural lesion in the skin.

More striking is the symptom of pain, or neuralgia in connection with skin-lesions, and most prominent is that associated with the various forms of herpetic disease, the zona or herpes zoster. For the completeness of our subject, we will rapidly review some of the features of the idiopathic form, which will at once meet with verification in the practice of every physician. The pain preceding, accompanying, or following an attack of herpes, is of a peculiarly piercing, boring, lancinating character, marking a true neuralgia, confined to the track of nerves, or to cer-

\* Archives Générales de Médecine. 1854.

† Diseases of the Skin. London, 1867, p. 810.

‡ Journal of Cutan. Med. Vol. ii., 1868, p. 130.

§ Phil. Med. Times, Jan. 10, 1874.

tain *points douloureux*, or tender spots, pointing very clearly to neurotic relations of the disease. Further, as is well known, the vesicles are developed very definitely along nerve-tracks, the exceptions to the same going only to prove the rule. This is true of zona, wherever developed—on the head following the course of the trigeminal, and on the arms, chest, loins, thighs, or elsewhere, it has the same general characters, wherein can be traced nerve-distribution.

Besides the pain, other symptoms pointing to the nervous system have been observed; thus, Duncan\* records partial hemiplegia, accompanying an idiopathic zona in two remarkable cases, both in old ladies, one aged 65 and the other 68, in the fourth right intercostal space in the former, and on the left thigh in the latter. In both instances the paralysis disappeared in a short time, three weeks and ten days respectively, when the herpetic eruption dried up. Cases of ophthalmic herpes are also reported by Vernon† and Greenough,‡ where there was paralysis of the facial nerve. Broadbent § gives a case where a right brachial herpes, preceded by severe burning pain, was accompanied by almost complete paralysis of the same arm. Not infrequently after zoster, there is left a considerable anæsthesia of the affected parts, and the obstinate ulcerations after certain cases are, in fact, necroses of the skin due to defective innervation.

Dr. Anstie || has seen a unilateral affection, undistinguishable from ordinary erysipelas, follow a neuralgia of the fifth pair, and limited to the painful parts. Dr. Russel ¶ records the case of a female, aged 23, who was subject to attacks of pemphigus, each attack being preceded for a time, varying from a few minutes to an hour, by itching with fearful pain, strictly limited to the particular spot to be affected. She was also, from the first appearance of this difficulty, liable to very severe and troublesome inodorous perspiration. Dr. Woakes,\*\* in an

\* Journal of Cutaneous Medicine, vol. ii., p. 241.

† St. Barthol. Hosp. Reports, iv., 1868.

‡ Bost. Med and Surg. Jour., No. 28, 1869.

§ Brit. Medical Jour., Oct. 27, 1866; Jour. Cut. Med., vol. i., p. 283.

|| Reynolds' System of Medicine, vol. ii., p. 737.

¶ Med. Times and Gazette, Oct. 29, 1864; Jour. Cut. Med., vol. ii., p. 129.

\*\* Jour. Cut. Med., vol. i., p. 283.

excellent article on Neurotic Exanthema, quotes a number of other idiopathic eruptions evidently connected with nerve-influence, which we will briefly allude to. A case of neuralgia of the leg, associated with superficial ulcers, was successfully treated by division of the popliteal nerve, after which the pain ceased and the ulcers healed.

Two cases of shingles affecting the arm, reported by Mr. Paget,\* are referred to, in which neuralgia continued after the attack, and with it the fingers exhibited in a well-marked degree the features so often seen after an injury of a nerve; that is to say, they became thin and tapering, smooth, hairless, glossy, pink and blotched, as if with permanent chilblains. The same author, Mr. Paget, is quoted in a case of neuralgia of the right side of the face, where an herpetic eruption coincided with the surface distribution of the infra-orbital, anterior dental, and anterior palatine branches of the right superior maxillary nerve; the eruption extending to the right half of the roof of the mouth and adjacent parts of gum and cheek. Necrosis of the alveolar portion of the jaw succeeded, the teeth of which fell out, and ultimately the bone itself came away.

This subject is further abundantly illustrated by Anstie, Mitchell, Mougeot, and others, but time forbids further reference here.

Not less striking are the nerve-indications associated with Elephantiasis Græcorum, or, more properly, *lepra anæsthetica*. Here the first symptoms may be entirely neurotic, before the appearance of any cutaneous lesion, as observed by many. In a case which recently fell under our notice, the first annoyance was the feeling as if a hair was lying across the right cheek, which the patient would repeatedly try to brush off, there being at about the same time a reddish streak, which died away, but afterwards returned and spread, covering much of the face. Coincident with the development of the macular form of the disease on the legs and arms, the patient noticed a very considerable hyperæsthesia of the whole body, so that the slightest touch was painful, and a moderate knock caused suffering. This, when first seen, was being replaced by an anæsthesia, commencing as a dead feeling in the right thumb and forefinger, and on the back

\* Medical Times and Gazette, Mar. 26, 1864; Jour. Cut. Med., vol. i., p. 282.

of the left hand. During the month previous he had had pains in the legs, also aching and shooting pain in the right forefinger. As is well known, in the true anæsthetic form so great has become the nerve-lesion at times, that absolutely no pain is felt in the spontaneous amputation of the joints which occurs, as we ourselves had also opportunity of observing in a severe case in the New-York Hospital, where the ankle became diseased, abscesses formed and were opened, the joint freely probed, and finally the limb amputated with the knife, absolutely without pain. The lesions found in the nerves in this disease will be mentioned later.

Closely resembling this in some respects are the *morphœa*, described so fully by Wilson, and further, *scleroderma*, with their anæsthetic patches, and also *alopæcia areata* which has been considered by some as a neurosis, while others\* have even traced nerve-influence in ordinary *alopæcia*, situated, as it commonly is, on the surface of distribution of the supra-orbital nerves.

Another disease, for which nerve-relations are claimed on physiological grounds, is *Nævus*. Bärensprung † was the first to suggest nerve-influence in this disease, from a resemblance in the distribution of certain nævi to that of zoster. Theodore Simon ‡ has further reported on the subject, with the title *nerve-nævi*, a number of cases where these patches followed cutaneous nerve-distribution so closely as to point to a connection between them, and Oscar Simon § adds four cases even more conclusive. This latter author, however, truly says that many cases are observed where no such localization can be made out; the relations of these must await further clinical and pathological research.

Finally, Paget || mentions the fact that a lady, who was subject to attacks of what are called nervous headaches, always found in the morning after such an one, that some patches of her hair were white, as if powdered with starch.

\* Simon : Die Localization der Hautkrankheiten. Berlin, 1873, p. 85.

† Nævus unius lateris. Charité-Annalen, 1863, xi. Heft II., p. 91.

‡ Ueber Nerven-nævi. Archiv für Dermatol. u. Syphilis, 1872, i., p. 24.

§ Die Localization der Hautkrankheiten. Berlin, 1873, p. 89.

|| Lectures on Surgical Pathology. Phila., 1854, p. 44.

The change was effected in a night, and in a few days after the hairs gradually regained their dark-brownish color. This he considered a nervous phenomenon. The late Dr. Anstie noticed in his own person a turning gray of the hairs in the course of a neuralgic nerve\*—a not very uncommon observation.

Other states pointing to the influence of the nerve-supply of the skin are those where a reflex irritation apparently gives rise to cutaneous lesion, or inversely where a cutaneous lesion produces internal disorder. Thus, in a paper† before the New-York Academy of Medicine last year, we endeavored to demonstrate the very intimate relations existing between the skin and the genital organs, and that especially in regard to uterine disorders and the pregnant uterus. As instances of this, the changes in the skin and hairs at puberty were noted, and the disorders of the former, in the chlorotic pallor, clammy hands, etc., attendant upon arrest of sexual development. Further, *physiologically*, the darkening of the areolæ of the breasts, and the enlargement of the follicles thereon was mentioned, and the dark line on the abdomen extending from the pubis to the umbilicus, together with the umbilical areola during gestation; and *pathologically*, the well-known chloasmic patches, especially on the forehead of pregnant females, and the bronzing of a large portion of the surface, as observed by some. Certain sympathetic nervous affections also attend this state, as facial neuralgia, cephalalgia, chorea, palpitation of the heart, and anomalies of sight, hearing, and sensation, one of the most marked sensory phenomena being the pruritus occurring repeatedly in some subjects, local or general, in either case giving great distress. Meigs says that 90 per cent of the cases of pruritus vulvæ he has met with were in women *enceinte*. General pruritus of the pregnant is a remarkable instance of reflex nerve-irritation, for, however severe, it vanishes at once upon parturition. It has been so severe as to cause premature labor; we have seen it so intense as to render a night's rest impossible, and upon its subsidence, in one case, a nervous hoarseness occurred, which had

\* Reynolds' System of Med., vol. ii., p. 737.

† Am. Jour. of Obstetrics and Diseases of Women and Children, Feb., 1874.



likewise appeared during a previous pregnancy, lasted to delivery, and disappeared spontaneously thereafter.

More interesting, however, were the cases of vesicular disease, evidently of reflex origin, to which we called the attention of the Academy under the name Herpes Gestationis, one case of which was presented and eight others quoted in brief, the only cases at all similar we had been able to find recorded. The eruption in question is papulo-vesicular, covering a greater or less portion of the body, accompanied with intolerable itching before the appearance of any lesion on the skin, and in most of the instances was repeated at each successive pregnancy. It is wont to appear at the third, fifth, or seventh month of gestation, and, as a rule, continues to the end, when it ceases suddenly upon the emptying of the uterus, frequently, however, with slight outbreaks while the uterus is undergoing involution. The analysis of these cases and analogy led us to conclude that the skin-lesion, the herpetic vesicle, or the aborted papule, was the direct result of a reflex action transmitted from the impregnated womb, whose nerves are known, on the authority of W. Hunter, Tiedmann, Stricker,\* and others, to be increased in number and size when in this state.

Other forms of skin-lesion have also been observed and noted as probably dependent on the gravid uterus, and reflex in character; thus Hebra† has recorded an impetigo, McCall Anderson ‡ quotes Hebra as to the frequency of the occurrence of eczema during pregnancy, and the observation is common with some others. We ourselves have observed acne rosacea developed around the mouth and chin with each pregnancy, also psoriasis, which becomes worse during every gestation.

Burns afford a striking illustration of the reflex connections of the skin, though in an inverse manner. All know the great shock attending them, as well as the subsequent tendency to visceral congestion or intestinal ulceration.§

Eulenberg and Landois || have endeavored to connect many

\* A Manual of Histology. New-York, 1872, p. 616.

† Wiener Med. Wochenschr., No. 48, 1872.

‡ A Practical Treatise on Eczema. London, 1874, p. 59.

§ Brown-Séguard: Physiology and Pathology of the Central Nervous System. Philadelphia, 1860, p. 161.

|| Angioneurosen. Wiener Med. Wochenschr., 1867-68, and Prag. Vierteljahrbuch, i., 1868.

of the lesions of the skin with nerve-causation, reflex in character, as urticaria, erythema, acne rosacea, and others, and Camille Misset \* argues quite strongly for the nerve-origin of acne rosacea. Finally, in many of the general eruptive diseases, there is quite distinctly traceable a certain disposition of the eruption in the course of surface-distribution of the cutaneous nerves.

We may, in conclusion of this part of the subject, again revert to a most interesting case which we have already mentioned in print.† A lady, aged 32, of intensely nervous temperament, the subject of a general paralysis twelve years ago, for the last two years has suffered, off and on, from a most excruciating lichenous eruption on the right shoulder and arm, running down on the wrist. She is a literary lady, accustomed to very great over-work, writing, etc., and whenever exhaustion is reached the pruritus returns, with the development of the papular eruption along the track of the nerves. Rest to the affected arm—that is, abstinence from writing—will cause it to disappear with treatment, whereas it has proved most rebellious while the over-strain was kept up. Of late the application of electricity has given very great, if not perfect, relief, it being applied by my friend Dr. Beard exclusively on the plan of central galvanization, no local applications being made.

3. We come now to the third, and, for direct proof of nerve-relations of skin-lesions, the most important part of our subject, namely, *pathological observations*, which, as before stated, will be subdivided as follows: *a.* Eruptions directly consequent upon peripheral wounds of nerves; *b.* Eruptions attending lesions of conducting nerves; *c.* Eruptions accompanying brain and spinal disease; *d.* Idiopathic nerve-lesions found *post mortem* in nerves supplying diseased skin.

The number of individual observations illustrating this portion which have been already recorded is now far too great for us to even briefly allude to them all here. We will, however,

\* *Etude sur la Pathologie des Glandes Sébacées.* Paris, 1872, p. 19.

† *Archives of Scientific and Practical Medicine.* Brown-Séquard, Feb., 1873, p. 127.

give certain cases as illustrative, and mention in general the results and opinions arrived at by different observers. For a fuller presentation of the subject, we must refer to the well-known work of Dr. Mitchell on "Injuries of Nerves," and to the able theses of Mougeot,\* Couyba,† and Hybord.‡

*a. Eruptions directly consequent upon peripheral nerve-wounds.* The recorded instances of this form of lesion are comparatively few in number, but sufficient to show the existence of cutaneous lesions from this cause.

One of the most striking has been recently published by Dr. Mitchell,§ and is in brief as follows : A lady, when a child, two and a half years of age, ran a fragment from a barrel-hoop into the palm of the right hand. The wound healed and the splinter remained, giving no annoyance, save once at the age of twelve, until she was twenty-two years old, when she bruised the region in which lay the splinter. Great local pain and slight swelling followed, but soon passed away, and in three months she began to have pain in the right shoulder. The splinter was then removed from among the median nerve filaments, but the neuralgic pains grew worse, until the whole arm and hand were exquisitely sensitive, which distress was relieved for a few days by exsection of an inch of the musculo-spiral nerve. It then returned, and a thick crop of herpetic eruptions covered the right arm, neck, and face, which then disappeared. A year and a half later, when seen by Dr. Mitchell, there was an incessant secretion of sweat from the median palm, with an acid and heavy odor, the second finger and thumb-nails were curved laterally in a singular manner, the right index-nail being five sixteenths, and the left seven sixteenths of an inch broad. The general tint of the right hand was livid, and the arm liable to sudden alterations as to temperature, while the slightest irritation caused at first intense paleness, followed by definitely limited islands of deeply flushed skin. The skin of the thumb and index-finger was rough, ragged, and marked with yellowish patches of loosened epithelium. After the operation of exsect-

\* *Récherches sur quelques troubles de nutrition, etc.* Paris, 1867.

† *Des troubles trophiques consécutifs, etc.* Paris, 1874.

‡ *Du zona ophthalmique et des lésions oculaires, etc.* Paris, 1872.

§ *Am. Jour. Med. Sciences*, July, 1874, p. 17.

ing three quarters of an inch of the median nerve in the middle of the forearm, the pain ceased, the eruption passed away, and a marked and steady change for the better took place in the color and vascular state of the limb. Ten months subsequently there remained absolute freedom from pain, and the nails of the two sides grew alike.

Another case is given by Mitchell, where a penknife was run into the palm of the hand, when neuralgia followed, and similar trophic changes in the hand.

At a recent meeting of the New-York Dermatological Society,\* Dr. Keyes presented a patient with a cutaneous lesion following peripheric nerve-injury. A man, aged about forty, had received a crushing injury, whereby the middle finger of the left hand had been lost, and shortly thereafter there appeared a papillomatous growth on the back of the same hand. The patch was of a dull red color, of irregular shape, averaging about two inches in length by one in breadth, situated longitudinally in about the centre of the dorsum. The surface was irregularly elevated to the height, perhaps, of a line above the level of the skin, edges clearly defined, also papillomatous and not particularly everted; a little pus continually formed on the surface, which was moist, and from many points pus could be made to exude by slight lateral pressure.

Hayem † reports a case of crushing of the hand, for which first the fingers and afterward the hand, to the middle of the forearm, were amputated for non-healing. A year later, after a blow upon the shoulder, there was pain and stiffness, and a vesicular development about the stump, which appeared cool and livid. Later, the whole forearm became swollen and hot, and covered with vesicles. Charcot's case, ‡ reported in 1859, was somewhat of this nature.

Hamilton § gives a case of a girl, twenty years of age, in

\* Archives of Dermatology, October, 1874, p. 47.

† Archives de Phys., 1873. No. 2. Viert. Jahressch. f. Derm. u. Syph., i., 1874, p. 98.

‡ Journal de la Physiologie (Brown-Séguard), 1859, p. 108.

§ Archives génér. de Méd., 1838, t. ii. Mougeot, Sur quelques troubles de nutrition, Paris, 1867.

whom, after a wound on the inner surface of the thumb with a knife, which healed kindly, a subsequent train of trophic symptoms occurred, which were very distressing. The hand became swollen, at first pale, afterward red, œdematous, and exceedingly painful. Two months later the parts of the wound assumed a phlegmonous appearance, which, however, disappeared entirely in one night, and was repeatedly reproduced, but ceased with the pain, as well, after a season. There remained, thereafter, slight sensitiveness, and, during paroxysms of pain, the hand and arm became covered with perspiration.

Other instances could be cited, but we pass on to the consideration of our second and even more interesting and important pathological point, namely,

*b. Eruptions attending lesions of conducting nerves.* As is well known, the credit of attracting much attention to this form of nerve-trouble belongs to American surgeons, and the admirable little work of Drs. Mitchell, Moorhouse, and Keen\* has received ample recognition at the hands of all who have written on the subject since. But Charcot † had previously, in 1859, published three cases, two of traumatic origin, where a skin-lesion was attributed to the nerve-disorder, to which report were attached remarks by Dr. Brown-Séguard on the subject; and Paget, ‡ in his lectures in 1854, mentions repeatedly cutaneous ulcerations following nerve-lesions. Since the appearance of the American work alluded to, numerous examples of this form of trouble have been published, so that now this branch of nerve-pathology of the skin may be considered as resting on a very sure foundation. We will mention in brief a few cases, by way of illustration.

To commence with simple [compression of the nerves, the case related by Paget § is as striking and illustrative as any. A man in Guy's Hospital suffered from compression of the median nerve caused by excessive quantity of new bone thrown out after a fracture of the lower end of the radius. He had ulceration of the thumb, fore and middle fingers, which resisted

\* Gun-shot Wounds and other Injuries of Nerves. Phila., 1864.

† Journal de la Physiologie (Brown-Séguard), vol. ii., 1859, p. 108.

‡ Lectures on Surgical Pathology. Phila., 1854, p. 40.

§ Loc. cit., p. 42.

various treatment, and was cured only by so binding the wrist that the parts on the palmar aspect being relaxed, the pressure on the nerve was removed. So long as this was done, the ulcers became and remained well ; but as soon as the man was allowed to use his hand, the pressure on the nerve was renewed, and the ulceration of the parts supplied by them returned. Mitchell quotes Raynaud\* in a case in which the ulnar nerve was compressed at the elbow, with the result of successive groups of phlyctenulæ seated exactly on the nerve-track. They were full of bloody serum, and left no ulcers when they broke. In these cases there was no inflammation, but in those related by Earl, Romberg, and Kuhl there was inflammation about the bullæ. In a case of nerve-injury by pressure at the wrist, Mitchell saw the thumb rapidly covered on the fourth day by a large bulla, and looking as if blistered. "Mr. Hutchinson reports a similar instance where there were marked inflammation, bullæ, and ulceration. It would be easy to extend the list if this were desirable."†

The most commonly observed disturbance of nutrition after injuries of nerve-trunks, is the erythematous state of skin, the *glossy skin* of Paget, as described more fully by Drs. Mitchell, Moorhouse, and Keen,‡ and which has been repeatedly noticed by others. They thus describe it : "The skin affected in these cases was deep red or mottled, or red and pale in patches. The epidermis seemed to have been partially lost, so that the cutis was exposed in places. The sub-cuticular tissues were nearly all shrunken, in the fingers there were often cracks in the altered skin, and the surface of all the affected parts was glossy and shining as though it had been skillfully varnished. In most of them the part was devoid of wrinkles and perfectly free from hair."

A very constant feature of this state of skin was the occurrence of eczematous eruptions, which appeared as minute vesicles thickly scattered over the thin and tender cutis, or else showed themselves in successive crops of larger vesicles on the skin about the altered parts, with usually a preference for the

\* Thèse de Paris. 1862, p. 156.

† Injuries of Nerves. Philadelphia, 1872, p. 154.

‡ Injuries of Nerves and their Consequences. Phila., 1872, p. 157.

portions which lay nearer the trunk. The nails and hair may undergo very curious changes consequent upon nerve-wounds. After total section, says Dr. Mitchell, the nails are apt to be clubbed, and, in rare cases, to suffer from painless whitlow. In lesser nerve-wounds ulceration around the nails is common and often very painful. This red and glossy skin, and these other nutritive changes, as in the nails, are generally attended by severe burning pains, or causalgia, as Dr. Mitchell calls it.

We will not now cite cases illustrative of this form of lesion, as they are so numerous and well-attested by so many competent observers as to be familiar to all and render it unnecessary; and, moreover, it were difficult to make a selection. We may mention, however, that we have observed an almost precisely similar state of the skin of both feet and legs to the knees, and the back of the right hand, with itching and burning, where there has been no traumatism whatever, the parts undergoing very material improvement under the use of the constant current, locally and generally applied. We will then pass on to our third pathological illustration of the influence of the nerves in producing skin-lesions, namely,

*c. Eruptions accompanying brain and spinal disease.*

This, a less trodden field, presents much of interest, and has received sufficient attention to demonstrate certain facts beyond doubt. The observations may be noted under the two heads, (*a*) traumatic injury of the cord and encephalon, and (*b*) idiopathic disease of the same.

(*a*.) Traumatism of the cord gives rise to very much the same dermal lesions as in the case of wounds of nerve-trunks; the epidermis and nails undergo the same alterations, vesicles frequently appear, and the erythematous redness is also present. Couyba\* gives a striking case of this. A man, aged 25, received a bullet-wound of the left side about the tenth rib; the ball traversed the vertebral column, and came out seven or eight centimetres from the spine on the right side. Incomplete paralysis of the left leg followed, with anæsthesia of that side, and incomplete anæsthesia of the right side, and fair movement. Two days later marked hyperæsthesia developed, more defined on

\* Des troubles trophiques consécutifs aux lésions traumat., etc. Paris, 1871, p. 53.

the right than the left side, with itching and burning pains, and slight redness on the sides of *both* feet, and two days still later erythematous patches appeared on both legs, having much the appearance of erythema nodosum, there being a dozen spots on one leg, attended yet with great hyperæsthesia. At the necropsy, nineteen days after the injury, intense spinal meningitis was discovered, but no myelitis or alteration of the gray substance. There was, however, neuritis of the *cauda equina*, and an evident atrophy of some nerves.

Gailleton \* quotes Gaillard in a case where, immediately after fracture of a vertebra, numerous vesicles appeared on the left leg for a month, the temperature of the paralyzed parts was much elevated, and the perspiratory secretion augmented. Later the lower limbs increased greatly in size, with œdema, and assumed much of the elephantiasic aspect, ulcers and gangrene supervened, and the patient died three years after the accident.

More commonly ulceration and sloughing, the *decubitus aigu* of Charcot, are observed very soon after a spinal injury, especially on parts exposed to pressure, and when of very speedy occurrence must be traced to the influence of disordered nervation. Thus Sir Benjamin Brodie has observed sloughing of the heels twenty-four hours after a lesion of the spine.†

H. Schmidt reports a case of herpes zoster after a contusion of the vertebral column.‡ A man was confined to bed for eight days after a fall of ten feet, with pain in the loins and left thigh. Improvement followed, but not a complete cure. After three weeks a zoster eruption appeared, following headache and fever, with great pain along the track of the ilio-hypogastric, ilio-inguinal, and genito-crural nerves, which all arise from the first and second lumbar nerves. Charcot and Cotard § observed an eruption of zoster in a case of cancer of the vertebra.

E. Wagner is quoted by Charcot || in a case of zoster of the ninth and tenth left intercostal spaces, in a young man with

\* *Traité Élémentaire des Maladies de la Peau.* Paris, 1874, p. 285.

† *The Influence of the Nerves on Nutrition.* Henry Power. *The Practitioner*, Feb., 1873, p. 101.

‡ Leyden: *Klinik der Rückenmarks Krankheiten.* Berlin, 1874, p. 153.

§ *Gazette Medicale de Paris*, 1866. No. 15. Leyden, loc. cit.

|| *Leçons sur les maladies du système nerveux.* Paris, 1872-73, p. 26.



pulmonary phthisis in whom the last six dorsal and first two lumbar vertebræ were carious, and the dura-mater enveloped in caseous pus which reached into the sheaths of the nerves and spinal ganglia.

Finally, hair has been observed to grow luxuriantly on paralyzed parts after a traumatic paraplegia.\*

Much the same trophic changes have been observed in the skin after (*b*) idiopathic disease of the brain and cord. Charcot † has repeatedly seen in chronic spinal meningitis, with thickening of the dura-mater, various cutaneous eruptions, resembling sometimes zona and sometimes pemphigus. Brown-Séguard ‡ has recorded the existence of special cutaneous eruptions on the arm, in a case of spinal meningo-neuritis of the inferior cervical region. Erythema, zona, muscular atrophy, and certain joint troubles have been connected, by M. Duménil, with chronic progressive neuritis, and by M. Leudet § with a peripheric neuritis, following asphyxia with carbonic acid.

According to Charcot, papular or lichenous eruptions, urticaria, zona, and pustular eruptions resembling ecthyma, are observed in the course of locomotor ataxia, especially in connection with the access of the lancinating pains. In one case pustules of ecthyma were followed by deep ulcerations and a slough on the sacrum. Gailleton || reports a case of ataxia with attendant urticaria for many months, in brief as follows : A female, aged 32, of a good constitution, had locomotor ataxia for a year. Six months after its appearance strabismus and facial paralysis occurred, which disappeared spontaneously. At the time these appeared the patient complained of sharp cutaneous pain, and numerous patches of urticaria were seen on the arms, thighs, neck, and body. These urticarial patches lasted individually but a few hours, but were reproduced with great rapidity on different parts of the body, and were accompanied with most distressing pruritus. This eruption lasted for nearly a year.

\* Brit. Med. Jour., June 14, 1873. Quoted in Berlin. Klin. Wochenschr., Jan. 5, 1874.

† Loc. cit., p. 27.

‡ Dublin Quarterly Jour. of Med., May, 1865. Charcot, loc. cit.

§ Recherches sur les troubles des nerfs périphériques, etc. Archiv. Gen. de Méd., May, 1865.

|| Traité Élémentaire des Maladies de la Peau. Paris, 1874, p. 286.

Bourneville\* reports a case of sclerosis in patches of the spinal cord, where, with disturbance of the intellect, contraction of the limbs, chills, and other nervous phenomena, there was herpes labialis, a diffuse erysipelas, œdema of lower limbs, and bed-sores, and at post-mortem examination sclerotic lesions of the cord were found. Leyden † speaks of herpes zoster facialis being not infrequently found during attacks of cerebro-spinal meningitis. Lancereaux gives a case of exfoliative dermatitis following hemiplegia, aphasia, and other nervous phenomena.‡

Gaillieton§ mentions the case of a woman aged 75, who had several attacks of apoplexy, and with the last, which caused death, an intense erythema appeared on the neck and upper part of the chest. Also, two cases of apoplexy attended by an eruption of zoster, in one case on the thigh, and in the other on the nape of the neck. Gaillieton further quotes Lombroso|| in regard to certain cutaneous manifestations in mental alienation, Arthaud¶ in the same state, Billod\*\* as to pellagra in the insane, and also Teilleux †† on the same subject. Further, others with reference to eruptions attending epilepsy and hysteria, which we can here only mention. Mougeot‡‡ quotes Thomas in a case of herpes zoster, after strenuous exertion in lifting a heavy sack of grain, after the occurrence of a sudden and sharp pain in the side during the act.

Our fourth and last division of the pathological part of this study will claim our most earnest consideration for many reasons, and although the evidence here rests on comparatively few recorded facts, still it is of very great weight in determining the true position of neuro-pathology in relation to diseases of the skin. It is—

\* La Sclérose en plaques disséminées. Paris, 1869, p. 193.

† Klinik des Rückenmarks Krankheiten. Berlin, 1874, p. 253.

‡ Traité Élémentaire des Maladies de la Peau. Paris, 1874, p. 288.

§ Gaz. Méd. de Paris. Am. Jour. Syph. and Derm., Oct. 1874, p. 429.

|| Giornale Italiano delle mal. ven. e delle mal. della Pelle. 1867. Fascic. 7.

¶ Lyon Medical—Mars 2, 1873 (Société de Med. de Lyon, Jan. 29, 1873).

\*\* Traité de la pellagre d'après des observ. rec. en Italie et en France. Observ. xi. Paris, 1865.

†† D'une variété de pellagre propre aux aliénés. (Annales medico-psychologiques, 1860.)

‡‡ Recherches sur quelques troubles de nutrition, etc. Paris, 1867, p. 38.

*d. Idiopathic nerve-lesions found post mortem in nerves supplying diseased skin.*

To commence with the disease which has, more than any one other, perhaps, contributed to this branch of study, *herpes zoster*, let us see what has been learned from macroscopic and microscopic examination of the nerve-elements. Neumann\* gives this very succinctly, thus: Danielssen found the sixth left intercostal nerve swollen and reddened by a firm infiltration of the neurolemma, the medullary portion being normal. Bärensprung found the intercostal nerves thickened and injected, and their spinal ganglia correspondingly altered, the inflammation being mostly in the neurolemma; the inflammation did *not* spread from the ganglia to the cord, but, on the contrary, in a peripheral direction. Bärensprung considered zoster as an affection of the ganglionic system, although peripheric irritation of a nerve leading to a ganglion can be followed by a limited zoster eruption in a reflex manner. Weidner† and E. Wagner‡ found also changes in the spinal ganglia similar to those observed by Bärensprung and others. Wyss§ had an opportunity of watching during life, and dissecting after death, a case of zoster occupying the region innervated by the first branch of the right trigeminal. The nerve was found to be broader and thicker than that of the left side, of a deeper gray-red color, of softer consistence, and with the several nerve-fasciculi separated by grayish-red, soft tissue containing many vessels. This alteration extended from the point where it entered the orbit to the finest branches, as far as they could be traced with the simple lens. The other nerves traversing the orbit were perfectly healthy. Outside the orbit, and extending from it to the Casserian ganglion, the first branch of the fifth was surrounded by extravasated blood. On the proximal side of the Casserian ganglion the nerve was normal in appearance. The ganglion itself was larger and somewhat more succulent than the left; upon its inner side was a red mass apparently caused by an

\* Lehrbuch der Hautkrankheiten. 3d edit. Vienna, 1873, p. 181.

† Berlin Klin. Wochenschrift. 1870, 7. (Archiv f. Derm. u. Syph., 1870, p. 622.)

‡ Virchow's Archiv, Bd. ii., 4 Heft.

§ Archiv der Heilk. Lond. Lancet, Oct. 3, 1872.

ecchymosis. The proper substance of the ganglion was not of a yellowish white color, but bright red. The nerve was healthy at its apparent origin from the brain, but where it entered the ganglion there were numerous ecchymoses; also the same in the ganglion, especially visible where the first branch of the fifth nerve arises.

Haight \* found cell-proliferation around and in the neurolemma in herpes zoster, the nerves swollen, the medullary substance softened, and the axis cylinder eccentrically enlarged.

Charcot and Cotard † found neuritis of the cervical plexus and corresponding ganglia of the posterior roots in a case of zona of the neck.

After traumatic eruptions, alterations are found in the nerves of much the same character. Thus Mitchell ‡ quotes a case reported by Mr. Swan in 1820, in which there were ulcerations on the hand after severe wrenching of the wrist. After amputation, some time later, he found hypertrophy of the median nerve beneath the annular ligament, and several gangliform enlargements of digital nerves.

In Dr. Mitchell's § case of severe brachial neuralgia, with herpetic eruption and trophic changes, in which nerve-section was performed, as before alluded to, the excised nerves were found similarly affected, the individual nerve-fibres presenting the principal changes. In very few of the rings of the secondary fasciculi could the axis-cylinder be recognized, even with high powers, the individual nerve-fibres being no longer clearly defined, but presenting a confused mass of concentric rings. These changes were somewhat different from those in chronic hyperplastic neuritis.

In the remarkable case of painful neuroma of the skin, reported by Drs. Duhring and Maury, || for which exsection of a portion of the brachial plexus was performed, there were much the same changes found, as also in the case of excision of part

\* Neumann : *Lehrbuch der Hautkrankheiten*. 3d ed., Vienna, 1873, p. 185.

† *Mémoires de la Soc. de Biologie*. 1866, p. 41. Mougéot, *Thèse cit.*, p. 61.

‡ *Injuries of Nerves and their Consequences*. Phila., 1872, p. 96.

§ *Am. Journal Med. Sci.*, July, 1874, p. 26.

|| *Am. Journal Med. Sci.*, October, 1873, and July, 1874.

of brachial plexus for traumatic brachial neuralgia reported by Drs. Sands and Seguin.\*

Another striking illustration of this branch of neuro-pathology of the skin is found in the pathological appearance in *lepra anæsthetica*, or elephantiasis Græcorum. According to Virchow,† the initial morbid process consists in a perineuritis, characterized by a cellular proliferation of a special, leprous character, situated between the nerve-tubes, which it slowly destroys. The nerves present, then, frequently, somewhere in their course, a fusiform tumefaction, which is sometimes easily recognized during life at the places where they lie superficially, as at the elbow. These alterations produce first hyperæsthesia, later anæsthesia.‡

These changes in leprosy have been admirably described and delineated by Boeck and Danielssen § in their magnificent work on skin-diseases.

Bergmann,|| from a dissection made in the beginning of the disease, determined that the bullæ of leprosy depended upon a leprous degeneration between the bundles and the fibres of the nerves. Steudener ¶ further found that often the whole nerve is not thus affected, which accounts for the partial anæsthesia sometimes found, with normal intervals of integument. Some observers have thought that characteristic disease could be made out in the brain and spinal cord, but this has been disputed by others, and is still in doubt.\*\*

Finally, in the true prurigo of Hebra, Dr. Gay, of Kasan,†† has found between the cells of the rete Malpighii, isolated branching structures with small nuclei, which he regards as probably the altered terminations of the nerves, which we have alluded to as having been found by Podcapaew and Eberth in

\* Archives of Sci. and Pract. Med., Jan., 1873, p. 1.

† Die Krankhaften Geschwülste. Nerven-Lepra, ii., p. 521. 1864-5.

‡ See case. Med. Times and Gazette, April 11th, 1874.

§ Recueil d'observations sur les maladies de la Peau. 1, 2, and 3 Liv. Christiania, 1860.

|| Die Lepra in Livland. St. Petersburg, 1870, p. 31. (Simon: Die Localiz. d. Hautk., p. 83.)

¶ Beitr. zur Pathol. de Lepra mutilans. Erlangen, 1867, p. 19. (Simon: Localization, etc.)

\*\* Simon: Die Localizat. der Hautkrankheiten. Berlin, 1874, p. 84.

†† Archiv für Dermat. u. Syph. 1871, p. 5.

this situation. Neumann \* thinks an examination of the cutaneous nerves might lead to the discovery of some alteration in their structure, as furnishing the cause of prurigo.

4. Having now briefly gone over the principal points of neuro-anatomy, physiology and pathology, as related to the skin, let us, in a few words, recapitulate, in order the more clearly to draw our deductions therefrom as to the nerve-relations of diseases of the skin.

1. We have, then, in the *microscopic anatomy* of the skin, in addition to the vaso-motor nerves distributed abundantly to the smaller arteries and capillaries, controlling their expansion and contraction, and besides the medullated fibres terminating in the Pacinian corpuscles and those of Meissner, the abundant supply of ultimate nerve-fibres to the cells composing the upper layers of the skin, where a large share of cutaneous disease is located. This mode of nerve-termination between the cells of the rete mucosum has been verified by numerous observers, and traced also in the mucous membranes, likewise in the cornea and in the lining of sebaceous glands.

2. *Physiologically* we have found that simple vaso-motor disturbance is incapable of effecting much cutaneous lesion, and that withdrawal of nerve-influence by section likewise produces but slight and temporary changes; also that experimental physiology likewise fails to induce pathological change in the structure of the skin. We further found close physiological relations between the skin and other organs, evidently the result of neural connection, as flushing and blanching of the surface, and cutaneous perspiration associated with functional derangements of internal organs or mental emotions.

The sensations of itching, burning, and pain, also hyperæsthesia and anæsthesia, together with certain local paralyses, were cited as common illustrations of the nerve phenomena of cutaneous disorders. The pain in herpes zoster, corresponding so closely to the area of distribution of the eruption, is a definite demonstration of nerve-implication, especially when taken in connection with the pathological conditions found post mortem. The prodromal and associate neurotic phenomena of *lepra*

\* Lehrbuch der Hautkrankheiten. 1873, p. 288.

*anæsthetica*, or elephantiasis Græcorum, with its corresponding post-mortem appearances, afford also conclusive proof in this direction.

The physiological distribution of these and other eruptions upon cutaneous nerve-tracts, as also the phenomena of reflex irritation, were further cited as weighing considerably in the direction of the neuro-pathology of skin-diseases.

3. *Pathological* observation we found to be rich in demonstration of the direct connection between nerve-influence and nutritive changes in the skin. We saw that peripheral nerve-injury was followed by cutaneous lesions, that lesions of conducting nerves were very constantly followed by the same, and that traumatic and even idiopathic disease of the spinal cord and brain was not infrequently accompanied by certain forms of disease of the skin. Lastly, we recalled the very striking nerve-lesions found in herpes zoster, in the cases of traumatic nerve-injury followed by skin-disease and in lepra anæsthetica.

Here our direct proof must cease, and with this may well rest the argument for neuro-pathology of skin-diseases. We have found nerve-section or nerve-abnegation incapable of exciting these disorders, but nerve-*irritation* abundantly able, and it is nerve-*irritation* which is excited by the new deposits of leprosy and syphilis, or by the circulation of the effete products of gout, rheumatism, scrofula, etc., or the ill-assimilated elements in dyspepsia, constipation, oxaluria, and the like. We have seen how large a number of skin-disorders may be the result of reflex action; that there are others than those proven, or those we have mentioned, there is no doubt. How can we better explain the pathological action going on in the outer portions of the skin, which are away from capillary influence, as in certain skin-affections, than by nerve-action, when we find much the same alterations following direct nerve-injury, as already mentioned?

That nerve-disease has not been observed and recorded in a larger share of diseases of the skin, is no evidence of its non-existence. If investigations in this direction have been made unsuccessfully, we do not know of it, nor could want of success be demonstrative, inasmuch as the opportunities or instruments may have been imperfect, or the changes such as to escape

observation hitherto. The field is a broad and interesting one, and invites pathologists to enter it. Certainly the nerve-elements in eczema, urticaria, pruritus, prurigo, erythema, etc., are plain enough to entice to a fuller knowledge of their relations.

Not less striking are the therapeutical indications of a neuro-pathology of skin-diseases. Among our very best remedies are iron, quinine, strychnine and arsenic, potent also in nervous disorders, while electricity, long serviceable in the latter, is claiming a high place in cutaneous therapeutics. If asked as to the action of other remedies, as the alkalies, acids, vegetable and mineral products, we reply, by so altering or removing elements which cause nerve-irritation, that normal innervation returns and continues. The action of cod-liver oil, nutriment, fresh air, exercise, and so on, can be answered equally well by the neuro-pathologists as by ourselves.

We confess to a little surprise at the manner and fullness with which our subject has expanded under study, and also at the quite definite conclusions which our investigations have forced upon us, but the latter seem to be necessary sequences of the abundant clinical observation recorded, which we have, indeed, barely alluded to, and the clearness and positiveness of the study have lent a fascination not easily avoided. We trust, however, that we have presented in a concise form such evidence as will lead to the fuller acceptance of the views as to the very important influence which the nerves have over nutrition, and the very close connection between many cutaneous lesions and disorders of the nerves, and finally, perhaps, to a closer investigation of the very important subject of the neuro-pathology of skin-diseases.\*

\* As we are going to press we notice the excellent contribution to this subject by Dr. Clifford Albutt, in *The Practitioner* for November, 1874, p. 316. It is not a little interesting that the same subject should be studied simultaneously in England and America—there from a clinical and here from a pathological point of view. We shall hope to comment on this article later, and to add further data from our own experience. L. D. B.



## MISCELLANEOUS NOTES.

BY THE EDITOR.

[Under this head it is proposed to discuss editorially the various scientific and practical topics that arise in the department of Electrology and Neurology. The discussions will take a very wide range over the whole field of Electro-Physics, Electro-Physiology, Medical and Surgical Electro-Therapeutics, Neuro-Physiology and Pathology, and Neuro-Therapeutics in general, and also will touch on Psychology and Mental Hygiene. The paragraphs will be, as a rule, brief, pointed, and practical.]

### *The Duty of Vivisection in the Study of Neuro-Physiology and Electro-Physiology.*

WE hold vivisection to be a duty. It is a duty binding on those who seek to solve the problems of life, and can not be shirked by them. Duty to humanity requires that animals should be sacrificed in large numbers, not only by original investigators, but by teachers who want to understand and impart a knowledge of what has been investigated.

Taking this view, we do not *defend* vivisection any more than we defend the duty of loving our neighbor; of telling the truth; of abstaining from theft, arson, and murder; of improving our precious time, or, in general, of leading a life of virtue. We should as soon think of defending a politician for being honest, as of defending a physiologist for experimenting on living animals. To be the attacking party is to be half victorious. We hold that scientists should no longer defend vivisection—they should require it. Our faith in legislation as a cure for all human woe is not strong; but, if any appeal must be made to law, let it be enacted that no medical student shall receive his diploma until he has gone through a course of vivisection, and be it further enacted that all ownerless cats and dogs shall be impounded in the laboratory.

As we write these lines, a rabbit, on whom we have made many physiological experiments, and which has become thoroughly tamed, so as to be a household pet, is munching and playing on our desk. It rests its nose on the manuscript, covering the freshly-written lines with ugly blots, and then hops to

the other end of the desk, upsetting bottles and scattering papers over the floor. To this rabbit we have become not a little attached, and when it dies we shall lose a friend that has forgiven long ago the slight pain that we ever inflicted upon it.

The practice of vivisection does not of necessity harden the heart. One may love an animal so deeply that, out of the very depth of that affection, he may honor it by offering it up on the altar of science. We eat meat to sustain life, and we vivisect animals to sustain science, and neither eating nor vivisecting make us cruel. The fact that dogs and cats may be the instruments of advancing knowledge adds a new dignity to animalhood, and brings it nearer to humanhood.

When the devil has any specially wicked purpose to perform in this world, he often selects some well-meaning, narrow-brained man who has been of service to the world in some one thing, and therefore thinks that he can be of service to it in every thing.

What to do with those who conscientiously oppose vivisection is a hard question. Active, direct opposition does no good, and should only be employed when they try to oppress us through law, when they seek to organize scientific persecution. Having never been reasoned into their views, they will never be reasoned out of them. We can trust to the slow improvement of the race, the gradual enlightenment of humanity, to do away with this class of beings who, standing midway between barbarians and Christians, retain much of the ignorance and superstition of barbarians, without having gained enough of Christianity and civilization to make them reasonable, just, or gentlemanly. One thing is sure: men of this stamp must go down, or civilization must go down, for they are antagonistic. The world can advance only at the expense of these ignorant, half-sided, underdone natures, that are, in certain stages, the worst enemies of progress.

The conscientious opponents of vivisection belong to the same class as the radical temperance reformers, and are to be treated in the same way—by indirect rather than by direct attack; by instructing and elevating the people, so that they may cast off these sloughs that were needed at one stage of the process of cure, but are now in the way.

*Camp-Life for the Nervous.*

THE best antidote for civilization is, of course, barbarism. One of the very best cures for the functional nerve-diseases of our large cities is to live like a North-American Indian. Prof. Wyman once remarked to us that if he were to live his life over again, he would spend at least two months of every year in camp. The great hygienic advantage of this kind of life appears to be that it compels us to *breathe out-door air twenty-four hours a day*. Those who sleep in-doors never breathe entirely pure air. According to experiment, there is very little ozone or electricity in-doors.

Another advantage of camp-life for the nervous is that it shuts out the newspaper. Reading daily papers robs us of our nerve-force, and blessed are they who can now and then find a way of escape.

Camp-life is, however, a trade, and, like other trades, must be learned by degrees. The first lessons are sometimes learned in sorrow. The real blessings of camp-life are for those only who have mastered it.

When this vast quantity of real estate which we call earth was given to the sons of men, to possess and bequeath for all time, the proviso should have been inserted in the deed that no house should ever be built upon it.

Abolish houses, the printing-press, the telegraph and the railway, and the specialties of electro-therapeutics and nervous diseases would disappear from the face of the earth.

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*Additions to the Cod-Liver Oil Emulsion.*

THE modification of the cod-liver oil emulsion, to which we called attention in the first number of the ARCHIVES, is rapidly growing in popularity. From various sources we learn that others are pleased with it as a nerve-food as much as we have been.

The dose of the essential oil of bitter almonds was perhaps rather large; fifteen or twenty drops will answer. The

emulsion may be further modified by adding Cruse's tasteless tincture of iron in appropriate doses.

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### *Cold-Powder.*

WE have long been in the habit of using what we call a *cold-powder*, which we have found of great value in breaking up colds when taken in time, and in modifying their force when taken late.

The prescription is as follows:

Camphor, five parts. Dissolve in ether to the consistence of cream. Then add carbonate of ammonia, four parts; opium-powder, one part.

Mix and keep in a tightly-corked bottle. The dose is of course regulated by the opium, and ranges between three and ten or fifteen grains. We have been accustomed to prescribe it for our friends by the finger-nail full, or as much as one can put on the finger-nail.

This powder may be taken in a little water just before retiring, by preference, or at any hour of the day, whenever there is a *suspicion of having caught cold*. If need be, a moderate dose may be taken several days in succession.

The advantages of this powder are very great.

1. The taste is agreeable, or at least is not disagreeable. Even the bitterness of the opium is mostly neutralized by the camphor and ammonia. No child objects to this powder.

2. It is singularly and inexplicably efficacious. We believe it to be more efficient than Dover's powder, and incomparably more agreeable. In some cases it produces a gentle perspiration; in others, this special effect is not observed. It is so easy to take, and so harmless in small doses, that it is well and safe to take it whenever we become badly chilled.

We first called attention to this *cold-powder* in "Our Home Physician," the first edition of which appeared in 1869. From various sources, lay and medical, we hear that it accomplishes all that is here claimed, and we therefore earnestly recommend it to the profession.

Quite a large proportion of nervous diseases, as locomotor ataxia, spinal congestion, neuralgia, progressive muscular atrophy, and so forth, are excited or aggravated by taking cold any thing, therefore, that will lay the axe at the root of the tree and remove the cause of those diseases, is worthy of our study.

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*Iodoform in Functional Nerve-Diseases.*

DR. BURGE has recently met with excellent and surprising results from iodoform and iron in hysteria, spinal irritation, and allied disorders. In one case especially, where there was great spinal tenderness, debility, insomnia, and other symptoms that accompany hysteria and spinal irritation, and where general faradization and central galvanization, usually so effective in such cases, had failed, Warner's pills of iodoform and iron seemed to act with almost specific power. We hope to print an article from him on this subject in the next number of the ARCHIVES.

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*To those Suffering from Hay Fever.*

SECOND CIRCULAR OF INQUIRY.

I AM desirous of obtaining a large number of facts and statistics in regard to the so-called "Hay Fever," otherwise called "Hay Asthma," "Rose Cold," "Peach Cold," or "Autumnal Catarrh."

I am especially interested in those facts that seem to indicate the dependence of this disease on the *nervous system*.

I shall therefore regard it as a great favor, if those who are personally familiar with this disease will fill out, so far as they can conveniently do so, the answers to the questions contained in this circular, and inclose it, *as promptly as possible*, to the following address:

GEORGE M. BEARD, M.D.,  
53 West Thirty-third Street, New-York City.

Quite a number of responses to the first circular have already been received, and from various sections of the country they are constantly coming in. The facts thus obtained are of the highest interest, and, though not yet fully classified, it is evident that they point to very different theories of the nature of the disease from those which are commonly entertained, and they would seem to call for methods of treatment that have not yet been fairly and fully tried.

Physicians, who receive this circular, are requested to fill out the blanks from direct inquiry of their patients, if convenient to do so. Editors of Journals are requested to call attention to the fact that these researches are being made, and that circulars can be obtained on application.

The results of these investigations, so far as obtained, were presented to the American Public Health Association, at their last meeting in Philadelphia; but the inquiries will be continued, and in time the facts and conclusions will be published in a permanent form.

Those who can not answer all the questions, will confer a favor by answering a part of them.

1. Name and residence? (If unwilling to give in full, the initials, or a simple blank, will answer.)
2. Sex?
3. Age?
4. Married or single?
5. Occupation?
6. Have any of your near or distant relatives been afflicted with any form of "Hay Fever"?
7. What is the predominant temperament among your immediate relatives?—nervous, bilious, sanguine, or lymphatic?
8. Is there any disease that seems to run in your family; as, consumption, catarrh, asthma, etc.?
9. What is your own predominant temperament?
10. What are the leading symptoms of the disease in your own case, from first to last?
11. At what date does the attack come on?
12. Does the attack come on every year at precisely the same day or hour, or does it vary somewhat?
13. How many years have you been a sufferer?
14. Do the attacks vary in severity different years?

15. Are there distinct intermissions during the course of the disease when it seems to abate decidedly ?
16. Do you have cough, or asthma ?
17. At what stage of the attack does the cough or asthma come on ?
18. Are you worse by night or by day ? If by day, what hours in the day ?
19. Which of the following causes are most likely to excite the paroxysms ? Cinders ? Out-door dust ? In-door dust ? Roses ? Other fragrant flowers ? Fresh hay ? Old hay ? Smoke ? Gases ? Foul air ? Pollen of corn ? Bright sunlight ? Bright gaslight ? Camphor, hartshorn, and ether ? Fruit of any kind ? Dampness ? Sudden chills ? Night air ? Perfumes of any kind ? Over-exertion ? Brimstone matches ? Indigestion ? Roman Wormwood ? "Sneeze-Weed" ? Are there any other special causes that excite the paroxysms in your case ?
20. At what date does the disease disappear ?
21. Does it disappear every year at precisely the same day or hour ?
22. Does the appearance of frost have any relation to the disappearance or the breaking up of the attack ?
23. Are the attacks or paroxysms, during the course of the disease, at all affected, for better or for worse, by mental influences ?
24. Do you observe any signs of nervous depression or exhaustion ; as, bad dreams, sleeplessness, poor appetite, indigestion, or debility, or any vague nervous pain, a few days or weeks *immediately preceding* an attack ?
25. After the close of an attack, is your general health better or worse than usual ?
26. Are you accustomed to have attacks of ordinary catarrh, "cold in the head" ?
27. Do you ever have, during the winter or spring, when exposed to any of the exciting causes, as dust, etc., attacks resembling "Hay Fever" in a mild form, lasting perhaps for a few minutes or hours ?
28. Will the atmosphere of a close, over-heated room bring on some of the symptoms temporarily in the winter ?
29. Is your capacity for intellectual labor affected by the attack ?
30. Have you ever, at any time of your life, been a sufferer from sick headache ? any form of headache ? dyspepsia ? backache ? sleeplessness ? St. Vitus' dance (chorea) ? epilepsy ? neuralgia ? palpitations of the heart ? paralysis of any form ? severe nervous exhaustion ? fits of melancholy ? any diseases of the skin—as eczema or prurigo ? or any other nervous symptom ?
31. Did any of your nervous diseases or symptoms leave you when the Hay Fever appeared ?
32. At the time when you were first attacked by the disease, were you or had you been specially over-worked or over-worried ?
33. Are the paroxysms in any way modified by the diet ? If so, what articles of food or drink are injurious ?

34. Have you ever been able to derive any good or evil effect from tobacco, or alcoholic liquors ?
35. Are the paroxysms more or less severe during or just before menstruation ?
36. Are the attacks or the paroxysms modified in any way by pregnancy ? or nursing ? or change of life ?
37. Are you better or worse on cool, dry, bracing days ?
38. What is the effect of thunder-storms ? of north-east storms ? of dull, moist weather generally ?
39. What kind of internal or local medication have you tried ?
40. Has any treatment relieved you ?
41. Have you ever tried the local application of a solution of quinine, as recommended by Helmholtz ?
42. Have you ever tried electricity in any form, and if so, which current, and how applied ?
43. Are you better in the city or in the country ?
44. Where do you find the quickest and surest relief ?
45. Have you ever visited a region which relieved others, without yourself experiencing relief ?
46. Is the relief, on visiting the non-catarrhal region, immediate or gradual ?
47. If you leave the non-catarrhal region before the disease has disappeared, what is the effect ?
48. Have you ever visited elevated regions without benefit ? If so, what regions, and what elevation ?
49. Have you ever tried an ocean voyage ? with what effect ?
50. Have you ever tried a trip to Europe, and what portion of Europe, and with what effect ?
51. Have you ever tried a residence by the sea-side, and with what effect ?
52. Have you ever visited the South, or South-America, or any warm country, at the time of the attack, and with what effect ?
53. Have you ever been benefited by a residence in a large city, at the time of the attack ?
54. Have you ever tried a prolonged use of tonic treatment ; as, quinine, iron, strychnine, phosphorus, cod-liver oil, or electricity, a few weeks or months before an attack, in order to prevent it ?
55. Is your case included in the statistics collected by Dr. Morrill Wyman, in his work on "Autumnal Catarrh" ?

The argument in favor of the theory that the nervous system plays the most important part in the causation of hay fever is as follows :

*First.* It is most frequent in nervous, or nervo-sanguine, or nervo-bilious temperaments.

*Second.* It is most frequent in those climates and those countries where other functional nervous diseases are most frequent.



*Third.* It runs in families like other nervous diseases. Some are afflicted with it from infancy.

*Fourth.* Like other nervous diseases, it is peculiar to modern civilization.

*Fifth.* The symptoms of the disease are very markedly of a nervous character.

*Sixth.* Like other nervous diseases, it is powerfully under the influence of the mind.

*Seventh.* Like other nervous diseases, it is aggravated by any thing that irritates the nervous system, locally or generally.

*Eighth.* The important element in the production of the disease is heat, following cold, and this same condition causes other nervous diseases.

*Ninth.* As in the case of other nervous diseases, the exciting causes, that is, smoke, dust, etc., etc., can do nothing unless they act upon a system predisposed.

*Tenth.* Hay fever is preceded in a certain number of cases, at least, by a period of debility and nervous prostration in its various symptoms all the way from several days to one, two, or three weeks.

*Eleventh.* Hay fever may come on in a mild form by exposure to heat or close-confined air at any season of the year.

*Twelfth.* Like other nervous diseases, it acts vicariously to the nervous symptoms.

*Thirteenth.* Like other nervous diseases, it is benefited by the tonic influence of mountain or sea air. The notion that we once entertained that the ozone of the sea and mountain air was the cause of relieving these diseases is not easy to demonstrate.

*Fourteenth.* The remedies that are most beneficial in hay fever are those remedies precisely which are most beneficial in nervous diseases. Those which act, so far as we know, through the nervous system.

The plan of treatment that we suggest for hay fever is as follows :

First. To prevent the disease. As early as March or April the patient should begin to take a course of nervo-tonic treatment. Would recommend it to be arsenic, phosphorus in its various forms, cod-liver oil, iodoform and electricity, especially the method of general galvanization and general faradization.

When the disease appears, the great dependence must be on local treatment combined with general tonic treatment. Our friend, Dr. W. F. Hutchinson, of Providence, has broken up a case this year by central galvanization. We relieved, decidedly, one case, and somewhat relieved another, by galvanization externally. Local applications of various substances should be used thoroughly. The great trouble with those who treat themselves is that they do not completely and thoroughly bring the remedies to act upon all the sinuous and tortuous lining membrane of the nasal passages.

*The Early and Later Form of Summer Catarrh.*—Hay fever may appear at any time between May and November. When it appears in May or June we call it early summer catarrh; when it appears in August or September we call it the later summer catarrh; when it occurs in July or the first part of August we call it the midsummer catarrh. The term autumnal catarrh, suggested by Dr. Wyman, seems to us a misnomer, since the disease rarely, if ever, begins in the autumn; it is almost always before the termination of August.

The theory of Helmholtz that infusoria in the nasal passage are the causes of this disease is also rendered improbable by these researches. The local use of quinine, suggested by Helmholtz, is mostly a failure, and the little good that comes from it can be mostly explained by the tonic and cleansing effect of the remedy.

In regard to the pollen theory advocated by Blakcley, of England, we can only say that it is entirely untenable; it is a hypothesis which does not account for the facts, and is overthrown by these researches, as it seems to us.

Another fact of great interest is that the disease is very rare among the lower classes. So far as we can learn, scarcely any cases of hay fever are reported in our New-York dispensaries. This fact is of interest, and has its consolations for those who are suffering from this disease in the fact of its aristocratic character.

The number of those who report that during the winter or spring they have attacks resembling hay fever in a mild form is quite large, and somewhat surprises us.

Among the regions which hay fever patients visit with benefit we may mention the White Mountains first; the ocean every

where, at least in cold climes, for those who take sea voyages almost never suffer while at sea, but may be attacked as soon as they land; a trip to Europe may save one from the disease; the Adirondack region is good; the island of Mackinaw is highly recommended by some. Dr. Dennison, of Denver, Colorado, sends us a pamphlet which reports that some cases of hay fever have been cured by a residence in that region. We have not been able to ascertain whether a residence in a tropical clime at the time of the disease would relieve it. One case which was not reported to us, but in a work on hay fever by another, suffered in India as much as in England, and suffered even at sea when he was in a hot clime. Few, if any, have tried a prolonged use of tonic remedies, as quinine, iron, strychnine, phosphorus, cod-liver oil, general faradization and central galvanization for some months preceding the attack, and for that reason we strongly urge that treatment to the attention of all medical men everywhere who have to deal with the disease.

The above conclusions are derived from the study of nearly two hundred cases carefully reported.

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*“ Mind Reading.”\**

UNCONSCIOUS MUSCULAR ACTION THE EXPLANATION OF THE  
PHENOMENA — RESULT OF EXPERIMENTS UPON BROWN AND  
OTHERS—THE ALPHABET TEST THE MOST INSTRUCTIVE.

AFTER our experiments with Brown in Music Hall, in New-Haven, last week, we suggested to the audience that they could themselves do as well as Brown, and we that very night made experiments of a similar kind with two or three friends. We carried out the plan which he adopts, which is to put the back of the hand of the person operated on against the back of the head of the operator, holding it there permanently, and the other hand of the operator being touched lightly against the tips of the fingers of the hand of the person operated on.

\* Being the substance of remarks made before the New-York Society of Neurology and Electrology, November 16, and the King's County Medical Society. Published in New-York Tribune, Nov. 21.

In this position the slightest tremor or agitation of the mind may be communicated through the tips of the fingers from one person to another. We found that in this way it was possible to detect the locality on which the mind of the person operated on was concentrated, provided he had his eyes upon it. About a quarter of our experiments were successful. These experiments were made in a small room and in a quiet way. Since that time we have made a different class of experiments to illustrate the remarkable results that are attained through *unconscious muscular action*. A lady with whom we are acquainted goes out of the room, and while she is absent an object is hidden. She returns, and two ladies who know where the object is stand up beside her in the middle of the room and place both of their hands upon her body, one hand in front, the other behind; all three stand there for a moment, the two women who know where the object is keeping their minds intensely concentrated on that locality. In a moment or so this lady who is to find the object moves off in the direction where it is, the other ladies with her still keeping their hands upon her, and in nearly all cases she finds it. This is accomplished by the unconscious muscular action of the two ladies who know where the object is, upon the person of the lady who is seeking it. This lady, who is quite successful in these experiments, thought it was necessary to hide keys, and supposed that "magnetism" had something to do with it. We told her that that was not probable, and tried another object, and found that it made no difference what the object was. She supposed, also, that it was necessary that the object should be secreted on some person. We found that that was also not necessary. She does not always succeed in finding the exact locality at once, but she comes usually very near to it, and after hunting for it about as much as Brown, "the mind reader," usually does, she finds it. In some cases she goes directly to it. She very rarely fails.

In order to settle the question beyond dispute whether unconscious muscular action was the sole cause of this success in finding objects, we made the following crucial experiments with this lady: Ten letters of the alphabet were placed on a piano, the letters being written on large pieces of paper first.

We directed her to see how many times she would get a letter which was in the mind of one of the observers in the room correct by chance purely, without any physical touch. She tried ten times and got it right twice. We then had her try ten experiments with the same letters in the same manner that Brown reads—that is, with the hand of the person operated on against the forehead of the operator, the hand of the operator lightly touching against the fingers of this hand, and the person operated on concentrating her mind all the while on the object, and looking at it. This is all there is of Brown's experiments and of those which imitate his. In ten experiments, tried this day, with the same letters, she was successful six times. We then tried the same number of experiments with a wire in the manner pursued by some of the faculty of Yale College and others. The wire was about ten feet long, and was so arranged—being made fast to a chair—that no unconscious muscular motion could be communicated through it from the person on whom she was operating to herself. She was successful but once out of ten times. Thus we see that by pure chance she was successful twice out of ten times; by utilizing unconscious muscular action in the method of Brown she was successful six times out of ten. When connected by a wire she was less successful than when she depended on pure chance without any physical connection. This seemed to us and to all who were co-operating with us a clear demonstration that unconscious muscular motion is the explanation of the success when connected in the method that Brown uses. In order still further to confirm this, we suggested to this lady to find objects with two persons touching her body in the manner we have above described. We told these two to deceive her, concentrating their minds on the object hidden, at the same time using conscious motion towards some other part of the room.

These experiments, several times repeated, showed that it was possible to deceive her just as we had found it possible to deceive Brown in the same way at the Sturtevant House investigation. This lady, who is more uniformly successful than Brown, at least in these household experiments, is of a nervous constitution and susceptible, but others who try the same expe-

riment meet with excellent success. Probably the majority of persons, with a little practice, can do all that Brown does or his imitators have done. Those who are successful with this method, and who carefully study the matter, tell us that they appreciate a slight thrill as though a hair had touched their fingers, when they approach the locality of the hidden subject that is in the mind of the person operated on. Some are not aware of this at first until their attention is called to it, and they observe closely. In all these experiments, especial pains were taken by us to avoid the element of error that comes from unintentional collusion. Those who were in the room were ordered by us to keep perfectly still—not to laugh, speak, or move in their seats. Experiments that have been made in New-Haven, Bridgeport, etc., lose their value partly because this element of error has not been guarded against, and partly because a fair comparison has not been made between what is accomplished when connected with a wire, or by the body, and when there is no connection, and no way of finding an object except by pure chance. The question may now, we think, be regarded as definitely settled as any question of this kind can be settled by rigid experimentation. These experiments can be confirmed without difficulty by any one who will take the same pains to avoid the errors that come first, from collusion; secondly, from unconscious muscular action; thirdly, from chance; and fourthly, from unintentional collusion of the audience. In comparing the success by pure chance with the success when there is unconscious muscular motion, the alphabet is a far better test than finding hidden objects, and it perfectly illustrates the whole principle. Mind-reading is really another form of the “learned pig” operations. In the case of the “learned pig” (“Educated Ben” excepted) the sign is given consciously by the master. In the case of “mind-reading,” the sign is given unconsciously by the person operated on.

The statements so positively made by those who are operated on successfully, that they do not make any unconscious motions, are Irish bulls of the worst kind. Unconscious motion is motion that we make without knowing it. The success of these experiments depends more on the person operated on than on the operator. Some persons are more liable to make uncon-

scious motions than others. The many failures of Brown in the New-Haven investigation were due not to my tests, for, as is well known, he utterly refused to take my severe tests, and also refused to experiment with me privately as he was publicly pledged to do, but because the majority of those on whom he operated were well trained, thoughtful persons, accustomed to self-restraint, and rendered skeptical by the public discussion of the subject, and by the suggestions that we read to the audience. We may say, in closing, that the notion entertained by some that these phenomena could be explained by "animal magnetism," is not only an unnecessary hypothesis, as shown by the above experiments, but is utterly opposed to what is known of electro-physiology.

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*The Relations of certain Diseases of the Skin to the Nervous System.*

IF the essay of Dr. Bulkley in the present number of the ARCHIVES, and which was recently read and discussed before the New-York Society of Neurology and Electrology, shall gain the gradual assent of specialists in dermatology, it may mark an era in that department of medicine.

Certainly, the nerve-relations of diseases of the skin demand more study than they have yet received.

The remarkable and incredible effects that we have obtained from *central galvanization* in some bad cases of chronic eczema and prurigo are very suggestive on this point, and we refer to them here that others may still further confirm our experiments.

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*In Memoriam of Professor Jeffries Wyman.*

ONE year ago last September, as we were spending a few weeks at Bethlehem, in the White Mountains, there came to the hotel a tall, somewhat slender gentleman, with quiet ways and a scholarly countenance, who registered himself as "J. Wyman, Cambridge." For two weeks and more we occupied the leisure hours of those splendid autumnal days in varied and, for our

side, most instructive converse. It was a season of extreme and exquisite silence among the mountains, for the noisy tide of travel had already set backward to the cities, and we heard naught save its distant roar, that soon died away and left the favored few to the congenial companionship of the mountains and of each other. Never before did we have for so long a time so good an opportunity for sustained scientific conversation, not alone in the special branch where he was one of the highest authorities on the earth, but in pretty nearly every great realm of thought he was more or less at home. He could talk of theology or neuro-physiology, of general therapeutics or electro-therapeutics, of geology and biology, of philosophy or poetry, of art or general literature, of oratory and morals, with an intelligence and suggestiveness most uncommon, and a candor that was almost a phenomenon. His mind was of that rare sort—in this country to be counted by dozens rather than by scores—in which reason rules, and it had been trained through a long life by a culture wide, deep, generous, and constant. Add to this intellect, a moral nature peculiarly amiable and equable, manners of almost feminine delicacy, and we have a companion for walk or lounge, at table or the mountain side, such as one might meet but once in a long lifetime.

A great man, though not of the greatest, his defects were of the negative rather than of the positive sort, and while they kept him from great popular fame, made him all the more companionable and lovable. It was because of his lack of self-assurance and of self-seeking, and his relative deficiency in the realm of imagination and generalization, that the obituaries of Prof. Wyman are set in fine type, and hidden in the corners of newspapers, while those of his friend Agassiz flamed in broad editorials, and dissolved a nation in tears. And yet, as naturalists well know, Wyman rose far above Agassiz in the certainty of attainment, and in the wisdom, justness, and safety of his conclusions.

In Wyman, talent of the scientific phase at least reached its culmination, and if it did not ever rise to the genius of Agassiz, it closely approached it, and at some points seemed to overshadow it.

Of the forty million human creatures in this country, there are possibly ten thousand that knew and cared for Prof. Wy-



man, and at some time, or many times, had felt his real value and of the other thirty-nine million nine hundred and ninety thousand there are probably none who, at this moment, could tell whether this great scientist is living or dead, or whether, when living, he was a philosopher or a fool. In the eternal constitution of things it seems to have been decreed that the people shall make idols only of those who feed their fancies or their passions.

A favorite thought with him, and one that many times he expressed to us, was, that all really good and original scientific work, however despised at first, would, in proper time and place, come to the light of men, and reflect merited glory on its author; and in proof of this, he gave illustrations from the history of science, that were both novel and striking.

Inspired and sustained by this faith, he was, we may suppose, content with the little glory he had gained, and we much doubt whether he had to fight for a moment with the feeling of jealousy of those who were more honored of men in proportion as they knew less than he.

Prof. Wyman was never strong; he suffered both from "hay fever," so called, and from consumption, that finally robbed him of ten years of life. His later days were one long battle, a ceaseless skirmishing, with now and then a sharp conflict, in which, until the last, he had ever won; he always, so to speak, slept under arms, in constant expectancy of an attack in which his previous good fortune might fail him. But all the while, as he well knew, he was fighting a losing battle, keeping the enemy at bay, but not repelling it, and living always in sight of his active and remorseless foe. Camp life in Florida was, for several years, his refuge from the ugly damp of our Northern spring; and to this, as he often said, he owed the little life that was left. From those distant solitudes of that region he wrote us a letter in which, among other matters of a personal nature, he spoke with enthusiasm of his studies among the Indian mounds—a record of which he was hoping at some time to publish in permanent form.

One bright September evening we stood on the rock that lies on the eastern slope of Bethlehem, and watched the purple shadows, as they crept slowly and softly over the heights of

Franconia, and, loth to leave, we prolonged our stay until the twilight grew deeper and deeper, and all the region was wrapped in haze, save over the distant crest of Mt. Washington the sun, bidding the earth good-by, planted a crown of pink and gold on the summit, rested a moment, with changing hues, and suddenly went out in a flash of rosy splendor.

In like manner his own life was most beautiful at its setting. He was one of those of whom we read so much and see so little, who grow old gracefully; who acquire the mellowness, the serenity, the patience, and the sweetness of age, without its acerbity and narrowness.

DR. ANSTIE.

The death of this famous worker in neurology we feel as a personal sorrow. The memory of a brief hour or so, passed with him, will not soon pass from us, for it left the impression that will be permanent, of a strong, sincere, and plucky man. On some points we thoroughly agreed, on others we widely differed; but his views, even when wrong, were well put and manfully contested.

He represented the best class of Englishmen, combining in a splendid and unusual manner the scientific and practical elements of the true physician. Very much of medical writing is dull and dreary twaddle; Dr. Anstie knew how to write nervous, powerful, and readable English. He was just entering his silver decade, and if he had lived twenty years longer he would have reaped a brilliant and substantial reward of the original work that he did in his youth and early manhood. But, after all, the highest joy is in work, and not in its rewards. "Whom the gods love, die young."

## GLEANINGS FROM HOME AND FOREIGN JOURNALS.

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*On Neuroses of the Joints*, by Dr. Moritz Meyer. Reprinted from the *Berliner Klinische Wochenschrift*. 1874, No. 26.—In this reprint Dr. M. reports four interesting cases of neuroses of the joints. The following points are of diagnostic importance :

1. The neuralgias are almost always unaccompanied with nocturnal pains. 2. The painful joints are very sensitive to slight touch or handling ; whilst strong pressure and knocking together of the heads of the joints is not particularly painful. 3. Recurring œdemas, and swellings of the skin and cellular tissue. 4. Occasional periodical changes of temperature of the affected joint. 5. In spite of long-continued rest, there is but little emaciation of the muscles. 6. The insignificant objective symptoms bear no importance to the grave complaints of the patient. 7. If the attention of the patient is drawn from the affection, he frequently forgets his pains, and the affected joint can be moved. The treatment consisted in the application of powerful induced currents directly to the joints. J.

*Contribution to the Physiology of the Cortex cerebri*, by JAMES J. PUTNAM, M.D.—These experiments upon dogs were undertaken for the purpose of testing the much-disputed point, namely : “Can the cortex cerebri be irritated to the extent necessary to produce the results claimed, *without* at the same time irritating deeper-seated structures enough to call out their functional activity ?” These experiments have given Dr. P. an affirmative result. His method is to find centres for definite and uncomplicated movements, and the minimal current strength necessary to produce these movements, and then, with a sharp knife, to make a cut underneath them, leaving a good-sized but thin flap, which contained the supposititious centre. If the part was irritated with the flap *in situ*, no movements occurred ; if the flap was then turned up and the part irritated below it, no movements generally occurred with the same current strength, but always appeared when the strength of the current was slightly increased ; the flap then being replaced, and the electrodes applied on its surface, no movements were produced. The centres found corresponded closely with those found by Ferrier, and in one instance more closely with that given by Hitzig. J.

*Dr. Väter von Artens on General Electrization and Central Galvanization*.—In a series of numbers of the *Wiener Medicinische Zeitung*, Dr. Väter von

Artens published his observations and experience about the application of electricity.

He begins by stating that Drs. Beard and Rockwell were the first to represent the method of general electrization in a scientific way, and to carry it out systematically.

In a work published in 1871, the German translation of which the author of this article recently published, these two gentlemen undertook to publish their extensive experience, by which the specialists of the branch of electro-therapeutics were stimulated to submit the method of general electrization to a thorough test. By the newest admirable work of Benedict it appears that also this eminent explorer and untiring practitioner has been actively engaged to test the statements of Drs. Beard and Rockwell. Benedict says: "I can state now already that I can support the statements of the American authors in general, and that especially in insomnia, even of lunatics, in migraine and general nervousness, splendid results have been obtained by me."

The method of general electrization will undoubtedly soon be adopted by all electro-therapeutists, but as this method deserves and ought to be known by all practitioners, he describes it in these articles and illustrates it by some very interesting and instructive cases of his practice, with the hope that all his colleagues may make use of it in suitable cases.

The purpose of general electrization is to influence the whole system as far as possible by external applications of electricity.

General electrization may be applied in different ways. Beard and Rockwell place the feet of the patient on a dry, warm copper plate; Benedict has the feet put in warm water, which is inconvenient both for patient and physician; Artens recommends the use of the copper plate covered with a piece of flannel dipped in a warm solution of salt; this flannel ought to be large enough to cover also the back of the feet. To female patients he applies to the lower extremities a copper plate with prolongations to cover the whole part from the tendo achillis to the popliteal space; the whole covered with flannel moistened in salt water. If these electrodes are used, the application of electricity is not so painful as if the current has to pass first and mostly through the tarsal bones. Beard and Rockwell recommend, in case this should be too painful, to have the patient sit on the plates, or to apply a large, moist sponge to the rectum. The foot electrodes ought to be connected with the negative pole, because experience seems to prove that the descending current affects the body less disagreeably than the ascending current. According to indication all currents may be employed.

As positive pole a sponge of five to six inches in diameter, fastened around a brass ball, or the hand of the operator, may be used. The latter mode offers many advantages, because it may be adopted to all parts of the body, and because the strength of the current can be easily graduated by pressure of the other hand on the sponge electrode, and the operator will be able to judge better about the strength of the current by his own feelings. The hand can be used, however, only in general and central electrization.

The use of the hand is especially indicated in nervous and delicate persons, and at the first sitting of every patient, in order to test the sensibility of the patient. He lays great stress on this rule, as frequently the first applications, if not very carefully made, will leave some unpleasant effects, which may deter the patient from the continuation of the applications, or at least create some alarm.

If the electrode is applied over the sixth and seventh cervical and first dorsal vertebræ, a strong current will not only reach the spine, but also the larynx, stomach, the lungs, pharynx, and upper extremities; in fact, the most important organs and nerves of the body, as also the sympathetic nerve, will be affected from this point. Very muscular persons require strong currents, if the effects shall be observed in the upper extremities, and most of the patients bear it here remarkably well. He considers it of great diagnostic importance if no pain is produced by the current in the spine.

Applied to the posterior border of the sternocleido-mastoid muscle, the brachial plexus, and if applied to the anterior border of this muscle and over the sternum, the sympathetic nerve will be affected. He advises also to move the positive pole several times around the neck in order to include all the nerves in this region in the sitting. The upper extremities should be treated with the interrupted current, but not strong enough to cause pain.

Especial care he desires to be directed to the application to the spine, which bears strong currents of all kinds; but in case of irritability or inflammation, the continuous galvanic current should be used (Beard and Rockwell). The sponge electrode ought to be moved slowly over the spine, and below the scapular angle it should be applied also laterally in order to touch the liver, spleen, and kidneys.

The temporary reaction of the organs of the chest is not considerable, and neurotic affections of these parts are less influenced by electricity; but the muscles of the chest are more permanently benefited, and thus the functions of the lungs indirectly improved, and, possibly, the development of tuberculosis prevented or limited, as Bastings, of Brussels, has pointed out already. Strong currents should be avoided, as the ribs, especially the lower ones, pain easily.

Stomach, liver, spleen, and intestines are more accessible to the electric current if the sponge electrode or the hand of the operator are gently pressed over the abdomen; the stomach ought to be subjected to the current with great care, as strong currents often produce very unpleasant symptoms. In patients with large adipose abdominal walls, these organs are more accessible to the electric current if the electrode is applied to the lower part of the spine.

Special treatment of the lower extremities is only indicated in local paralysis.

The following rules about the application ought to be observed: 1. The strength of the current ought to be moderate in the beginning, even if the patient is very strong and muscular, to be increased later to such a strength that it feels moderately painful. 2. About the completeness of the applica-

tion: he wishes to have in the beginning only the neck subjected to treatment, and to extend it later gradually over the whole body. It is not necessary, however, to apply the current to all parts at every sitting. 3. The duration of the sitting may vary from five to thirty minutes, according to the strength of the patient, and most of this time should be devoted to the neck and spine, and should be repeated daily or weekly, according to the case and to the state of the patient, and should be continued for some time, with intervals, as recommended by Drs. Beard and Rockwell.

The effects of general electrization he divides in three classes: 1. Primary, manifesting themselves during or immediately after the application. They vary considerably; sometimes the electrization produces sleep, exhilaration, relief of pain and fatigue, trembling, perspiration, etc. The galvanic current carelessly applied to the head produces sometimes temporary headache and giddiness. Temperature and pulse are also influenced by the electric current, as was proved by some very interesting researches by Drs. Beard and Rockwell; sometimes it improves the appetite. 2. Secondary effects. They are generally noticed only in the beginning of the treatment, if too strong a current has been employed, or the sitting has lasted too long. The faradic current produces sometimes pain in the muscles of the upper part of the body, and the galvanic current not unfrequently fatigues the patient. 3. Permanent effects are noticed sooner or later, according to patient and disease. Amongst the first is improvement of sleep, and this may be taken for a good sign for the success of the treatment; later, appetite and digestion will be improved, and also the functions of the intestines and the general circulation. Nervousness, mental depression, and neuralgic affections are more benefited by this than any other treatment, and also the mental faculties are improved by the application of electricity.

Reviewing the tonic effects, he finds: 1. That they are not uniform, but vary according to patient and disease; they may be noticed only during treatment or some time afterwards. 2. They are sooner noticed in quick, nervous patients. 3. They are, as a rule, as permanent as results obtained by other remedies.

The effects depend especially on the circumstances—1st, on the fact that the whole nervous system is influenced by the current; and, 2d, on the passive exercise of all muscles, produced by quick and continued contractions.

The question, When is local and when is general electrization indicated? he answers thus: Local diseases, as all peripheral, some central and reflected paralyzes and neuralgias, local injuries, and many diseases of the eye, ear, larynx, of the genital and digestive organs, also those disturbances which are benefited by galvanization of the sympathetic nerve, the local application is indicated; but also alternating with general electrization in many nervous disturbances, it will be found of great value. In constitutional diseases, due to faulty nutrition or general debility of the vital functions, in doubtful cases not dependent on local causes, and in incurable diseases accompanied by disturbances of nutrition, general electrization will be required.

The question, when galvanic or faradic currents are to be used, he divides in the following way: Where contractions of muscles or mechanical effects are desired, the faradic current ought to be used; but where the effect is desired to deeply penetrate the body or to act on the nervous system, the galvanic current, which produces catalytic, electronic, thermic and chemical effects, is to be preferred. If alternate currents are indicated, the galvanofaradic current might be used. He applies this by using two foot-plates, one for the galvanic, the other for the faradic current, and a positive electrode, which has both currents combined.

As contra-indication of general electrization, regardless of currents, he considers if the patient, after two or four sittings, even if only weak currents have been employed, complains about increased irritability and congestions, and no beneficial results are to be noticed. He warns not to rely always on electricity, even if its use should be indicated. Age makes little difference, as even infants bear weak currents very well; but of course great caution has to be used in very young and very old people. He refers to the essays of Ziemssen, Burkhardt, and Erb, who undoubtedly proved that, if the galvanic current is applied to the head, considerable branch-currents pass through the brain; but it is not quite so clearly proved that this is also the case with the spine, but we have more certainty about its effect on the sympathetic nerve.

He refers now to Beard's admirable plan of *central galvanization*, instead of the formerly applied special galvanization of the head or spine. The negative pole ought to be held by the patient over the epigastric region, whilst the operator applies the positive reophore to the nerve-centres. He proposes the expression of *pan-central galvanization* as more appropriate. The selection of the epigastrium for the negative pole is advisable, because here the cataelectronic effect of the current is exceedingly well borne; but in sensitive patients, or when the sitting should last too long, it should be moved up and down the sternum, in order to avoid all irritation of the stomach and the pneumogastric nerve. He does not think it necessary or even advisable to extend the galvanization over the whole head, but has it applied, as Dr. Beard recommends, especially to the cranial centre (parietal suture), as from here to the stomach the current passes through all the principal centres. After this the electrode is applied along the anterior border of the sterno-mastoid muscle, and from there along the clavicle of both sides, which may take from one to five minutes. In applying it to the spine, the cilio-spinal central (over the fifth to seventh cervical vertebræ) ought to be attended to especially. The whole sitting should last from five to fifteen minutes. It is plain that in this way all the nerve-centres are reached in one sitting by the positive pole principally. Its effects are more powerfully tonic than general galvanization, because, if this mode is used, the poles are farther separated, and therefore milder in its actions. It is especially adapted for children; its effects are also more of a sedative and tonic character than those of the local applications. These facts are based on extensive experience, and supported

by many interesting and instructive cases, some of which are mentioned here :

*Case 1.*—A farmer was taken sick three years ago with chronic intestinal catarrh, lasting seven months, and, after the use of opium and astringents, great nervous irritability, want of appetite, and obstinate constipation remained. At the beginning of the electric treatment, which was adopted because the stomach could not bear any medication, great debility and anæmia were observed. The plan of general faradization and cold water injections every morning was adopted. At the first sitting, great tenderness of the last dorsal and lumbar vertebræ and of the abdominal walls was observed, and patient fainted after the current had been directed to these parts; good sleep was enjoyed the following night, and after sixteen applications the tenderness of these parts was entirely gone, and the patient's health and appetite greatly improved, but the bowels remained constipated; but after five weeks, this was also completely relieved, and the patient discharged well, and remained so thereafter. This case proves how carefully the application has to be conducted. At the first sitting the current that was used in this case was only of the strength to produce slight contractions of the muscles of the thumb, and yet was powerful enough to make the patient faint. It is strongly urged by him, to test the irritability of the patient by producing contractions of any smaller muscle, especially of the upper extremity.

*Case 3.*—A delicate young lady had for three weeks, after some domestic difficulties, insomnia and loss of appetite, was frightened by the slightest noise, and complained about vague pain in the chest. At the first sitting patient was greatly excited, and the electric current applied to the thumb caused great pain, but the patient insisted on the continuation of general faradization, and stood a mild current, applied for eight minutes, remarkably well. The next day patient appeared in high spirits about the pleasant effect of the application, and in a week was quite well again.

*Case 4.*—A young man fell in a river full of drifting ice, but was saved after being in the water fifteen minutes. Patient had high fever and great pain in lumbar region, and episthotonos. After a week slight paralytic affections of the lower extremities were observed, first in one foot, later in the other. After five weeks the paralysis was complete, but bladder and intestines remained intact. Reflex irritability of both limbs had disappeared, and partial muscular atrophy commenced to show itself. The diagnosis was myelitis partialis, accompanied by meningitis spinalis acuta. Patient was melancholic, had no appetite, little sleep, and was greatly emaciated. General faradization was resorted to; but only after about one hundred applications, during one year, an essential improvement was noticeable, and patient was able to walk with assistance of a nurse, and greatly improved in other respects.

*Case 5.*—An old lady had suffered for years with chronic rheumatism, many joints greatly distorted. After general faradization was used without benefit to patient, the general galvanization was substituted, and after thirty-



five applications, during four months, very few signs of the arthritis nodosa remained, and sour night-sweats, which had been very troublesome, had disappeared entirely.

*Case 6.*—Shows the good effects of general galvanization on hysteric attacks, although the patient was a very delicate and anæmic young lady. Many other interesting cases are mentioned by the author. M.

## REVIEWS OF BOOKS.

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UNTERSUCHUNGEN ÜBER DAS GEHIRN. EDWARD HITZIG. Berlin: 1874.

In this work Dr. Hitzig presents all his researches on the brain up to the date of publication. The work includes the original paper as published in the Archives of Du Bois Reymond and Reichert—also researches on the brain of the ape, and a criticism of Ferrier's method of research, and of his course towards Hitzig.

With the nature of these researches all of us are now more or less familiar. The observations of Fritsch and Hitzig have been confirmed and developed both in England and America. The most interesting portion of the present work is that which is devoted to controversy. Hitzig complains, and in all justice, that the English have not given him proper credit for his discovery in the electro-physiology of the brain. This has not been so much the fault of Ferrier, as we understand the matter, as with the English press, and notably the secular press. When the newspapers get hold of a scientific man they generally give him a good shaking, and rarely let him go until he aches all over. The performances of the English as of the American secular press on scientific matters are enough to make science bow its head and weep. Usually the American newspapers have been the worst in the world. In the May number of this Journal we gave a *résumé* of all that had been then accomplished in this department, including the criticisms of Dupuy, Carville, and Duret, and our own experiments. We are pleased to see, however, that there is a reaction in favor of justice, and in one of the issues of *Nature*, last summer, an editorial appeared on this subject which must have been quite satisfactory to Hitzig.

We do not think that the course of the English papers was inspired by any evil intention; it was simply ignorant of Hitzig's claims. It is true that the experiments of Fritsch had been recorded in the Archives of Du Bois Reymond and Reichert, and that an abstract of them had been published in this country in the *Archives of Scientific and Practical Medicine*, but in neither country and in no country had they attracted the attention they deserved, even among physiologists. Very few read them; scarcely any cared for them or appreciated in all their attempted discussion of scientific matters; but in this particular matter the London *Times* and other English papers seemed to follow the example of American newspapers and drew absurd inferences from these experiments, and over-estimated their practical importance, without duly appreciating their scientific value.

But the English scientists are not wholly blameless in this matter, for they probably furnished some of the material for newspaper reporters, and so able a writer as Dr. Carpenter, in his last work on Mental Physiology, gives in his appendix a *résumé* of the experiments of Ferrier, and absolutely ignores Hitzig and all other German, French, and American physiologists who have worked in the same department. When therefore Ferrier came forth with his clear and interesting exposition, it was to the English-speaking world of science a new revelation, and amid the enthusiasm and excitement Hitzig was ignored or forgotten.

But justice, though slow, is strong and sure in these matters; the genuine claims of Hitzig will be remembered by physiologists, and will become a permanent part of science.\*

ELECTRO-THERAPEUTICS. By D. F. LINCOLN, M.D. Philadelphia: H. C. LEA.

It is a question among many how far the so-called handbooks in the various departments of medicine and surgery are of real utility. To our mind it is clear that they have a not unimportant mission, and if they are used without being over-used or exclusively used, they can be of positive aid to the student in certain stages of his progress. They may prepare the mind for the exhaustive treatises, and open the way to some who perchance may be forever repelled by works of greater pretensions. In exploring a new country it is well sometimes to first take a general view of the more prominent mountains, capes, and headlands, and then to examine at leisure the more detailed geography and the minute geology and the natural history of the hills and the lowlands. Some such use as this should be made of medical compends of all kinds, and when so used they make shorter and safer the work of the student. Those, however, who stop with the general examination they afford do injustice both to themselves and to the cause, and never rise above the grade of superficiality.

It is as impossible to condense the science and art of Electro-Therapeutics in a small volume of one or two hundred pages as it would be to condense in similar compass general surgery, or medicine, or materia medica, or obstetrics, or the diseases of women, of the eye, or ear, or throat, or of anatomy and physiology.

In these days no one can be a scientific and thorough electro-therapeutist who is not more or less of an electrologist and neurologist; in other words, who has not attained some mastery of electro-physics, electro-physiology, and of the diagnosis and general treatment of diseases of the nervous system.

In the present treatise Dr. Lincoln has given some of more important facts of medical and surgical electricity, and has given them, on the whole, with

\* Dr. Hitzig sends us some corrections of errors in the abstract of his paper as published in the May number of this journal. We much regret that it will be impossible for us to make the corrections clear and intelligible without republishing the entire article.—ED.

fairness and impartiality. It is the best of the various works of this class that have recently appeared. It would have been better, we think, if he had allowed himself greater space, so as to have gone more into detail. Electro-therapeutics is essentially a science of detail, and there is no short cut to attain a knowledge of these details, and they can not be shirked by the student. There are a few points where we differ with the author, but inasmuch as he has not stated them with great positiveness or elaborateness, we will not discuss them here. In these complex and growing themes we are all learning—all constantly changing our views.

One correction we will make, and that is the remark of the author in regard to the use of the hand as an electrode in general faradization. It is a *convenience*, not a *necessity*, to use the hand as an electrode in general faradization, or in any other method of electrization. The results can be obtained without allowing the current to pass through the body of the operator at all. We generally use the hand as an electrode in applying to the head and neck, and in the case of a very sensitive patient, on the body, but not usually, and we are rarely fatigued by the application.

*The Psychological and Medico-Legal Journal.* Edited by Dr. HAMMOND, assisted by Dr. CROSS. Published by Christern & Co., New-York.

Several numbers of this journal have reached us, and all of them contain valuable essays and discussions. The mechanical execution of the journal is also excellent.

The sudden and rapid development of interest in neurology and allied sciences, as evidenced by journals and societies, is something phenomenal in the history of science, and is most grateful to the pioneers in that department.

*Archives of Dermatology.* Edited by L. DUNCAN BULKLEY, A.M., M.D. Published by George P. Putnam's Sons, New-York.

The first number of this new journal promises well. It fully meets the purpose of the founder, and is practical and popular in character. Among its contributors are some of the ablest writers in the land. A feature of interest to electrologists is that it will have a section devoted to the electro-therapeutics of diseases of the skin. When we consider that three years ago the mere mention of electricity in connection with diseases of the skin was regarded as a sufficient proof of insanity, one may well exclaim, What hath a short time wrought! We cordially give this journal the right hand of fellowship.

CLINICAL ASPECTS OF SYPHILITIC NERVOUS AFFECTIONS. By THOMAS BUZZARD, M.D. London: J. & A. Churchill.

This is an excellent little work by a careful observer, who in London is well known for his earnest and successful devotion to his profession, and who is giving special attention to diseases of the nervous system.

This work contains chapters on the diagnosis, pathology, prognosis, and

treatment of syphilitic nervous affections, with a number of illustrative cases of great interest. The author especially insists on the importance of giving for a long time enormous doses of iodide of potassium—the efficacy of which is now pretty generally admitted. The work is free from extravagances, is clear, sensible and suggestive, and will help to keep us all on our guard lest we allow syphilitic symptoms to deceive us. In this respect the profession go to extremes; some are always on the lookout for syphilis in every case of disease that appears; others are not as suspicious as they ought to be.

We would suggest to the author that in his next edition he give some attention to those manifestations of syphilis that simulate hysteria,—some of the cases that we have seen are very interesting. We would also suggest that the author and all others who treat these cases by electricity use central galvanization just as though they were real cases of hysteria. The benefit derived from this method in cases of this kind is very important.

THE LEGITIMATE INFLUENCE OF EPILEPSY UPON CRIMINAL RESPONSIBILITY.

By MEREDITH CLYMER, M.D.

This reprint from the Proceedings of the Medico-Legal Society of New-York is exceedingly interesting and valuable. It discusses the subject in a calm, scholarly, and judicial manner, and illustrates the positions taken by a number of striking and suggestive cases.

The following paragraph contains much common sense, a faculty, or rather a combination of faculties, too little used in the current discussions on insanity and legal responsibility :

“At the beginning of this paper I expressed the opinion that the mind of the epileptic is rarely, if ever, whole; though unquestionably the alteration may be of a kind and degree not to affect either the moral or legal responsibility of the individual. But an epileptic dwells on the border-line of insanity, and may at any moment pass the limit, and live there forever. We may in these cases have the whole gamut of insanity sounded, from mere irascibility and capriciousness of thought, feeling and conduct, to the most terrible explosions of maniacal fury.”

In passages of this kind a sensible man finds a positive pleasure. When will lawyers, judges, jurists, and editors learn to look at the subject in this way?

## EDITORIAL.

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THIS journal is now thoroughly and permanently established. It numbers both among its contributors and subscribers many of the ablest thinkers and writers in the departments that it represents, as well as an increasing body of general practitioners who are seeking to keep abreast of the age.

No other subjects so occupy the professional thought as Electrology and Neurology, and in both of these branches this journal will aim to be not only up to the times but ahead of the times. Its mission is to inspire the love of original research, and its contents will as a rule represent the personal experience of the authors.

Hereafter, as heretofore, perfect freedom of statement and of opinion is allowed and expected of those who contribute to these pages, and the opinions and prepossessions of the editor are not to be considered for a moment.

Hereafter, as in the present year, the ARCHIVES will appear in the latter part of May and November. Those who wish to have articles appear in the May number, 1875, will please forward their MSS. by March 15th.

It is expected that the next number will contain articles by various authors on Iodoform in Nervous Diseases; a continuation of the letters on the Elements of Electro-Therapeutics; a paper on Hysterical Symptoms in Organic Nervous Affections; a Case of Stricture of the Œsophagus treated by Electricity; remarks on the Psychological Lessons of the Beecher-Tilton case; a paper on Hallucinations, and another on Muscular Reaction in Paralysis.

After January 1st, 1875, the law requires that the postage on periodicals of this kind shall be paid in advance. On that account partly it has been thought best to raise the subscription price to \$3 a year. Those, however, who send in their names before January 1st, 1875, will be received for the original price for the year 1874.

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The money value of the prize is of course merely nominal, but the subject is very important, and it has not yet been developed. We hope that some of our enterprising general practitioners, who have acquired skill in the use of electricity, especially by the general and central methods, will improve the opportunity here offered.

The successful paper will be published in the ARCHIVES for November, 1875.





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The flattering and gratifying testimonials of a large number of influential men, North and South, induce us to feel some satisfaction in the labor we have so far expended, and we continue our work with brave hearts and with cheerful confidence; but obeying the call of the profession, we look for support to the individual influence, intelligence, and energy of our brethren. If willing to aid us in our effort to diffuse information and improve our common profession, we shall be pleased to have your names recorded as subscribers and as contributors. The plan, the tone, and sentiment of our Journal can but be learned by examination of the numbers already issued, while the list of honored names presented as collaborators, and which list we could easily add to were it necessary, must of itself be a guaranty of its character. We have a large number of subscribers, South and North, and it is a valuable medium for advertising.

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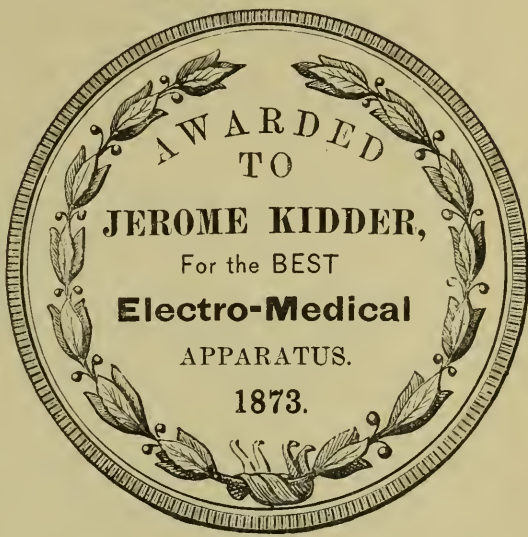
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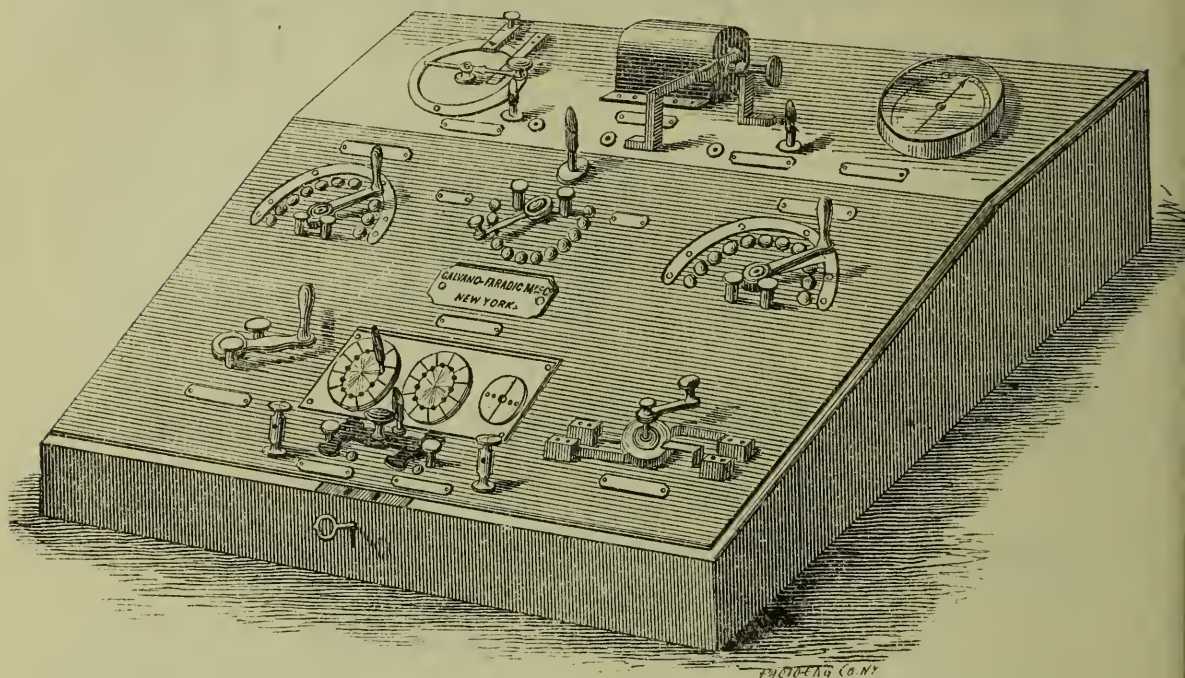
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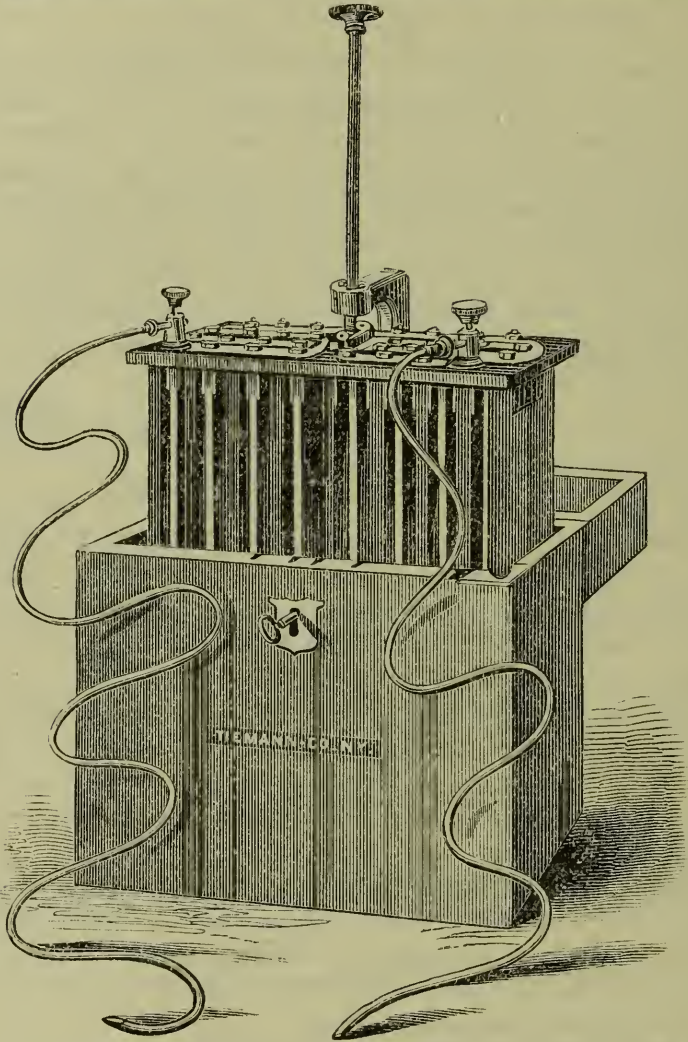
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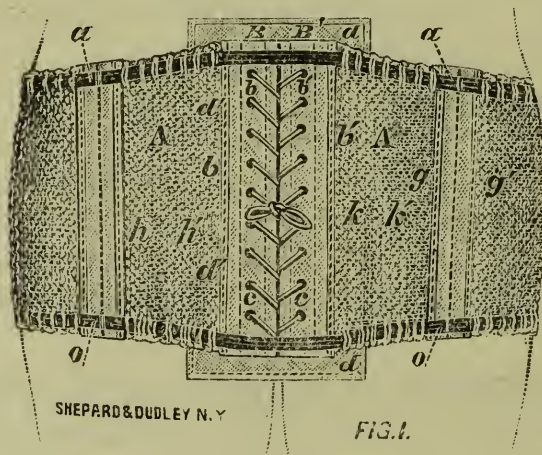
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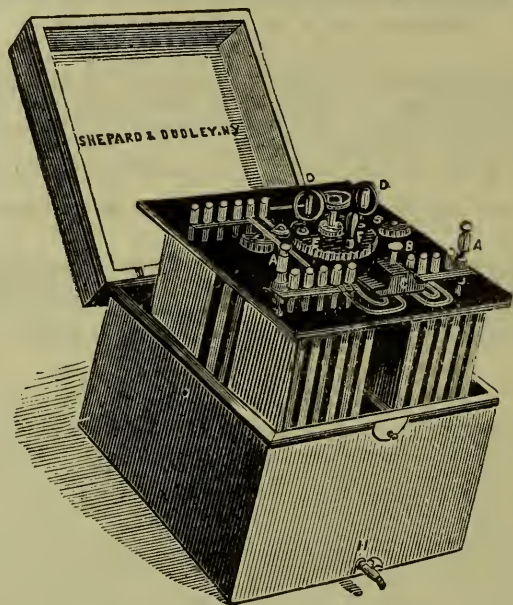
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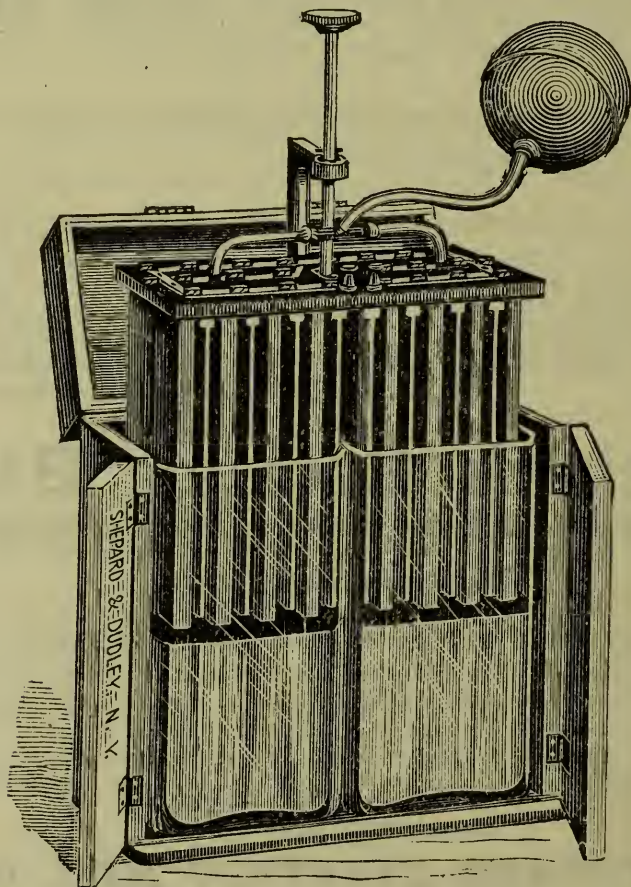
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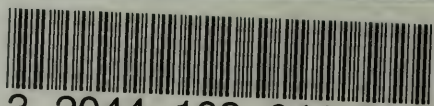
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