Even the personal experience which this writer has referred to, as furnishing to the homœopathist facts which still further confirmed his delusion as to the efficacy of his remedies and mode of cure, also furnished the scientific physician with facts that enabled him, by discussing them and comparing them with the results obtained by other methods, to discover the natural history of many diseases, and to realize the disturbing and injurious effects of many established modes of treatment. He was thus led to realize more fully the agency of that *vis medicatrix naturæ* to which the homœopathist's success could only be ascribed, since, reasoning from known facts, the peculiar remedies of the homœopathist must be regarded as without effect. The result of this discussion of the subject was the more speedy recognition of the recuperative powers of the system, and the abandonment of injurious methods of treatment, and a consequent rapid advance in medical science and an increased success in medical practice.

In the same way a discussion and comparison of different experiences in the treatment of any form of ophthalmic disease may lead to the discovery of the important underlying principles of cure, from which must be derived that scientific practice which we aim to establish and perfect.

If this discord was to be interpreted as indicating a lack of progress it would be disheartening indeed. On the contrary it seems rather to be the natural outcome of too earnest seeking after facts. It seems with the profession as the poet declared to be true of the individual,

"Who knows most, the more he knows to doubt,
The least discourse is commonly most stout."

At least we can console ourselves that notwithstanding all this discord and conflict of opinion on ophthalmic subjects, progress has been steadily made. When Graefe devised his cataract extraction with iridectomy he at once increased the percentage of cures very greatly. That increase went steadily on until about 20 per cent. was added to successful results, making about 95 per cent. in all. And now one of those who asks us to return to the simple operation shows us one table with 96 per cent., and another with 97 per cent. of perfect results, and in 200 cases only 2 cases (1 per cent.) of total failure.¹⁵

Why is it that after so many years we return again to simple extraction with so much greater success? What are the essential elements of this success? Is this attainable by the average operator? These are themes for discussion. So with the other subjects I have mentioned. We treat glaucoma, sympathetic ophthalmia, and errors of refraction and nearly all other ophthalmic affections with more success than ever before. What

are the elements of progress? Let us debate them.

We have indulged in a feast of statistics, and have not digested and assimilated them as we ought. It is possible that by proper discussion of these mooted subjects we can separate the truth from error, and deduce more fixed and definite principles and standard rules for our guidance in practice, and one of my objects in calling your attention to these unsettled questions is to remind you that there will be ample ground for debate in these meetings, and some, if not all, of the questions referred to will be raised for your consideration. "Try all things, hold fast by that which is good," is a safe injunction to heed, and I have no doubt that it will be faithfully observed by the members of this Section.

ORIGINAL ARTICLES.

THE THERAPEUTIC USES OF ELECTRICITY.

BY JOHN V. SHOEMAKER, A.M., M.D.,
OF PHILADELPHIA, PA.

It begins to dawn upon the medical mind that the field covered by electricity is larger than that comprised by any other curative agency. That this should occur long after the whole world was disposed to accept the discovery of electricity in a form applicable to medical treatment as one which was to revolutionize medical practice, is at the first glance strange, but is nevertheless susceptible of easy explanation.

Electricity, known even to the ancients, had yet to wait until a time so modern as the end of the last century before a machine was devised to administer it even in the static form. Then, when men found themselves possessed of a force which they could for the first time generate and control, they naturally fell into confused notions about its being the vital force. Hence, when it is considered that the static form of electricity has comparatively little range in the treatment of disease, that quacks rushed forward to assert and maintain its universal curativeness, and that the sounder observation of skilful physicians discovered the untenability of the proposition, it is not surprising that when, in the early part of this century, current electricity was first generated, controlled, and applied to therapeutic purposes, electricity as a curative agent had been so discredited, that even thinkers in the medical profession were slow to believe in its remedial virtues.

On the one hand, electricity had, by those ignorant of its limitations, been lauded to the skies as a panacea; while, on the other hand, it had, by those equally ignorant of any of its merits, been decried as perfectly worthless. Empirics

¹⁵ Report of the first series of One Hundred Successive Extractions of Cataract without Iridectomy, by H. Knapp. Archives of Ophthalmology, Vol. xvii, p. 73. Also second series of One Hundred Cases. Archives Ophthalmology, March, 1889, p. 10.

having absurdly imagined and claimed that electricity would cure everything, and time having proved that the claim was unfounded, the medical use of dynamic electricity came in, without trial, for a share of the obloquy which attached to the failure of static electricity to do what it should never have been alleged to be capable of performing. Yet, the therapeutic value of static electricity will stand all reasonable test, and similarly, so will the therapeutic value of current electricity. Static electricity has never been fairly tested by physicians, because extraordinary efficacy being at first ascribed to it, and then as generally denied, it lost all standing in court, while current electricity never had proper standing there, because it was discredited in advance, by the loss of faith in static electricity, for which it was no more responsible than it was for the preceding ascription to static electricity of universal virtue.

The proverb truly says that a poor workman never had a good tool, and with equal truth we may add, that a good workman can supplement a bad tool. But these cases refer to work directly wrought by the hand of man. No amount of scientific knowledge or of manual skill can supply the deficiencies of a poor apparatus. No economy could be more false than to possess and use one. To accomplish our purpose in administering electricity, the apparatus must be not only good, but in good condition. Otherwise it is worse than useless; it is a delusion and a snare to both patient and physician. Whether, therefore, the apparatus be galvanic, faradic, combined galvanic and faradic, supplied by the incandescent light current or by storage batteries, or the apparatus be for static electricity, let it be excellent of its kind, under penalty otherwise of its not accomplishing the purpose professedly sought. Makers of good electric instruments now abound in the United States; France excels in them, and even England, which was slow in having specialists in that department of labor, is now supplied.

Dr. W. R. D. Blackwood reports that both static and faradic treatment often have the effect of relieving the chest pains and the debilitating night sweats of phthisis, through the improvement which they effect in general innervation and nutrition.

Faradization of the thorax is very beneficial in spasmodic asthma and chronic bronchitis. The dyspnoea of the latter is by this treatment much diminished in gravity.

Even more efficacious in the paroxysms of angina pectoris than inhalation of nitrite of amyl does prompt galvanization of the sympathetic seem to be in aborting an attack of this acute affection.

Sufferers from hay fever are so much addicted to seeking refuge in a change of climate when the season approaches when they are liable to an attack, that there has not yet been the fullest op-

portunity to experiment with electricity in cases of this disease. There is, however, reason to believe from the result of treatment which has been practiced in that direction, that hay fever can be much relieved by the employment of galvanization, administered as in exophthalmic goitre.

In exophthalmic goitre itself galvanization relieves the glandular swelling and reduces the protrusion of the eyeball. The method of application is to place the anode directly under the angle of the inferior maxillary bone (over the pneumogastric), and the cathode over the solar plexus. The current should be moderate, ten minutes at a time, at intervals of two days.

Insomnia is frequently successfully treated by general galvanization or faradization, when the use of drugs is contraindicated. General faradization just before the patient is intended to sleep has a calming effect. This is caused by the capacity of electricity to equalize the circulation and reduce the pulse without lowering its tone. The application is so simple that it can be made by a nurse or a member of the family.

Sciatica can always be relieved during its acute paroxysms by the administration of descending galvanic currents. Permanent cure of it has been frequently obtained by electro-puncture, the needle being thrust down to the nerve at one or more points along the painful portion of the nerve.

Neurasthenia is not always cured by electricity alone, although it frequently is. It will generally yield to electro-massage. This obviates the assumed necessity of the gorging which has been so general in the treatment of this complaint. The method employed is daily combined general galvanization and faradization.

Torpor of the liver is readily overcome by the faradic current.

General faradization of the abdomen every morning for a while, or if more convenient, every evening, will always provoke a movement of the bowels within a moderate time. This treatment is to be recommended far beyond that of the taking of drugs to relieve constipation, because, instead of its being followed by constipation, the effect tends to be permanent. Constant use of drugs for that prevalent ailment of constipation can thus be avoided by the employment of methodical faradization. Nothing so surely and promptly tones up the intestinal muscular fibre as does electricity, and causes the functions of the bowels to be regular.

In intestinal occlusion Dr. Larat¹ recommends galvanic electrization, and he reported nineteen cases before the French Academy of Medicine in which he cited six successes.

Dyspepsia in various forms receives decided relief from galvanization. Defective secretion of the gastric juice is rectified, glandular action stim-

¹ The Treatment of Intestinal Occlusion by Electricity. By Dr. Larat. Paris Letter to THE JOURNAL, June 15, 1889.

ulated, and the muscular tone of the stomach increased by this treatment.

Gastralgia and stomach-cramp are usually at once relieved by galvanization, as are also pyrosis and the vomiting of pregnancy. Currents not exceeding 15 milliampères are best suited to the purpose, the anode being placed on the cervical spine and the cathode on the epigastrium.

Instances have been from time to time reported of the dislodgment of impacted gall-stones by the administration of electricity. As we have no remedy for this painful malady except *dilcareia villosa*, it would be well to give electricity a fair trial for its relief.

Hæmorrhoids, although not a disease of the digestive tract, so often depend upon the blocking of the chylo-poëtic circulation, as to suggest some mention in connection with the preceding brief notice of electrical treatment as applied to the bowels. The aching attendant upon congested piles is often dissipated by placing the anode on the anus and the cathode over the liver, and passing the galvanic current for fifteen minutes, with the strength of from 20 to 30 milliampères.

The value of electrolysis in urethral stricture of the male has been incontestably proved by Dr. Newman, of New York. For that matter, contraction of any duct, such as the lachrymal canal, the œsophagus, or the Eustachian tube, is amenable to the electrolytic method. Extended clinical observation, however, is still needed to perfect these latter forms of electrolysis. For the relief of ordinary enlargement of the prostate gland, a suitable intra-rectal rheophore is required. In cases of extreme hypertrophy of the gland, the negative pole may be applied by a well-insulated needle introduced per anum, and with a current as strong as can be tolerated, say from 75 to 150 milliampères, for from three to five minutes, at intervals of three days. The indifferent electrode may be applied over the abdomen or on the thigh. In all administration of the current to a mucous membrane canal the negative pole must be used, for the positive pole would ruin the passage.

In diseases of children electricity presents excellent results. Marasmus, or general wasting and debility without loss of muscle, is readily overcome by thorough electrical treatment. In this case general galvanization should be used for its tonic effect, and faradization of the muscles employed for giving exercise to them within the lines of producing fatigue. Undue muscular exertion effected in a debilitated child would be injurious, instead of beneficial. Therefore the current should be mild, and the time of application short.

Incontinence of urine, an affection extremely intractable to treatment by drugs, is usually easily controlled by galvanization faithfully administered.

The vomiting of cholera infantum is sometimes

checked by mild faradization of the pneumogasttric.

The dyspnœa following scarlet fever, measles, and whooping-cough, and the aphonia sometimes existing as the suite of these affections, are ordinarily amenable to galvanization; and in the case of the aphonia, static electricity has proved to be extremely valuable.

Dropsy, as the suite of scarlatina, is sometimes quickly reduced by localized electrization, as is also œdema in either children or adults, provided always that it is not complicated with Bright's disease.

Faradization, which tends to relieve the engorged capillaries of the mucous lining of the bladder, is therefore often instrumental in curing cystitis in both adults and children. Incidentally it has been observed in these cases that electrization reduces the mucoid discharges from the bladder.

Galvanization has been proved to be of value in some cases of disease of the eye. Dr. C. S. Bull remarks, in the *New York Medical Journal* of April 27, 1889, that, "in traumatic anæsthesia of the optic nerve and retina, uncomplicated by any laceration of nerve tissue or rupture of nerve fibres, galvanism carefully and persistently applied has been known to produce a rapid and permanent improvement of vision when applied directly to the closed lids, and the current passed through the eyeball."

The knife-pains of locomotor ataxia are sometimes sensibly relieved by galvanization, and spinal galvanization has in some instances so greatly ameliorated the condition of the patient as to permit of his leaving his couch, to which he had previously been almost confined.

In uterine disorders electricity is almost indispensable. Extra-uterine pregnancies have been cut short by both currents, some operators preferring one, and some the other. In dysmenorrhœa intra-uterine galvanization with a strong current is of great service, while in amenorrhœa, by means of faradization through the ovaries and uterus the menstrual flow is soon established. Menorrhagia arising from relaxed uterine walls is specially relieved by faradization. When the result of villous growth of the endothelium, the employment of cauterant galvanic currents will remove the active cause of the affection.

Many eminent alienists, especially abroad, are reporting favorably on the use of galvanization in some mental disorders. Melancholia, with or without delusions, has been benefited by prolonged treatment without recourse to commitment to an asylum. Some patients, presenting delusional or monomaniacal features which had resisted routine asylum treatment, have been thoroughly restored to sanity under cerebro-spinal galvanization.

In the methods of electro-cautery we possess for many cases great advantages over those of

former surgical procedure. The galvanic loop is rapid in its operation, aseptic, and bloodless. When a current of strength sufficient to make chemical resolution is anywhere used, the operator should know that the acid goes to the positive pole and the alkali to the negative pole. Hence it is not a matter of indifference which pole is to be used for a particular purpose. In the electrolysis of a fibroid we aim at its disintegration. Hence, in that case, the needles introduced should represent the negative pole. The result is the liquefaction of the mass, and the rapidity and amount of the effect produced are dependent upon the strength of the current. If, on the contrary, we purpose arresting the hæmorrhage from a bleeding myoma, we must depend upon the action of the positive pole, the current from that pole tending to neutralize the vascularity of the part, producing coagulation of the blood.

In this connection we would remark that much inconsiderate animadversion has taken place with reference to the use of strong currents upon occasions. The question depends simply upon what is the occasion. As a general rule, currents should be used very mild, and their duration not be prolonged. But when we say that, we are speaking of currents for general practice. There are many occasions when the currents cannot be otherwise than strong if they are to accomplish their professed purpose. Such are the currents used in galvano-cautery. They are really not so efficiently strong as they appear to be from the mere mention of the number of milliampères employed, the indifferent pole diffusing the current over a vast space, and the working pole being used as a cauterizing instrument at the point operated upon.

At least brief mention should not be omitted here of the efficiency of electrical treatment in neurotic skin affections. Some forms of eczema are remarkably amenable to both galvanization and faradization. Acne is also sometimes cured by local galvanization, and at present attention is drawn to the employment of strong currents in ulcerative skin diseases. The distressing itching of prurigo is readily relieved by general galvanization or faradization.

The diagnosis of nervous diseases is greatly facilitated by electric tests. Then, the very instrumentality which has enabled us in paralysis to diagnose the extent of the disease to the best advantage, also enables us to the best advantage to treat it, if it is at all amenable to treatment.

Many nervous girls who are a burden to themselves and their families are brought into new enjoyment of life under proper electrical treatment. More treatment by electricity and less by abdominal surgery would relieve large numbers of female hysterical patients.

Epileptiform seizures and epilepsy are sometimes susceptible of amelioration by galvanization. The best way in these cases is to administer the

descending current from the vertex to the epigastrium. If convenient, the current should be administered so as to anticipate the spasm. If this be accomplished, the seizure is generally cut short or aborted. The effect of the bromides is heightened by conjoined electrization. When minor epilepsy is simply held in check by bromine, electrization combined with it has sometimes effected a cure. Chorea and allied tremor are often notably relieved by general galvanization. Cases occur in which a single muscle twitches, as, for instance, the levator labii superioris alæque nasi, for which local faradization proves entirely successful. Spasm of one or both eyelids is effectively treated in the same manner. The ordinary chorea of schools is usually cut short by strong faradization of the entire surface of the body.

When paralysis is dependent upon such central lesion as intracranial hæmorrhage, time should be given for the absorption of the clot. In from six to twelve weeks after the onset of the disease, no treatment equals faradization. Gentle faradization of the brain undoubtedly hastens absorption of the effusion on the brain. For Bell's palsy nothing exceeds in usefulness localized galvanization. The affected muscles should be picked out separately and submitted to treatment one at a time. When the galvanic current proves slow to act favorably upon the disease, static sparks may be advantageously substituted. Recovery is sometimes so prompt as to astonish even the patient.

As we remarked at the beginning of this article, early in the history of electro-therapeutics static electricity was extensively used for the cure of disease, but owing to the causes detailed, fell into disrepute. But within the last few years this form of electricity has been revived for the treatment of disease. It should undoubtedly be allowed a prominent place in peripheral nervous disorders, as there is reason to believe that deep-seated lesions are favorably reached by it through the instrumentality of reflex action.

The use of static machines for general tonic electrization is very advisable in many cases. Various hyperæsthesias and anæsthesias of the surface of the body are often amenable to static applications. Diseases resembling herpes zoster may in the beginning be amenable to this form of electrical treatment. Spermatorrhœa and other conditions of the generative organs evidencing debility, are frequently benefited by the administration of static electricity. Amenorrhœa is sometimes cured by the administration of static electricity, after other means, even including dynamic electricity, have failed. As a counter-irritant in affections of the joints, such as gout and articular rheumatism, static electrization is frequently preferable to faradization.

There is nothing concerning the medical employment of electricity in which we personally

feel more interest at the present moment than in its alleged efficacy in palliating the treatment of cancer of the breast and various other tumors.² Dr. Parsons,³ of the Chelsea Hospital for Women, lately reports that he has been able to check cancer by means of electrolyzation. M. Darin also reports lately excellent results obtained from electrical treatment in the case of cancer and other tumors. If one does but for a moment reflect upon the sum of his observations of fungoid growths, whether vegetable or animal, he will perceive that their vitality seems to be of the most precarious sort, all the more precarious when the growth is morbid, when it is conditioned upon the most undisturbed circumstances to ensure continued cell proliferation and growth. It would seem, then, that as nothing is so capable as electrolysis of shattering the fundamental integrity of any tumor, it would be well to pursue the investigations referred to still further in the direction necessary to settle the question whether it is equal to the palliation or the cure of cancer.

NEEDLESS AND ANNOYING RESTRAINTS IN EYE SURGERY.

Read in the Section of Ophthalmology, at the Fortieth Annual Meeting of the American Medical Association, June 26, 1889.

BY JULIAN J. CHISOLM, M.D.,

PROFESSOR OF EYE AND EAR DISEASES IN THE UNIVERSITY OF MARYLAND, AND SURGEON-IN-CHIEF OF THE PRESBYTERIAN EYE, EAR AND THROAT CHARITY HOSPITAL OF BALTIMORE.

The successful surgery of the day depends largely upon the care bestowed in the carrying out of details. Many things, little in appearance but really essential, make up the summary of successful treatment. While this applies to all surgery, it embraces eye surgery as well. The successes of to-day, which make operations upon the eye the most perfect of all surgical practice, is brought about by the great care bestowed in the preparations for the operation, the manual for its performance, and the after-treatment.

In eye surgery smooth operations cover at least 75 per cent. towards successes, so that the bad results can be partly laid to traumatism, or defective operative procedures. When an eye operation is well done the surgeon may confidently expect good results. To ensure this there are certain points upon which all agree. *Cleanliness holds the first place.* Clean instruments, clean hands, clean dressings, clean surroundings, are all of paramount importance, and should be of universal adoption. To obtain the largest per cent. of successes in eye surgery no one of these can be omitted. The necessity for asepsis and antisepsis are recognized and adopted more or

less generally and thoroughly. Our instruments must be kept sharp, as well as clean, or they will not do the nice work required of them. Putting them in boiling water before as well as after operations ensures this cleanliness, and is a good precaution which many use. The mercurial and boric acid solutions I find detrimental to delicate instruments, and hence I do not immerse cataract instruments in them. The same might be said of passing the blade of a knife rapidly across a flame. If left long enough to destroy bacteria the edge of the blade is very apt to suffer. Boiling water ensures all that is desired, with no risk to the instruments.

The washing of the eye with weak solution of mercury bi-chloride, 1 to 4000, or mercury biniodide 1 to 20,000, or boric acid 1 to 40, are in very general use for cleansing the conjunctival surfaces both before, during and after eye operations. Water which has been boiled is found quite as good as the medicated lotions. The eye operated upon is usually in an aseptic condition. As we desire to keep it in the same, we do not wish to impregnate the newly made wound with offending material conveyed in the water used for cleansing purposes, hence the medicated liquids in which the sponges or wiping pledgets of cotton are kept immersed while the operation is going on. This seems to be the chief protection against infection. The momentary application of these lotions to the conjunctiva can be of little service in destroying bacteria. We all do it, some going so far as to wash the face, including the eyelids, with the lotion. It is a harmless procedure, and I believe as useless as it is innocent.

Some surgeons carry antiseptic precautions to an excessive and even annoying degree. They seem to be suffering from bacterial fright, and are suspicious of the most innocent organisms. To them it is as if every man, woman and child met with on the streets of a crowded city are assassins bent upon mischief, and hence enemies. All bacteria are treated as if malignant, and are to be killed in sponges or dressings at least, by the long continued application of heat. Absorbent cotton used for dressings is baked at high temperature for hours, and then kept in air-tight jars which have been equally sterilized by long exposure in hot ovens. This seems to me a useless precaution from over-zeal, the more especially when I see unwashed hands manipulate the excessively prepared dressings. That bacteria exist and are omnipresent no one now questions; but that they are always bent on mischief only the over-zealous believe. Experience proves this to be the case, as no better results are obtained in treatment by those who over-do in their excessive preparations for an operation.

Confinement to bed for eye operations is another practice often annoyingly pressed to the discom-

² "On the Treatment of Uterine Tumors by Electricity," by Thomas Keith, M.D., LL.D. The British Med. Jour., June 8, 1889.

³ "The Arrest of Growth in Cancer by a Powerful Interrupted Voltaic Current (Electro-Necrosis)," by J. Inglis Parsons, M.D. The British Medical Journal, June 8, 1889.