

High-frequency current in ophthalmic practice / by L. Webster Fox.

Contributors

Fox, Lawrance Webster, 1853-1931.
Royal College of Surgeons of England

Publication/Creation

[New York] : [publisher not identified], [1907]

Persistent URL

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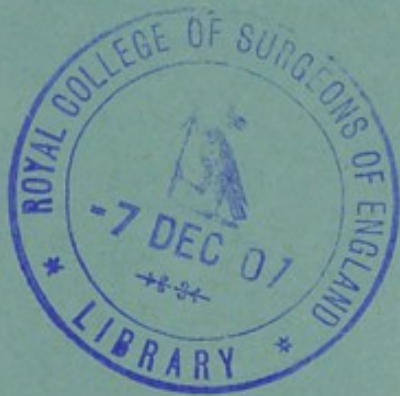
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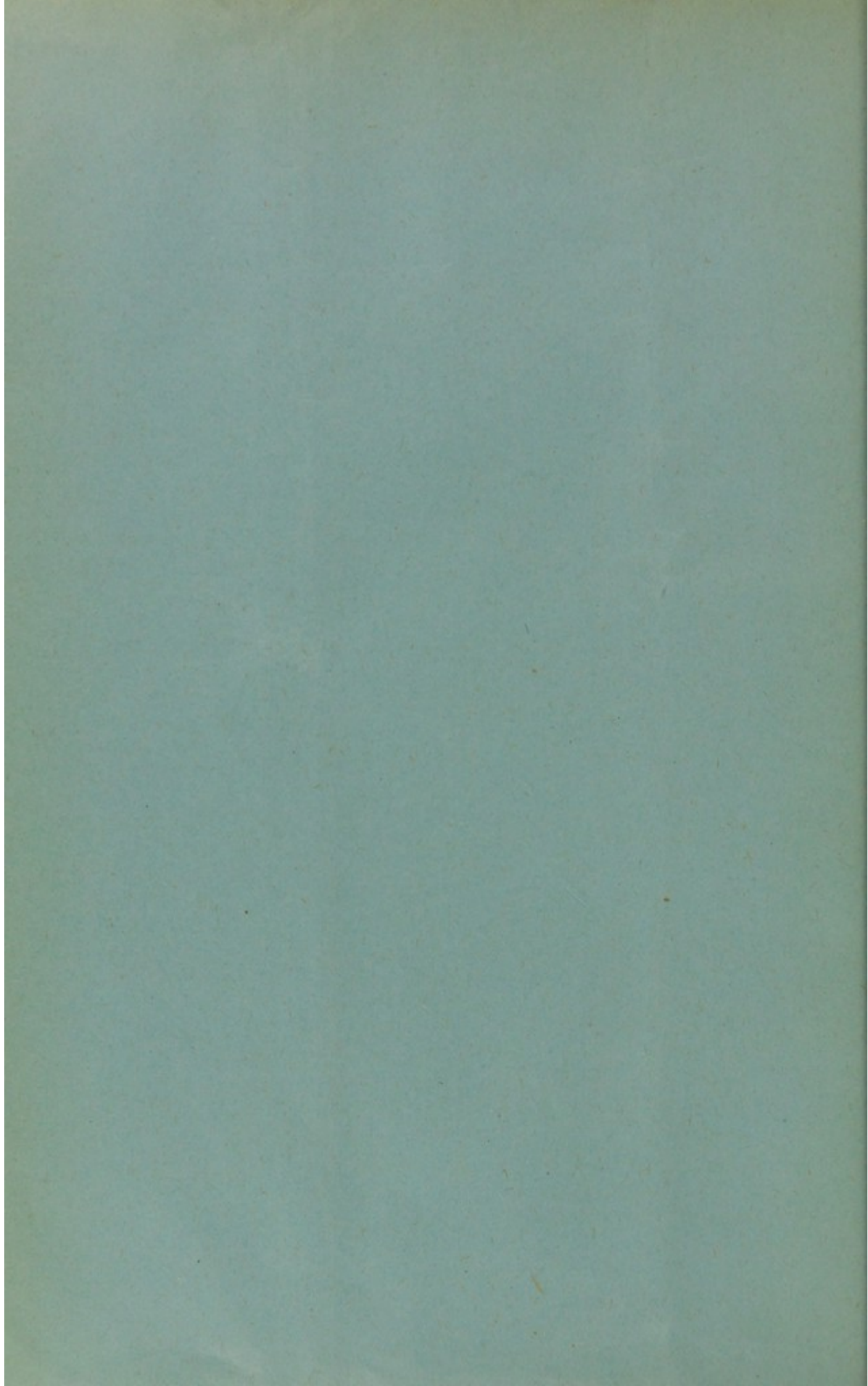
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1304 Walnut St., Philadelphia, Pa.



Reprinted from THE JOURNAL OF ADVANCED THERAPEUTICS,
April, 1907





HIGH-FREQUENCY CURRENT IN OPHTHALMIC PRACTICE.*

BY L. WEBSTER FOX, A. M., M. D.,

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I approach this subject with considerable hesitation, feeling confident that among my hearers are electro-therapeutists who do understand something about this subject, and who should be giving to the profession the benefits of a more thorough and extended experience. My limited knowledge has been gleaned from such authorities as Guilleminot, Freund, Cohn, Piffard, Snow, and others.

My work has been of an experimental character, watching all cases and making careful notes of the failures and improvements in such special diseases which might be of some value to the ophthalmologist. Unfortunately, little has been done by the advocates of the high-frequency current in the unexplored field of ophthalmology.

The current used in my work was obtained by changing the direct current of relatively low tension, that is, the dynamo direct current of our lighting system in the Hospital into an oscillating current of exceedingly great rapidity and high tension through a large Ruhmkorff inductor, Leyden jars, and Oudin resonator. The applications were made directly to the eyelids by a Wappler vacuum spiral tube and directly to the eye-ball (cornea) by specially devised vacuum eye electrodes, single and double. The time of application varied from two to twenty minutes. I did not use the static machine, but when used the current should be taken directly from the machine. My friend, Dr. David H. Coover, of Denver, first called my attention to his success in the use of the high-frequency currents in a certain class of eye diseases. Following his sug-

* Read at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association at Philadelphia, September 1, 1906.

gestions I had my chief of clinic, Dr. John A. Brophy, select a variety of cases from blepharitis marginalis to atrophy of the optic nerve. These cases were then placed under the charge of Dr. A. Weise Hammer, chief of the electrical department of the Medico-Chirurgical Hospital, who carried out the treatment with the greatest care and accuracy. The majority of cases received the treatment three times per week, some few varieties received daily treatment; the length of the treatment varying from two to twenty minutes, and each patient was kept under treatment until I felt assured no benefit could be derived.

Blepharitis marginalis, all forms—100 cases. It was most gratifying to note that while the treatment was more or less difficult to carry out with children, yet in those (100) cases to which it was applied the cure was rapid and apparently permanent. The cases were treated with the spiral vacuum tube ten minutes daily for two weeks.

Granular lids—10 cases. After twenty-one treatments to each case there was no apparent benefit, so this was abandoned. It must be noted that the current was passed through the eyelids, and not against the everted lids—the secretions were possibly lessened.

Ulcers of the cornea—25 cases. This covered all forms of ulcers, from simple to Saemisch. The application was made through the eyelids and also directly to the cornea. In the non-vascular, but slight benefit was noticed after ten applications; while with the same number of applications in the ulcerated type, where there was destruction of tissue with pus shreds, the current seemed to retard the destructive process; and in one case of Saemisch it was cured without the aid of drugs or operative procedure. The single electrode was applied directly to the cornea under cocaine in all these cases. My judgment is that the high-frequency current is of some value in these cases, but still I would have to enlarge my experience before replacing it by our known and older methods of treatment.

Iritis—5 cases—three specific, two rheumatic. The usual internal treatments, as well as local, was not suspended in these cases. Ten applications were made day by day. There was no noticeable change for the better in the reduction of the congestion of the blood vessels, nor was there a notable change in

the color of the inflamed iris, but the pain was certainly lessened. In one case, where the supra- and infra-orbital pains were intense and nothing but dionin relieved these pains before the application of the high-frequency current, the effect of ten minutes' treatment during the painful attack was magical; it gave instant relief, which lasted for three or four hours.

Ophthalmoplegia interna—1 case. Ten applications were made over the superior ganglion of the cervical sympathetic without contracting the dilatation of the iris. This treatment was suspended and other means of treatment adopted.

Vitreous opacities—20 cases—including all forms, from simple hyalitis to the marked products of chorio-retinitis, cyclitis, and hemorrhages. These cases were given a great deal of attention. While in the majority of cases there seemed some clarification, yet the total outcome did not show as much improvement as was found subsequently under the constant current—voltaic alternatives—and saline injections. I was determined to give this most troublesome condition a thorough trial. As many as fifty applications were given to the cases that gave even slight encouragement. Evidently, the cathartic action of this current is not the same as that of the constant current.

Retinitis pigmentosa—3 cases. Characterized by marked deposit of pigment, diminution of the blood vessels, pallor of the disk, and contraction of the visual fields down to 10, 20, and 30 degrees respectively. Vision ranging from 20-200 to 20-50. The patient who showed the most marked improvement was a female thirty-two years of age. From January 8 to March 28, 1906, thirty-one applications were given. The patient lived some distance from Philadelphia, and was obliged to return home. To continue the good results obtained, she took home with her a dry cell battery with instructions to apply the weak current three times weekly. The negative pole to be placed over the eye and the positive pole to the back of the neck or the temple. The other two cases did not show as marked improvement, both being older, forty-eight and fifty-two respectively, but both fields were enlarged and the vision slightly improved.

The action of the high-frequency currents here is somewhat similar to the constant current, and under similar conditions probably productive of the same results.

Amblyopia toxica—tobacco and alcohol—3 cases. The treatment in these cases did not consist alone in the high-frequency current, although it aided materially in rapid restoration of vision. The use of alcohol and tobacco were strictly forbidden, a Turkish bath, twice weekly, demanded, and internally, ascending doses of tinct. nucis vomica, commencing with 15 drops, three times daily, ascending to 35, then falling back to 15 drops. Good nourishing diet and outdoor exercise advised. The number of applications was from ten to twenty.

Amblyopia exanopsia—10 cases. It was to this series of cases that my attention was first called by Dr. Coover in a personal interview about one year ago. He has since published his observations in the New York Medical Record, October 14, 1905. I can confirm his observations in every detail. The younger the patient the more rapid the recovery. My youngest patient was six years of age.

One patient, aged fifty-two years, an engineer on one of the leading railroads in Pennsylvania, had a marked squint and also amblyopia exanopsia. The Company was re-examining all the employees of the road, and among others he was requested to consult an ophthalmic surgeon for his physical defects. Dr. Coover was in Philadelphia at this time and he examined the patient with me. The eye was successfully straightened—defect four lines—and three days later the high-frequency current was applied to the amblyopic eye. The applications were made daily until thirty had been given with the glass spiral vacuum tube; the sittings lasting from three to fifteen minutes. The result obtained with his uncorrected hyperopia was from 15-200 to 20-50 and with a correction of + 1.50 Sph. to 20-40. His left eye had a hyperopia of + 0.50 and vision equaled 20-20 without the glass. As he had been in the employ of the company for many years he was permitted to retain his position and he is now at work.

From my experience with those ten cases of amblyopia exanopsia I am quite sure that we have a curative measure much more simple and radical than the fusion method with the amblyoscope. I have found it requires great patience to train small children, and even well-grown boys, to practice with and use this instrument. I predict that it (the amblyoscope) will soon be relegated to that ophthalmic graveyard where so many instruments of precision lie buried.

Retinitis proliferans—2 cases—ten applications. There was no change in the retinal deposits nor in the connective tissue growths in the vitreous, although the vitreous did become a little clearer. This was probably due to the absorption of the delicate flocculi floating in the vitreous.

Retinal hemorrhages—10 cases—four due to anemia, one to injury, five to albuminuria. Eight of these cases improved after two or four weeks' treatment. Two cases of albuminuric retinitis associated with marked arterio-sclerosis and optic neuritis did not clear up and local treatment was of no avail. The arterial tension was very high, 200 mm. The three milder cases were benefited temporarily—these cases are still under medical treatment.

Optic neuritis and optic atrophy were not benefited by this treatment alone, although one case of the first mentioned and ten of the latter disease were given a thorough and prolonged course. In this case of optic neuritis, as soon as it was found that the disease was progressing, other treatment was inaugurated as well.

Glaucoma, chronic—5 cases. Ten applications were made, but no change either in tension or lessening of the tortuous blood vessels of the sclerotic was noticed. I did not venture to use it in any case of acute glaucoma, as loss of time was too great a risk to the vision, and we do know the result of the operative procedure.

Freund states that, "When acting beneficially high-frequency currents modify the process of nutrition in badly ulcerated conditions and in parietic states of certain tissues, thereby promoting the healing of the former and the resumption of functions in the latter."

I also quote from Guilleminot, who wisely states in regard to electricity in general, "If the progress of science finally enables us to master this force, which is the very essence of life, and to subjugate it, as steam has been subjugated to the service of mankind, we shall have ready to our hands the most potent curative agent imaginable to modify the volition and ameliorate the condition of living beings."

As this paper is merely a preliminary one, I hope that I shall not be criticised for giving my statistics in such a vague or indefinite, or what might still be called non-scientific manner for

a meeting of this kind, yet it must be remembered that I started out on the simple lines of experimentation and I am simply giving my limited experience so that others may be induced to follow in this same field, so that we may cull out the "wheat from the tares."

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Discussion.

Dr. F. Barrett, Westbrook, Me.: In a case of optic neuritis treated for about three months with other than electric treatment with no result. With the high-frequency current from a static machine I then employed a Piffard hyperstatic and completely relieved the neuritis in two months. I gave six ten-minute treatments every other day.

Another interesting case was that of a boy with alopecia of two years' standing. The head was entirely bald. I began treatment two months ago and the boy's head is now almost covered with hair. In another case of not so long standing half a dozen treatments gave complete cure.

Dr. William G. Schauffler, New Jersey: I would like to ask Dr. Fox whether in the employment of electricity here in the College they have used, apart from the high-frequency current, any form of light. My experience has been that light, especially the blue light, has been very useful in many of the conditions in connection with the high-frequency current.

Dr. William Benham Snow: As I am not a specialist I cannot speak with the same authority as can Dr. Fox. I have had experience with a number of cases in which the eyes have not been properly refracted for glasses and in some of which there was astigmatism, causing head ache and eye strain. I find that the application of the vacuum tube double eye connected to one side of a static machine with the other side grounded and the spark-gap length adapted to the case gives gratifying results. By this means a distinct vibratory action arising from induced cell contraction sets into activity the structures of the eye, improving nutrition, and relaxing the ciliary muscle, re-

lieving the tension. In two cases of retinitis pigmentosa there was marked benefit in one and an absolutely negative result in the other. The administration of the high-potential current from the static machine, administered as described, has been satisfactory in ulcers of the cornea. In cases of local congestion, the indurated tissue is thrown into contraction and with the spark discharging at the spark-gap at a rate of two to six hundred per minute, there are intervals of tissue rest which give the effect of an intrinsic massage thereby softening the tissues and re-establishing circulation, followed by prompt repair. This is easily demonstrated in cases of inflammation with obstruction of the tear duct in which complete relief was obtained with one five-minute application in a case of but few days' standing. These instances as indications of the possibilities of this method.

From an experience with one of my own children I have come to believe that by this method children with slight errors of refraction can be carried through adolescence without being handicapped by the subsequent wearing of glasses. I believe that by the correction of these slight dispositions to contraction and tension arising from overwork in childhood which take the eye out of its natural form, we can eliminate the possibilities of more serious errors.

Dr. S. Lewis Ziegler, Philadelphia: I have used the high-frequency currents somewhat, possibly not with as great success, because I am thoroughly convinced of the advantage of the constant current. Dr. Alleman of Paris has used the high-frequency current with somewhat of success, but I think he has again reverted to the constant current. Of course, the methods of application are still tentative, and it may be that there are living potentialities in this method to be brought out later. The cases referred to by your President are quite amenable to the constant current. Retinitis pigmentosis, if it yields to anything, yields to the constant current. I have seen the condition yield in a number of cases to the constant current. The inflammatory lesions yield more promptly to the constant current on account of the electrical action.

Dr. Alleman some years ago prepared an electrode for direct application to the cornea through a globule of mercury more especially for the scar resulting from corneal ulcer, but I think direct application of the electrode to the cornea is better than through the medium of the globule of mercury. I have seen some cases that did not yield to high-frequency currents which did yield to the constant current, especially atrophic cases.

Dr. William W. Eaton, Mass.: I have still a good deal of faith in the constant current in these cases. I have found the most satisfactory results in conjunctivitis and inflammatory states. One case of some importance was that of a patient

about thirty-eight years of age, who had a family history of cancer running through one or two generations. She came to me about a year ago with three nodules in the upper eyelid, the smallest being the size of a pea, another twice that size. They were more or less painful and had caused inflammation in the conjunctiva and in the eye itself. I did not want to risk the x-ray, not feeling sure of the effect upon the vision. I gave her a number of treatments with the constant current and then varied, using the high-frequency with the spiral or vacuum tube. A few treatments made a perfect cure of the hardened masses in the upper lid. I saw the case five or six months ago and it was then free from disease in the eyelid.

Dr. G. Oram Ring, Philadelphia: I have had practically no experience in the application of the high-frequency current, but I would like to ask the President if I understood him to say that his little daughter was hypermetropic and astigmatic?

Dr. Ring (continuing): I understood Dr. Snow to say that he proposed by treating his daughter twice a week to do away with glasses. In hypermetropia alone this would be difficult to do by the substitution of electrical treatment for glasses.

The President (answering Dr. Ring): She was not astigmatic.

Dr. J. D. Gibson, Denver: I am glad to hear that Dr. Coover's work has spread so far in its influence and that it is leaving its impress in the Medico-Chirurgical College. Dr. Coover has been accomplishing a good deal with high-frequency currents and the x-ray in Denver and has aroused much enthusiasm among the specialists there in this work.

From the history of high-frequency currents I would expect the best results in granular lids by the direct local application, which would give both the general and local effect. I believe there is a special electrode made for treating under the lids.

Dr. Fox (closes): In answer to Dr. Schauffler I would say that I have not tried the various lights. I have one of Dr. Schauffler's lamps and we did try it for the hypnotic effect, not from the therapeutic standpoint.

We have been trying to extend this field to see what we can accomplish with the high-frequency current, and as Dr. Gibson has suggested, Dr. Coover was one of the men who created this enthusiasm within myself. I thought that if we could stimulate the retina to come back within the normal range we would gain much. If there is anything to be obtained from electricity in the general field of ophthalmology we would like to find it out. In granular lids, we believe the grattage operation is better than the application of the high-frequency current to the everted lid in that it saves time. If the high-frequency current will make an amblyopic eye useful we desire to use it.