

small, no larger than a papular syphilide, and if the assertion made by Dr. Harris would hold good, it might be considered proper to excise every papule of a papular syphilide in order to get rid of so much more infection. That would be an equally logical proposition, and as a result, the patient would certainly be well tattooed. I would ask: What grounds are there for amputating the chancre with the idea of ridding the patient of that amount of infection?

DR. M. S. HEIDINGSFELD, Cincinnati: I concur with Dr. Gottheil that we are in danger of placing too much reliance on comparatively new tests. While the value of the laboratory tests can not be questioned, they must still be regarded in the light of aids to clinical diagnosis rather than as absolute methods. The reports that emanate from the laboratory and which receive widespread attention are apt to lead the profession into serious error. I have known the diagnosis of syphilis essayed purely on laboratory tests in cases of suspected initial lesions which at the time were clinically negative and failed to show any confirmation after months of careful observation. I do not believe that the laboratory tests in syphilis have yet reached the degree of perfected development that they overshadow the clinical features in importance. With reference to the syphilometer: I found the syphilitic regulation test of two drops to be entirely too small to convey any degree of accuracy. The manufacturers kindly supplied me with a half pound of the taurin solution and when I repeated the test, using one or two grams of clear serum in place of one or two drops, they became uniformly positive in character, irrespective of the syphilitic or non-syphilitic character of the case.

DR. F. G. HARRIS, Chicago: In regard to the method of demonstrating the spirochete, to which several of the speakers referred, I worked for a long time with the staining method, with uniformly poor results. My organisms were indefinite in outline, and I was unable to identify them positively. We must have a live organism in order to make a positive diagnosis, an organism which is not deformed.

In my work, I employ the Reichert apparatus, which I prefer on account of its convenience. I use an arc light, although one may also use a Nernst lamp; with the new model of the Reichert apparatus the ordinary inverted Weisbach light may be employed.

To obtain the material, I simply irritate the chancre or mucous patch and collect the serum in a capillary tube, from which it is then blown on a clean cover glass, which is inverted on a clean slide. The specimen must be as thin as possible. If the preparation is too thick or the slide is too thick, the rays of light will not be focused at the proper point.

The characteristic movement of the spirochete in a fresh preparation is rotary, like that of an auger-bit, and that is one thing that we do not see in the stained specimen. The windings are absolutely regular in a fresh specimen, but later become somewhat irregular. In the stained specimen few of the organisms are characteristic, most of them have lost their regular windings, due to the traumatism of preparation.

As to Dr. Montgomery's question whether or not it would be proper to excise all the possible foci of infection in secondary syphilis, he misunderstood the purpose in view in amputating the original chancre. With the dark-field illumination method we are able to make the diagnosis from the very beginning of the chancre. I have found the spirochete in chancres one day old. In such cases, by amputating that focus and putting the patient on immediate treatment, we hope to abort the syphilis. Scherber, in the case referred to by Dr. Pernet, amputated the chancre and gave the patient two courses of injections and there were no further symptoms during the three years that he was kept under observation. By means of the dark-field illumination method we can make the diagnosis of syphilis very early, and the reasons for amputating the chancre are mainly for the purpose of preventing dissemination, just as the surgeon would remove the primary source of any other kind of infection. We remove the primary and chief focus of infection by excising the chancre, and depend on the mercury to destroy any spirochetes that are left behind. Why should we wait until the body is permeated with them?

DR. MAXIMILIAN HERZOG, Chicago: I do not think that there was any possible mistake about the character of the organism that I demonstrated in Chicago in the shape of photomicrographs. The smears had all been prepared from typical primary lesions, the cases in fact were followed up to the secondary stage. It would indeed have been strange if I should have had the misfortune to find only the *Spirocheta refringens* in typical primary lesions. Such a claim need hardly be discussed.

## REGENERATION OF THE CORNEA \*

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It has long been known that the epithelium of the cornea would regenerate itself after being destroyed intentionally or by accident.

Haller<sup>1</sup> as early as 1763, in his "Elementary Physiology of the Human Body," asserts that regeneration of the cornea takes place, and even the oldest ophthalmologists<sup>2</sup> assume that regeneration of corneal tissue occurs. In fact, Desmarres<sup>3</sup> states that, in experimenting on transplantation of the cornea, he has noted an increase in length of the corneal flap, and even a true regeneration. Mauchart,<sup>4</sup> Mead and Larry,<sup>4</sup> Wardrop,<sup>4</sup> Gulz,<sup>5</sup> and Malgaigne<sup>6</sup> resected corneal scars, and found that healing took place with little or no scar. What is extremely interesting in the light of our present knowledge of the effect of an opium derivative, dionin, is the work of Muehlbauer<sup>7</sup> and Beger,<sup>8</sup> who resected the superficial layers of the cornea and succeeded in obtaining a clear cornea following the application of laudanum. Desmarres was unsuccessful in his attempt to verify these results, since the rabbits on which he operated contracted a severe purulent inflammation (infection?), resulting in heavy scars.

It is a matter of common observation that corneal wounds following cataract extractions heal so that it would be difficult to find the line of incision. Also numerous corneal opacities clear in time, where the question might easily arise as to whether there might not be a true regeneration of transparent corneal tissue in these cases.

The first systematic research for actual proof of corneal regeneration was made by F. C. Donders<sup>4</sup> in 1846, who suspected that it occurred, but did not think that there was sufficient proof to establish the fact. He accordingly conducted a series of experiments on twenty-two rabbit eyes, from which he resected a flap of cornea from one-third to two-thirds of its thickness, including generally about one-half of the area of the cornea or more. He examined six eyes microscopically and gives a tabulated report showing (1) the thickness of the cornea cut away, (2) the thickness of the uncut

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1. "Vulnerato ex succo effuso pellucida renascitur, ut coram video, et late deleta nova redit, omnino ut epidermis." Haller, *Elementa physiologiae corporis humani*, Lausanne, 1763, 363.

2. Mauchart, B. D.: *De ungue oculi pure inter lamellas corneae* (defendet C. F. Bilget), *Diss. Med.*, Tübingen, 1742; in Hallerus, *Alb. Disputationes chir. selectae*, 1, 394, Lausanne, 1755; abstr. in Donders, Note 6.

3. Desmarres: *Ann. d'ocul.*, 1843, x, 5.

4. Donders, F. C.: *Untersuchungen über die Regeneration der Hornhaut*, *Holländ. Beitr. zu d. Anat. u. Physiol. Wissensch.*, 1846-8, 1, 387 to 400.

5. Gulz: *Oesterr. med. Wchnschr.*, 1842, No. 2.

6. *Ann. d'ocul.*, Fl. Cuniere, 1845, xlii, 211.

7. Himley: *Die Krankheiten und Missbildungen des menschlichen Auges und deren Heilung*, 1843, ii, 56.

8. Ueber die Verwundbarkeit des Auges und seiner Haute, nach Versuchen an Thieraugen, *Ztschr. f. d. Ophth.* (von Ammon's), iii, Nos. 2 and 4.

cornea, (3) the thickness of the operated part a definite period after operation, and (4) the thickness of the regenerated part in hundredths of millimeters.

He concludes that the epithelium on the injured part grows thicker than on the normal cornea; that the newly formed true corneal tissue never reaches the same thickness as that removed, but that the longer the time elapsed from the time of operation to the time of examination, the thicker it becomes; that when one-half to two-thirds of the thickness of the cornea is removed, neither inflammation nor any other abnormality occurs; and that epithelium covers the exposed surface within two days after the operation, with a gradual regeneration of cornea, slowly assuming its normal characteristics.

The only one following Donders, so far as I have been able to find, who conducted experiments on animals and made microscopic examinations of the regenerated cornea was Reich.<sup>9</sup> He operated on thirty-two rabbit eyes and made twenty-two microscopic examinations with results similar to those of Donders. The longest time between operation and examination was nine months. His conclusions are that the reaction and the remaining scar are so slight that the removal of thick corneal opacities by the knife are not contraindicated, but that almost always irregular astigmatism and marked light diffusion results.

Waldeyer<sup>10</sup> says that Sanftleben, pupil of Cohnheim, admits the possibility of regeneration of the corneal cells.

The few clinically reported cases of regeneration, all except one, followed destruction of the corneal tissues from purulent ophthalmia. Kaempff<sup>11</sup> reports a case of pyorrhea in a soldier in whom, after the swelling of the lids had sufficiently subsided to permit an examination of the eyeball, an apparent complete destruction of the cornea was revealed, the surface being covered with slough. Within three weeks there was a regeneration of clear cornea, except in the central part, where there was an anterior synechia in both eyes. Four months later an iridectomy performed above and outward in either eye gave useful vision.

N. D. Stalcovici<sup>12</sup> reports a case of complete regeneration of the cornea after its destruction down to Descemet's membrane following suppurative conjunctivitis.

A case is reported from Darier's clinic<sup>13</sup> in a man 67 years of age who had been blind for ten years with complete destruction of the cornea with a central prolapse of the iris. The prolapsed iris underwent an inflammation from infection during which the entire cornea sloughed off, leaving only Descemet's membrane, a final regeneration of clear cornea taking place.

H. Armaignac<sup>14</sup> observed, in a patient suffering from a very severe acute purulent coryza, a complete destruction of the cornea with the exception of Descemet's membrane. There was an almost complete staphyloma of the cornea with a central perforation. When the patient went home there was a ring of redness surrounding the cornea two millimeters wide composed of small

capillaries which had the appearance of a new growth. The patient was given a 1 per cent. solution of picric acid to instill into the eye. Armaignac was astounded when, a month later, the patient returned to him with a complete regeneration of clear cornea. True, it was traversed by very fine capillaries and sprinkled with small vague opaque spots. The anterior chamber was re-established without synechia. Unfortunately, oblique illumination revealed the pupil almost blocked by a membranous exudate. The patient could distinguish the movement of fingers at thirty centimeters. Atropin failed to break up the adhesions, but one month later vision had reached one-twentieth. The same author<sup>14</sup> reported a case of regeneration of the cornea after a complete destruction of the membrane following purulent ophthalmia in a woman 60 years of age.

Peter A. Callan<sup>15</sup> saw the cornea regenerate after its destruction from *ulcus serpens*. The patient, a boy 17 years of age, appeared at the New York Eye and Ear Infirmary, Oct. 6, 1903, twenty-four hours after having been struck in the eye by a rivet. There was a circular ulcer three mm. to four mm., involving all the layers, filled with a creamy white mass, umbilicated in the center. Despite cauterization and other treatment, the ulcer increased in size until on October 11 the entire cornea was involved and on October 12 the anterior chamber abolished. The next day the slough disappeared, leaving Descemet's membrane exposed. October 14 there was no more suppuration and the eye was bandaged. On October 16 cicatrization was observed over the intact Descemet's membrane. Dionin in increasing strength was given, when by March the upper half had cleared so that the pupil was visible. On June 13 vision with +3.5 D. cyl; ax. 105 degrees was 8/70. The cornea was quite clear in the upper third, but lower two-thirds more or less hazy, resembling an eye after recovery from a severe attack of interstitial keratitis.

H. L. Wolfner<sup>16</sup> reported a case in which a woman 32 years of age came with gonorrheal ophthalmia of right eye. The left eye had been removed in childhood. The socket of the left eye was also infected with gonococci. When first seen there was ulceration of the right cornea, which progressed until the entire cornea down to Descemet's membrane was destroyed. Neither Wolfner nor Dr. A. Alt, who saw the case in consultation, believed that there was any hope of preserving vision. Within six weeks to two months the cornea was practically regenerated. There resulted a very thin but clear cornea, except from a faint cloud just below the center, with a slight tendency toward keratoconus and a small deposit on the anterior capsule; vision, 14/120.

In view of the partial success of the results already obtained along this line, and encouraged by the knowledge accumulated by modern studies on regeneration in general, as well as by the fact that our former investigators had no knowledge of aseptic surgery, late in July, 1908, I began a series of experiments on rabbits. From then to March 10 thirty-one rabbit eyes have been used for experimentation. Five rabbits died before notations were finished, and these have been excluded from the report. The rabbits were cocaineized and wrapped in a long towel, with only their heads pro-

9. Reich, M.: Ueber die Regeneration der Hornhaut, *Klin. Monatsbl. f. Augenh.*, 1873, xl, 107-211.

10. In de Wecker and Landolt: *Traité complet d'ophtalmologie*, ii, 35.

11. Regeneration des grossten Theils der Hornhaute nach Pyorrhoe, *Oesterr. Ztschr. f. pract. Heilk.*, 1868, xlv, 77-80.

12. Stalcovici, N. D.: Doua cazuri de regenerare completa a corneei in urma distructiunii complete a acestei memb. membrane, prin procese de supuratiune conjunctivala. *Rev. de chir.*, Bucharest, 1903, vii, 20.

13. Armaignac, H.: Regenerazione del tessuto cheratico, *Boll. d'ocul.*, Firenze, 1897, xix, 161-164.

14. Armaignac, H.: Un cas de régénération complète de la corneée après un splacole total de cette membrane consécutif à une conjunctivite purulente chez une femme de 60 ans. *Boll. et mém. Soc. Franc. d'ophth.*, 1899, xvii, 287.

15. Regeneration of cornea. Report of case of *ulcus serpens*. *Am. Med.*, July 9, 1904.

16. Regeneration of the Cornea; report of case at Ophthalmic Section of St. Louis Medical Society, June 10, 1908.

jecting, which served to keep them immovable. A thread was then passed through the conjunctiva and subconjunctival tissue so as to help fix the globe, which was held by the assistant who separated the lids. A flap of cornea was then dissected away varying from one-half to a little over two-thirds the thickness of the cornea, and including one-half, two-thirds, or even the entire area of the cornea, the extent of surface bared seeming to have little or no influence on the general healing process or regeneration. The only difference was that the smaller area was sooner covered by epithelium. Aside from taking general aseptic precautions at the time of the operation, no special means were taken for their after-care, the rabbits being placed in the cages without dressing or bandage. Only where occasionally there seemed to be a purulent or mucopurulent discharge after a day or two, a little powdered xeroform was dusted once daily over the cornea until the infection was controlled, which was usually within a few days. Also whenever there happened to be an unusual amount of secretion, purulent or otherwise, which might tend to agglutinate the lids, the lids were washed with warm water and the secretion removed. Following the operation the rabbits seemed to suffer no pain or inconvenience, the palpebral opening being held as wide open over the eye operated on as the sound eye, with no photophobia.

Where only half the cornea was removed, the posterior was selected as being more readily managed on account of escaping the incidental action of the membrana nictitans. The section was commenced by making a vertical incision from above downward through the median line from the upper corneal margin to the lower corneal margin, going as deep as judgment from experience would permit without puncturing Descemet's membrane. Then from the center of this line a similar cut was made horizontally backward to the posterior limbus. The triangular was then grasped with a fine conjunctival forceps, and with slight tension, and the knife held flat, the corneal tissue was easily peeled off. Sometimes where the flap looked thin a further attempt to resect another layer was made, but this usually ended disastrously by puncturing Descemet's membrane. When this occurred an ectasia cornea, or even staphyloma of the cornea, almost invariably took place. Twenty-four hours after the operation there was usually some slight conjunctival injection. The resected surface had a stippled appearance as though covered with a thin layer of serum or lymph, but wiping the surface with a wet sponge did not seem to change its aspect. The cut edges had a slightly raised but rounded-off look. The transparency, however, was surprisingly little disturbed. This was also the case after forty-eight hours, when the raised edges had encroached several millimeters over the raw surface. There were at this time, however, no blood vessels over the cornea except that there was an increased vascularization at the limbus.

On the third day there is generally a small milky spot about the center of the resected area, but this usually disappears within a few days, when the cornea again shows a smooth surface, being completely covered by epithelium. The resected area now shows a general infiltration or haziness which is greatest at the line of incision, but at no time to such an extent that the pupil can not be seen through it, unless infection supervenes. This haze gradually clears until about four to six weeks after the operation a casual examination would

not determine an opacity, which can only be revealed in certain positions or by oblique illumination.

In those rabbits which have been kept several months the cornea is generally apparently perfectly clear by oblique illumination as well as by transillumination, with the exception of an occasionally small, slightly hazy area.

Microscopic serial sections have been made showing the fresh cornea immediately after resection; after twenty-four hours; after forty-eight hours; four days; seven days; two weeks; one month; two months, and so on up to seven months. The specimens show a gradual thickening of the cornea the longer the period from the time of operation. Experiments are also under way on other animals than rabbits. Since, however, enough time has not been had to complete the series, I have refrained from presenting at this time the results of microscopic examination, not wishing to draw too hasty or indefinite conclusions. This is consequently offered as a preliminary report.

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#### ABSTRACT OF DISCUSSION

DR. JOHN GREEN, JR., St. Louis: Through the courtesy of Dr. Wiener I had an opportunity of examining the animals operated on by him. The line of incision was represented by a very delicate linear scar and the area corresponding to the excised portion was faintly nebulous. The nebula was visible only by oblique illumination. The contour of the cornea in the excised portion seemed to be about the same as in the unoperated part. In future experiments it would be well to observe the reflections of the cornea from Placido's disc before operation and for some months afterward, to determine, if possible, how much distortion of the corneal surface had occurred, and whether regular or irregular astigmatism had developed. Two facts have been brought out which indicate that a true regeneration has taken place: First, the absence of any notable opacity shows that a very small amount, if any, of scar tissue has formed; second, the evenness of the corneal surface, there being no irregularities of the epithelium.

DR. WILLIAM ZENTMAYER, Philadelphia: Recently in a case of nodular keratitis I dissected out a nodule down to the membrane of Descemet and I can say that after a few weeks the corneal tissue apparently had been regenerated, as the resulting space was filled in almost to the level of the surrounding corneal level. I did not examine it with the loup, but with the naked eye it appeared transparent.

DR. R. L. RANDOLPH, Baltimore: I have been very much interested in these observations of Dr. Wiener, and have been long impressed with the reparative activity in the rabbit's eye particularly and in the eyes of the lower animals generally. Some years ago in some experimental work in the reproduction of the crystalline lens I succeeded in getting as many as three lenses from an eye in the course of a year. Whether this reproductivity finds any analogy in human beings is doubtful, but I cannot help thinking that what we call secondary cataract is perhaps an effort on the part of Nature to form a new lens. We know that the lens in the lower animals is formed by the reproduction of the cells on the anterior capsule by the growth of these cells into spindle cells and subsequently into lens fibers, and we have pretty much the same process in human beings. As regards the rabbit, I have been astonished at the quickness with which superficial abrasions of the cornea get well. A fine scratch across the cornea in the case of the rabbit will disappear absolutely in two or three hours, where it is perfectly possible in the human being still to reveal it late in the day with the aid of fluorescein. This is very surprising in view of the fact that the bacterial flora of the conjunctiva in the rabbit is practically identical with that of the human being; in other words, its cornea has much the same conditions to contend with as has the human. What this is due to I have never been able to say. It is suggested

that the leucocytes in the rabbit's cornea are exceedingly active. I am a little skeptical as to the repair of so serious a wound in the human as Dr. Wiener has spoken of.

Dr. A. R. BAKER, Cleveland: No doubt all of us have seen cases of ophthalmia neonatorum in which there is an anterior polar cataract and doubtless there must have been a perforation of the cornea; and yet we have seen those persons later in life when little or no opacity of the cornea existed. I have seen several cases with 20/20 vision after the lens has been removed, so that it seems probable there may be a regeneration of the cornea in young persons. I do not think that I have ever seen this occur in adults, although we have all seen cases in which the epithelium has been entirely restored. Only recently in the case of a burn from an explosion of chemicals the cornea of both eyes were entirely opaque. The physician in attendance gave a verdict of total blindness, yet in a few hours the entire epithelium peeled off and in the course of a few weeks the patient recovered perfect vision. We have all seen these cases. I must confess, however, that I am pessimistic as to the permanent result of regeneration of the deeper portions of the cornea. Many years ago I made experiments on guinea-pigs similar to those of the essayist; results were favorable at first, but disappointing later. Transplantation of the cornea has been one of the dreams of the oculist for hundreds of years. The primary results are always flattering, but the ultimate ones are disappointing.

Dr. R. F. MILLER, St. Louis: Through the courtesy of Dr. Wiener I had an opportunity to see the animals he operated on, and I would like to say that many of these cases showed very beautiful results. I also happened to be present when he operated on the human, and I must say that from all appearances the outlook is certainly beautiful, and, as the doctor reported, about three days afterward the condition seemed to be about the same as in the animals. So I think the doctor has opened up a subject again which has been tried many times, but perhaps with careful detailed work he will be able to accomplish a great deal more than was accomplished twenty-five years ago. The work was very interesting to me and I think with future trials will give very good results.

Dr. M. WIENER, St. Louis: In regard to the corneal reflections in these photographs which I pass around, there is one rabbit which shows the regular reflection of the window in the eye, while the other eye shows an irregular reflection of the window. In one eye we got a clear cornea after resection and in the other we got a fairly clear cornea. The reason we got the clear cornea is that I believe the cornea was dissected out as it should be, that is, in layers. The piece should not be taken out irregularly in ridges, but evenly, and it can easily be done, almost peeled off in separate layers. I think this is essential in order to get a clear and regular surface. So far as having a regeneration, one microscopic specimen surely shows thickening of the cornea in the late specimens from that of the earlier ones; also, immediately after the operation, microscopically we can see a distinct depression, which later smooths out perfectly. Dr. Randolph believed it could not be done in cases in which there had been serious inflammation. These experiments were done on account of my having read of and seen a case of regeneration of the cornea after a gonorrheal ophthalmia, and that is certainly a severe process of inflammation. If the cornea can regenerate after a gonorrheal ophthalmia we ought to be able to take a clean scar and resect it. Dr. Baker thought it would be feasible, perhaps, only in the young. I have taken old animals as well as young, and the regeneration of the cornea mentioned in this paper was in an adult. I mentioned in the paper that after the operation these animals were put in the cages and nothing done with them at all. Their eyes were left open. If there was an unusual amount of secretion it was wiped off from day to day and possibly a little antiseptic powder used. Now I have started a series of experiments to determine whether there is any more rapid regeneration or clearing in eyes not treated as compared with eyes treated with dionin.

**Knowledge of Drugs.**—"Learn how to prescribe remedies and you will complain less of their inefficacy and their dangers."—Cappivaccio of Cremona in the sixteenth century.

## THE OPERATIVE TREATMENT OF GLAUCOMA BY CYCLODIALYSIS \*

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The operation of cyclodialysis suggested by Heine in 1905, consists in making an artificial communication between the anterior chamber and the suprachoroidal space, allowing a new channel for the escape of the aqueous humor and thus reducing intraocular tension. The operation is performed under local anesthesia by making an incision in the sclera 6 to 8 mm. posterior to the sclerocorneal junction after reflecting a conjunctival flap and with a bent spatula, separating the ciliary body from the overlying sclera and breaking through the pectinate ligament. A quadrant of the iris periphery is then detached. I have performed this operation in eighteen cases specially selected to test its merits. These cases have now been observed for a sufficiently long time to permit an opinion on the value of this operation.

The cases can be arranged in the following groups:

### A. CHRONIC GLAUCOMA

These are cases in which an iridectomy did not succeed in permanently reducing the tension, or a contra-indication to an iridectomy was present.

CASE 1.—R. B. M. Age 55. L. Vision=20/20—. T. (Tension)+1. F. (Field normal) Nov. 14, 1905; Iridectomy. T. again increased after six weeks. June 2, 1906: Cyclodialysis. At operation some difficulty in breaking through pectinate ligament. Aug. 1, 1906: T. V.=20/30. Dec. 1, 1906: Some opacities in posterior cortex of lens. T. (Tension normal) March 22, 1909: T. has remained normal without any miotics; cataract nearly mature.

CASE 2.—E. M. R. Age 60. Aug. 1, 1905: Iridectomy. Notwithstanding drops, eye showed tendency to be hard. V.=20/30. F. contracted nasally and below. May 21, 1906: Cyclodialysis. During operation anterior chamber filled with blood. This was evacuated by paracentesis two days later. V.=20/40. On the last visit, May 6, 1908, V.=20/30; F. no change. T. Has occasionally used miotics.

CASES 3 AND 4.—S. G. Age 45. R. absolute glaucoma. L. 20/100. T.+ F. contracted nasally to 10 degrees. March 20, 1906: R. cyclodialysis. April 1, 1906: No reaction. No choroidal detachment appreciable. T. April 4, 1906: L. cyclodialysis. April 20, 1906: R. T.+; L. Tn. March 10, 1907: R. T.+ L. 20/70. F. no change. T. 1/2. T. to use drops. April 3, 1908: L. tension kept slightly elevated, hence cyclodialysis repeated in left eye. F. nasally contracted to 5 degrees. Incision in sclera external to old one. On introducing spatula instrument passed into anterior chamber without encountering any resistance. June 17, 1908: L. Tn. 20/70. R. T.+ Dec. 30, 1908: L. Tn. Feb. 24, 1909: L. Tn. R. T.+.

CASE 5.—M. W. Age 56. Marked arteriosclerosis. R. widely dilated pupil. T.+ Od. cup with atrophy. V.=20/100. F. nasal contraction to 5 degrees. May 2, 1907: Cyclodialysis. Uneventful. June 17, 1908: R. 20/200. Tn. No miotics. March 2, 1909: Tn. V.=20/200. No drops.

CASE 6.—P. P. Age 61. R. iridectomy, 1905. May 1, 1907: R. V.=20/200. F. 15 degrees nasal. 30 degrees temp. T.+ Cyclodialysis. Uneventful, June 10, 1908: R. 20/200—; T.+ F. Slightly more contracted. March 8, 1909: T.—.

CASE 7.—A. G. Age 42. R. 20/200. F. 80 degrees temp. 35 degrees sup. 35 degrees inf. 30 degrees nasal. T.+ Aug. 27, 1908: Cyclodialysis. During operation anterior chamber filled with blood. That evening attack acute glaucoma, re-

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