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Knapp, Herman, 1832-1911.
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Publication/Creation

[Chicago] : [publisher not identified], [1888]

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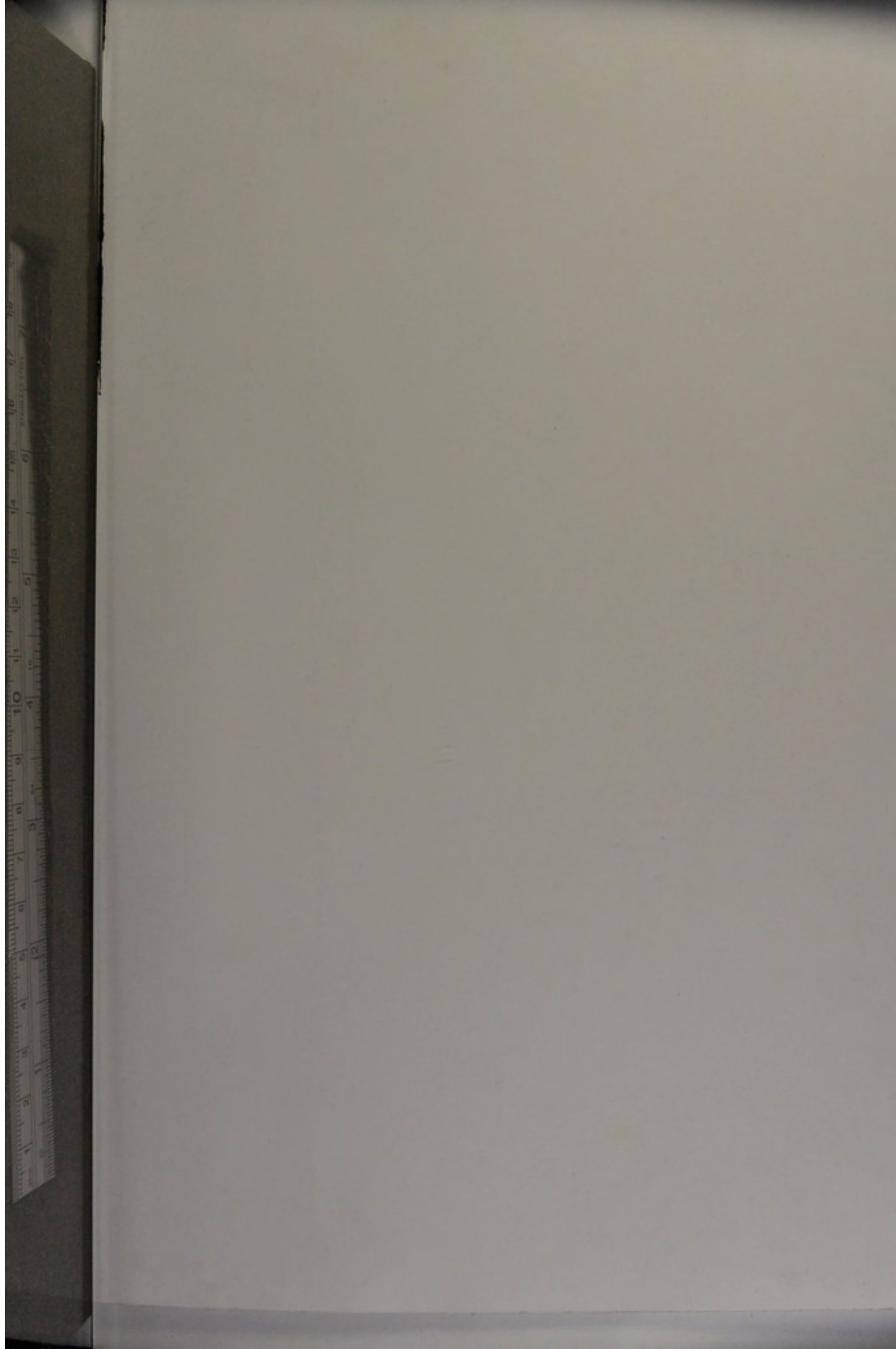
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REPORT ON THE FIRST SERIES OF ONE HUNDRED SUCCESSIVE EXTRACTIONS OF CATARACT, WITHOUT IRIDECTOMY.

By H. KNAPP, M.D.

THE series of cataract extractions considered in the following report were performed in New York City, the great majority at the Ophthalmic and Aural Institute, from June 10, 1886, to November 13, 1887. During this interval of time I made 117 extractions of cataract, among which 17 with iridectomy, according to von Gräfe's method. The necessity or advisability of the iridectomy was recognized either before or during the operation. The cases in which a subsequent excision of the iris was made for prolapse or glaucoma (1 case) are comprised in the present series. It results from these figures that I made an iridectomy in $\frac{1}{4}$ or 15% of the cases. On February 21, 1887, I read a paper on cataract extraction without iridectomy before the Ophthalmological Section of the New York Academy of Medicine, which was based on the 29 first cases of the series under consideration. As this paper was published in these ARCHIVES, March, 1887, (vol. xvi., p. 54, etc.) I can refer to it and begin this report with a tabular synopsis of the remaining 71 cases, but I first beg leave to supplement the above publication by a statement of the further changes that have come to my notice concerning the first 29 cases. I have endeavored to obtain as complete records as possible, not only during the time the patients were under my daily care at the hospital, but also later, asking them to come to me and be examined again,

Reprinted from the ARCHIVES OF OPHTHALMOLOGY, Vol. xvii., No. 1, 1888.

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or to send me letters either personally or through their physicians; and I have written to those of whom I had notes only on the primary visual results. We all know, however, that, in spite of every effort, such reports must remain more or less incomplete; yet with all their shortcomings they draw the most trustworthy picture of our work, bringing out, in the number and kind of accidents, our lack of experience and skill, while the results demonstrate the correctness or fallacy of the principles and rules that guided our minds and hands.

Case 7 had V $\frac{20}{200}$ at time of discharge, 12 days after extraction; discission 5 weeks later gave in 4 days V = $\frac{20}{40}$, in 8 months V = $\frac{20}{20}$.

Case 8. Primary V = $\frac{20}{100}$, in 8 months = $\frac{20}{40}$, in 10 months = $\frac{20}{20}$; disc. advised.

Case 11. Prim. V = $\frac{20}{100}$, with large prolapse, which in 6 months had spontaneously and completely disappeared; V = $\frac{20}{20}$.

Case 16. Prim. V = $\frac{20}{20}$; disc. in 6 months, V = $\frac{20}{20}$.

Case 17. Prim. V = $\frac{20}{200}$, later $\frac{10}{200}$; in 3 months, $\frac{20}{200}$.

Case 18. Prim. V = $\frac{8}{200}$; disc. 8 months later, V = $\frac{15}{200}$. Old corneal opacities prevent better vision.

Case 21. Prim. V = $\frac{10}{200}$, in 10 weeks = $\frac{20}{40}$, in 6 months = $\frac{20}{20}$.

Case 23. Prim. V = $\frac{20}{100}$, in a year $\frac{20}{20}$.

Case 24. Prim. V = $\frac{10}{200}$; disc. in 4 months, V = $\frac{20}{40}$.

Case 25. Prim. V = $\frac{20}{20}$; disc. in 3 months, V = $\frac{20}{20}$.

Case 26. Prim. V = $\frac{20}{20}$; in 4 weeks = $\frac{20}{40}$; in a year = $\frac{20}{20}$; disc., V = $\frac{20}{20}$.

Case 29. Prim. V = $\frac{20}{20}$; disc. in 2 months, V = $\frac{20}{20}$.

$\frac{20}{20}$	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
30	Mrs. M. Fleck. 49. Good.	Almost mature. Normal.	March 3, 1887. Conjunctival flap. During capsulotomy lens and some vitreous expelled by sudden contraction of lids. Iris reduced. Wound closed slowly, Iris folded back. 35 days.	$\frac{20}{100}$.
31	Mrs. Cors. 60. Good.	Hard, ripe. Normal.	March 23. Conjunctival flap. 15 days.	$\frac{20}{20}$.

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
32	Mrs. Bache. 27. Good.	Soft. Normal.	March 24th. Speculum removed after division of capsule. Lens expelled by pressure with lids. 20 days.	$\frac{20}{70}$. Discission on 14th day. $\frac{20}{20}$.
33	Mr. Gallagher. 66. Good.	Hard, ripe. Normal.	March 24th. Small conjunctival flap. 14 days.	$\frac{20}{70}$.
34	Mrs. Townsend. 54. Good.	Morgagnian. Normal.	April 4th. No injection into ant. chamber. 13 days.	$\frac{20}{70}$. Disc. 23d day. $\frac{20}{30}$; $\frac{20}{20}$ in 9 mos.
35	Mr. Stanton. 56. Good.	Hard, ripe. Normal.	April 4th. Pupil oval, by iris, partly tilted back. 20 days.	$\frac{20}{200}$.
36	Jas. Christian. 67. Good.	Hard, ripe. Normal.	April 11th. 16 days.	$\frac{20}{70}$. Disc on 17th day. $\frac{20}{30}$.
37	Charles Mills. 67. Good.	Hard, ripe. Normal.	April 13th. Large conjunctival flap. 17 days.	$\frac{20}{30}$.
38	Mrs. Coulter. 67. Good.	Almost mature. Normal.	April 13th. 19 days. Pupil oblong; iris adherent to scar.	$\frac{20}{100}$. Disc in 11 months. $\frac{20}{100}$ in 3 weeks.
39	Mr. Butler. 66. Colored, good.	Hard, ripe. Normal.	April 14th. Conjunctival flap. Horizontal superior division of capsule. 15 days.	$\frac{20}{100}$. Capsule evenly stretched across pupil. 9 months, capsule wrinkled, $\frac{20}{200}$. [Disc. necessary.]
40	Cath. Gill. 55. Good.	Hard, ripe. Normal.	April 16th. 16 days.	$\frac{20}{200}$. Disc in 9 mos. $\frac{20}{30}$.
41	Mr. Stewart. 59. Bright's disease; alcoholism.	Hard, ripe. Normal.	April 16th. 14 days. Pupil round; no adhesions.	$\frac{20}{70}$. 9 weeks after ext. crucial division, followed by acute glaucoma. Iridect. 2 days later. Rapid recovery. V = $\frac{20}{60}$. Died 2 months later.
42	Mrs. Donovan. 68. Good.	Hard, ripe, complicated. Normal.	April 23d. Some irido-capsulitis, subsiding in 3d week. 29 days.	$\frac{20}{200}$. Old trachoma and maculæ corneæ.
43	James Couser. 75. Good.	Hard, ripe. Normal.	April 23d. Conjunctival flap. 18 days.	$\frac{20}{70}$.
44	Mrs. King. 51. Good.	Hard, ripe. Normal.	April 23d. 23 days.	$\frac{20}{30}$.
45	Mr. Thoma. 67. Good.	Hard, ripe. Normal.	April 23d. 15 days.	$\frac{20}{50}$; in 2 months $\frac{20}{200}$. Discission $\frac{20}{40}$.

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
46	Mrs. Laverack. 74. Good.	Hypermaturation. Normal.	May 4th. Conjunctival flap. Expulsion of lens laborious. <i>Intense iritis with closure of pupil.</i> 19 days.	$\frac{1}{2}$. In 5 months $\frac{4}{200}$. Discission, $\frac{20}{200}$.
47	Mr. Vinton. 52. Good.	R.—Hard, ripe. Normal.	May 4th. 13 days.	$\frac{20}{200}$. Discission, $\frac{20}{200}$.
48	Mr. Vinton. 52. Good.	L.—Hard, ripe. Normal.	May 17th. 13 days.	$\frac{20}{200}$. Discission, $\frac{20}{200}$.
49	Pet. Bowman. 56. Good.	Hard, ripe. Normal.	May 7th. 14 days.	$\frac{20}{200}$.
50	Mrs. Graddy. 60. Good.	Morgagnian. Normal.	May 11th. Lens removed with capsule. Iris reduced. No injection into chamber. 19 days.	Fundus perfectly clear. Pupil round. V. excellent, $\frac{20}{200}$ (estimated, patient cannot read).
51	Mr. Bietz. 65. Good.	Hard, ripe. Normal.	May 11th. 15 days.	$\frac{20}{200}$. Discission, in 5 days $\frac{20}{200}$; in eight months $\frac{20}{200}$.
52	Mr. L. Kahn. 66. Good.	Hard, ripe. Normal.	May 13th. 16 days.	$\frac{20}{200}$. Disc. in 5th week; $\frac{20}{200}$ 7 days later; $\frac{20}{200}$ 9 months later.
53	Mr. Suydam. 84. Feeble.	Hypermaturation.	May 12th. 21 days.	$\frac{20}{200}$. Discission, $\frac{20}{200}$.
54	Mrs. M. Beyer. 54. Good.	Hard, ripe. Iris atrophic.	May 17th. Pupil oblong; iris <i>adherent</i> to scar.	$\frac{20}{200}$
55	Mrs. Kean. 76. Good.	Hard, ripe. Normal.	May 20th. Two filamentous adhesions. 20 days.	$\frac{20}{200}$. Disc. on 30th day; $\frac{20}{200}$ 5 days later.
56	Mrs. Ehrlich. 77. Bronchitis.	Hard, ripe. Normal.	May 19th. Some filamentous adhesions and opacities in pupil. 25 days.	$\frac{20}{200}$. Disc. on 25th day. $\frac{20}{200}$; 8 days later.
57	Miss A. Knoop. 60. Asthma. Severe spells of coughing.	R.—Hypermaturation. Normal.	May 24th. 13 days.	$\frac{20}{200}$. Disc. on 34th day, $\frac{20}{200}$; $\frac{20}{200}$ in 7 months.
58	Miss A. Knoop. 60. Asthma. Severe spells of coughing.	L.—Hard, ripe. Normal.	Oct. 12th. No reaction. 16 days.	$\frac{20}{200}$. Disc. 2 months; $\frac{20}{200}$ in 2 months.
59	Mrs. Hand. 60. Good.	Hard, ripe. Normal.	May 25th. <i>Mild iritis</i> , with synechiæ below and some opacity of capsule. 20 days.	$\frac{20}{200}$. Disc. on 20th day; $\frac{20}{200}$ 5 days later.
60	Mrs. A. Simon. 42. Good.	Half-hard. Normal.	May 27th. 13 days.	$\frac{20}{200}$. Disc. on 13th day; $\frac{20}{200}$ 4 days later; $\frac{20}{200}$ a month later.

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61	Mrs. H. Lindsay. 65. Good.	Hard, ripe. Normal. Myopia.	May 31st. Circumcorneal injection. No synechiæ. 17 days.	$\frac{20}{200}$. Disc. on 18th day, $\frac{20}{100}$.
62	Mr. Mathews. 60. Good.	Hard, ripe. Normal.	June 6th. Two filiform adhesions. 13 days.	$\frac{20}{70}$.
63	Mrs. Parks. 61. Good.	Hard, ripe. Normal.	June 7th. Some pericorneal injection. 17 days.	$\frac{20}{100}$. Disc. on 21st day; $\frac{20}{40}$ 9 days later; $\frac{20}{20}$ 6 months later.
64	Mrs. Weid. 60. Good.	Ripe. Normal.	June 14th. 16 days.	$\frac{20}{70}$.
65	Dr. Orendorf. 56. Good.	Ripe. Normal.	June 14th. 15 days.	$\frac{20}{50}$. Disc. on 16th day; $\frac{20}{30}$ a week later.
66	Mr. Murphy. 45. Good.	Ripe. Normal.	June 21st. One filiform adhesion. 11 days.	$\frac{20}{50}$. Disc. on 21st day, $\frac{20}{30}$.
67	Mrs. Johnson. 65. Good. Traces of albumen in urine.	Ripe. Normal.	June 21st. Ruptured wound on sixth day by hurting her eye. Small prolapse in centre of section, which I reduced. Pupil central again. No reaction.	$\frac{20}{200}$. Disc. on 20th day; $\frac{20}{100}$ in 5 days; $\frac{20}{30}$ later.
68	Mrs. Hearn. 60. Good.	Ripe. Normal.	June 23d. 14 days.	Disc. $\frac{20}{200}$. Disc. on 14th day; $\frac{20}{70}$ 5 days later.
69	Mr. Vetter. 45. Good.	Ripe. Normal.	June 23d. Great difficulty in clearing pupil. Rubbing and Daviel's spoon. 14 days.	$\frac{20}{70}$. Disc. on 21st day; $\frac{20}{30}$ three months later.
70	Cath. Leydinger. 46. Normal.	Ripe, complicated. Normal.	Sept. 9th. Patient very refractory. Fluid vitreous escaped. Patient etherized to reduce iris. No irritation in healing, but moderately large prolapse of iris. 24 days.	$\frac{20}{100}$.
71	McCrystal. 50. Good.	Ripe. Normal.	Sept. 14th. Small peripheral part of iris fell before knife; excised. Pupil central, round. 19 days.	$\frac{20}{200}$. Disc. in 6th week; $\frac{20}{50}$ in 2 weeks; $\frac{20}{20}$ in 3 months.
72	Aaron Weise. 50. Good.	Ripe, complicated with glauc. simpl. Normal.	Sept. 19th. Patient restless. Small prolapse. Post. synechiæ. O. d. white; beginning of cupping. 17 days.	$\frac{15}{200}$. 4 months later: Incarceration of iris; no irritation; both Odd. whitish, somewhat cupped. $\frac{15}{200}$. Disc. in 5 months; S. $\frac{20}{100}$ in 4 days; 4½ months, $\frac{20}{70}$.

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
73	Fr. Fischer. 46. Good.	Ripe. Normal.	Sept. 19th. 13 days.	$\frac{20}{70}$. Capsule veils fundus. Disc. in $4\frac{1}{2}$ months; $\frac{20}{40}$ in 3 days; $\frac{20}{20}$ in 26 days.
74	Mrs. Fitzgerald. 62. Good.	Ripe. Normal.	Sept. 23d. 12 days.	$\frac{20}{70}$. $\frac{20}{40}$ in a month.
75	Mrs. Low. 62. Good.	Ripe. Normal.	Sept. 26th. Considerable cortex left. No reaction. Pupil round. 16 days.	$\frac{20}{200}$. Disc. on 33d day. $\frac{20}{70}$ in 5 days.
76	Mrs. Goldsmith. 69. Good.	Ripe. Normal.	Sept. 30th. Operation and healing of eye undisturbed. On 3d day, headache, nausea, and persistent, uncontrollable vomiting for 3 days (had such attacks before), then coma and death.	Condition of eye unexcelled. ($\frac{20}{40}$, estimated.)
77	Mrs. Stinitzka. 60. Good.	Ripe. Normal.	Oct. 1st. Pupil vertically oval. <i>Adherent to scar</i> . 14 days.	$\frac{20}{200}$. Disc. in 6th week; $\frac{20}{80}$ in 5 days; $\frac{20}{30}$ in 3 months.
78	Mr. Moore. 47. Good.	R.—Immature. Cortex transparent. V = $\frac{6}{200}$.	Oct. 4th. Lens and cortex escaped together completely. 14 days.	$\frac{20}{70}$. Disc. 2 months, V $\frac{20}{20}$.
79	Mrs. Devlin. 63. Good.	Complicated excessive myopia.	Oct. 5th. Hurt herself on changing dressing. Pupil oblong. (Adhesion of iris.)	$\frac{10}{200}$. Disc. 18th day; $\frac{20}{200}$ in 4 days.
80	Miss Geering. 22. Good.	Soft, ripe. Normal.	Oct. 6th. Patient restless. <i>Moderate prolapse</i> . No reaction. 16 days.	$\frac{20}{100}$. Prolapse cu. 21st day. Disc. 35th day, $\frac{20}{30}$.
81	Mrs. Murphy. 73. Feeble.	Complicated. Normal.	Oct. 6th. Extensive subconjunctival hemorrhage. No reaction. 20 days.	$\frac{10}{200}$. Atrophy of chor. in region of yellow spot. Died soon.
82	Mrs. Smith. 60. Good.	Ripe. Normal.	Oct. 7th. No reaction. 15 days.	$\frac{20}{200}$. $\frac{20}{100}$ in 5 weeks.
83	Ella Stein. 13. Good.	Ripe. Normal.	Oct. 10th. Capsule extracted with Mathieu's forceps. 12 days.	$\frac{20}{40}$.
84	Mrs. Cors. 60. Good.	L.—Ripe. Normal.	Oct. 12th. <i>Small prolapse</i> . 15 days.	$\frac{20}{100}$. Prolapse cystoid; abscised 2 mos. later. No reaction. V good, $\frac{20}{30}$ (estimated).

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
85	Mrs. Bradley. 75. Good.	Hypermature. Normal.	Oct. 14th. Capsule and lens removed with Mathieu's forceps. Pupil round. Pat. restless. <i>Prolapse</i> of iris. 21 days.	$\frac{20}{200}$.
86	Mrs. Crait. 56. Good.	Ripe. Normal.	Oct. 15th. 14 days.	$\frac{20}{50}$. 3 weeks.
87	Dr. Cr. 63. Good. Diabetes.	Hypermature. Normal.	Oct. 14th. Thickened portion of capsule removed with Mathieu's forceps. A good deal of manipulation in clearing the pupil thoroughly and reducing the iris. Thorough washing out of ant. ch. Intense pain first night. No discomfort afterward. Pupil round, central, clear. 20 days.	$\frac{20}{50}$ in 20 days; $\frac{20}{50} +$, 6 weeks; the same in $4\frac{1}{2}$ months.
88	Mrs. Schurich. 70. Feeble.	Morgagnian, complicated. Normal.	Oct. 18th. 14 days.	$\frac{20}{100}$. With + 7. Large crescent; rarefaction of choroid.
89	Mr. Eno. 67. Good.	Ripe. Normal.	Oct. 28th. 15 days.	$\frac{20}{70}$. Disc. on 30th day, $\frac{20}{50}$.
90	Mrs. McQuiry. 47. Good.	Ripe. Normal.	Oct. 28th. Pupil central. Iris <i>adherent</i> at periphery. 16 days.	$\frac{20}{100}$. Disc. in 4 mos.; $\frac{20}{50}$ in 3 mos. $\frac{20}{30}$ in 5 days.
91	Mr. Schuman. 66. Diabetes (5% of sugar).	L.—Ripe. Normal.	Oct. 29th. <i>Incarceration</i> of iris, pupil oblong. No reaction. 20 days.	$\frac{12}{200}$. Disc. on 33d day; $\frac{20}{200}$ 6 days later.
92	Mrs. Morgan. 80. Feeble.	Ripe. Normal.	Nov. 3d. No reaction. Pupil slightly oblong; iris <i>adherent</i> . 14 days.	$\frac{20}{50}$. Disc. in 4 mos.; V = $\frac{20}{50}$.
93	Mrs. Laverack. 75. Good.	R.—Ripe. Normal.	Nov. 3d. Some synechiæ above and below. 14 days.	$\frac{20}{200}$. Disc. in 20 days; $\frac{20}{40}$ 6 days later.
94	Miss Jones. 29. Good.	Soft. Normal.	Nov. 4th. 9 days.	$\frac{20}{200}$. Disc. on 40th day; $\frac{20}{40}$ 4 days later; $\frac{20}{20}$ 3 mos. later
95	Mrs. Kirman. 82. Paralysis agitans.	Hard, ripe. Normal.	Nov. 6th. 15 days.	$\frac{20}{70}$.

No.	Name, Age, General Health.	Character of Cataract, Functional Examination.	Operation, Incidents, Healing Process, Duration of Treatment, Secondary Operation.	Primary and Ultimate Vision. Remarks.
96	Mrs. Barnett. 74. Good.	Cataracta nigra complicata. Normal.	Nov. 7th. Escape of a drop of <i>vitreous</i> . Iris <i>tilted</i> back. No subsequent protrusion. Healing undisturbed. 14 days.	$\frac{15}{200}$ on 14th day; in 3 months $\frac{20}{20}$. Atrophy of choroid. Pupil oblong. Synechiæ in upper part.
97	Mrs. McCowan. 59. Good.	Ripe. Normal.	Nov. 8th. 14 days.	$\frac{20}{100}$. Disciss. 56th day; $\frac{20}{20}$ 5 days later. Exposed herself at home. Pain and diffuse opacity of vitreous. Recovered quickly by leeches, salicyl. of soda. V = $\frac{20}{40}$.
98	Mr. Vail. 70. Diabetes.	Morgagnian. Normal.	Nov. 9th. Parotitis on 9th day, lasting 3 days, not interfering with undisturbed recovery of eye. 18 days.	$\frac{20}{200}$. Disc. on 14th day; $\frac{20}{200}$ 4 days later; $\frac{20}{40}$ 3 weeks later.
99	Mr. Volckmer. 64. Good.	Ripe. Normal.	Nov. 12th. Pain in first night, swelling of lids. Spongy exudation and some lens matter in ant. chamber; both absorbed slowly. No discomfort from 2d day. Abscission of small <i>prolapse of iris</i> on 5th day. No reaction. 21 days.	$\frac{20}{200}$. Coloboma and adherent iris. Disc. in 3 mos; V = $\frac{20}{100}$ 2 weeks later.
100	Mrs. Dillon. 65. Good.	Ripe. Normal.	Nov. 13, '87. Pupil excessively small. Iris reduced with difficulty. Patient restless. Prolapse of iris noticed on 4th day and cut immediately. Incarceration of iris in both corners. Healing smooth. 22 days.	$\frac{20}{200}$. Disc. in 2 mos. V = $\frac{20}{20}$.

In the subsequent remarks, to avoid repetition, I shall refer to my former paper in vol. xvi., p. 54, etc., of these ARCHIVES, and add only such statements as increased experience may suggest.

As to the **propagation** of the method of simple extraction, two authoritative voices in Germany have pronounced themselves in favor of this method. They are Prof. SCHWEIGGER, of Berlin, whose paper "The Return to the Flap-Operation," in vol. xvi., p. 447, etc., our readers, no doubt, have read with great interest, and Prof. SATTLER, of Prague, whose views are published in the Transactions of the Nineteenth Meeting of the German Ophthalmological Society at Heidelberg (September, 1887), page 92, etc., where also some very instructive remarks on this subject by Dr. E. MEYER, of Paris, are found. In the city of New York the simple method continues to be pursued, with critical consideration, by a number of oculists, Noyes, Bull, Grüning, Webster, and others. Bull reported¹ in the last meeting of the American Ophthalmological Society 36 cases without a loss (one eye, blind before, gave no visual result). Dr. Hasket Derby, of Boston, in an article just published and entitled: "On the Dangers of Simple Extraction of Cataract,"² writes: "I have been enabled to collect the notes of 48 cases of simple extraction performed in Boston within the last three years, nearly all by two surgeons, both of whom had had a large experience in the Graefe operation. Results: Central pupil in 31 cases, distorted pupil in 5, hernia of the iris in 12. Vision: 0.1 or more in 40, moderate in 5, $\frac{1}{\infty}$ in 2, still under treatment, 1." These results Derby justly considers as unfavorable and asks: "May not the operation, however, be restricted to certain cases, under special rules?" He comes to the conclusion: "Even if these or similar rules be followed, I cannot resist the belief that for the average surgeon, and in the present state of our knowledge, simple extraction, at the best, involves an element of danger that is wanting in the method of v. Graefe." The same criticism has been raised against the revival of the flap-extraction in Germany, England, and even in France, the country which is honored by its invention.

The following remarks will show on which side the present writer stands:

¹ Transactions of 1887, vol. iv., p. 413.

² *Boston Med. and Surg. Jour.*, February 23, 1887, p. 189.

On the preparation of the patient before the operation I have nothing new to suggest. I have continued to operate in the patient's room and the

Method of Operating

has not been changed or varied in any thing essential since my publication in these ARCHIVES. Personally I have had no inducement to lay aside Gräfe's narrow knife and return to the triangular (Beer-Richter) knife, for I have found the former convenient and well adapted to its object. I have continued to place the patient on the operating chair, because the chair can be easily moved toward the window and the source of artificial light (I use a drop-light with an Argand gas-burner), and during the progress of the operation it can be readily turned, if need be, so that for each step the best illumination may be secured. To operate on the patient in his bed, as we used to do before the introduction of the combined extraction, has, no doubt, certain advantages, for I am afraid that the transport of a blind-folded person from the chair to his bed may, in some cases, cause displacement of the iris. This risk can, however, considerably be guarded against by letting him remain in the operating chair until the eserine has had its full effect in contracting the pupil, *i. e.*, about ten to fifteen minutes. At the expiration of that time the eye may be inspected once more, and any thing wrong, in particular a prolapse of the iris, be removed prior to the application of the definitive dressing. The consumption of time is compensated for by greater safety.

Before and since I became acquainted with Dr. F. Valk's iris-retractor,¹ I have drawn, with the well-known wire loop, the pupillary portion of the iris towards the centre of the section in order to facilitate the exit of the lens. This was done only in cases where, by rigidity of the sphincter portion of the iris, the pupil did not readily dilate, but I found that the pupillary edge of the iris was apt to be notched

¹ F. Valk: Report of four operations for the removal of cataract without an iridectomy, and by an entirely new method. *The Post-Graduate*, New York, 1887.

and a round pupil was not so easily reëstablished. In such cases, I think, a small iridectomy is preferable. The proposition of Valk to draw the iris towards the periphery prior to the opening of the capsule, has appeared very tempting to me, for it would enable us to make a sufficient peripheric capsulotomy, and thus obviate the frequent formation of posterior synechiæ inherent to the laceration of the centre of the capsule. Yet I have not tried it, because it introduces a new step into an operation that is already complicated and delicate enough, and the posterior synechiæ have thus far, in my practice, proved harmless. I await further information on the part of Dr. Valk, for everybody cannot try every thing.

It is of importance that the *flap be of sufficient size*;—for a ripe, hard cataract fully two fifths of the corneal edge of the limbus conjunctivæ. A conjunctival flap is somewhat in the way during the operation; but I think it acts favorably on the closure of the wound. That it is a protection from secondary infection I am fully convinced of.

Extended experience has confirmed Dr. Panas' and my own statements that the *peripheric location of the corneal section does not in itself favor the occurrence of prolapse of the iris*.

In the majority of cases the *capsule was opened* in the centre by a cystotome; some trials to open it at the periphery, by carrying the point of the instrument behind the iris, were not continued, because the escape of the lens proved not so easy as when the centre was opened. Yet I carry the point of the instrument high up, and add a horizontal stroke in the upper part, as v. Gräfe used to do. In this way the lens tilts very readily.

The mode of expelling the lens differs from that used in the combined extraction. The pressure should be made through the cornea on the lower portion of the lens, directly towards the centre of the globe. In this way the flap rises, tilts forward, and the lens passes through the pupil with the least bruising of the iris. This is the old classical procedure; but we have gradually departed from it, because in the combined method the lens can be pressed out more di-

rectly, whereas in the simple extraction direct upward pressure would be counteracted by the iris stretching like a retentive bandage over the advancing edge of the lens.

In a number of cases, in all where the centre of the capsule was thickened, I tried to *remove the pupillary portion of the anterior capsule*, and mostly succeeded. I used for that purpose a pair of Mathieu's iris-forceps, the teeth of which are on the back, but close to the point. This instrument, the excellent and well-known modification of Liebreich's iris-forceps, has been invaluable to me since I first saw it in London in the year 1871.¹ I am not aware that the numerous capsule forceps which have been described during the last years are in any way superior to Mathieu's. The indications for removal of the central part of the anterior capsule have not been very frequent in the present series. It is not impossible that I may soon try to do this step in every case as is recommended by many operators. During several years I have done it regularly in Gräfe's operation, but for the present I seek to obtain the maximum of visual acuteness by an after-operation. More of this hereafter.

The *removal of the cortex* was done, in the first place, by following up the escaping cataract with the spoon, continuing the pressure, so that, if possible, the whole cortex came forth with the lens. A great deal can be accomplished in this way by judicious, bold, and quick action. The moment the lens is out the speculum should be removed, and in case any remnants lag behind, they should be wiped out with the edge of the lower lid, taking care that neither the edge of the upper lid, nor any other organic part, be passed through the wound. If there is a conjunctival flap, the remnants can be stroked out by passing the edge of the lower lid or a blunt spatula over it. These pressing movements with the lower lid, which can be done boldly and without injury, are very efficient, and it seems to me that where they fail other means are not likely to succeed.

During the operation, and immediately after it, the eye, especially the wound, was frequently *irrigated with Panas'*

¹ See my description of it and my appreciation of its advantages in these ARCHIVES, vol. ii., pt. 2, p. 158, 1872.

solution, not only to prevent infection, but also to counteract the rapid exsiccation of the surface of the cornea. When the iris was reduced and the pupil round and central, I injected, with a delicate lachrymal syringe, a few drops of this solution into the anterior chamber, passing the nozzle of the instrument along the whole wound canal, while the liquid was flowing out. My object was to sterilize the whole region of the wound, not to remove coarse remnants of lens. When a good deal of manipulation had been necessary to clear the pupil and reduce the iris, I injected a larger quantity. When, on the other hand, the lens came out entire and the iris re-entered the anterior chamber spontaneously, or by easy manipulation with the lid or probe, I only irrigated the lips of the wound, omitting the intra-ocular injection altogether, or making it very slight. If much of this antiseptic is injected, it occasions considerable irritation, burning and pain for from nine to fifteen hours, yet I have never seen it cause any inflammation. When blood, pigment, or small granular and flaky remnants of cataract render the pupil and iris dull I syringe them out with Panas' solution. This procedure is easy, and has a surprising effect. As an example, case No. 87 may be cited:

Dr. C., æt. sixty-three, suffering from glycosuria, but being otherwise in good health. After the cataract was removed and the iris reduced, the pupil and anterior chamber contained an unusual amount of iris pigment. On syringing it out the escaping liquid looked like a blackish emulsion. The pupil and chamber became entirely clear. He had intense pain for fifteen hours, but then he was completely free from it. Healing undisturbed; $V = \frac{2}{3} \oplus$.

The abundance and easy separation of iris pigment in this and similar cases may find its explanation by Dr. Kamocki's anatomical researches of diabetic eyes.¹ The uveal cells became enlarged and dropsical, the whole layer is thickened and contains cyst-like cavities. (See the drawings on plates II. and III.)

I have used no other *antiseptic* than the solution of

¹ See his paper in the present number of these ARCHIVES, p. 41.



Panas; not that I consider it superior to all others, but because I am not particular in the choice of these means as long as they do not irritate. I would just as gladly use the mercuric bichloride, or a very weak solution of nitrate of silver, or properly diluted chlorine water, had I a tendency to experiment with remedies. Since I began to use Panas' solution and the precautions described in my previous paper, I have performed one hundred and fifty-nine extractions, and lost only one eye (the case of suppuration, No. 22, in my previous paper), in a patient suffering from diabetes and dacryo-cystitis purulenta. In ophthalmic surgery, now as before, I lay the greatest stress on smooth operating, which means to create no condition favoring the multiplication of bacteria. There are, more or less, germs in every conjunctiva, and we cannot destroy them if we do not destroy important tissue elements. These germs, however, will not multiply as long as the organ is healthy, but they multiply if bruised and necrosed particles, or serous and sanguinolent transudations prepare for them a suitable nutrient soil. The vitality of bacteria, and in most species also their quantity, play an important part concerning the full development of their action. We know that the resistances of a healthy organism to most bacterial invasions are great—certainly to the invasion of a moderate quantity of pyogenic germs. If truly virulent staphylococci, when they are cautiously (*i. e.*, without too much bruising of cornea and wounding of iris and lens) injected into the anterior chamber, disappear without a trace; if the same microbes, injected into the veins, cause suppuration only when there is a weak point in the body, for instance a fracture, it is clear to everybody, even to those not familiar with Metschnikow's phagocytes, that the healthy body possesses the means of successfully resisting many a microbial invasion, and that in our particular case an eye, correctly operated on, is not doomed to destruction if a few microbes lodge in its conjunctival sac or get into the wound. I may here recall some experiments which I published in these ARCHIVES two years ago, viz., that out of six inoculations of truly virulent staphylococci into the same cornea, only one devel-

oped into a pustule; further, that an emulsion of staphylococci dropped into the conjunctival sac of rabbits, from which I immediately afterward extracted the lens with clean instruments and without using any antiseptic, produced no suppuration; whereas a small knife dipped into the same emulsion and used for extractions, produced it regularly. Are we not justified in assuming that no knife, not even the smallest and sharpest, can be thrust through a cornea without a certain degree of bruising? Prof. GAYET, of Lyons, after carefully disinfecting the eyes of his cataract patients, found, by test-tube cultivations, microbes in the conjunctival sac in seventy-five per cent. of the cases; but is he correct in saying that these germs are not all pathogenic because there was suppuration only in $6\frac{1}{2}$ per cent. of the patients he operated on?¹

His second conclusion, being the immediate result of his very numerous experiments (two hundred and thirteen test-tube cultivations), must, however, be admitted without reserve, and has a great practical bearing. It reads as follows: The employment of antiseptic or aseptic substances appears to have only a very slight (*bien minime*) influence on the presence of germs in the conjunctival sac; or, in other words, whatever we do, we are never sure to eliminate them from the field of eye operations.

We may fairly assume that it is impossible to make a cataract operation without setting up conditions that are more or less favorable to bacterial growth. If we further believe—and for all practical purposes nobody can refuse to believe—that there is no suppuration without bacteria, we have to act accordingly, omitting nothing that is calculated to assist in securing success. Even at the risk of repeating well known truths, I beg leave to lay down the following **general rules for guidance in our cataract operations:**

1. Keep out bacteria or wash them off by germless, unirritating liquids: boiled water, boric acid and other indifferent substances dissolved in boiled water.

¹ Gayet: Recherches expérimentales sur l'antisepsie et l'asepsie oculaires. *Arch. d'Ophthal.*, Sept.-Oct., 1887, p. 403.

2. Prevent the multiplication of germs by antiseptics: watery mercuric bichloride, or alcoholic biniodide, chlorine water, nitrate of silver, and other substances in very weak solutions.

3. Perform the operation with the utmost degree of neatness and accuracy, and with a minimum of traumatism, avoiding bruising, scratching, and tearing of any kind, so as to reduce septic conditions to a minimum.

4. Endeavor to obtain primary union by freeing the wound from all foreign substances, by perfect coaptation of its edges, and by maintaining the greatest possible immobility of the organ until the closure of the section is firm.

5. Avoid constitutional infection of the wound. It is dangerous to operate for cataract as long as the constitution of a patient is under the active influence of a specific disease; for instance, articular rheumatism, acute or chronic suppuration, syphilis, and the like. In some incurable diseases—for instance, diabetes—we must select the time when the vitality of the patient is least reduced.

All these rules are clear and have been sufficiently discussed, only in regard to the fourth I would like to make a few remarks. The endeavor to cure our patients "jucunde," that is, with as little discomfort as possible, has of late, it seems to me, been carried too far. SNELLEN sends some of his patients into the garden the first days after the operation. CHEATHAM removes the cataracts in a lecture room before the students, and immediately after lets them drive home in a country carriage, ten or more miles. MICHEL, of St. Louis, CHISOLM, and others, close both eyes with simple plaster, or even leave the eye not operated on open, allowing the patient, from the first day of the operation, to remain up and look about. There is no doubt that under all these conditions multitudes of eyes recover. It is incredible what a healthy eye can endure. But demonstrate by statistics large enough to exclude the element of chance, that such procedures are beneficial, or at least harmless, and I shall gladly remove all restraints from my patients. Suppose I extracted a cataract in the large hall of the New York University Medical College (where

gelatine plates, exposed only a few minutes, develop any number of germ colonies), and then let the patient drive home to some village on Long Island. Suppose that this patient loses his eye, as possibly he may, for, all other things being equal, the lecture room as an operating theatre and the drive to his home are certainly no guaranty of success. And suppose that he accuses me of negligence and sues me for damages, it is sure that my counsel would have some difficulty to convince every one of the twelve jurors that I could not have acted more carefully. If there is no other possibility, and the patients want to have it so, as in the case of Cheatham, then, of course, they take the risk. With regard to the court-plaster dressing and letting the patient have the partial use of his visual organ, Dr. Chisolm, in my opinion, also goes too far, surely for eyes whose cataracts have been extracted without iridectomy. The light which shines through the plaster induces the patient to wink and move his eye. Apart from that the stiff plaster is not the height of comfort. Patients with whom I have tried it, preferred the flannel bandage. If it is alleged that the flannel bandage presses on the eye and flattens the cornea, then the first rule of the classical binocular has been disregarded by the dresser, namely, to pad up the corners of the eye and put only a little cotton on the top, so that an elastic and even pressure, free from any inconvenience, keeps the eyeball in a degree of immobility that is secured, as far as I have experience, by no other kind of dressing. In summer, flannel is too warm, and there are some restless patients who will disturb the roller. In such cases the linen gauze and cotton-wool can be kept in position by strips of adhesive plaster. This mode of bandaging, of course not new, is quite convenient, but secures the immobility less than the contentive and elastic flannel roller. The superiority of Dr. Chisolm's bandage is not borne out by his statistics.¹ Five per cent. of loss and five per cent. of $V = \infty$ is below the average success of experienced and skilled operators, to the front rank of whom, we all know, Dr. Chisolm belongs.

¹ See the paper by Dr. Belt, his assistant, at the beginning of this volume.

Of the **accidents** occurring during the operation the following should be mentioned :

1. In one case, No. 71, a small part of the periphery of the iris *fell before the knife*, and was cut off. No consequence. Pupil round, central, movable, $V = \frac{20}{20}$.

2. *Prolapse of vitreous* in five cases, Nos. 14, 24, 30, 70, 96. In four of them the iris was pressed back. All got well without incarceration, and obtained good vision.

The **wound complications**, which can be studied in detail in the foregoing tabular synopsis, may be summed up as follows :

Prolapse of the iris occurred in *twelve* cases.

In *one*, the case of suppuration by secondary infection, the iris filled the gap when the previously closed wound had re-opened.

In *four* cases the prolapse *disappeared spontaneously* in the course of some months.

In *four* others it was removed with scissors.

In *one*, produced by a hurt, it was reduced two hours after its occurrence. No reaction followed, and the pupil was clear and central.

In *two* cases the prolapse remained, but I shall remove it if, on the patient's return, it has not disappeared.

In *eight* cases the iris did not protrude, but was more or less extensively united to the scar. Slight, partial adhesions have probably occurred more frequently, but have either not been noticed, or have not been noted on account of their harmlessness.

If I still mention *three cases* in which the iris was *pressed back* by advancing vitreous, I have stated all the anomalies of position which the iris has presented. They occurred in twenty-three patients, all of whom, however, regained good sight, except the one with suppuration. This calamity was, of course, not caused by the prolapsed iris. The patient was an innkeeper, addicted to drink, and suffering both from dacryo-cystoblenorrhœa and diabetes, having from 5 % to 8 % of sugar in his urine, when he came to be operated on for his other eye, in which the operation was successful, in spite of his diabetes.

One case of suppuration in a hundred seems little enough, but it is one case too many. Since that time (November, 1886) 124 extractions have been made without a trace of suppuration, and without any serious inflammation. More or less filiform posterior synechiæ were all the reaction that occurred, and vision was good in every case.

Twenty times the presence of iritis, or posterior synechiæ, is noted, but there were only two cases in which the inflammation was of some intensity, leading to incomplete obstruction of the pupil. In the one the pupil cleared up spontaneously, in the other discission was made; good sight was obtained in both. Cyclitis has not occurred at all. The fact that of late not only the suppurative processes, but also the other severe forms of inflammation, irido-cyclitis, etc., have likewise become scarce, was lately mentioned by Prof. SATTLER, before the Medical Society of Prague, and is exemplified also by the present report.

After-operations.

In spite of this remarkable freedom from inflammation, the *pupillary area has not been so unobstructed as I anticipated*. As a rule, the centre of the capsule had been freely ruptured, yet only rarely did the pupil become clear enough to render a subsequent discission useless. Thus far, discission with a knife-needle has been made in fifty-four cases of the series under consideration, and will be made in others if the patients return and show that their vision can be improved. I dare say that there is no operator who performs after-operations in so large a percentage of cases as I do. The reason is, not that the primary results obtained by me are below the average, but that I am not satisfied with results that satisfy others. Most operators consider $V = \frac{2}{10}$ or $\frac{3}{10}$, even $\frac{2}{7}$, as sufficiently good, and so it is for ordinary purposes, especially in a patient who has been blind before. When, however, other patients consult us for vision so much impaired, we do not tell them: "Go home again; your sight is good enough"; but we try to raise it with glasses, and when we succeed in bringing it to $\frac{2}{10}$ or $\frac{3}{10}$, we feel sure to have essentially increased their

happiness and usefulness. It will at once be objected that the use of glasses is harmless, but an operation is never free from a certain risk. This is not only true, but some cases have come to my notice where, after a tolerably successful extraction, the sight was destroyed by suppuration following needle operations. The danger of needling is proportionate to the density and the age of the pupillary membrane. Capsules not thickened by products of inflammation, can be cut easily and without danger, be it shortly or long after the extractions. Pseudo-membranes, after iritis or irido-cyclitis, must be dealt with very cautiously. If they show a place of presumably slight resistance, a discission can be made in that place with a knife-needle, or a laceration with a double needle. In less favorable cases the safest operation is an iridectomy, comprising a part of the pseudo-membrane. For many years, and after different trials with iridotomy and other procedures, *I have preferred the excision of a piece of capsule and iris to all other methods.* I thrust a Beer's knife through the cornea and the pseudo-membrane, splitting the latter about 3 mm in length. Then I pass the loop of a Tyrell's blunt hook through the opening of the false membrane, draw the latter out and cut it off, together with a small piece of adjacent iris. These two operations, discission with a knife-needle (rarely with two), and iridectomy with Tyrell's hook, are the only ones I practise for secondary cataract. The first is very frequent, the second has become quite rare. Last year I made only one, in an old case. The reaction was nought, and the result brilliant. I will say nothing against other operations, for instance Wecker's iritomy; every one avoids dangers in operations to which he is accustomed. I only want to state what in my own hands has proved best.

It is needless for me to say that the after-operations have to be done with the same precautions as the primary. We must not think that a needle is a small innocent tool. If it tears and bruises it creates favorable conditions for non-specific processes, I mean simple exudative and plastic inflammations, as well as for the growth of bacteria should any have been introduced with the needle itself, or still

harbor in the eye, lying dormant after non-deleterious suppurative processes. They may also be in the system. The eye will then be a point of minor resistance where bacteria are used to settle.

In the great majority of cases the secondary division of the anterior capsule was followed by no or only very slight reaction, the patient being discharged in four or five days. In a certain number simple irritation or serous inflammation was noticed, marked by circumcorneal injection, even slight swelling of the conjunctiva and dulness of sight from diffuse turbidity of the vitreous. The iris was somewhat discolored, but adhesions did not appear nor did the capsular opening become occluded. There was pain and occasionally some increase of eyeball tension connected with it. exposure to light and cold, as every imprudence, made these cases worse. They all recovered with improved sight. Most of them got quickly well by salicylate of soda, alone or with leeches applied to the temple. In one or two, where the eyeball appeared harder, I instilled eserine, but it increased the pain, whereas atropine was well borne.

In one case (No. 41) a simple division of a wrinkled, not thickened, capsule produced an attack of *acute glaucoma*. The patient had Bright's disease and was an inveterate drunkard. The attack of glaucoma followed the division within 24 hours. $+T\ 2$ was reduced by eserine the next day, but on the third it was fully $+T\ 2$ again, the sight, $\frac{20}{70}$ before the operation, had fallen to quantitative perception of light. I made an iridectomy in the upper part, the incision posterior to the previous corneal section. The relief was instantaneous, the recovery prompt, and the sight good.

In no case the vision became worse by the secondary operation. How much the vision was increased in the single cases can be seen in the tabular synopsis, which, however, does not express the full visual gain, as in very many cases the last record taken was at the patient's discharge from the hospital, that is, on the fifth day, when the vitreous has not entirely cleared up. For the sake of comprehensiveness I will survey the cases in which discission (the only after-operation done in the present series) was performed.

The gain in sight, as is evident from the table, was very great. $V = \frac{20}{20}$ was attained in 17 cases, to which only 4 are added in which perfect sight was restored without a secondary operation [Nos. 3, 21, 50 (extraction with the capsule), 87 (removal of anterior capsule)].

The subsequent division of the capsule has, therefore, played as important a part in this series of operations, as in the former ones where iridectomy was made and the capsule opened at the periphery only. If we want to give our patients the highest degree of visual acuteness obtainable, we have, as WECKER says, either to split the capsule later, or remove a piece of it during the first operation. And in the latter case even then, I may add, the subsequent wrinkling and dotting of the posterior capsule may render a discission advisable in many cases.

Primary vision.	In cases.	Ultimate vision.	In cases.	Primary vision.	In cases.	Ultimate vision.	In cases.
$\frac{20}{40}$	2	$\frac{20}{20}$	2	$\frac{20}{200}$	18	$\frac{20}{20}$	2
$\frac{20}{60}$	7	$\frac{20}{20}$	4			$\frac{20}{30}$	6
		$\frac{20}{30}$	3			$\frac{20}{40}$	3
$\frac{20}{70}$	12	$\frac{20}{20}$	6			$\frac{20}{60}$	2
		$\frac{20}{30}$	3			$\frac{20}{70}$	4
		$\frac{20}{40}$	1			$\frac{20}{100}$	1
		$\frac{20}{50}$	2	$\frac{15}{200}$	2	$\frac{20}{40}$	1
$\frac{20}{100}$	9	$\frac{20}{20}$	3			$\frac{20}{100}$	1
		$\frac{20}{30}$	2	$\frac{12}{200}$	1	$\frac{20}{200}$	1
		$\frac{20}{40}$	1	$\frac{10}{200}$	1	$\frac{20}{200}$	1
		$\frac{20}{50}$	1	$\frac{8}{200}$	1	$\frac{15}{200}$	1
		$\frac{20}{70}$	1	$\frac{4}{200}$	1	$\frac{20}{60}$	1
		$\frac{20}{100}$	1				
					54		54

The Ultimate Visual Results

obtained, according to the last examinations that could be made, were as follows:

$\frac{20}{20}$	in	21	cases.
$\frac{20}{30}$	in	18	cases.
$\frac{30}{40}$	in	11	cases.
$\frac{20}{50}$	in	8	cases.
$\frac{20}{70}$	in	16	cases.
$\frac{20}{100}$	in	12	cases.
$\frac{20}{200}$	in	10	cases.
$\frac{15}{200}$	in	3	cases.
$\frac{10}{200}$	in	1	case.
0	in	1	case.
			100 cases.

If we classify the results in the customary manner we have : 96% of good results, 3% of moderate results, and 1% of failure.

These figures speak for themselves. It will be noticed with satisfaction that the lowest vision was $\frac{10}{200}$, and that the ominous symbol $\frac{1}{\infty}$ does not appear in this series.

Considering these results I need not say that I have continued to extract cataract according to the same method.

