

**Traumatic cataract, with results of eighty-two operations : read before the International Ophthalmological Congress, held in London, August, 1872 / by J.R. Wolfe, M.D., F.R.C.S.E.**

**Contributors**

Wolfe, J. R. 1824-1904.  
International Ophthalmological Congress (1872 : London)  
University of Glasgow. Library

**Publication/Creation**

Glasgow : James MacLehose, 1873.

**Persistent URL**

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# TRAUMATIC CATARACT,

WITH

RESULTS OF EIGHTY-TWO OPERATIONS,

*READ BEFORE THE INTERNATIONAL OPHTHALMOLOGICAL CONGRESS,  
HELD IN LONDON, AUGUST, 1872,*

BY

J. R. WOLFE, M.D., F.R.C.S.E.,

SURGEON TO THE OPHTHALMIC INSTITUTION ; LECTURER ON OPHTHALMIC MEDICINE  
AND SURGERY IN ANDERSON'S UNIVERSITY.

*WITH ILLUSTRATIONS.*

GLASGOW :

JAMES MACLEHOSE, 61 ST. VINCENT STREET,

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Printed at the University Press  
BY ROBERT MACLEHOSE, 55 GLASSFORD STREET,  
GLASGOW.



## TRAUMATIC CATARACT.

SINCE May, 1870, I have operated in the Glasgow Ophthalmic Institution on 82 cases of Cataract caused by injury. These cases were under the immediate care of myself and competent assistants. We have noted the progress of each successful case, and also what we considered to be the cause or causes of each failure.

I am desirous of submitting the result of our observations to this Congress, as hitherto we have little else than the records of isolated cases; and a comprehensive view, based upon a large experience, is still a desideratum. It appears to me that, the various aspects in which this disease comes before us, are peculiarly adapted to exhibit the different elements which render ophthalmic operations precarious. Indeed, so many considerations enter into the study of this subject, that, in a theoretic as well as in an artistic point of view, it merits a special classification.

In the cases to which I shall refer, the injuries

were such, as to permit an attempt to obtain the restoration of sight ; but, in addition to these, a large number of other cases came under observation, where the injury was so great as to preclude the possibility of any such attempt being made, and the eye had to be removed. These last cases, however, afforded ample opportunity of carefully observing the changes produced by injury and inflammation of the deep structures ; and thus our operative procedure came to be based both upon pathology and on practical results.

I will not enter here on the question, as to whether an injury inflicted upon the lens or its capsule is capable of repair ; for abstract speculation and discussion of theories is foreign to my object, inasmuch as, the cases dealt with were such, that vision was completely lost, the lens having become irrevocably opaque. I will take it as an axiom that, whatever may be the case in the lower animals, in the human subject, at least, an injury to the capsule or the lens, either by a foreign body having lodged within it, or by the capsule being ruptured by concussion without an external wound, sooner or later produces opacity.\* It may also be assumed that, in dislocation forward into the anterior chamber, the lens cannot fail to act as a foreign body, which

\*The time of the completion of lenticular opacity varies in different subjects. At present I have under observation the case of D. F., glazier, Rutherglen, who had a piece of iron passed through the cornea, iris, and lodged in the lens, where it has been for the last 14 months without materially affecting his sight.



it becomes absolutely necessary to remove, not only to save sight, if possible, in the affected eye, but also to avoid the risk of sympathetic irritation and possible destruction of the other eye.

Of the cases treated there were 77 males and 5 females, their ages ranging from 5 to 61, viz.:—

From 5 to 10 years of age,.....	8
„ 10 to 20 „ .....	28
„ 20 to 30 „ .....	20
„ 30 to 40 „ .....	13
„ 40 to 50 „ .....	7
„ 50 to 60 „ .....	5
„ 61 „ .....	1

Thus, the greatest number of accidents occurred between the ages of 10 and 20; after this age the number gradually decreases.

The occupations of the patients were as follows:—

Children and Message Boys,.....	14
Needle Women,.....	3
Shoemakers,.....	1
Brass Polishers,.....	2
Labourers,.....	6
Miners,.....	4
Granite Polishers,.....	2
Smiths, Irondressers, and Puddlers,.....	9
Mechanics,.....	3
Riveters, .....	15
Caulkers and Boilermakers,.....	17
Engineers and Enginefitters,.....	6

The shipbuilding department alone, therefore, furnished 40 cases, or nearly 50 per cent. of the whole.



## *Nature of Injuries and Complications.*

Some of these were—

### *A.—Recent Injuries.*

Without penetrating wound,.....	1
Simple punctures,.....	18
Laceration of cornea and iris,.....	22
With Hypopion,.....	3
Foreign bodies impacted in lens or ciliary processes, 7	
Dislocation of lens into anterior chamber (partial),....	11
Dislocation of lens into anterior chamber (entire),....	4
Dislocation into the vitreous humour,.....	1
Contusion of Eyeball,.....	1

### *B.—Old Injuries.*

Simple, .....	3
With anterior adhesions, .....	2
With posterior adhesions,.....	8
Dislocation and adherent lens to Decemet's membrane, 1	

CASE I. *A Fragment of Quartz, three-fourths of a grain in weight, buried in Lens; Extracted; Cure; Good sight.*

James J., aged 28, a granite-polisher, recommended by Dr. Lewis of Dalbeattie, was admitted into the Glasgow Ophthalmic Institution in May, 1870. The patient, whilst following his occupation, was struck by a small fragment of quartz, which pierced the cornea of the left eye, and became imbedded in the lens. The lens was opaque and tumefied, pressing the iris slightly forward. The ciliary circle was strongly injected. The iris was slightly discoloured. The lens was extracted along with the quartz by a linear incision, without iridectomy, five day after the accident had occurred. He was dismissed cured, with good sight, six days after the operation. The quartz weighed three-fourths of a grain.

CASE II. *Fragment of Brass lodged in Lens; Iridectomy, followed by extraction; Cure; Good Sight.*

Samuel O., aged 61, a chandelier-polisher, thirty-one years previously had his right eye destroyed by a ramrod, on which occasion the cornea of the left eye also had sustained some damage, resulting in slight opacity. On presenting himself at the Institution, the cornea of the left eye (the only one he had) was found lacerated, and a fragment of brass imbedded in the lens. Iridectomy was performed; and, four weeks afterwards, the lens and brass were extracted by a small corneo-conjunctival flap. He was cured, with good sight.

CASE III. *Fragment of Steel piercing the Iris, and driven against the Lens; Extracted; Cure; Good Sight.*

Benj. M., aged 21, caulker, presented himself with the right eye injured by a rivet, a fragment of steel having been driven against the cornea and iris, which it lacerated, and lodged in the lens. The left eye had been destroyed by a similar accident two years before. Linear extraction with iridectomy was performed. The cicatrix of the tear in the centre (right across the middle) remains opaque, but in other respects the sight is good.

CASE IV.—With the last case I may contrast the following, in which the foreign body was a mere speck of iron, and the lenticular opacity did not set in till a fortnight after the accident. Robert W., aged 22, boilermaker, was struck with a piece of iron, which penetrated the cornea, traversed the iris, and became imbedded in the lens. On presenting himself at the Ophthalmic Institution on October 2nd, two hours after the accident, we could distinctly discern by illumination, the course which the foreign body had taken; but, as the sight was good, he was kept under observation as an out-patient. The lenticular opacity was steadily progressing until November 4, 1871, when the cataract was found complete, and he was admitted for an operation. The pupil having been



atropinised, I opened freely the capsule with a needle; and, five days later, the lens was extracted by linear incision, without iridectomy. The fragment of iron imbedded in it was a mere speck. On the third day, his sight was found good; and on the sixth he was discharged cured.

CASE V.—*Traumatic Cataract; Partial Dislocation of Lens, without External Wound; Linear Extraction; Cure; Good Sight.*—

J. C., aged 9, Falkirk, was struck on his right eye with a towel, which caused him great pain at the time. There was inflammation of the eye, persisting for a week or two, which yielded to local treatment. On presenting himself at the Institution in January 1871, about four weeks after the injury had occurred, the lens was found opaque, and pressing considerably at the inner angle upon the iris; and the pupil dragged towards that part. On examination, the capsule of the lens was found ruptured in that spot, the colour of the iris normal, and ciliary circle not much injected. I opened the capsule with a needle through the cornea, and in a fortnight later I extracted the lens by a linear incision. He was dismissed cured, with good sight, eight days after operation.

CASE VI.—A. R., aged 30, engine-keeper, recommended by Dr. Caldwell of Shotts, was struck with a piece of iron, producing traumatic cataract, with laceration of the cornea. The inner part of the lens was found dislocated, pushing the iris upwards and inwards; the capsule was lacerated, and lenticular fragments were floating in the anterior chamber. I extracted the lens with iridectomy fourteen days after the accident. He counted fingers immediately after the operation, and was dismissed cured, with good sight.

CASE VII.—*Dislocation of Lens (entire) into anterior Chamber; Extraction; Cure; Good Sight*

The following case is remarkable from the circumstance that the entire lens remained for a considerable period

(as far as I can learn, upwards of two years) in the anterior chamber, where it formed partial adhesions to the cornea, and the whole iris greatly atrophied. The patient was considered as hopelessly blind ; and it was only after the eye was injured by a fall, which excited cyclitis, that the Secretary of the Glasgow Mission to the Blind, under whose superintendence he was, sent him to us for relief.

Daniel B., aged 59, shoemaker, of Greenock, was admitted into the Glasgow Ophthalmic Institution in March 1871. The patient's right eye was completely atrophied ; the left eye was cataractous. A large lens, with a hard amber-coloured nucleus, filled the anterior chamber, and partly adhered to Descemet's membrane by two spots at its lower portion. The iris was completely pushed out of sight and covered by the lens. I extracted by a small flap. He was cured, with good sight.

The methods which I have adopted are the following :—

1. Linear extraction with the lance without or with iridectomy.
- 2 The Author's method.\*
- 3 Curvo-linear corneal incision with Graefe's knife.

Fig. I. represents the linear extraction with lance.

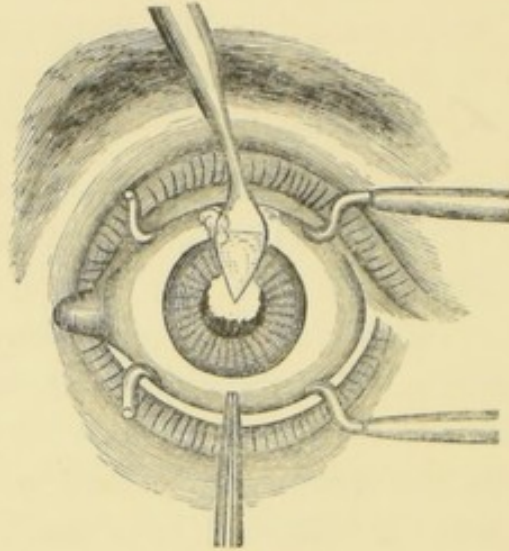
The patient being under chloroform, and the eyelids held open by a speculum, I seize the conjunctiva and the subconjunctival tissues with a blunt forceps, either in the upper or in the lower vertical meridian, at a distance of about a sixth of an inch from the

\*An improved method of extraction of Cataract with results of 107 operations. J. Churchill & Son, 1868.



corneo-sclerotic junction. I then introduce the lance obliquely through the cornea into the anterior cham-

Fig. 1.



ber and behind the lens, pushing the iris out of the way. The aqueous humour escapes, and the lens advances forwards, and is thus pumped out by alternate pressure and relaxation with the forceps on the one hand, and depression of the lance on the other.

If the incision be found insufficient, I enlarge it on each side, and direct the point of the lance towards the débris of the lens which may have remained behind. The lens is thus extracted without interfering with the integrity of the pupil. If, however, the state of the parts is such that iridectomy is thought necessary, I introduce the lance in the first instance, more horizontally, making an opening of about a quarter of an inch, and excise the iris. I then re-introduce the lance, and enlarge the opening on either side, enlarging the incision to the extent of about three-eighths of an inch (either by

pushing the lance forward, or by pressing it first on the one side, then on the other,) and pump out the lens as already indicated.

The reason of limiting the puncture in the first instance is, that after the iris has lost its support from behind, and some of the lens' substance has lubricated its anterior surface, it is both apt to fall back and to become slippery, so that it becomes difficult, if not impossible, to seize it with the forceps.

This operation is applicable to cases of young and middle-aged persons, who form the largest class subject to Traumatic Cataract. I have adopted it in 49 of the cases referred to.

The small wound made by this operation heals generally within four or six hours, and can never do any harm; on the contrary, even if it do not produce all the results desired, it serves the purpose of a large paracentesis in lessening the tension by allowing the escape of the fluid.

The following case will show the advantage of relieving tension in this manner, in other injuries besides those above referred to.

CASE VIII.—\*\*\* a Gentleman of advanced age, who had lost the right eye by an operation for cataract some time ago, came to me for an operation on the left eye, which was also affected with senile cataract. This being his last chance of recovering vision, I made a preparatory iridectomy, which did well, the only peculiarity being that the cornea collapsed during the operation. Three weeks later, I removed the lens by a small flap-operation. After forty-eight hours, the eye was opened, when the sight was found good, and the aqueous chamber clear. On the third day, the



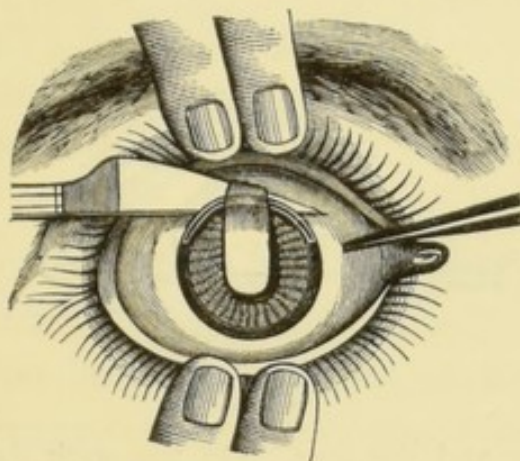
corneal wound was completely healed, and he was allowed to go to the next room. On the sixth day, I found that he had passed a restless night. On the previous day he had accidentally struck his eye with the point of his thumb, he felt pain at the time, but in half-an-hour it passed away, and he thought no more of it. In the evening, however, the pain returned; and, on examination, I found the cicatrix looking tender and puffy in the middle, but the media still clear. On the seventh day, the cicatrix was rather more puffy, the aqueous humour clouded, and the iris slightly chagrined. On the eighth day, when in the act of sneezing, he felt something give way, which was followed by immediate relief. The centre of the cicatrix had, in fact, burst, allowing the escape of the aqueous humour. On the ninth day, the pain having returned, paracentesis was performed, giving immediate relief. From this time the eye began to mend, and ultimately recovered; the only inconvenience being that the pupil became adherent to the cicatrix. This was remedied by an artificial pupil and ultimately fair sight was obtained.

There can be no doubt that this case was saved by paracentesis. It appears, therefore, evident that an eye which has just sustained an injury, although it cannot resist the shock nor repair the wound of a large operation, can yet be benefited by a small operation which draws off some of the aqueous humour, containing, as it does frequently in such cases, fragments of floating lenticular substance, and occasionally pus. This operation may with safety, even with benefit, be repeated, if necessary, several times at intervals.

Fig. 2 represents the author's method in the first stage of operation. It shows the size of the corneo-conjunctival flap, and at a glance will be seen the

advantage which we derive from that section in cases of partial opacity of the cornea, when it is

Fig. 2.



our object not to encroach upon any transparent portion.

It is right, however, to state that I do not use the conjunctival flap so frequently as I was in the habit of doing some years ago, but in some of the cases already stated, it rendered me very important service.

Although this is my favourite method in idiopathic cataract, I have employed it only in 24 of the cases under consideration.

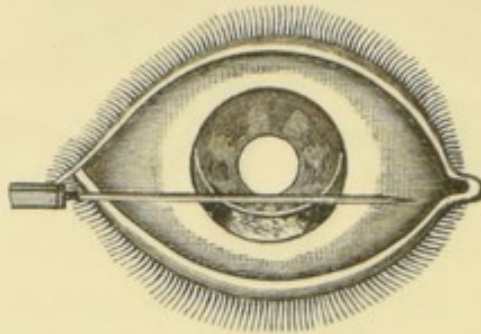
Linear extraction with Graefe's knife is in some cases much to be preferred to every other method, as represented in the following case :—

CASE IX.—This is a sketch of the case of Edward Queen, aged 20, riveter, who was struck with a piece of iron on the right eye. On presenting himself at the institution in July, 1871, four days after the injury, the lens was found opaque, and presenting an elevated ridge on its surface, and there was pus in the



anterior chamber, and infiltrated into the lower part of the cornea. A curvo-linear section with Graefe's knife was made in the lower healthy portion of the cornea, above the suppurating part, and iridectomy performed, thus giving exit to the pus in the

Fig. 3.



anterior chamber and the lens. On the sixth day, the anterior chamber was found clear. The patient could count fingers, but the lower part of the cornea still remained opaque, having a yellowish puriform look. At the end of a fortnight this part had cleared, bringing into view a black point, which was at first sight taken for a shred of the iris, but, on examination, was found to be the point of a piece of iron imbedded partly in the cornea, at its junction with the sclerotic, and partly in the ciliary processes. This was removed; after which the lower part of the cornea became flattened and the pupil contracted. An artificial pupil was made, which resulted in good sight.

These operations I have employed according to the following plan :—

1. When the lens is totally dislocated or broken into fragments, I remove it by the lance.

2. When I judge that the whole lens cannot be removed, I perform iridectomy, removing only the broken fragments, and leaving the rest, which, if not removed by the action of the aqueous humour, may be dealt with subsequently; but in no case would I

use a spoon or any traction instruments to remove lenticular debris.

3. When the capsule is but slightly torn, I open it freely with a needle, and then I remove it subsequently.

4. When the iris has been lacerated, I remove the injured portion, and leave the lens, if not dislocated, to be dealt with at a future period.

I would here call particular attention to hernia iridis. If the laceration extend to the ciliary processes, I remove only the injured portion of the iris, and in no case do I interfere with the ciliary processes ; but I rather favour their retraction either by compress or suture.

5. In patient of 45 or thereby, where the lens is not broken up, I make an iridectomy, and extract the lens by the small flap at the same time, when urgent, or else at a subsequent period.

In short, the principle on which I act is to stand by the eye as long as possible, and not to do too much at a time, but to proceed safely as far the recuperative powers of the organ will admit.

#### *Dislocation of the Lens into the Vitreous Humour.*

This accident generally does not call for immediate operative interference. At present I have two cases under observation, one of six and the other of fifteen months' standing ; in the one the lens is quite transparent, and does not cause any inflam-



matory symptoms, and in the other the lens is almost opaque and will soon require extraction. But the following case required an operation.

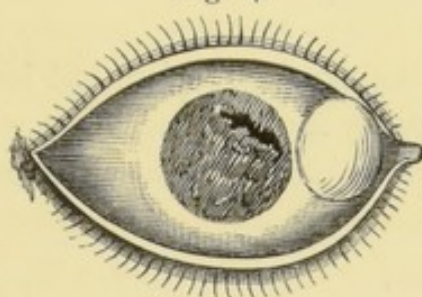
CASE X.—A.C., aged 21, riveter, was struck with a stone on his left eye. On presenting himself at the Ophthalmic Institution on the 4th December, 1871, two days after the accident had occurred, the eye was free of inflammation; the pupil was widely dilated; the zonula ruptured, and the lens within its capsule and pigmentous ring round its border, floating in all directions, following the movements of the eyeball. Knowing the difficulties which beset the extraction of the lens under such conditions, I recommended to have the eye shaded for a few days, and to abstain for the present from all treatment. On the 14th December, the patient returned with violent glaucomatous symptoms: pain in the eyeball and temple excessive, whence it extended to the whole side of the head and ear in such a manner, as I have rarely met with in ordinary glaucomatous cases. Ophthalmoscopic examination showed the lens beginning to exhibit opaque striæ. Under these circumstances I admitted him into the house; and on the 15th I operated in the following manner:—

1. The patient was seated upon a chair with his head bent slightly forward, supported by an assistant; whilst I, sitting in front of him upon a lower chair, used the fingers of my left hand as a speculum to keep open the eyelids, and with the right I introduced a needle through the sclerotic behind the lens, which I brought forward into the anterior chamber.
2. I then handed over the needle, which fixed the lens in that position, to another assistant, and made the patient recline his head backwards, still leaning upon the assistant.
3. I now introduced the lance through the cornea behind the lens, part of which presented itself at once through the wound, and another portion slipped and then became fixed in the outer angle, covering the fourth part of the cornea. The patient was at once relieved of his pain, passed a quiet night, and on the tenth day was dismissed with good sight.

In speaking of dislocated lenses, I may mention a curious case of dislocation which I have at present under treatment.

Fig IV. represents a case which I admitted last week into the Ophthalmic Institution. The patient is a puddler from West Hartlepool, aged 35, whose right eye was injured seven weeks ago

Fig. 4.



by a scrap of iron. At the outer margin of the orbicularis there is a large nodulated cicatrix where the stroke was inflicted. The anterior chamber is shallow, and the iris dragged towards the inner angle, and partly atrophied. He can count fingers at the outer angle. At the inner angle there was a large sub-conjunctival tumour which limited the motion of the eye inwards. I was sure that this could be nothing else than the lens dislocated, and, on opening the conjunctiva, I extracted the lens which was softened. The tumour having disappeared, and the movements of the eye re-established, I shall improve vision by the formation of a new pupil.

#### *Old Accidents.*

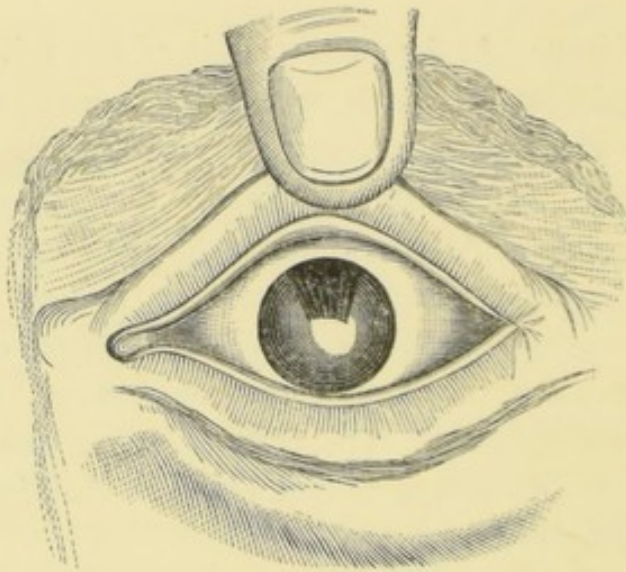
As traumatic cataract of old standing does not differ from idiopathic cataract, I therefore treat it upon general principles; viz., in simple lenticular opacity, in young and middle-aged subjects, I open the capsule or break up the lens with a needle (according to its consistency) and then extract it, about five or ten days later, by a linear



incision, generally not interfering with the integrity of the pupil. In persons above the age of fifty, I extract it in the ordinary way. I may illustrate it by the following case, which from its many complications is best calculated to convey my meaning, although it does not belong to the class of cases of which I am treating.

CASE XI.—Mrs. G., aged 54, Crieff, had lost the sight of her right eye completely by small-pox some years ago. The left eye (as represented in Fig. 3), although vision was not gone, was

Fig. 5.



affected with staphyloma; nearly one-half of the cornea was opaque; the iris was adherent in the corneal cicatrix, and not dilatable. Recently this eye became affected with cataract, but without absolutely complete loss of vision. It was one of those cataracts which come slowly to maturity. I first performed iridectomy, and a fortnight later I opened the capsule with a needle without disturbing the lens, and at the same time breaking up old adhesions. Three weeks later, I extracted the lens by a small cornea-conjunctival flap; the result was good sight.

The value of the conjunctival flap in this case is apparent, as it will be seen from the drawing, taken after the removal of the lens, that opaque lines are radiating from the cicatrix; hence the desirableness to save the transparent cornea.

CASE XII. *Traumatic Cataract, with posterior adhesion of seven years standing: Iridectomy and Extraction: Cure; Good Sight.*

J. L., aged 15, message-boy, was brought as an out-patient to the Glasgow Ophthalmic Institution in October 1871, for an extensive ulceration of the cornea of the left eye. There were spasm of the orbiculares, photophobia, lacrymation, and sneezing; so that minute examination of either eye was impossible. With regard to his right eye, his mother informed us that it was destroyed seven years ago by a piece of clay thrown from a sling. The accident was under the care of an oculist at the time, who declared it a hopeless case, and all interference unsafe. After the ulceration of the left eye began to cicatrise and the symptoms abated, I examined the right eye, which I found to be affected with traumatic cataract and posterior adhesions. The pupil was small, irregular, and distorted towards the inner angle, and so much stretched upon the capsule of the lens, and the anterior chamber deepened, that it had the appearance of cornea pellucida. He was admitted as an in-door patient to the institution on November 11th, when I broke up some of the adhesions with a needle, and next day I made a large iridectomy and extracted the lens. On November 14th, he had good sight; and on the 18th, he was dismissed cured. The left eye is still improving; but, owing to its extensive opacity, he will depend almost exclusively upon his right eye, which was considered hopeless.



*Results of the Cases under consideration :—*

- 65 Were cured with good sight.
- 10       „       „       medium sight.
- 7 Dismissed with no sight.
- 16 Required subsequent pupil formation.
- 6       „       laceration of capsule.
- 4       „       pupil formation and laceration of  
capsule.

*Causes of Failure.*

I think it will be admitted that the opaque lens in cases of traumatism may hide damages to other structures, so that it becomes impossible to say beforehand what the extent of the injuries may be. We may find choroidal vessels ruptured—vitreous softened—retina detached, &c. Indeed, I need not refer to complications which will readily suggest themselves to every one. I may signalise here, however, what I consider the principal causes of failure, namely—*First*, The impossibility of removing the entire lens. Instead of the lens being dislocated forward, and becoming softened by the aqueous humour, the centre, or a portion only, is damaged, and the rest is compressed towards the meridian of the eye, where it forms adhesions, so that no pressure would dislodge it. Slow choroido-iritis is the inevitable result. I am quite satisfied that a larger section in these cases would only facilitate the escape of the vitreous, but not the exit of the lens-substance.

CASE XIII.—As a type of our unsuccessful operations, may be mentioned the following. Miss B., aged 19, cloakmaker, by an accident had a steel pen with ink driven into her left eye. On presenting herself a few hours after the accident had occurred, the cornea was found muddy, the iris lacerated, and the lens opaque and partially torn. There was excessive pain, photophobia, and lacrymation, followed next day by œdema of the upper eyelid. The lens was *partially* removed by a linear incision with Graef's knife, whereupon the symptoms of panophthalmitis considerably diminished, but ended ultimately in atrophy of the eyeball.

Indeed, in such instances there are peculiar features of the eye—a physiognomy readily recognisable,—and indicative of deep-seated structural changes, namely—cloudiness of aqueous humour—dry look of the iris, if not actually amounting to change of colour, injection of the ciliary circle, causing an appearance of constriction—a muddy look about the cornea; but the appearance of the lens is particularly noteworthy. In favourable cases, it is tumefied, and the other tissues are only thus far implicated, in their attempt to extrude that offending substance; whilst in unfavourable cases, the capsule is thickened, and the lens is considerably shrunk and grasped by the gorged iris, zonula, and ciliary processes. In short, in the one case the lens acts as an irritating foreign body, while in the other, all the deep structures are more or less implicated, and the lens itself becomes atrophied, and has no active share in the inflammatory process.

Permit me to remark here, in passing, that



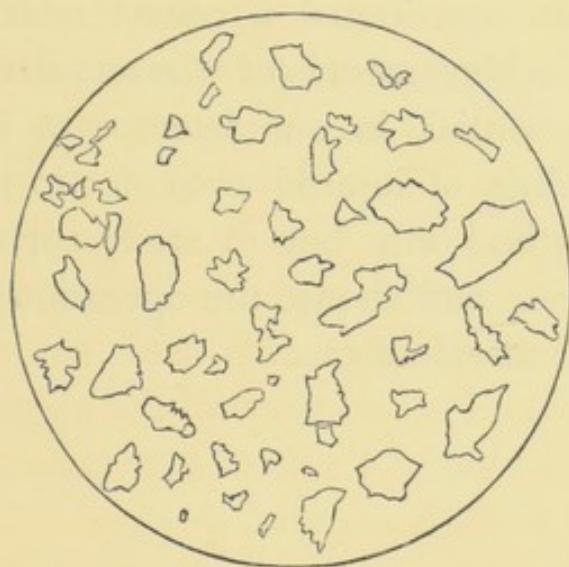
the greatest objection which can be urged against all those methods of extraction of the lens by a small incision, is, in my estimation, to be found in the phenomenon just referred to; for, wherever extreme pressure is requisite for the accouchment of the lens, we can never be certain that the entire lens has been removed; and when considerable fragments of cortical substance remain behind, it is sure to show its existence by the appearance of slow iritis.

The *Second* cause of failure may arise from the severity or peculiarity of the injury. As an instance, I may refer to cases of accident with coal. Generally, when a piece of iron or granite lodges in the lens—even after laceration of iris, or even when the eye has been contused—the lens is extracted, and all ends well. But I have observed that when a eye has been struck with a piece of coal, however slightly, onyx and hypopion are the result; and when the coal had penetrated the anterior chamber, suppuration of the globe is certain to ensue. Indeed, I have such a respect for coal accidents, that whenever they present themselves, I am inclined to abstain from surgical interference, and would wait for weeks to see the issue of the case, rather than share the responsibility with this potent agent.

In comparing the issue of these accidents, therefore, with the treatment which the cornea receives in the process of tinting, or in gunpowder ex-

plosions, when the epithelium is singed, and particles of powder are embedded even in the cornea proper, without causing suppuration, I was inclined to ascribe the serious results from coal accidents to chemical causes ; but in consulting with our eminent chemist, Professor Bischof of Glasgow, he expresses it as his opinion that the effects of coal-dust upon the cornea must be due to physical or mechanical agency—namely, to the shape of the fragments of coal-dust. He says, “In order to ascertain this, I pulverised a lump of coal, separated the

Fig. 6.



finest particles by repeated decantation. After allowing the liquor to stand for twenty minutes, I filtered it through paper, and thus obtained the very finest particles. I mounted part of the dust with Canada-balsam on a glass slide, and, on examination under the microscope, my anticipation appears cor-



roborated. The particles of coal-dust (Fig. 6) have the greatest resemblance to glass-shivers—they have almost, without exception, extremely pointed angles and sharp edges. I leave it for you to decide whether this may account for the irritation produced.”

For my own part, I am inclined, provisionally, to accept this explanation until more light be thrown on the subject.

In thus reviewing the results obtained in the cases under consideration, and seeing, that in pretty nearly all the accidents, the old flap-operation was quite inapplicable, I am inclined to think that modern ophthalmology, with its improved operative methods, has contributed a considerable share towards the achievements of conservative surgery. But it is essential, in our attempt to save vision from the débris of injured eyes, not to trust to one favourite method only, but to study each particular accident *per se*, and choose the operation best adapted to each individual case.

TABLE OF CASES.



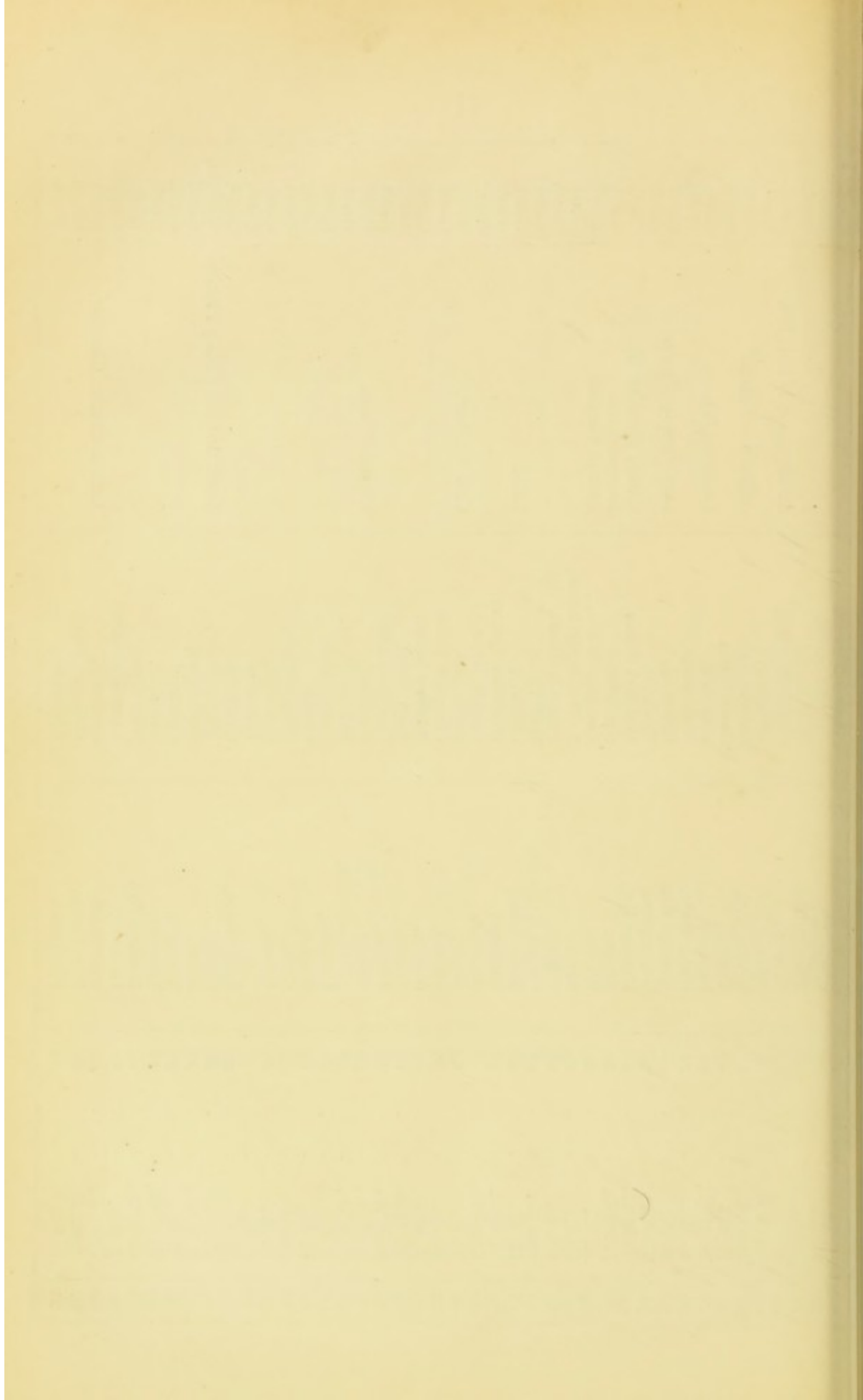
## LIST OF CASES.

No.	Name and Age.	Occupation.	Address.	Complications.	Sight.
1	W. R.,	Labourer,	Govan,	Anterior Adhesion,	Good.
2	J. M.,	School,	Coatbridge,	Posterior Adhesion,	Good.
3	J. D.,	Hammerman,	Maitland Street,		Good.
4	W. D.,	Engineer,	Carstairs,	Posterior Adhesion,	Good.
5	M. S.,	Cabinetmaker,	M'Neil Street,	Laceration of Cornea,	Medium.
6	J. R.,	Smith,	S. Coburg Street,	Iron in Lens,	Good.
7	J. B.,	Message Boy,	Shamrock Street,	Laceration of Cornea and Iris,	Good.
8	A. F.,	Riveter,	Kelvinhaugh Street,		Medium.*
9	R. M'L.,	Caulker,	Springburn Road,	Posterior Adhesion,	Good.
10	B. M.,	Boilermaker,	Springburn Road,	Steel in Lens,	Good.
11	G. H.,	Chandelier Polisher,	Newcastle,	Posterior Adhesion,	Good.
12	S. O.,	Engine-fitter,	S. Wellington Street,	Iron in Lens,	Good.
13	T. H.,	Engineer,	Havanah Street,	Laceration of Iris,	Good.
14	G. C.,	Engine-keeper,	Dale Street,		Good.
15	A. R.,	Boilermaker,	Shotts,	Dislocation of Lens, Pro*	Good.
16	R. M'A.,	Granite Polisher,	Hill Street,	Lacer. Iris and Cil. Pro*	Good.
17	J. F.,	Riveter,	Dalbeattie,	Granite in Lens,	None.
18	G. H.,	Miller,	Greenock,	Steel in Lens,	Good.
19	G. C.,	Boilermaker,	Plantation,		Good.
20	D. S.,	Dressmaker,	Parliamentary Road,	Lacer. Cor. and Iris,	Good.
21	D. B.,	Iron Dresser,	Parliamentary Road,	Laceration with Steel Pen,	Good.
22	D. S.,	Boltmaker,			None.
23	H. M'C.,	Riveter,	S. King Place,		Good.
24	T. M.,	Cloth Dresser,	Shaftsbury Street,		None.
25	A. M'G.,	Painter,	Govan,	Laceration, Cornea, and Iris,	Good.
26	W. G.,	Mechanic,	Cowlary Park,	Laceration in Iris,	Good.
27	Th. W.,	Boilermaker,			Medium.
28	D. M'F.,	Boilermaker,	Shaftsbury Street,		Medium.
29	J. W.,	Riveter,	Greenock,	Laceration of Cornea and Iris,	Good.
30	G. P.,	Boilermaker,	Greenock,		None.
31	J. S.,	Mechanic,	Stobcross Street,	Posterior Adhesion,	Medium.
32	J. C.,	Engine-fitter,	High Street,	Iron in Lens,	Good.
33	J. B.,	School,	Falkirk,		Good.
34	F. H.,	Carpenter,	Partick,		None.
35	W. L.,	Labourer,	Partick,		Good.
36	P. M'D.,	Sewing Girl	Well Street		Good.
37	F. I.				Good.

41	J. B.,	Granite Polisher,	Newton-Stewart,	Good.
42	R. K.,	Engine-fitter,	Eglinton Street,	Good.
43	J. M.,	Message Boy,	Well Street,	Good.
44	R. C.,	Riveter,	Greenwell Place,	Good.
45	Sarah B.,	School,	Larkhall,	Good.
46	Mary T.,	Sewing Girl,	Gallowgate,	Good.
47	F. M.,	Riveter,	Grove Street,	Good.
48	N. M'G.,	Labourer,	Greenock,	Good.
49	R. W.,	Boilermaker,	West Street,	Medium.
50	A. S.,	Message Boy,	Greenock,	Good.
51	T. W.,	Granaryman,	Montrose,	Good.
52	T. M'L.,	Message Boy,	Maitland Street,	Good.
53	J. M'K.,	Riveter,	Sunderland,	Good.
54	A. C.,	Riveter,	Catharine Street,	Good.
55	P. P.,	Baker,	S. Wellington Street,	Good.
56	Ed. C.,	Caulker,	Piccadilly Street,	Good.
57	Ann C.,	Copper Engraver,	Main Street,	Good.
58	H. R.,	Boilermaker,	Greenock,	Good.
59	T. M'G.,	Labourer,	Netherton Quarry,	Good.
60	Corn. C.,	At home,	Church Street,	Good.
61	T. B.,	Miner,	Rutherglen,	None.
62	R. C.,	Builder,	Campbell Street,	Good.
63	J. M'G.,	Riveter,	Renfrew Street,	Good.
64	M. M'K.,	School,	High Street,	Good.
65	J. M'A.,	Riveter,	Lancefield Street,	Good.
66	J. M'A.,	Riveter,	Renfrew,	Good.
67	J. M'D.,	Ship Carpenter,	M'Lean Street,	Good.
68	J. D.,	Labourer,	Swan Street,	Good.
69	R. F.,	Riveter,	Govan,	Good.
70	Jane B.,	Child,	Grangemouth,	Good.
71	D. B.,	Riveter,	Greenock,	Good.
72	J. B.,		Hill Street,	Good.
73	N. C.,	Boilermaker,	Greenock,	Good.
74	R. W.,	Caulker,	Thistle Street,	Good.
75	J. M'A.,	Miner,	Rutherglen,	Medium.
76	T. M.,	Tinsmith,	Carron,	Good.
77	P. M'G.,	Labourer,	Greenock,	Good.
78	C. M'D.,	Message Boy,	John Street,	Good.
79	J. R.,	Labourer,	Lancefield Street,	Medium.
80	Dan. B.,	Shoemaker,	Greenock,	Good.
81	Alex. F.,	Iron Turner,	Garscube Road,	Good.
82	J. L.,	Plumber,	Elderslie	Good.

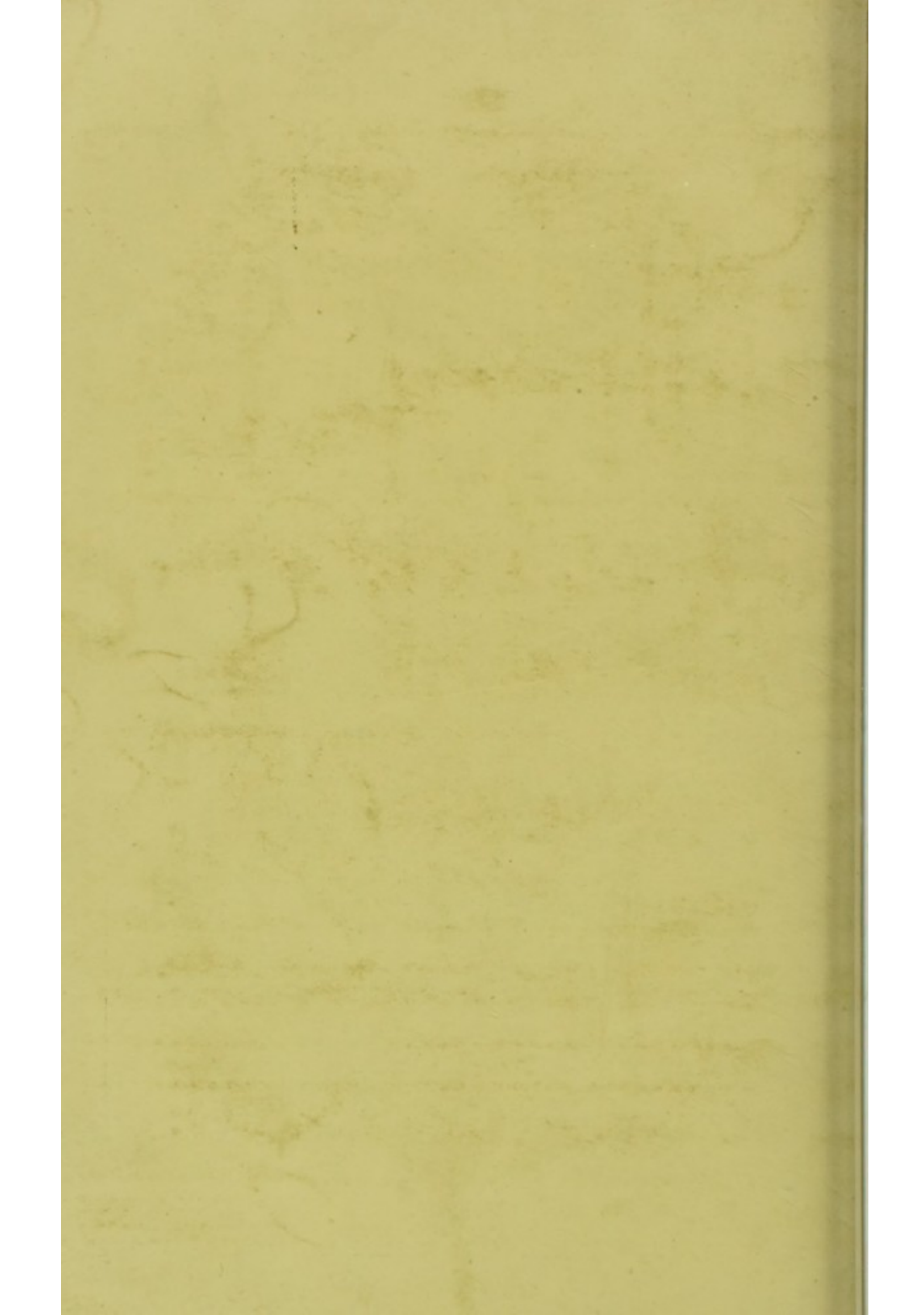
\* Atrophied subsequently.

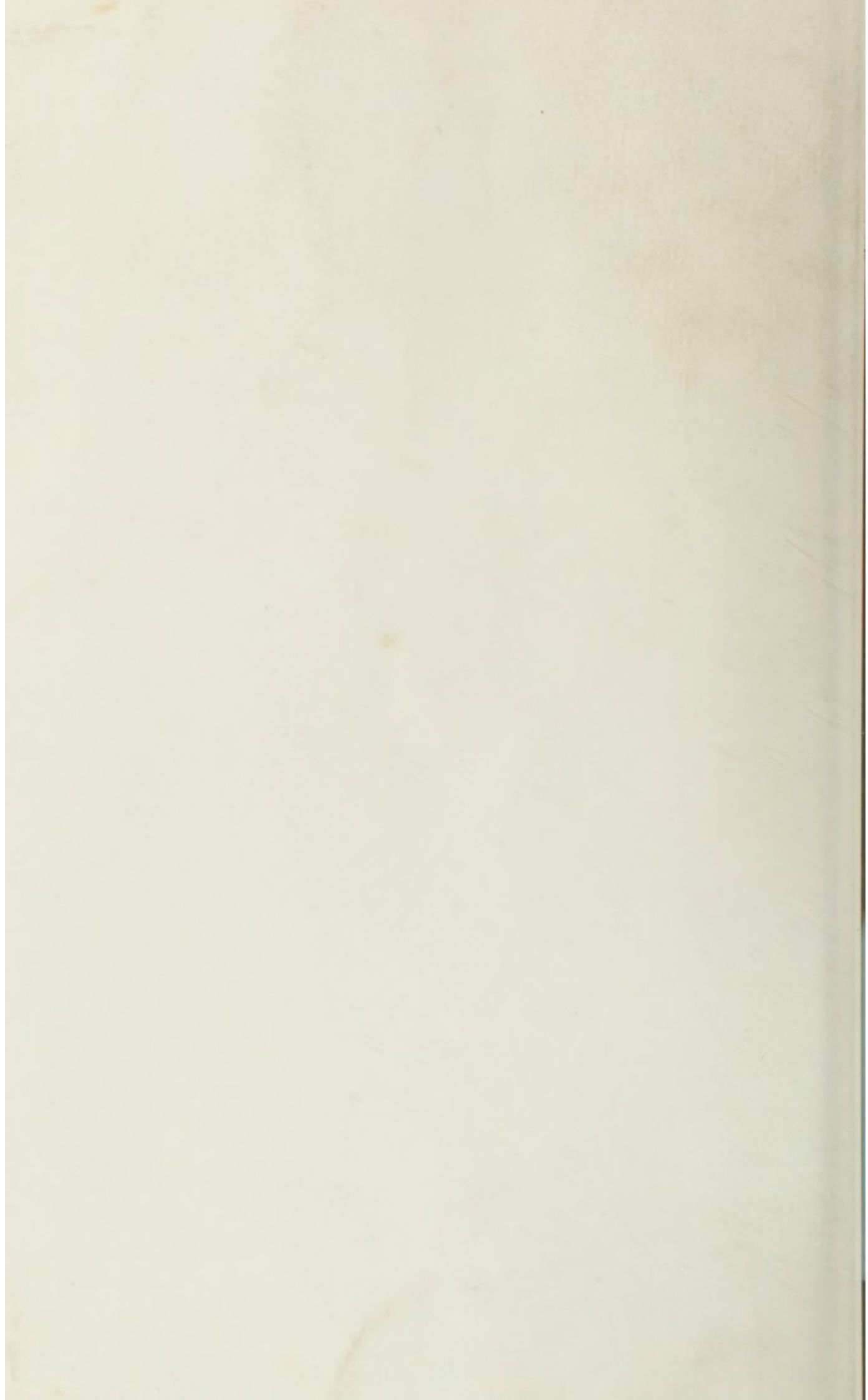
















TABLE(S)  
RUN INTO  
GUTTER