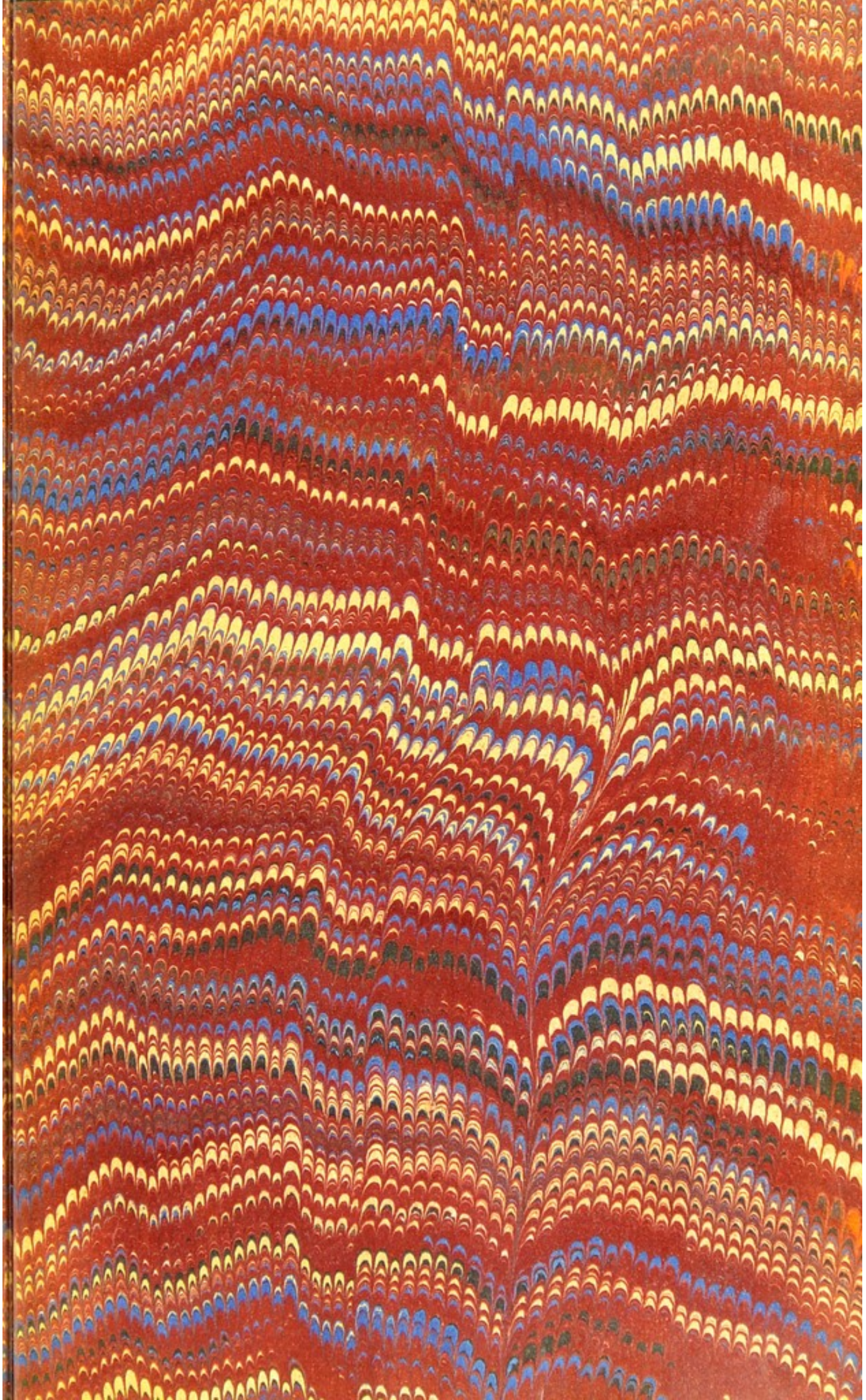
An improved method of extraction of cataract : with results of 107 operations / by J.R. Wolfe.



Professor Lister

With sincere regards

J. Norris

AN IMPROVED METHOD

OF

EXTRACTION OF CATARACT,

WITH

RESULTS OF 107 OPERATIONS.

BY

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WITH ILLUSTRATIONS.

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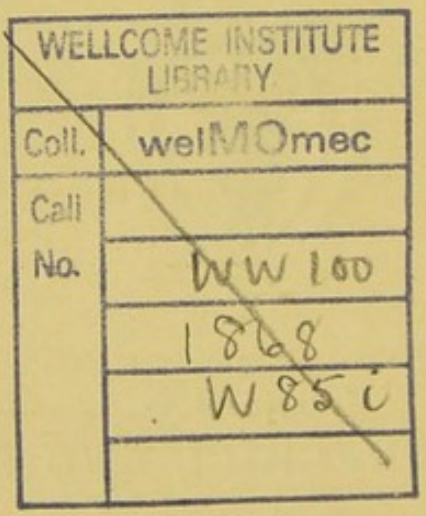

TO

L. A. DESMARRES,

PROFESSOR OF OPHTHALMOLOGY AT PARIS,

OFFICER OF THE LEGION OF HONOUR,

KNIGHT OF VARIOUS ORDERS OF SWEDEN, BELGIUM, SICILY, AND ROME,

&c., &c.,

THESE PAGES ARE INSCRIBED

BY HIS FORMER PUPIL,

THE AUTHOR

PREFACE.

THE very favourable notice which these papers received from the French Medical Press on their appearance in the columns of *The Lancet*, encourages me to republish them in this collected form.

The discovery of the Ophthalmoscope, by enabling us to ascertain accurately the condition of the deep-seated structures of the eye, has given an impulse to the cultivation of all branches of ophthalmic science, from which, so important an operation as that for the cure of cataract could not remain excluded.

Indeed, so numerous have been the modifications introduced within a short period, that no small amount of confusion has resulted. Operation after operation has been brought forward, lauded as an improvement, and then abandoned, so that only a careful study of the progress of this branch of surgery will prevent one practising operations which had been abandoned as useless by their projectors. I have, therefore, in the first place, given a succinct account of the various operations that have from time to time been introduced, and have

given an estimate, which I have tried to render as impartial as possible, of the advantages and disadvantages of each.

In the revolution which has taken place, I have endeavoured to preserve the really valuable ideas that have been suggested, from being lost amidst the waste in which, in many cases, they have been imbedded.

The operation which I have proposed, and to which I have given a fair trial—extending over a period of four years—has proved so encouraging in its results, as, I think, fairly to warrant me in hoping that it may prove of permanent advantage, and by diminishing the risk of failure, be an acquisition in the treatment of this affection.

UNION STREET, ABERDEEN,
August, 1868.

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IMPROVED METHOD

OF

EXTRACTION OF CATARACT.

My object in these pages is to submit to the profession the results of 107 cases of cataract, which I have extracted by a new method; to compare this method with the ordinary flap extraction, and with the other procedures lately introduced by the German opthalmologists.

For a period of five years I tried these various methods in a considerable number of cases, in the public institutions with which I am connected, as well as in my private practice; but during the last four years I have adopted the procedure which I call Extraction by "*Iridectomy and Small Corneo-Conjunctival Flap*,"[1] and which I find highly encouraging in its results.

In order to avoid a hasty generalisation, and to arrive at a satisfactory conclusion, I have not restricted my observations to the experience obtained within the scope of my own practice, but have frequently visited

[1] It is very difficult to give a short definition which shall sufficiently express the distinctive characteristics of such an operation; that which I have adopted appears to me to define it sufficiently for practical purposes.

the different Ophthalmic Hospitals in this country and on the continent, with the view of seeing as many patients as possible at different stages; and it is only after a long study and comparison of the relative advantages and disadvantages of the different methods that I venture now to recommend my modification to others for trial.

To give a connected view of the whole subject, it will be best to submit a short outline of the history of the operation of extraction, and to trace the different stages of its development. It will thus be interesting to see how we have progressed step by step in our course of improvement; how we have turned a hazardous operation—an operation fraught with anxiety to the surgeon and risk to the patient—into one of comparative ease and security.

The history of extraction of cataract can, according to Rhazes, be traced as far back as the end of the first century, when it was performed by Antyllus, and at a later period by Lathyrion. Ali-Abas, in the tenth century, knew also of the operation, and later, Abulkasem, having found it dangerous, tried to make the cataract disappear by suction, a method generally employed by the Persians.[1] But if the operation ever was performed

[1] The suction method was introduced by Professor Laugier of Hotel Dieu of Paris in 1847, performed by means of a very ingenious pump-needle made by Charrier. Desmarres practised it also in many cases, but had to give it up as a bad procedure. In cases of *liquid* cataract it is very enticing to use that instrument, because an immediate result is produced, but such cataracts are comparatively rare, and a *soft* cataract cannot be thus got rid of. We are apt to pump out the vitreous, which has a less density than the lens, and thus cause collapse of the globe, whilst no impression whatever can be made upon the nucleus. Charrier's instrument is constructed

at that remote period, it had fallen into oblivion, and was practically unknown till 1707, when Saint-Yves, in the presence of Méry, made an incision in the cornea, and by means of a curette extracted a cataract, which, after depression, had risen up again, and passed through the pupil into the anterior chamber. The following year Pourfour du Petit performed the same operation upon a priest in the presence of Saint-Yves and Méry. The latter submitted an account of these operations to the Académie des Sciences,[1] in which he proposed to extract a cataract through a corneal incision, not only when dislocated into the anterior chamber, but also when lying *in situ* behind the iris. As the author, however, never performed the operation which he so ingeniously suggested, his advice was fruitless, and nothing further was made known on the subject until the hint was reduced to practice, and the whole particulars of the process published by Daviel, a French surgeon, in 1745.[2] To Daviel, therefore, belongs the credit of having obtained that new conquest to science,

so as at the same time to depress the nucleus if necessary, rendering the operation a compound one—suction and depression.

Mr. Teal, Jun., of Leeds, has within the last few years revived that method. Mr. Bowman, who adopted this operation, devised a very elegant suction instrument for the purpose. From my personal experience, and from what I have seen of it as practised by others, I do not think that it offers much encouragement: A *liquid* cataract can easily be removed by a small corneal puncture, or it disappears in a few days from the anterior chamber after opening the capsule with a needle; a *soft* cataract can be removed by a linear incision, after a few days' maceration of the lens, with more ease and safety than can be effected by the introduction of pumping instruments, which are not without their own risks. All such devices appear to me to serve the object of despatch at the expense of the safety of the organ.

[1] Mémoires de l'Académie des Sciences, 1708, p. 310.

[2] Daviel: Sur une Nouvelle Méthode de Guérir la Cataract par l'Extraction du Crystallin (Mémoire de l'Académie de Chirurgie, t. ii., p. 336, 4to ed., 1753).

in systematising the process of extraction of the crystalline lens through an incision in the cornea. Daviel's procedure has subsequently been modified by Lafaye, Wenzel, Richter, Barthe, and Beer. It would be out of place here to mention all the modifications which Daviel's method has undergone; they refer partly to the size and direction of the flap, and partly to the form of the various instruments used.

Daviel's Method, or Flap Extraction.

THE object of this operation, then, is the removal of the opaque crystalline lens from the eye, through the pupil, and through a semicircular opening made in the cornea, either in its upper or in its lower half. The incision must be made large enough to allow easy exit to the lens without the use of much pressure, which would do violence to the iris, or would rupture the hyaloid membrane, and force out the vitreous humour. On the other hand, it must not be made too large, lest it should prevent coaptation of the flap, and interfere with union by first intention. The size must be regulated by the nature and density of the cataract. If it has a hard large nucleus, the section should commence at the transverse diameter of the cornea, the twentieth of an inch from its sclerotic junction, thus opening the half of its circumference; but when the cataract is of a homogeneous softish consistency, or with a small nucleus, a section of five-twelfths of the circumference is sufficient, as such

a cataract can mould itself and pass through a smaller opening. Mackenzie advises to make the incision "at least one-half the circumference of the cornea," and mentions Ware as proposing even the nine-sixteenth part.[1] After the incision is duly made, the anterior hemisphere of the capsule is to be lacerated as widely as possible with the cystotome, and the lens to be gently squeezed out through the opening.

When this operation is well performed, and the healing process proceeds regularly, it leaves nothing to be desired; it is so beautiful in its results and appearance that it may be called the *chef-d'œuvre* of surgery. So high was my appreciation of this method, that four years ago, when exhibiting to the Aberdeen Medico-Chirurgical Society four of my first cases operated on by my improved method, I stated: "Of all the new methods which have lately been proposed for the extraction of cataract, none is, in my opinion, ever destined to supersede the ordinary flap extraction. Any given case of hard cataract without complications runs the best chance of success by the old classic operation, which is, moreover, so brilliant in its results that I should never look for another operative procedure. But cases, like those which I have the honour of presenting to you, do occur which are associated with local or constitutional complications, rendering the old method either too hazardous, or impossible. To overcome such difficulties we must devise new plans for the removal of the opaque lens."

But it must be allowed that, besides the inapplicability

[1] Mackenzie: Practical Treatise on the Diseases of the Eye. 4th edit., p. 788.

of the flap operation to some cases, it carries a host of contingencies in its train. Not to mention the accidents which may occur during the operation, but which may be overcome by dexterity and coolness of judgment, there are others beyond the control of the operator, and which may undo his best executed work. It is evident that the ordinary flap extraction is inapplicable to a cataractous eye complicated with—

1. An adherent pupil, with or without pseudo-membranous exudations.
2. Confluence of the vitreous humour (synchysis).
3. Dropsy of the anterior chamber (hydrophthalmus).
4. Central opacity of, or conical cornea.
5. Posterior staphyloma.
6. Glaucoma.

Moreover, as the patient is required, after such an operation, to remain perfectly quiescent for about four, six, or eight days, it is impracticable to those who are suffering from—

1. Rheumatism or sciatica.
2. Disease of the bladder or bowels.
3. Bronchitis.
4. Hysteric or epileptiform attacks.

M. Desmarres tells of a patient, Baron V—— (an important political personage), in whom, on examining the eye the third day after extraction, he found the sight good and the flap united; all of a sudden when he was about to leave, the patient was seized with a fit of sneezing, which burst the flap, and the eye was completely destroyed. Every ophthalmic surgeon will be able to supply instances from his own experience where such an

untoward accident as coughing, straining, starting, &c., saddened his brightest prospects.

Let us briefly analyse the principal factors which render the operation *per se* hazardous, and see how we can eliminate them.

1. *The large corneal incision* requires some days before it heals, and a few additional days before the cicatrix is out of risk of being burst open. Now, in a patient of strumous habit, or in a state of senile marasmus, such a large flap is apt to suppurate, independent of other contingencies or mal-coaptation; although it must be admitted that primary suppuration of the cornea is very rare indeed.

2. *The lens may be found unnaturally adhering to the capsule*—one of those cataracts which come slowly to maturity; and instead of coming out entire, the nucleus alone comes through, leaving the cortical substance in the equator of the eye, which no coaxing can entirely remove. The fragments which remain within the interstices of the capsule may cause proliferation of its epithelial cells and those of the membrane of Descemet, and thus act as a focus of inflammation. But,

3. The *iris* is the most fruitful source of subsequent mischief. The sphincter iridis sometimes contracts so much that the capsule cannot be sufficiently opened, or even after it had been opened the iris may close upon the lens, preventing its easy exit; inordinate pressure is used, and contusion is the result. Now, if this membrane has been wounded by the knife, or lacerated by the cystotome, and particularly if it has been contused by undue pressure during the *accouchement* of the lens, a form of

iritis develops itself, which may either close the pupil, or extend its inflammatory process to the wound, causing the latter to burst, and so produce hernia iridis and anterior adhesions, or it may even extend to the ciliary circle and to the deep membranes, causing panophthalmitis and complete destruction.

With so much anxiety did our classic writers caution us against lesion of the iris, which they considered as the starting-point of nearly all the ills that befall the eye after extraction, that Mackenzie's advice is, in case "the iris has fallen under the edge of the knife, an attempt must be made to push it back by pressing with the point of the forefinger on the cornea; but if the iris does not retire on pressure of the cornea, the *knife must be withdrawn, and either the operation deferred to a future day,* or a small probe-pointed knife introduced through the aperture which has been made, pushed gently through the anterior chamber to the nasal edge of the cornea, and over the end of it an opening made with another knife, so as to allow it to come through, after which the incision is to be finished exactly in the same way as if the sharp-pointed knife only had been employed." As far as I know, M. Desmarres was the first to advise us that when a fold of the iris has fallen upon the knife, it is better to run the knife through it; for although in cases of contusion or laceration we must expect some mischief, yet when a slice of the iris has been cleanly cut off, the healing process is far easier, and no iritis need be apprehended. This doctrine seems to me to contain the germ of many of the improvements which of late years have been introduced in ophthalmic operations.

In submitting an outline of the progress and development of the operation of extraction of cataract, I cannot avoid touching, though briefly, on the other two methods of removing the lens from the axis of vision—namely, that by solution and that by depression.

Solution or Absorption.

This operation consists in lacerating the capsule with a needle introduced either through the sclerotic or through the cornea, and thus leaving the lens exposed to the action of the aqueous humour to be dissolved and absorbed. It is an excellent and safe method, but its employment must be restricted to—

1. Cataract of infants, excepting zonular, where artificial pupil is to be preferred.
2. Adults before the age of forty.
3. Fluid cataracts at all ages.

In these cases the operation by solution is more than likely to keep its ground amidst all innovations. But after the age of forty or forty-five, when the lens is generally of a denser consistency, and absorption less vigorous, it requires long time and frequent introduction of the needle, and thus becomes a tedious and unsafe procedure. Indeed, in old people, the chance of inducing blindness during the process of solution is very great, on account of the condition of the tissues, altered by senile metamorphosis, which, coming in contact with the swollen lens, are apt to take on inflammatory action. Neither is the process of solution to be thought of in traumatic cataract, even in young persons, when the internal mem-

branes have suffered by the injury. In fact, in every case the operator must keep himself in readiness to remove the lens whenever dislocated fragments or great swelling of the lens cause irritation and assume a threatening aspect! The following case will illustrate this :—

R. A., age 9, was sent to me by Dr. Polson, of Friockheim, with a traumatic cataract in his left eye, caused by a stroke four weeks before admission. I introduced the needle through the sclerotic to enlarge the capsular opening, and at the same time liberate the iris. The case went on to my best expectation for about three weeks, when one morning he presented himself with pain in the eye, and the anterior chamber full of blood. He had gone to bed quite well, but was roused during the night by pain, and in the morning was found in this condition. I put him under chloroform, performed iridectomy, and extracted the lens. Dismissed June 24, 1868, ten days after operation, cured ; sees small objects.

Depression and Couching.

THE operations of *depression* and *couching* have played a most conspicuous part in ophthalmic surgery. They are performed by introducing a needle through the sclerotic or cornea, and by thrusting the lens directly downwards (depression), or by pressing it downwards, backwards, and outwards, so that it should recline with its anterior face directed upwards ; hence reclination or couching. In either case a bed is made for the lens in the interior of the eye at the expense of the broken-up

cells of the vitreous humour. The result is, that when the lens is soft, it cannot be depressed at all, but is merely broken up, and is partly dissolved and partly remains in the aqueous humour, forming a nucleus for a secondary cataract, or for something more serious.

This operation originated at a period when the doctrine of Celsus and Galen was prevailing—viz., that the lens was the essential organ of vision, and that cataract was a pellicle formed in front of it, which could easily be depressed and removed from the pupil.[1] Yet even after Kepler (1604) proved that the lens was merely a refracting medium, and Maître-Jan, Heistre, Saint-Yves, and Brisseau had established by demonstration that cataract was an opacity of the lens itself surgeons still continued depressing on account of the facility of execution. At one period of its history, indeed, it seemed as if this operation was to take precedence of extraction. But, thanks to our better means of diagnosis, and to improvements in our operative procedures, couching has well-nigh disappeared from British practice, and will very soon have only a historic existence. Couching owes its long existence to the facility with which it can be performed. Nothing can be more easy than to put in a needle and push the lens out of sight; but alas for the consequences!

In instituting a comparison between these two methods by authenticated statistics on a large scale—*i.e.*, in 2073 extractions and 177 depressions—we find that,

[1] Fabricius ab Aquapendente interprets thus :—Suffusio latinis *ὑποχύμα* Græcis, vulgo cataracta dicitur, sumpta, uti opinor denominatione ab illis portis quæ in oppidis et castris superna deorsum cadunt. Op. Chir. de Suff., p. 57.

whilst 1 eye in every 10 is lost in extraction, 1 in every $3\frac{1}{2}$ is lost in couching or depression.[1] Further, the worst issue of extraction are suppuration, panophthalmitis, and—loss of vision; but depression records four deaths in such able hands as Dupuytren,[2] and, what is worse, the miserable existence of some victims of that method caused by chronic irido-choroiditis. For the depressed lens may act as a foreign body, irritate the retina, or roll forward against the ciliary processes and iris, and thus act as a constant focus of inflammation to harass the patient's life. "Jrido-choroiditis is the most obstinate and cruel affection that I know. It not only makes the patient desperate by the often-recurring pain, but may even compromise life, as in the case of old people. It is impossible to mistake that terrible disease when, after couching, redness of the eye present itself with interminable neuralgie, against the return and duration of which all means remain ineffectual—bleeding, leeches, cupping, opiates, quinine—nothing can arrest the progress of the disease; and after months, sometimes even more than a year, the eye shrinks or is struck with amauresis. Fortunate is the patient whose constitution resists all these sufferings!" For the arresting of this terrible issue of couching Desmarres first applied excision of a portion of the iris. "We cannot too soon," he says, "resort to that measure as the only means of relieving the pain, and of, sometimes, saving the eye from certain destruction through slow atrophy."[3]

[1] Rivaud-Landrau: Annales d'Oculistiques, 1862.

[2] Leçons Orales, t. iii., p. 335.

[3] Maladies de l'Œil, t. iii., p. 371. When iridectomy proves unavailing, and the eye is already amaurotic, enucleation is the only alternative to save the other eye from destruction by sympathetic ophthalmia.

Professor v. Graefe achieved a great improvement in this department of ophthalmology, which entitles him to a fair claim on our gratitude, by extending the doctrine of excision of the iris (iridectomy) to the cure of glaucoma, on which he published a memoir in 1857.[1]

As the extension of iridectomy has in reality formed the basis of the modern improvements in the operation of extraction, and as a great deal has been written of late years on the cure of glaucoma by iridectomy—a subject over which much obscurity still hangs,—it may not be out of place, in view of its proper elucidation, to give here a *résumé* of the present state of the science in connection with it.

Glaucoma.

THE disease called glaucoma, on account of the peculiar sea-green or bottle-green reflection from the background of the eye, is characterised by attacks of excruciating paroxysmal throbbing pains in the eye-ball, radiating thence to the various parts supplied by the fifth pair—great sense of fulness, and tension of the globe—sensation of fiery prismatic spectra—muscæ volitantes—flashes or scintillations; very soon vision becomes misty, the density of the mist increases, whilst perception of the natural light diminishes. The sight may thus be abolished by one violent attack even within twenty-four hours, or it may be lost gradually after several recurrent invasions, with weeks or months of interval. These

[1] Archiv fur Ophthalmologie, vol. iii. part 2.

symptoms may set in either suddenly without warning, or with indistinct premonitory symptoms. There is constitutional fever, and the local symptoms are marked by the appearance of large tortuous veins traversing the subconjunctival cellular tissue, close to the corneal margin. These are developed as auxiliary veins from the compression of the *vasa vorticosa.*

The *cornea* has lost its transparency, and presents the appearance of glass when breathed upon, and is insensible to touch; its convexity is also diminished.

The *iris* is paler and drier than in its natural state, is atrophied and arched forwards; this, with the diminished convexity of the cornea, causes flattening of the anterior chamber.

The *pupil* is fixed and dilated, sometimes of a transversely oval shape.

The *aqueous chamber* appears as if filled with smoke, or milky, which gets thicker and thicker, until it assumes its characteristic sea-green coloration. It may change its aspect several times a day.

Such being the symptoms of a typical case of well-marked glaucoma, it will be understood that, these, may occur in any less degree of intensity, or that many, or even most, may be absent. But one characteristic symptom which never fails, and may be considered as pathognomonic, is *tension* of the globe, rendering it as hard as marble when touched through the eyelid.[1] In an ad-

[1] Graefe, Donders, and Hammer have constructed instruments for the measurement of the degree of hardness. The one invented by M. Dor is the most perfect of the kind. For clinical purposes, the application of the two fingers through the eyelids elicits the surest indication of the degree of hardness, as well as that of softness of the eye.

vanced stage, when the cornea is hazy, or when there exists a state of syrous chemosis, lachrymation, with spasm of the orbiculars, ophthalmoscopic examination becomes impossible; but under more favourable circumcumstances, the opthalmoscope reveals a depression of the optic disc, the retinal vessels dilated, and tortuous dipping into a hollow to reach the disc, and sometimes also pulsation of the arteria contralis and veins. It must be remarked, however, that the ophthalmoscopic signs in themselves are not quite conclusive, because the papilla is cupped in other amaurotic affections, and the arterial pulsations may be observed even in a healthy eye under certain circumstances of excitement; but they certainly are corroborative evidence when in connection with *anæsthesia of the cornea, atrophied and slate-coloured iris, dilated and fixed pupil, and hardness of the globe.*

All these symptoms are caused by intraocular pressure. This is proved by the circumstance that the media clears up, and corneal sensibility returns, by the evacuation of the aqueous humour. In a healthy state of the parts, the pressure of the external tunics on the one hand, and of the humours on the other, are so balanced as to permit the nutrition of all the parts to go on with regularity; but when from any cause whatever the volume of the humours is increased, the exaggerated intraocular pressure interferes with the functions of the parts, inasmuch as the sclerotic cannot yield to this pressure, except with extreme slowness. When, therefore, tension is exerted rapidly, its action of the nerves and vessels is productive of the severe pain and the other acute symptoms. But when the tension has come on gradually, so that the

sclerotic has had time to distend, and so to accommodate the hypersecrition of the affected parts, then we have the same train of pathological changes only in a *chronic form.* This latter steals on invidiously, with dimness of vision, accompanied with little or no pain. It may take some months, or even a year or two, for its development, when it may betray its existence by suddenly breaking out into an acute attack, or by simple loss of vision. Now, if we happen to examine an eye under such conditions, we find nothing but *tension* discernible. There is one difference, however, between the acute and the chronic form, viz., whilst the acute attack induces a state of hypermetropia, or augments the pre-existing presbyopia, the chronic form, on the other hand, has the effect of enabling presbyopic persons to read without spectacles, and nearer than they could do before, even with convex glasses.

Owing to the different phases which this disease may assume, the circle of glaucoma has been, perhaps, too widely extended by some modern ophthalmologists, who put under this category every diseased condition of the eye which in its *ensemble* gives rise to the rapid or slow development of intraocular pressure, from whatever cause it may arise. According to this view, irido-choroiditis, ectasis of the sclerotic, anterior adhesions, amaurosis with excavation of the optic nerve, &c., when associated with tension of the globe—yea, even hardness of the eye in consequence of mechanical injury, is called glaucoma or glaucomatous. As these differences have a practical bearing, we must examine the question in its pathological as well as in its therapeutic aspect.

Pathology of Glaucoma.

GLAUCOMA, according to Graefe, is a choroiditis or irido-choroiditis with effusion by endosmosis into the vitreous and aqueous humours, the augmentation of which causes intraocular pressure, producing excavation of the optic nerve and iridoplagia. The latter is caused by pressure on the ciliary nerves in their passage to the iris; hence also anæsthesia of the cornea, &c. Now, finding that iridectomy produced good results in chronic iritis, in irido-choroiditis, and especially in lessening the tension in sclerotic staphyloma, he tried it also in glaucoma with successful results.

This pathological basis has been very much called in question. Thus, Mr. Dixon "could not fail to be struck with the apparent absence of all causal connection between the morbid changes of glaucoma and the means proposed for arresting them. We were told that the intraocular pressure was the cause of all the phenomena of glaucoma, without any very clear account being given as to what was pressed, and what effected the pressure." [1]

In a paper which I published about the same time, [2] I ventured to question the soundness of the theory advanced by the distinguished Berlin Professor. I urged that there was no trace of iritis in typical glaucoma; that the iris, on the contrary, was atrophied to such an extent as to make it often difficult to seize it with the forceps for excision, nor is there choroiditis strictly so called. On the other hand, it appeared to me, at that

[1] Diseases of the Eye, 2nd Ed., 1859. [2] *The Lancet*, Dec., 1859.

time, that the disease has its origin in the derangement of the fifth pair. More recently, however, in the course of an extensive discussion, I suggested that the whole range of glaucomatous symptoms may be accounted for on the hypothesis, that, it is the result of hyperæsthesia and spasmodic irritation of the sympathetic within the orbit. This will accord with Claude Bernard's experiments on the vaso-motor system. There is, in the first place, the dilatation of the pupil, caused by the irritation of the sympathetic, which, in junction with the pneumogastric, furnishes filaments to the radiating fibres of the iris; there is also engorgement (nervous congestion) of the choroid, which gives rise to pressure upon all the ciliary nerves (both those proceeding from the ophthalmic ganglion to the sphincter iridis and cornea, and those from the nasal nerve), hence anæsthesia of the cornea, vitiated nutrition of the organ, tension, &c., rendering the phenomena more complex, and the *ensemble* tending to inevitable blindness.[1]

As applicable to this subject may be quoted the explanation of the pathology of exophthalmic goitre as given by Trousseau, who regards the triad of symptoms present in Graves' disease—viz., hypertrophy of the thyroid gland, protrusion of the eyes, and transitory cardiac hypertrophy, as a "*nevrose a congestion locale*," having its proximate cause in the modification of the vaso-motor apparatus.[2]

[1] See my paper in the British Medical Journal, Feb., 1864.

[2] There is a preparation in the Aberdeen Infirmary Museum of a case of exophthalmic goitre, published by my excellent friend and colleague, Dr. Reith (*Medical Times and Gazette*, Nov., 1865), in which the disease of the cervical ganglia was the principal lesion discoverable. A similar case is recorded in the *Gazette des Hôpitaux*, March 21st, April 16th, 1865.

According to this view the *modus operandi* of irridectomy in the cure of glaucoma is easily explained :—

1. The removal of a portion of the iris, by removing the nervous loops therein distributed, has the effect of a genuine neurotomy, and is strictly analogous to the removal of a part of the portio dura in tic douloureux, as first suggested by Allen Burns,[1] and recently adopted by Nélaton and others.

2. By removing a portion of the iris, we relieve the constriction which it and the ciliary muscle produce round the zonula of Zinn and the protruding lens, thus keeping up the disease.

3. The evacuation of the aqueous humour has undoubtedly its share in relieving the over-distension of the eyeball.

The same explanation would also apply to the advantages derived by Prof. Hancock's operation—section of the ciliary muscle. With reference to the theory of this operation, Nunneley's criticism[2] seems to me to be in the main correct. It is not the section of the constricted muscle which gives relief, but the division of the nerves which meet there, and the tapping of the vitreous. It is well known, however, that to render the effects of neurotomy lasting, it is requisite to remove a portion of the nerve; hence my preference for iridectomy.

Most recent opinions seem to tend in the direction of regarding glaucoma as a nervous lesion. Thus Donders considers it as hyperæsthesia of the fifth pair.[3]

Prof. Magne of Bologna, after combating the views of

[1] Surgical Anatomy of the Head and Neck, p. 287.
[2] *The Lancet*, Jan. 16th and 26th, 1861.
[3] Annales d'Oculistique, 1865, p. 121.

Graefe for the reasons stated by me—namely, that there was no trace of iritis or choroiditis, but, on the contrary, an atrophied condition of those membranes,—ascribes glaucoma to an atrophy of the ciliary nerves.[1]

Mr. Hart adopts my theory of glaucoma.[2]

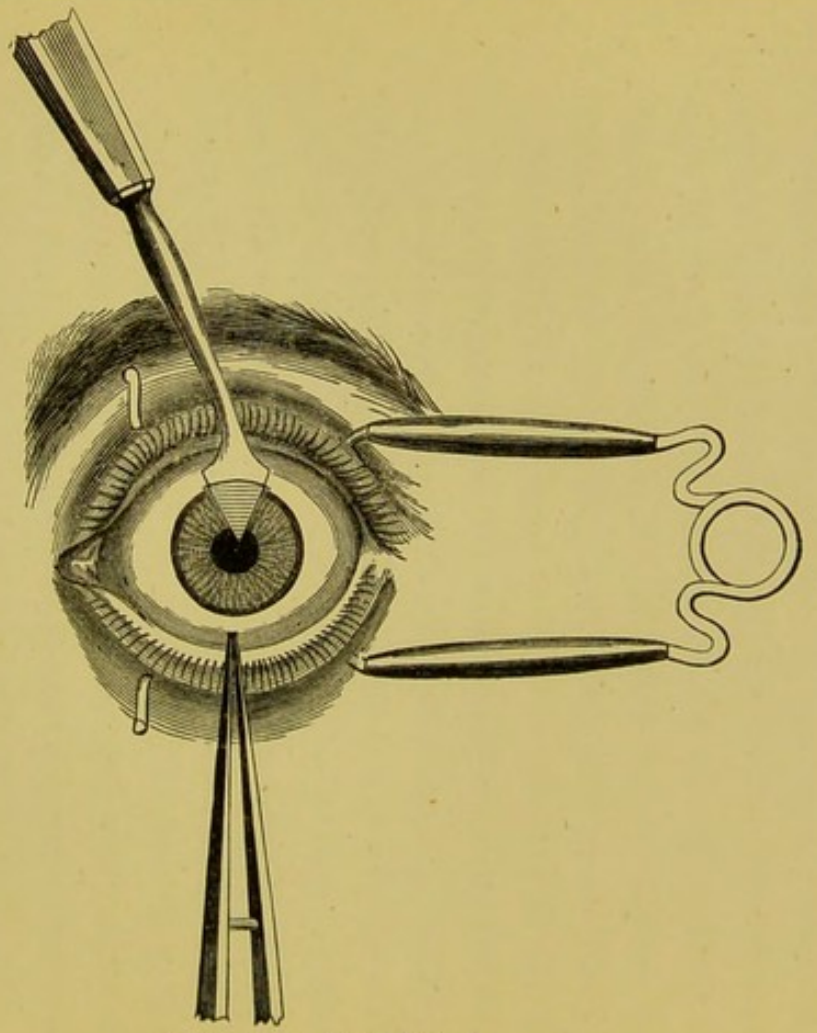
Now that more than a decade has elapsed since the introduction of iridectomy for the cure of glaucoma, abundance of materials has been collected for estimating its value; and it appears to me probable that more harm has been done by performing it in unsuitable cases than by undervaluing its advantages. My first trials of it, shortly after its introduction, convinced me of its value; but subsequent experience has proved to me that the extent of its utility is limited. I find it of greatest service in acute and subacute forms of the disease, especially in their early stages, and before the eye has become in any way disorganised by the progress of the disease. In short, whenever ciliary pain is present the operation is useful: either optically, in the view of restoring vision; or, at the lowest estimate, therapeutically, with the view of allaying suffering, which it can very nearly always be trusted to effect.

In purely chronic or non-inflammatory cases, however, when blindness steals on gradually without pain or other acute symptoms, it is absolutely useless, whatever the degree of tension may be; as either no good result is obtained by its performance, or, at best, a very transitory one. Those who acted on the principle of performing iridectomy in every case where tension was present, must,

[1] L'Union Médicale, 1862; Ann. d'Ocul., 1863.

[2] Ophthalmic Hospital Reports, 1866, p. 30.

FIG. 1.



Iridectomy—First Period.

I conceive, by this time have been convinced that this position is untenable. For the credit of the operation, I find it best to avoid all surgical interference, except where decided benefit may fairly be looked for.

Those who are opposed to the operation expatiate on the mutilation of the eye, and on the various accidents accompanying it. As to the deformity of the pupil, there is absolutely none where the coloboma is made upwards. With regard to the risk, I am in a position, after having performed several hundreds of iridectomies for various purposes, to state most emphatically that I am unable to call to mind a single case of distressing consequences.

Operation of Iridectomy.

As iridectomy forms part of our cataract operations, I shall explain my manner of performing it, which differs in some respects from the methods usually adopted.

I administer chloroform only to highly nervous patients, and in cases where the eye is much distressed by pain. The patient being in a recumbent position upon a couch, and the eyelids kept open by a spring speculum—the operation is divided into two periods.

The first period is shown in Fig. 1: I stand behind the patient, whom I order to look downwards; with the conjunctiva forceps in the left hand, I seize a part of the conjunctiva and subjacent tissue, and steady the eye; and with the curved lance in the right hand I enter in the anterior chamber through the conjunctiva, half a line or one

line from the corneo-sclerotic junction; if the opening be insufficient, I enlarge it on either side in withdrawing the lance.

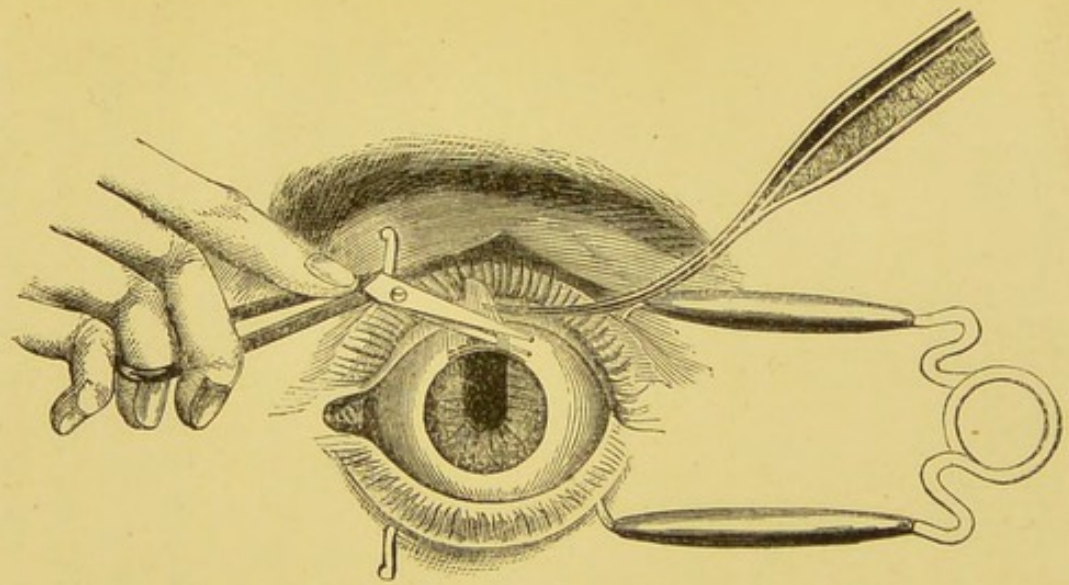
Second period: I take the curved iris forceps in my left hand and the scissors in the right, and order the patient to look down, when I introduce the former into the anterior chamber, seize the iris and withdraw it, into which I first make a vertical incision from the pupillary margin to its ciliary attachment; a flap of the iris thus remains between my forceps, which I put upon the stretch, and by other two cuts with the scissors in a horizontal direction I finish the section. Fig. 2 shows the second period, where the iris hangs only by a small pedicle before receiving the finishing cut. By this method I can measure the precise portion of the iris which I intend to remove, instead of making a random cut. When there is some blood in the aqueous chamber, slight pressure with Daviel's spoon upon the upper lip of the wound is sufficient to cause it to escape.

All the duties of my assistant in this operation are: to hold the speculum a little forward to prevent the pain caused by its pressure upon the orbit, and to hand me the instruments. I dispense also with an ophthalmostat in the second period. The operation is thus performed with the minimum of pain, most of which is caused by the pressure of speculum and fixation forceps.

To save description of the instruments, I have given in the engravings the precise size and form as drawn to a scale.

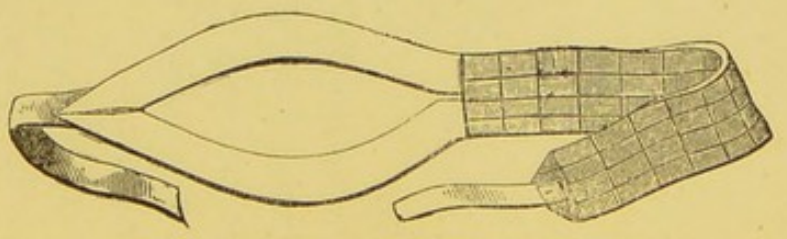
After trying various specula, I have returned to that without screws, which are in the way, and are besides in-

FIG. 2.



Iridectomy—Second Period.

FIG. 3.



Liebreich's Fixed Eye-Bandage.

convenient when there is occasion to remove it quickly. Of scissors I use the small form, as it is easy to insinuate the probe-pointed ends under the conjunctiva, to finish the section, when a fold of it has fallen upon a portion of the iris.

The dressing consists in three layers of lint or jeweller's wadding, secured by Liebreich's eye-bandage (Fig. 3), the circular part, made of broad tape, being fixed upon the back of the head, and the knitted part carried over the eyes. Rest for twelve hours is all the subsequent treatment.

I have only to add, that I consider the risk of the operation so trifling that, in cases of emergency, I should apprehend no bad consequences from sending the patient some distance by train six hours after the operation.

Schuft's Method.

THE introduction of iridectomy for the cure of irido-choroiditis and glaucoma had the effect of familiarising us with the operation, and of extending its application to the extraction of cataract. The practice of combining the operation of extraction with that of iridectomy, performed either at the same sitting or at a previous period, had already been adopted by Desmarres in 1856, when, in the presence of Nélaton and others, he operated on Baroness Folgosa of Lisbon, and on General Lopez, in both which cases the cataracts were complicated with posterior adhesions. Von Graefe practised it also in some cases of soft cataract. But, whilst these able operators regarded it only as a means to be resorted to in complicated cases, and while Desmarres, as shown in his subsequent writings,[1] considered the integrity of the pupil as an essential point, Dr. Adolph Schuft (now Waldau) published a paper in 1860[2] proposing its general adoption, with the view of superseding the ordinary flap extraction.

Waldau's operation consists in the removal of the cataract through a small corneal incision and a coloboma iridis, aided by a spoon which he devised for that purpose. Of this spoon he has four sizes, made of silver, so as to allow of its being easily bent to suit the prominence of the brow, &c. This method, which he calls "spooning out the cataract," is performed in the following manner :—

[1] Clinique Européenne, 1859, p. 59. [2] Die Auslöffelung des Staars. Berlin.

1. The patient being in a recumbent position, and the eyelids being held up by an assistant, the operator fixes the ball with the forceps, and introduces a broad lance through the temporal side of the cornea, making the incision of about three lines.

2. With the pupil forceps the iris is seized, withdrawn, and excised. From the slit thus made the cornea is cut through vertically: hence the iris cannot be incised to its periphery, as is done for the cure of glaucoma, but there is left a narrow fringe behind, which protects the vitreous from prolapsing.

3. The capsule is opened with a cystotome.

4. The spoon, the size of which is regulated by the size of the nucleus, is introduced behind the lens, which is seized and withdrawn. If any fragments remain behind, a clean spoon is again introduced, and they are seized and withdrawn. On no account ought there to be a stirring about in the interior of the eye, to fish for floating fragments. By means of these spoons the author proposed to remove every lens, whatever may be its size and consistency, entirely, and without much damage to the organ, through a small wound extending through less than one-fourth of the corneal circumference.

Whatever may be the drawbacks of Waldau's method —and, indeed, it has many,—he certainly is entitled to the credit not only of having enriched us with an instrument which is an acquisition in ophthalmic practice, but also of having been the first to popularise the procedure based upon the principle of sacrificing a portion of the iris, for the sake of lessening the risk of a hazardous operation.

Bowman and Critchett's Modification.

WALDAU'S method has been introduced with great *éclat* into this country by Bowman and Critchett, who practised it for upwards of three years since 1860 with the following modifications:[1]—

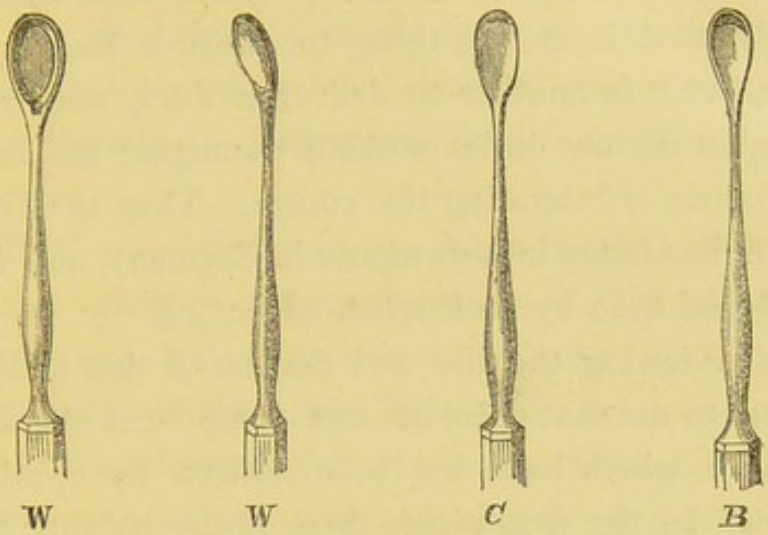
1. They both administer chloroform in every case where practicable.

2. They make the incision at the upper part.

3. Mr. Critchett's incision, like that of Waldau, is in the corneal substance, not, however, close to the border, but half a line from its sclerotic junction; whilst Mr. Bowman makes the wound curvo-linear, passing through the sclerotic junction, in a plane about parallel to the iris. The incision thus made is near to the equator of the lens, and the iris is removed to its ciliary attachment. The size of the incision is from a quarter to nearly one-third of the circumference. After trial of this operation for upwards of three years these able surgeons became convinced that Waldau's spoon was seriously defective. Owing to its thick frontage and the sharp edges of its dish-like cavity, it is apt to break up the lens when soft, and dislocate it when hard, bruise the iris and lacerate the edges of the corneal wound. Mr. Critchett accordingly devised a new form of spoon, of which he published the details in *The Lancet*, Jan. 11th, 1864. His slipper-shaped spoon, which acts like a wedge, is more readily inserted behind the lens. Mr. Bowman proposed another form, which he considers as taking a better hold of the nucleus.

[1] Ophthalmic Hospital Reports, 1865.

FIG. 4.



Showing a front and a profile view of Waldau's largest spoon. *C* represents Critchett's vectis ; *B* that of Bowman.

Appreciation.

With regard to my own experience of this method, I may state that my first two cases proved brilliant successes. In the next I had a layer of cortical substance left behind, which took three weeks to absorb—sight good. In a very short time, however, I had two cases of panophthalmitis, and one of iridocyclitis, which caused me grief and annoyance. For it must be remembered that in a small town the bad cases are not lost in the crowd, but rise before us like so many Banquo's ghosts. I did not fare much better with Critchett's spoon. It is more easily insinuated behind the lens, but if it has a hard large nucleus, it rebounds just when one is on the point of withdrawing it, even if the wound extends to

nearly one-third of the circumference. In short, I shared the experience of many others who tried it—namely, that it is one thing to catch a lens upon a spoon, but it is another to deliver it safely and entirely through a narrow outlet without damaging the internal membranes or lacerating the cornea. Thus the traction method has fallen into disrepute in Germany, and is now abandoned even by its English advocates.

In reviewing the rise and decline of that method, it appears to me that there are two component elements in its failure which have not been noticed by ophthalmic writers. In the first place, there is the liability to the admission of air into the interior of the organ, especially when the spoon has to be repeatedly introduced. Secondly, the shock which the organ may receive, and the consequent irritation, by the sojourn of such a large foreign body in its interior. Some organisms are so delicately constituted that they resent such an intrusion even for a few seconds, apart altogether from the damage done to the eye by clumsy ferreting about in its interior. I shall make this plain by the following cases, which will show that, in some, a great amount of mischief may be done which will be quickly recovered from, whilst in others a comparatively trifling injury may be followed by the most serious consequences. On February 13th, 1868, I operated on four cases of traumatic cataract in the Royal Infirmary, assisted by my friend Surgeon-Major Black, in the presence of the President of the Medico-Chirurgical Society and another medical manager of the Infirmary, and a large number of students, of the details of which the following is a short summary.

1. R. W——, aged fifty-nine, labourer. Thirty-six days ago, in breaking stones, a piece struck him on the eye. Iris discoloured; lower segment atrophied and adhering to capsule; lens opaque, part floating in anterior chamber. Iridectomy and extraction under chloroform.

2. F. Y——, aged sixteen, stone-dresser. Fourteen days ago, when at his employment, a chip of granite struck the eye, lacerating the cornea and iris, and producing opacity of the lens. When the stone was withdrawn I was informed that the iris protruded, but subsequently receded, and it is now simply adherent to the site of the lacerated cornea. Iridectomy and extraction under chloroform.

3. G. M——, sixty-three, labourer. Thirteen days before he came under treatment he was struck with a stone from a sling. At first the anterior chamber was filled with blood, on the absorption of which the iris was found partially adhering to the capsule, lower segment tremulous, lens opaque; ciliary pain. Cured by iridectomy six weeks prior to extraction.

4. F. B——, aged twenty-six, shoemaker. About a year ago he received an injury by a blow from a ramrod, which produced laceration of the cornea, extending from its centre to two lines beyond the sclerotic junction on the inner side. Partial anterior adhesion and cataract followed. Preliminary iridectomy and extraction.

In the first two cases, where there was pain and partial dislocation of the lens, I performed iridectomy and extraction under chloroform; but in the other two cases, where the lens was *in situ*, I made an iridectomy at a

previous period, and extracted without the aid of chloroform. The above-named gentlemen examined the patients previous to their leaving the hospital. In none of the cases were there any pain or lachrymation six hours after the operation. After forty-eight hours I removed the dressings, and found the wound healed; the patients were then allowed to walk in the ward. Vision eight days after the operation:

1. Sees features and minute objects, as little finger and ring.
2. Sees ditto ditto.
3. Reads No. 16 of Jaeger with 2½ cataract lenses.
4. Reads No. 6 with ditto.

Here are four cases which, in addition to the serious injuries inflicted, have undergone an operation of iridectomy and extraction, and are thereby relieved of their suffering without much inconvenience to vision. Now, contrast these with some cases of slight injury, as the thrust of a penknife or fork in the centre of the cornea, where no injury has been done to the lens, and no surgical interference has been resorted to, and yet the globe shrinks. What is the cause of this disparity of result?

Take another instance. A boy is brought in, who has the whole contents of a squib lodged under his upper eyelid; the upper part of the cornea is singed, but he recovers vision, with only slight opacity and partial symblepharon, caused by the conjunctival burn. Another boy, again, meets with a similar accident, apparently very slight—only a few particles of powder being upon the cornea; hypopion presents itself, resulting in com-

plete disorganisation. In explaining such phenomena, we must fall back upon the admission that some organisms are so constituted, that, the slightest injury destroys their vitality.

In experimenting on animals, we find that, whilst operations performed upon dogs and horses of the lower breeds seem scarcely to impair their appetite or derange their normal secretions—the various functions of the economy pursuing their natural course—the same operations, when performed upon those animals of a higher breed, with an irritable, sensitive, and more highly organised nervous system, possessing qualities of a nobler kind, invariably prove fatal. Now, as every organ has, to a certain extent, its own history and life independent of the general organism, so there are idiosyncrasies of parts whereby some are more easily affected and their vitality interfered with by certain agents. Rigour caused by the introduction of a catheter in the bladder may be cited as an example of this. I submit, therefore, that a large corneal incision may be a great demand upon the reparative powers of nature, but the introduction of a large spoon through a narrow opening may impart a shock to the organ. The one, if gently and artistically done, leaves the parts in good condition for repair, whilst the other may produce concussion, and thus materially disturb its vitality.

Mooren's Method.

THE first alarm against Waldau's spoon operation was raised by Dr Albert Mooren of Dürseldorff, in a brochure which he published in 1862.[1] "Of all the splendid hopes," says he, "which I had placed upon Waldau's method, I have not realised one. Of thirty-two cases which I have operated by the spoon, ten eyes have been destroyed, some through inflammation of the cornea and choroid, and some through panophthalmitis." Mooren therefore proposed another method, which is simply the ordinary flap extraction, with an iridectomy performed two or three weeks previously. His results are of fifty-nine extractions:—[2]

Immediate success, with good sight, ...	39
Do. medium sight, ...	3
Healed well, but no sight, ...	7
Required secondary operation, successful issue,	2
Do. do. with medium sight,	2
Do. do. no sight, ...	1
Do. do. but not operated,	3
Complete loss by corneal suppuration, ...	2
	59

From the analysis given in a previous paper of the causes of failure which attend the old operations, we

[1] Die verminderten Gefahren einer Hornhaut Vereiterung bei der Staar-Extraction.—Berlin.

[2] In estimating the value of these results it must be borne in mind that some of those cases have been operated on by this method which would not have been attempted by Daviel's operation.

cannot but regard this method as a step in the right direction. The coloboma iridis made at a previous period, allows free issue to the cataract, and lessens *pro tanto* the risk. But there are still remaining those contingencies connected with the large flap.

Jacobson's Method.

In 1863, Professor Jacobson of Königsberg, proposed a new operation,[1] the leading peculiarities of which consisted in the administration of chloroform, and in the performance of iridectomy after extraction. The following are the details :—

The patient is put completely under chloroform, and kept so during the whole time ; to prevent retching and vomiting, he is not allowed any substantial meal for twenty-four hours previously, and no solid food for several hours before the operation. He makes a lower flap with Beer's knife, which is entered at the corneo-sclerotic junction, half a line under the horizontal meridian of the globe and the counter-puncture on the same level on the other side. The capsule is opened, and the lens is easily pressed out with Daviel's spoon or with the thumb—a large segment of the iris is then excised. If the lens cannot be pressed out, iridectomy is done first to facilitate its passage.

[1] Ein neues Operations-Verfahren zur Heilung des grauen Staares. Berlin.

Notwithstanding the success of this operation in Professor Jacobson's hand—(the loss being only two per cent.), he has found no imitators.[1]

In addition to the remarks made upon Mooren's method, with regard to the risks of the large flap, the following serious objections present themselves :—

1. If contusion of the iris be dangerous, why contuse it first and then excise it? Why not rather perform iridectomy at once?

2. In making a large flap, why go so far as the corneo-sclerotic junction? If a section at the vascular portion lessens the risk of suppuration and gangrene of the cornea caused by isolation, it must be remembered that this accident is comparatively rare, and hardly to be taken into account, compared with the enhanced risk of hernia of the remaining portion of the iris, which is thus left without support.

3. The administration of chloroform in flap extraction, and *à fortiori,* in a flap of the nature just alluded to, is a serious venture. Who can ensure against emptying the eye by vomiting? Who can reckon upon such favourable results as Professor Jacobson met with among the Russian borderers? In reading Jacobson's paper on the use of chloroform in his operation, where he states that some of his patients took the enormous quantities of from twelve to sixteen ounces to pro-

[1] Since this was published there appeared an Article in the Annales d'Oculistique (April, 1868) by M. Wecker of Paris, who, after 3 years' trial of Jacobson's method, speaks in high terms of its advantages. The only modification which M. Wecker had adopted is in performing iridectomy immediately after the section of the cornea, and in removing but a very small portion of the iris.

duce anæsthesia,[1] and bearing in mind that the napkin used is covered with wax-cloth to prevent evaporation, I could not help being impressed with the conviction that he has to do with patients of a different organisation from that usually met with, and therefore that his results cannot be safely referred to as a guide for practice elsewhere.

[1] Archiv. f. O. 1865, tom. i. p. 119.

Graefe's Operation.

THE most important business before the International Ophthalmic Congress, at its meeting in Paris in August, 1867, was to hear and discuss reports on the results of Graefe's operation, which has at present a great run on the continent. I will therefore enter into a detailed account of it. Von Graefe was induced to try "the English modification" of Waldau's method, as described above, consisting in a larger opening and in an improved form of spoon, but obtained the following rather discouraging results:—Of 118 cases—

Destroyed through panophthalmitis, 7.

Nearly lost through iritis, 4.

Required subsequent iridectomy and capsular laceration, from 28 to 30:

Thus giving a decidedly less favourable result than the old operation. He consequently abandoned the spoon, and in May, 1865, commenced a new operation, which he calls "modified linear extraction."[1]

Availing himself of the advantages noted by Jacobson in his peripheral section, he proceeds as follows:—

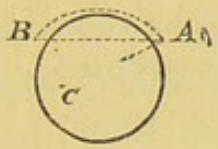
1. The patient being in a recumbent position, and the eyelids separated by a speculum, he stands at the side of the patient when operating on the left eye, and behind him when on the right. With the forceps in the left hand, the lower part of the conjunctiva is seized at the insertion of the tendon recti inferioris, and with the right he makes

[1] Archiv. fur Ophthalmologie, 1865, t. iii.

the upper section by introducing the narrow knife (Fig. 5) into the conjunctiva and sclerotic at A (Fig. 6), entering

Fig. 5.

Fig. 6.



at the extreme periphery of the anterior chamber. He first directs the point of the knife downwards as if wishing to reach C; but, after penetrating about three lines in that direction, he lowers the handle so as to carry the point horizontally to reach the counter-puncture B; then he makes two or three sawing motions, to complete the section of the sclerotic. This being done, and the knife being still under the conjunctiva, he directs the edge forwards, so as to cut it about two lines from the cornea. He thus obtains a section approaching to a straight line, which closes without any tendency to gaping. The dotted lines in Fig. 6 show the direction of the knife and the extent of the incision. The object of introducing the knife first in a downward direction is to enlarge the internal opening, and so to avoid the small shelf or corner at the commencement of the wound, which is necessarily left when the knife is carried throughout in a horizontal direction, and which presents an obstacle to the passage of the lens.

2. The fixation forceps being then given to an assistant, he raises the conjunctival covering with small forceps, and,

reflecting it upon the cornea, whereby the iris remains exposed, with the same forceps he seizes the prolapsed iris in the middle and excises it.

3. He takes again the forceps from the assistant into his own left hand, and, with the right, he opens the capsule by means of the cystotome.

4. When the cataract is soft, gentle pressure with the flat end of the curette upon the sclerotic lip of the wound, and counter-pressure with the fixation forceps, is generally sufficient to cause its expulsion ; but when the cataract is hard, he introduces a small hook flatly behind the lens, then he turns the hook upon it and so drags it out.

In his later writings[1] Von Graefe improved upon this last stage of the operation. He does not trust to the *vix expellens* of the forceps ; he applies the forceps about two lines towards the nasal side of the conjunctiva, so as to be out of the way, and with the back of a smooth spoon, made of caoutchouc, he first presses upon the lower margin of the cornea, and then gradually slides it upwards, whilst no counter-pressure is applied to the upper part. When the cataract is advancing, the back of the spoon is pressed more strongly upwards until it has reached the centre of the cornea, thus chasing the cataract towards and through the wound.

5. When cortical débris has remained behind, as happens in the majority of cases, he waits a little until the aqueous humour is collected, when he makes an attempt to dislodge them towards the wound by gentle circular friction through the closed eyelids ; then, opening the eyelids, the fragments are either removed by gentle sliding

[1] Arch. f. Oph., 1867, t. ii.

pressure, or, if this be insufficient, by means of a small spoon introduced into the anterior chamber.

FIG. 7.

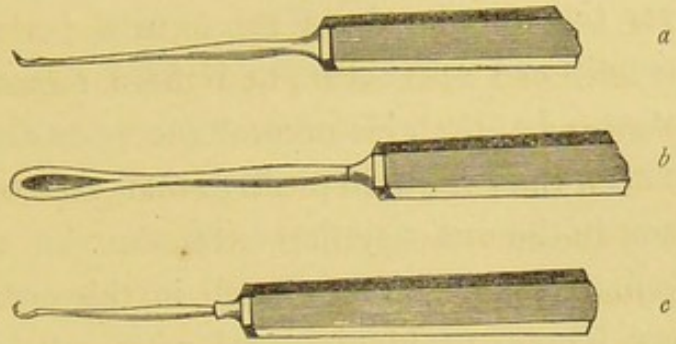


Fig. 7 represents the instruments required in the different stages of the operation.

a Is my cystotome, having a blunt convex surface and a sharp edge at its convexity.

b Is Graefe's small curette.

c Is my hook.

He avoids the use of chloroform as, in general, disadvantageous, and therefore administers it only to very timid patients.

The principal accident in this operation is the loss of the vitreous. This accident may happen immediately after the section, by the incision being carried so far back that the zonula is left unsupported, and so may arch forward and burst; or by the point of the scissors touching the zonula in excising the iris; or by strong backward pressure of the cystotome upon the hard cataract; or by too firm pressure in attempting to expel the lens; or by spasm of the orbicularis; or, finally, by a pre-existing diseased condition of the zonula, caused by choroiditis with softening of the vitreous. The following are the results:—In the first 69 cases he had 62

complete successes and 7 incomplete. In 14 there was escape of the vitreous; of these only 4 numbered among the incomplete successes; thus giving a decided advantage over the spoon. At a subsequent period he lost vitreous only in 13 per cent., and more recently in only 6 per cent. In short, his present successes are so great that he expresses himself positive that this operation is to supersede the ordinary flap extraction.

The first to follow Von Graefe in this operation was Professor Knapp of Heidelberg,[1] with only the difference that, instead of making a straight incision, he makes it a little arched in the sclerotic, and consequently more easy for the exit of the lens. His results are: out of 100 operations he had the loss of vitreous in 25 cases, of which 11 resulted favourably; in all, he had 15 bad cases.

Foremost among the communications before the Ophthalmic Congress in August last was that of M. Otto Becker of Vienna.[2] It is a model of a concise and comprehensive report of 217 operations performed in the Vienna Clinique, 150 by Professor Arlt, and the rest by himself and assistants. Of these 217 cases, 117 progressed favourably, and 45 were accompanied by more or less serious accidents: thus—

Slight iritis, 30.

Irido-choroiditis, 9.

Hæmorrhage in anterior chamber, 4.

Phlegmon of the globe, 5. *Résumé:* Lost, 5½ per cent.; required secondary operations, 10 per cent.; acuity of

[1] Op. cit. 1867, t. i.

[2] Comptes Rendu, p. 72.

vision particularly favourable; length of sojourn in hospital diminished by one-third; unripe cataracts could be operated on as well as ripe ones with the same chance of success.

Most of the speakers who followed seemed to regard this method as an improvement on the old operation. Notwithstanding the recommendations from such authorities, I was not induced to give it a trial, inasmuch as there is a *prima facie* case against it, tending rather to favour the conclusion arrived at by one of the speakers, M. Quaglino of Pavia[1]—viz., that this operation does not lessen the risk of panophthalmia, secondary cataract, and especially loss of the vitreous. From the large number of cases which I have examined in the different cliniques of Paris and elsewhere, I am confirmed in my conviction. I have noticed in some a considerable quantity of cortical substance left behind, and vision, after some weeks, either imperfect or deficient. In other cases, again, in which the wound healed well and vision was good, there were marks of cystoid union, showing that the eye had run a risk during the operation. In some cases the pupil was dragged upwards. This, I may remark, is invariably the case when lenticular substance is left behind to be absorbed.

That Graefe's section in the sclerotic exposes too much to the risk of loss of vitreous is sufficiently apparent from the fact that Arlt, Liebreich, and Critchett have modified it by making the section terminate in the corneal substance; this, of course, lessens the outlet, and the section will have to be carried further downwards,

[1] Op. cit. p. 85.

thus approaching more to a small flap. It appears to me, therefore, that Graefe did not succeed in the attempt he proposed to himself, to steer clear of the Scylla of contusing the internal parts by pressing a hard cataract through a small incision, without falling into the Charybdis of carrying the incision so far back as to endanger the vitreous. Loss of vitreous in itself is of no great consequence, but such an accident, when occurring before the exit of the lens, is highly embarrassing, as shown by the following quotation from Knapp's paper:—

"The escape of the vitreous was especially unfavourable when it occurred before the exit of the lens, for I was then obliged to introduce a traction instrument through the torn-up vitreous to drag out the lens. I succeeded almost in every case, but nearly always there remained behind a greater or less amount of fragments, which gave rise in one case to panophthalmia, in others to more or less violent iritis, resulting in secondary cataract or closed pupil; in other cases, again, there was very little irritation and good sight."

Since the above was written, the last number of the *Annales d'Oculistique* came to hand, in which I observe a notice of an unseemly attack by Professer de Hasner,[1] of Prague, on Von Graefe and his method of cataract extraction. I feel myself the more at liberty to express an opinion on this, inasmuch as in these papers I have freely criticised and stated my views on all the operations that have of late years been brought forward. When treating of iridectomy for the cure of glaucoma, or on the modified linear extraction, I have shown that

[1] Die Neueste Phase der Staar-operation. Prague, 1868.

I have not implicitly followed Von Graefe's or any other man's theory or practice, but have endeavoured, by careful observation, to test the practical value of each method irrespective of the authority from which it had emanated. From my remarks on Daviel's method it will be seen how highly I appreciated the old classic operation. It was only necessity that, in the first instance, led me to seek for a new operative procedure. The first case in which I did so was one of traumatic cataract with closed pupil by plastic exudations, which had been declared hopeless by the father of ophthalmic surgery in this country (the late Dr. Mackenzie), and to which the old flap method was certainly inapplicable. At first I restricted my method of iridectomy and extraction to those cases only where the flap operation was impracticable, and it was only gradually that I glided into it as a general method, after becoming convinced of its unquestionable superiority.

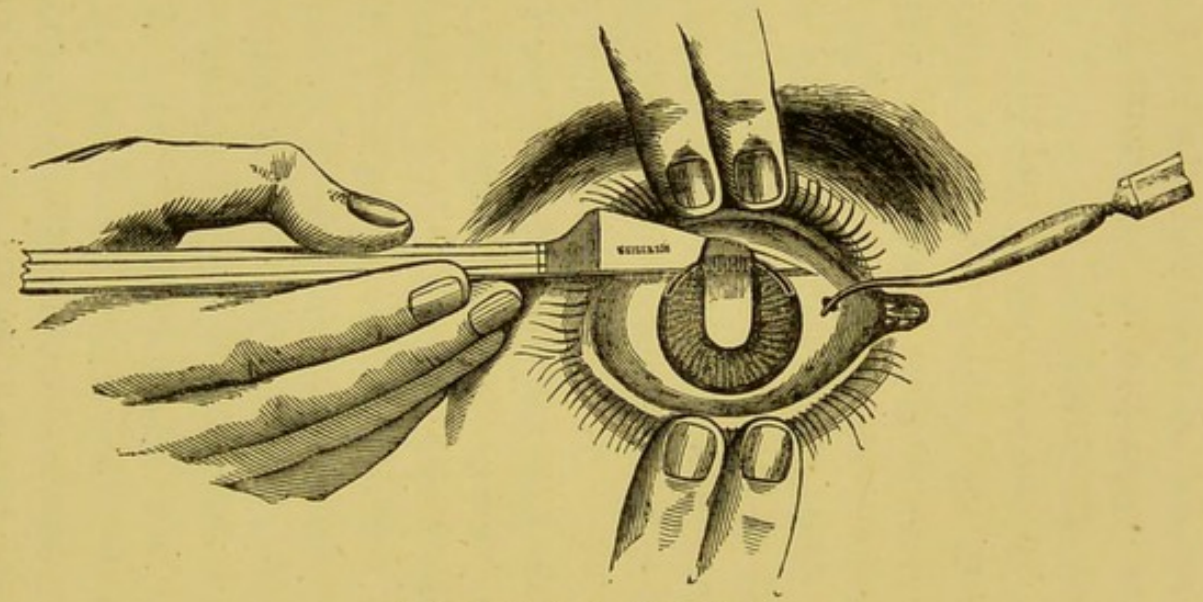
While, therefore, I highly appreciate M. de Hasner's zeal for Daviel's operation and his opposition to other methods, of which he has no experience, I must here enter my earnest protest against his novel system of polemics which he has imported into scientific discussions. Such a system of warfare will, I trust, find no admirers in this country, and is peculiarly *mal-àpropos* when directed against one to whom ophthalmic science owes so much. It is indeed refreshing to turn from the flippant declamation of the attack to the characteristic calm strength and dignity of Von Graefe's reply which follows in the same number.

The Author's Method.

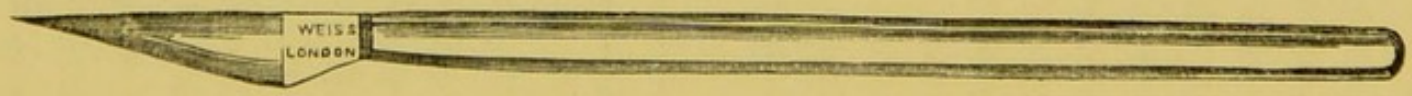
SINCE the autumn of 1864 I have practised an operation which, I think, combines the advantages of all recent improvements without their risks. My object is, to remove the cataract through an incision sufficiently large to give free exit to the entire lens, of whatever size and consistency, without bruising the internal parts or the corneal wound, and without incurring the loss of vitreous; and at the same time to ensure rapid union, so as to make it applicable to all possible local or constitutional complications. *Easy exit of the entire lens, and sparing the vitreous, I consider to be the essential elements of perfect extraction*—perfect both in its immediate and in its prospective results.

I perform iridectomy and extraction at the same sitting, under chloroform, only in traumatic cataract with dislocated lens; but, as a rule, I make iridectomy six weeks prior to extraction. I rather avoid doing both operations at the same time, because in some cases iridectomy cannot be satisfactorily performed with a large opening—the corners of the section in the iris are apt to be invaginated in the corneal wound, thus giving rise to a larger pupil than the operator intended, which interferes subsequently with distinctness of vision—because the fresh wound of the iris may be irritated by the *débris* of the lens; because the blood from the iris may conceal the lens from view, and so render its removal a sort of groping in the dark; and, finally, because when there is a glaucomatous tendency, or softening of the

FIG. 8.



Author's Method—First Period.



The Author's Cataract Knife.

vitreous, the simultaneous performance of the two operations may cause internal hæmorrhage or collapse of the eye.

As a rule, then, the eye can more easily bear the operation when thus divided into two periods, and the different stages of the operation can be performed with more regularity and precision.

In old people I perform iridectomy and the subsequent flap downwards, and find the optical effects perfectly satisfactory ; and in middle-aged persons, where regard must be had to appearances, I make them upwards. In either case I perform iridectomy exactly in the vertical meridian of the eye, so that the coloboma iridis shall correspond with the centre of the subsequent corneal section. The extraction is done as follows :—

The patient being in a recumbent position upon a high couch, and the eye-lids being held aside by an assistant, I stand behind the patient, operating with the right hand on the right eye and with the left hand on the left eye. Fig. 8 shows the right eye operated on by a superior flap thus :—

1. With the right hand I fix the globe by means of the pique de Pamand, which I consider the most suitable instrument ; with the narrow Beer's knife in my right I enter the external margin of the cornea close to its sclerotic junction, perpendicular to the surface, as if wishing to reach the iris, in order to prevent the knife running between the layers of the cornea, and also in a downward direction, after Graefe's example, in order to enlarge the internal opening. After the point is seen in the anterior chamber, I carry the

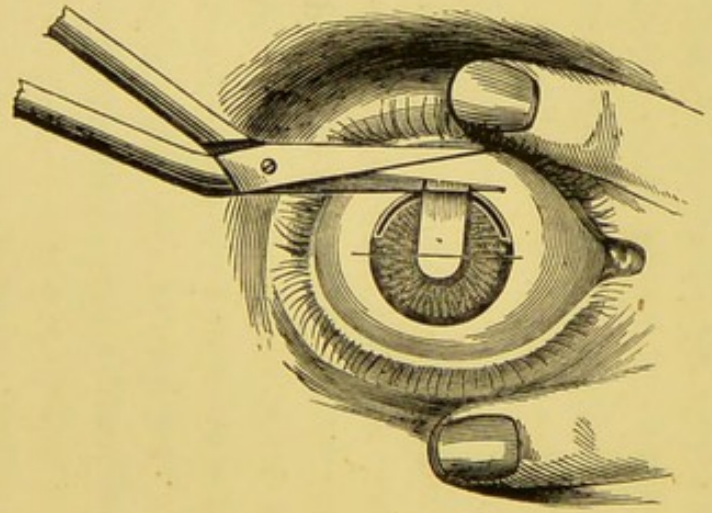
handle backwards and pass to the counter-puncture, which is made directly opposite on the inner side. The points of puncture and counter-puncture are so made that the corneal flap extends to a line more than one-third of its circumference. The knife is then pushed on in a plane parallel to the iris, until the corneal section is nearly completed, when its edge is inclined a little backwards, so as to carry it under the conjunctiva, and it is then withdrawn, leaving a conjunctival bridge in the centre.

2. At this stage I take entire charge of the eye, as shown in Fig. 9. My two fingers of the left hand serving the purpose of a speculum, I order the patient to look down, and introduce one blade of the probe-pointed scissors in the track of the knife, and, carrying it to the conjunctival flap, divide it. When operating on the left eye I must here change my position, as the scissors cannot conveniently be used with the left hand, and it is not advisable to divide the conjunctiva with the knife, as it is apt to peel off.

3. The capsule is then largely opened with the cystotome. To facilitate this process, gentle pressure with my fingers upon the ball is necessary to make the capsule tense.

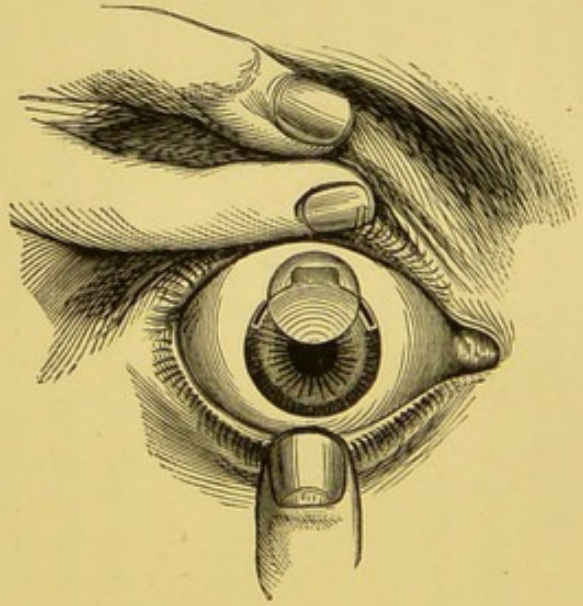
4. After a few seconds of rest, I seize a fold of the upper eyelid between my fingers (Fig. 10), and the lower I depress with the other thumb, and, directing the patient to look down, I exercise pressure on the lower part, exactly in the vertical meridian facing the middle of the coloboma iridis, and with the other fingers through the eyelid I press upon the wound to make it gape, when

FIG. 9.



Author's Method—Second Period.

FIG. 10.



Author's Method—Third Period.

the cataract advances through the corneal and conjunctival flap.

Due attention must be paid to this direction: pressure must be made at the point just indicated, otherwise the lens is pushed sideways, and may rupture the hyaloid or damage the ciliary processes. This is, indeed, the most critical stage of the operation, for the surgeon must have his art literally at his fingers' ends. If inordinate pressure is used, the vitreous may come out and the lens fall backwards. The pressure must be steady and graduated, and with due co-operation of both hands. If the cataract be found adherent (which can be easily diagnosed beforehand), I introduce the hook in the same manner as I introduce the cystotome, first in a horizontal direction; with it I lacerate again the anterior capsule, to make sure that there is no impediment from that source; then I slip it flatly behind the lens, turn the point forwards, and draw the lens out. If cortical fragments remain behind, the ordinary friction and sliding manœuvre, as adopted in Graefe's operation, is used to extrude them; should this fail, a small curette is used.

A glance at Fig. 9 will show the advantages of this method.

1. Previous iridectomy prevents many risks during and subsequent to the operation, as already pointed out.

2. No contracted pupil preventing its exit, the lens can be extracted by a smaller incision than one-half of the circumference, as shown by the equatorial line in the same figure; indeed, a section of this extent has no tendency to gape, as can be readily proved by section on

the dead body, and by the liberty which I can take with the eye immediately after the operation.

3. The exposed meridian of the lens, represented by the black shading at the margin, shows that we are able to look through the suspensory ligament and clear of the margin of the lens, which enables us to introduce with exactness a small hook behind it, if necessary, thus avoiding the risk from inordinate pressure. I may add, however, that, with my section, I have only eight times had occasion to resort to the hook or curette. In short, we avoid to a great extent the whole string of accidents which may happen at each stage of the ordinary flap operation. The additional security is in the conjunctival flap, which heals in a few hours, and secures against bursting of the wound from muscular exertion, &c.; it is also a guarantee against suppuration of the cornea, and thus renders the operation available in feeble and cachectic patients, in whom such an accident is to be apprehended.

I must here remark that, while I think the conjunctival flap, originally introduced by Desmarres in 1849, to be a great advantage in cachectic cases, and in others where rapid union is of importance, I do not consider it an essential part of the operation; in some cases, indeed, it is rather to be avoided, as, for instance, in pterygion, where it might give rise to excessive hæmorrhage, or in old people with a loose unhealthy conjunctiva, and in those cases where, after iridectomy, there has been found a tendency to serous chemosis. When the conjunctival flap is not to be made, the first stage of the operation is finished by turning the edge of the knife slightly forwards, so as to round off the corneal flap.

I administer chloroform only in cases of traumatic cataract, when the eye is tender to the touch, or in cases where special circumstances render it absolutely unavoidable: thus I have administered it in a case of an imbecile whose steadiness I could not trust to, and in some cases where the patients refused to submit to the operation except under chloroform, all of which cases proved perfectly successful. My objection to chloroform, as a rule, is because it embarrasses me in the fourth stage. With the *vis expellens* of the ocular muscles I can so graduate my pressure as to extrude the lens with ease; but when these muscles are flaccid, I am at a loss as to the amount of pressure requisite. It also deprives me of the opportunity of testing the result at once, which is always desirable. Moreover, in some cases of softened vitreous and of thinning of the cornea, strong pressure upon a flaccid eye may cause collapse. Perhaps those who are in the habit of extracting under chloroform may give a more favourable verdict.

Dressing consists in two strips of court plaster, wadding, and Liebriech's bandage. I never used leeches, and only very rarely have I had to paint belladonna round the eyelids. I take the same precaution with regard to perfect quiescence, avoidance of mastication, &c., as after the ordinary flap extraction. At the second visit—*i.e.*, forty-eight hours after the operation, I remove the dressings, examine the wound, and allow the patient to be out of bed. In several cases I had to open the eyes twenty-four or thirty hours after extraction, and found union complete.

The cases to which I have already alluded, as leading

to the adoption of this method, occurred in 1864, when the spoon operation was still in vogue, and may be briefly detailed thus:—

1. *Double cataract, with dropsy of the anterior chamber, and the largest cornea pellucida on record; vision restored.* —W. B——, aged fifty-nine, weaver. Always remarkable for exaggerated shining goggle eyes, but vision perfect until three years ago, when cataract began; both corneæ highly transparent, glittering, hemispherical, measuring seven-eighths of an inch in diameter, with a diffused bluish haze in the centre, where they seemed thinned; sclerotic also thinned; iris slate-coloured, slightly depressed; pupil irregular in outline, sluggish. Right eye, which was considered the best, had been operated on by Waldau's method; wound healed well, but the cornea collapsed and became opaque.

Nov. 23rd.—Iridectomy performed on the left eye, which was followed by sinking of the cornea, which lasted for a few hours, but rose again under hot fomentations. Six weeks subsequently extraction was performed, lens being removed by a hook; wound healed without a bad symptom. Sees large type without glasses, and is now employed as a porter; is not benefited by spectacles.

2. *Traumatic cataract, with closed pupil; cured.*— J. S——, aged twenty-four, engineer. Four years ago left eye injured by a piece of steel; sight instantly abolished. Inflammation lasted three weeks. Iris discoloured, adherent to capsule; lymph filling pupil and part of anterior chamber. Was for some time under the treatment of a celebrated oculist (Dr. Mackenzie), who declared the eye as incurable. Patient consulted me for muscæ

volitantes in the other eye. Iridectomy and subsequent extraction by my method. Was out the third day after extraction. Reads No. 16 of Jaeger with 2 convex.

3. *Traumatic, cataract, with hypopion and posterior adhesions; cured.*—A. D——, aged sixty-three, mason. Left eye struck with a piece of granite, resulting in inflammation and hypopion. After three months' treatment, iridectomy and subsequent extraction by my method. Reads No. 12 with $2\frac{1}{2}$ convex.

4. *Double cataract, with undilatable pupil, in an epileptic; cured.*—Mrs. B——, aged sixty-five. Subject for some years to epileptic fits, coming on irregularly. Operation by my method. Had a fit the day after extraction, which, however, did not interfere with perfect recovery. Read No. 10 four weeks after extraction.

These cases (which I exhibited at the time to the Aberdeen Medico-Chirurgical Society) having proved so satisfactory, induced me to give the plan an extended trial, with the result of the loss of only 4 out of 107 cases, as shown in the following table:—

	Hospital Cases.	Private Cases.	Total.
Senile ...	57	32	89
Traumatic ...	12	3	15
Glaucomatous	3	0	3
	72	35	107

RESULTS.

	Senile.	Traumatic.	Glaucomatous.	Total.
Healed well, with perfect vision .	81	12	1	94
Healed well, but no vision . . .	2	3	2	7
Healed well, requiring subsequent operation . . .	2	0	0	2
Loss by internal hæmorrhage . .	1	0	0	1
Loss by suppuration	2	0	0	2
Loss by iritis . . .	1	0	0	1
	89	15	3	107

Remarks.

1.—The case lost by internal hæmorrhage was a lady, aged eighty-two, for many years subject to rheumatism. The hæmorrhage was profuse, lasting for two hours, the result probably of a diseased condition of the choroidal vessels.

2.—One of the cases of suppuration, which came on the next day after the operation of iridectomy and extraction done simultaneously, was that of a pauper woman of premature senility with all the joints distorted by rheumatism; small sunken eyes, with granular lids, and blephero-adenitis—a case, in short, in which I operated

against my judgment, circumstances having, in a measure, compelled me to attempt it. This will serve to show that many cases have been operated on by this method which would never have been attempted by the old operation.

The only objection that can fairly be made to this method—namely, that it makes two operations instead of one—may be met by the fact that Graefe's operation, in the hands of Professor Arlt, has required subsequent operation in 10 per cent. Of these secondary operations, according to Wecker, only 50 per cent. recover sight; if, therefore, two operations are to be performed, it is infinitely preferable that the secondary one should precede, and not follow, the extraction. Besides which, it is frequently of essential importance to become acquainted with the habit of the patient's system, which we do during the previous iridectomy. As an example of this I may cite an instance of tobacco delirium which nearly produced serious results:—

In February, 1862, Miss E. C——, aged sixty-eight, was brought to me affected with double cataract. I extracted the cataracts from both eyes by the ordinary superior flap at the same sitting, assisted by her medical attendant, Dr. B——, of M——. All went on well for the first thirty hours after the operation, when we were suddenly summoned, as the patient was delirious, and fighting with the nurse to get out of bed. On our arrival we found her half out of bed, and talking incoherently. On inquiry, we learned that she was a confirmed smoker, and that since the operation the nurse had refused to allow her accustomed smoke. A full opiate quieted the

symptoms at the time, and the allowance of her pipe prevented a return. She recovered without any other bad symptom, with excellent vision of both eyes.

Notwithstanding my conviction of the advantages of my operation, I have not altogether abandoned the old flap extraction, but still perform it in a few exceptional cases, such as the following :—

A venerable city clergyman, aged eighty-one, cataractuous, was affected with such extreme tenderness of the skin that a slight scratch, or even rough friction with a cravat, produced erysipelas. A drop of a solution of atropine on the eye caused serous chemosis and œdema of the eyelid, lasting for a considerable time ; and the least touch on the eye made him shrink, producing spasm of the orbicularis. In this case it was evident that, if the cataract was to be removed, it must be done quickly through the cornea. Accordingly, I extracted by Daviel's method, which proved highly successful.

A lady, about seventy years of age, was brought to me from the country. I wished to operate by my own method; but her medical adviser, Dr. Kilgour, represented that her mind was so made up to have her operation finished within a few days that the delay would be unendurable, and, in the then condition of her nervous system, unadvisable. I therefore operated by the ordinary flap. Six hours after the operation a fit of retching and vomiting occurred, caused probably by nervous excitement, notwithstanding which she made an excellent recovery, with perfect vision.

But considering the great anxiety which these cases cause, the care which they require, and the uncertainty

which they involve, even after the best executed work, I am more than ever determined to reserve it for very exceptional cases, and, as a rule, to adhere to the operation which I proposed.

In conclusion, the advantages of the procedure which I now advocate may be summed up as follows :—

1. It is the safest; all the different stages of the operation may be gone through with precision, safety, and almost certainty of success.

2. The chances of success being so high, we need not put off the operation until blindness of both eyes is complete, but may perform it as soon as one eye is blind and the other becoming so.

3. It does not require long confinement, and does not distress the patient.

4. It is applicable to cases of local and constitutional complications in which Daviel's operation is inadmissible.

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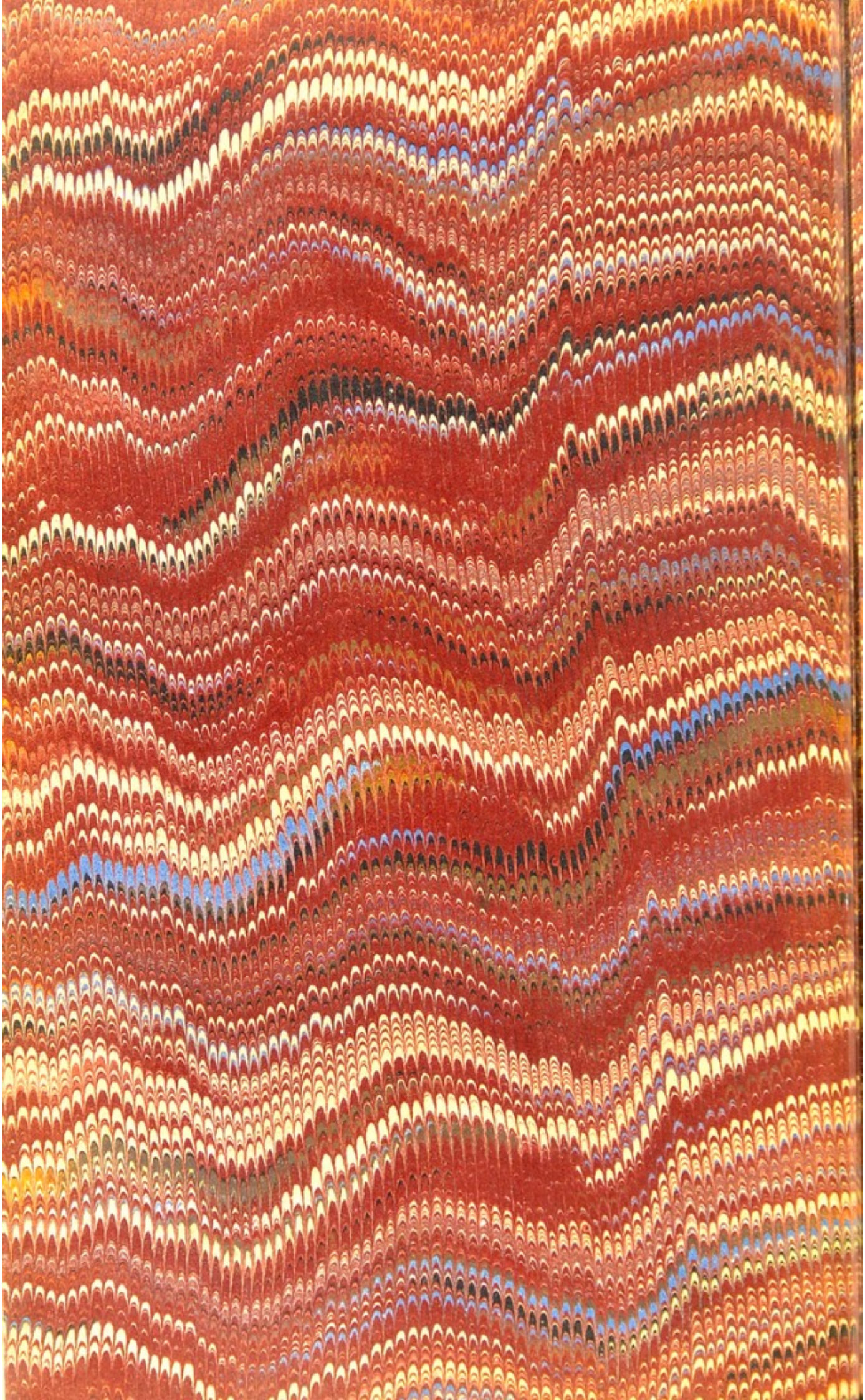

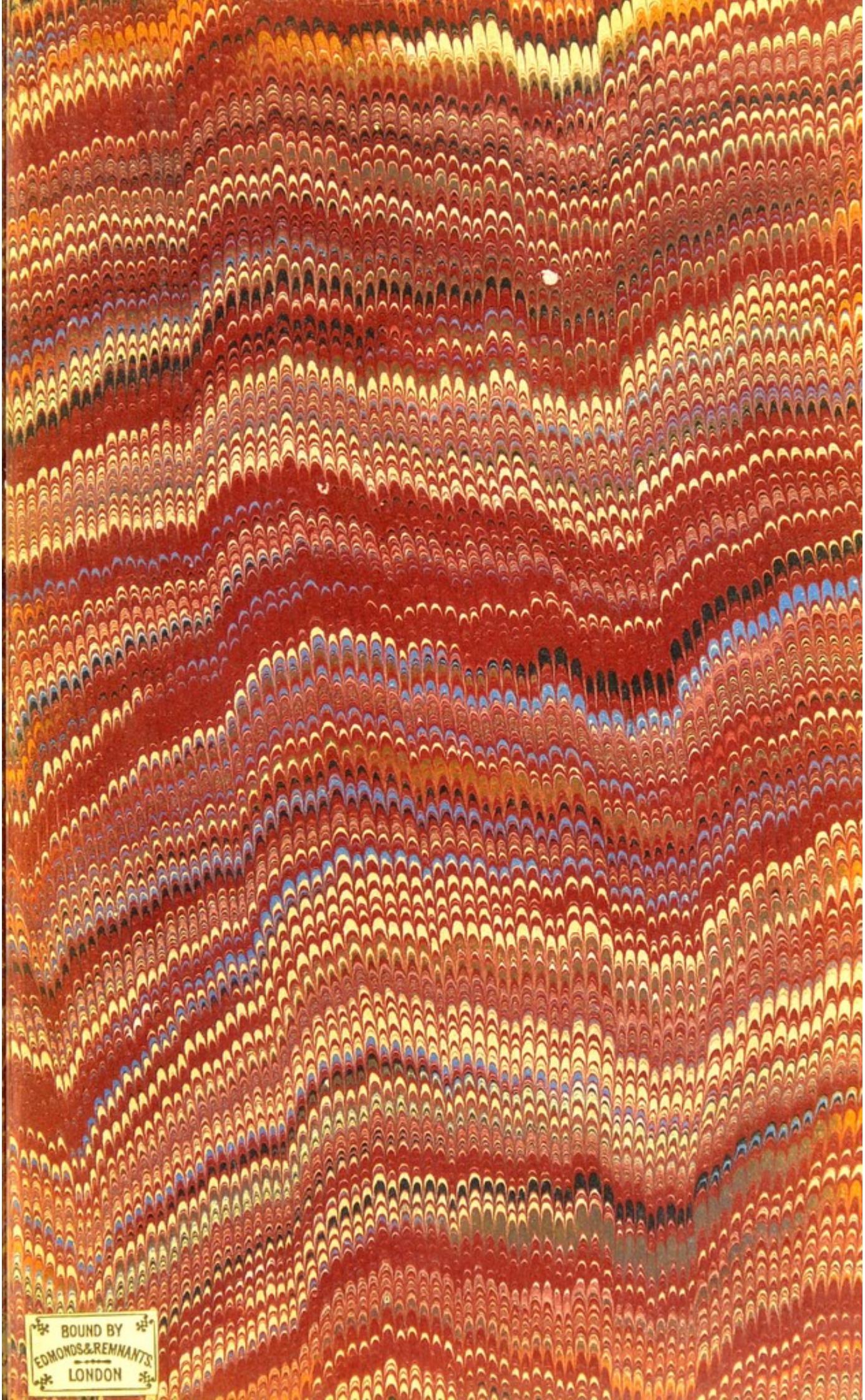
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