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By E. LANDOLT, M. D.,

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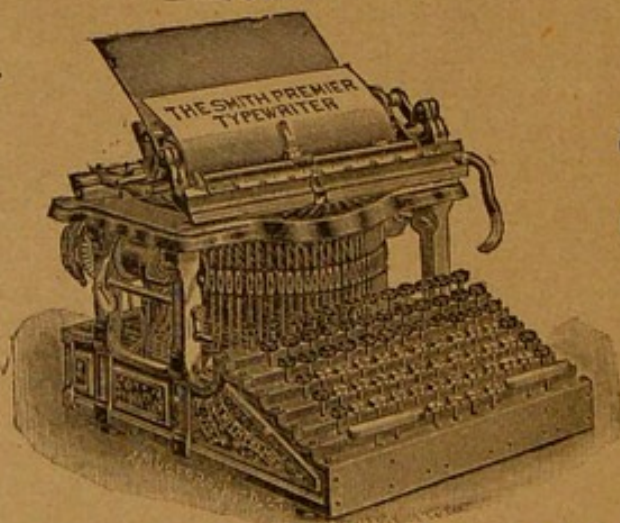
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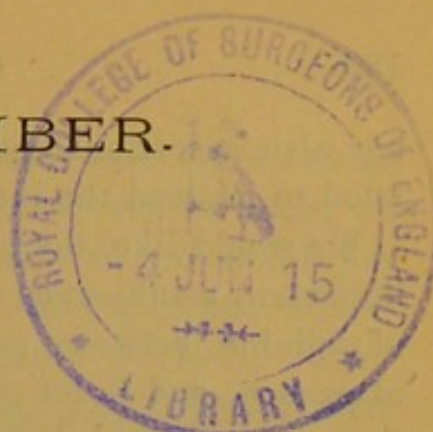


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VOL. II. OCTOBER AND NOVEMBER, 1892. NOS. 4 AND 5.

CATARACT-OPERATION, IN OUR TIME,

By E. LANDOLT, M.D.,

PARIS, FRANCE.

(Translation made, in compliance with the author's request, in part from each of the French and German originals, and the author's special corrections of each, by

C. M. CULVER, M.A., M.D.,

ALBANY, N. Y.)

Cataract-operation has, in all times, had a peculiar charm for surgeons.

Its purpose gives it, for the philanthropist, a leading rank in its class. The manual dexterity and accuracy of vision which it demands, will always assure it the sympathy of surgical adepts. To these may be added the fact that the eye is, for the surgeon, as well as for him who studies its physiology or pathology, a marvelous microcosm, admirably adapted to the study of such new methods as have, in recent times, caused such rapid and astonishing progress to be made, in surgery.

Nothing could be more natural, then, than to see this operation constitute, for men to whom this art specially belongs, the favorite subject of conversation, investigation and publication.

But, in the domain of publication, we meet recently not only contradictions that are disquieting, even for the best judges,

but also assertions that are incontestably erroneous and ^{apt}calculated to mislead the inexperienced.

We would like, therefore, to try to establish the ideas upon so important a subject as cataract-operation, explain the differences of opinion between masters of equal right to authoritative utterance, and to let good sense speak in opposition to propositions that are as baleful as they are fantastic.

This attempt seems to us all the more indicated, at this time, because it affords an opportunity to give an account of the influence, upon cataract-operation, that has been exerted by antisepsis—which has inaugurated a new era, for surgery—and by cocaine, which some benevolent genius seems to have created expressly for our specialty.

In order to render our work the more fruitful and exempt from all appearance of prejudice, we have made sure of the collaboration of a large number of colleagues in all countries and of every age. Convinced that those whose voices are raised highest in the press and in sessions of the erudite societies, do not at all represent the opinion most generally entertained, and that those, to whom it would be best worth while to listen, the masters to whom great experience has long since demonstrated the best methods to follow, are silent, precisely because their way of doing seems to them neither new nor extraordinary; convinced, in a word, of the great utility of a general inquiry into our subject, we have permitted ourselves to address a circular-letter to a large number of our colleagues whose opinions were not known to us.

The benevolence of the welcome, with which that circular was received, has caused us the sincerest gratification. Only lack of time has prevented our personally thanking each of our correspondents for the courteous, interesting and instructive way in which they have kindly replied to our quest. Let them all now accept the expression of our deep and sincere gratitude! Their responses are of the highest value to us, and would constitute the most precious background for the history of ocular surgery, if it were practicable to publish them all.

Those of our colleagues who have not received the circular-letter will excuse us for not having importuned them, in this

connection. The opinions of many of them were known to us, from their publications. Of such opinions, as will be seen, we have rendered account, so far as the extent of this article has permitted. Moreover (as the colleagues will, doubtless, understand), it was hardly possible that all should be heard. We have been obliged to limit ourselves to a single representative of each of the different countries and schools; but I very sincerely hope that, nevertheless, each will find his opinion recorded in the following pages and that, thus, harmony among those who seek, with equal sincerity, what is right, will prevail.

When we speak of cataract-operation we mean to limit our subject to the method by extraction. Now it might be supposed that, Daviel having demonstrated the possibility of removing the crystalline by means of an incision made in the eye, and so many remarkable men having since devoted their attention to perfecting this operation, there ought, at present, to be no longer the least doubt as to the best method to use, in this undertaking.

However, such is not at all the case; the result of our inquiry is the best proof of the considerable differences of opinion, concerning this matter, which exist.

Before the question, as to how to do the operation, is reached, there seems to be a want of agreement as to what are the *indications* for it. And between those who, like Gayet, avoid "as much as possible, operating on unripe cataracts," or who find, with Sprague, that it is "bad surgery to extract immature cataracts," and those to whom operation on unripe cataracts gives "as good results as the extraction of ripe cataracts" (Fuchs, Hirschberg, Schweigger and many others) all possible opinions find themselves represented, and worthily so.

If we consider the operation, itself, we find that there is not a single detail of it which has not been a matter of controversy.

It is almost necessary to strain matters to secure unanimity on this single point, that the best location for the wound is the margin of the cornea, and that it ought to be greater than the cataract to which it is designed to give egress. But there the accord ceases.

Some incise above, some below. Those of one party make a

conjunctival flap, those holding different views carefully avoid doing so. Some will perform, as a guarantee of the success of the extraction, an iridectomy, which others consider as more than superfluous.

For certain colleagues, the lens capsule will have been sufficiently opened only when they have removed a morsel of it by means of forceps; for the majority of operators it suffices that the capsule be cut, with a fine blade, or that it be torn, by means of a delicate point.

And when the cataract has been taken out of the eye, with what care does the one operator avoid entering the wound with any instrument whatever, preferring to attempt to remove the residue by massage alone, practised through the lids; while this other operator goes on to scour hardily the hyaloid sac free from the cortical masses that it still contains, using a spatula, and not even fearing to press them out with the aid of a strong curette. What is still more, the daring one may practise abundant washing of the anterior chamber, which many others consider as eminently dangerous.

How are we to explain this considerable divergence of views (concerning a subject that is, apparently, so simple) among equally competent men who are equally expert and sincere?

Must we conclude that our desire to reach an understanding, in this matter, is premature? Is the extraction of cataract still a problem that is far from being solved? Statistics, which prove this operation to be one of the most successful in surgery, and one which, in the opinion of all, borders on the ideal, exist, to convince us of the contrary.

But how does it happen, then, that the same successful result is reached by so different paths? It must be true that different routes lead to it. Is there, after all, one single, straight road that leads to the destination, and certain of us have found it, while others are straying in by-paths? That is another question!

If we consider the extreme merit of the colleagues who devote themselves to ocular surgery, it is hardly to be conceded that a small number, among them, have been endowed with a kind of grace; while the others, victims of some strange blindness, grope in comparative obscurity and arrive with difficulty, as

if astride the turtle, at the place to which the others have been triumphantly carried by the eagle in his flight.

If therefore we may, without undue temerity, try to solve this problem and even hope to reach a satisfactory solution of it, the task seems, nevertheless, a difficult one.

And, at the outset, on reflecting a bit, one will readily find that there is not a single one, but a rather large number of reasons to explain this diversity of rules concerning the method of operating on cataract.

In the first place it may be due to a *lack of clearness in certain definitions*. Such is surely the case as regards the *maturity* of cataract.

For a long time a cataract has been regarded as ripe, or, in other words, fit for operation, only when the lens was opaque through all its thickness.

Experience has proved that many cataracts are quite ready to be operated upon, though still allowing the ready passage of light. By replacing the term "ripe", which borders on the equivocal, by "operable", one thus brings into a single class the majority of our colleagues. Most of those, indeed, who favor operating on unripe cataracts, mean, thereby, simply such cataracts as are more or less transparent, but which are none the less "ripe" for the harvest.

This does not prevent the existence, among operable cataracts, of a great diversity; such diversity, indeed, that one operative method, for one kind, and another method, for another kind, seem to us more than justified.

It appears to us quite natural, therefore, that he who has more cataracts, of a certain sort, upon which to operate, should give the preference to a method different from the one chosen by him who sees more cataracts of another kind. Thus, we know two colleagues, who practise in the same city, who are equally erudite and both skillful operators. One is at the head of a great, government ophthalmic-hospital, while the other's work is done in his own clinic. The former has more cataracts, upon which to operate, than he wants, and, naturally, chooses the most favorable. His method is the "simple." The other, who has to do especially with those who have not been chosen at the hos-

pital above mentioned, adds iridectomy to his extraction, this seeming to him a simplifying factor, in the numerous complicated cases with which he is concerned.

In this connection, too, a trifle more clearness of definition would be very advantageous. It would be well if the inventors of operative methods would tell us, each time, for what form of cataract the method is recommended.

The classical, senile cataract may be operated upon properly by almost any rational method. In this case, therefore, we need only such guidance as is furnished to us by our own personality and that of the patient. But, besides such cataracts, there exist complicated ones, for which the majority of the brilliant proceedings, extolled in the last few years, do not suffice, which fact their promoters are at some pains not to acknowledge.

Still another cause, which can and ought to influence us in choosing the operative method, is the *temperament of the patient*; in this respect there exist very obvious differences. Some patients are calm, docile and indeed even indifferent and sluggish, while others are impressionable, nervous, unable to endure even slightly acute pain or an operation which is to last any length of time, although, the operation having been concluded, they are able to resign themselves to the essential quiet. The oculist who has more of the patients belonging to the first category, upon which to operate, may, without fear, have recourse to the safer method of operating, whose duration, however, since it exceeds that of the courage of the faint-hearted ones, above referred to, would imply, for it, in their cases, a certain danger.

At times, too, the indocility of the patient, by letting us know in advance that he will not observe the quiet that is so favorable to a prompt recovery, will cause us to accord the preference to the method which requires of the patient the least possible tranquillity.

A third factor influencing the choice of operative procedure, a factor of such importance that it is surprising that no more should have been made of it, hitherto, is the *individuality of the operator himself*, his temperament, his intellectual or moral qualities, his manual skill.

The character of one operator rather favors a bold and rapid

method, to which, operating in public, he aims to give a sort of *brio*. Another, having in view only the final result, desires above all to risk nothing and he will give the preference to a slower and even more complicated method, but one which seems to him safer.

It may happen, too, that one surgeon uses one knife more easily than he does another, or operates more easily in one way than in another. Is he blameworthy on that account? No more than a left-handed man is blameworthy because he does not prefer to use his right hand, or a right-handed person because he does not become ambidextrous when his adroitness does not favor such a course. For let it be noted that each can obtain excellent results by his method, precisely because that is in conformity with his aptitude. All such persons are right and would be wrong only when they wished to impose on each other the peculiar methods that are their own.

We also see, however, the same surgeon change his way, abandon one way to assume another, resume the abandoned method, to modify it, perhaps, radically, after all, in the end. This shows only the more clearly the influence of the operator's individuality upon the choice of operative method.

It is easy to convince ourselves, indeed, that, as regards the operator, there are not alone certain physical, material peculiarities that are properly to be taken into account, in the so delicate undertaking of cataract-extraction, but, as we have just said, his moral disposition and turn of mind are worthy of consideration.

Cataract-extraction, although it has become a "current" operation is not, on that account, an easy operation. Does not its success depend in great part upon circumstances which are beyond our control, as, for instance, the conduct of the patient, over whom we have but limited influence? Improvements of the operative method, in instruments, even antisepsis and asepsis do not wholly protect us against all kinds of accidents. Some sort may occur, and some accidents do happen to the most skillful and to the most fortunate. These vexations, from their very rarity, are all the more annoying.

Why should it excite surprise, then, if the operator be seen

to modify his method, thinking that he has found therein the cause of his failure, against which another form of procedure seems to him to offer more guarantee? He avoids Charybdis. His colleagues will say, perhaps, that he is getting too close to Scylla. And sometimes he will think so, too, and will again change his course, in consequence.

During an entire year I operated upon my cataract-patients without iridectomy. A master in ophthalmology said to me, at that time: "You are now enthusiastic" (I was nothing less than that) "over extraction without iridectomy. I predict that you will change your mind about it. It is a bad method and I am all the more sure of it because, after having operated for a long time, with iridectomy, I became the champion of its abolition and have again resumed, and this time to continue, the doing of the iridectomy."

He was right in a part of his prediction; I became less ardent concerning simple extraction; like himself, I resumed iridectomy, at least for the majority of cases. However there was a gap in his prophecy; it is he who again extols extraction without iridectomy. How are to be explained these tergiversations, these transformations, these oscillations between two methods that are apparently so different?

As for me, I confess that I had annoying complications, due to enclasis and to incomplete expulsion of the cortical remains. I seek to avoid such complications, by excision of the iris, in cases which will be specified later on. The colleague in question, after having suffered similar miscalculations, experienced those of a different character when he operated with iridectomy; for every medal has its reverse. The latter annoyances appeared to him more vexatious than the former, hence he is, until further notice, again the partisan of simple extraction. I say till further notice, for one always risks being forced to change his mind, when one is exclusive.

The responses, so interesting and so varied, with which my circular-letter has been honored, are, moreover, the best demonstration of the influence which the *imagination*, or, to use a fashionable term, suggestion, exerts upon the operator.

Many of our colleagues say that they see one of the principal

advantages, of cocaine and antiseptis, in the reduction of the number of losses of vitreous; others do not even mention that accident, but gratulate themselves that they are no longer meeting, as they formerly did, cases of plastic iritis. Hence some have had to deplore mainly, losses of vitreous, the others mourned inflammations of the iris and secondary cataracts.

The same operation has given rise, for both, to quite different accidents. To what has that been due? Probably to the fact that the first, fearing principally the troublesome consequences of incomplete expulsion of the cataract, made rather too extensive and peripheral section and were not sparing of the manœuvres designed to cause expulsion of cortical masses. For the latter, the loss of vitreous, or even a simple rupture of the hyaloid, constituted a greater danger than did the leaving of some cortical substance. They were less bold concerning the dimensions of the operation-wound and the cleaning out of the anterior chamber. The latter, like the former, wishing to avoid one peril, rushed into another.

And with reference to the post-operative discission. Nothing is more curious than the difference of views held with reference to so simple an intervention. Just half of my correspondents consider it as altogether inoffensive, while, for the other half, it constitutes a graver operation than the extraction itself. And all are, of course, decidedly in favor of antiseptis. Whence this further divergence of principles? It certainly arises from the fact that, despite our utmost precaution, it is impossible to guard the vulnerable organ, on which we operate, against all kinds of infection.

Infection has become rare, very rare, thank God! But he who has had the misfortune to lose, even a single time, by a simple discission, an eye to which he had restored sight by means of a delicate and perhaps difficult operation,—that man will have been so impressed by this experience that he will not enter upon this trifling complement of his work without a feeling of the keenest apprehension.

In short, cataract-operation, notwithstanding the investigations of which it has been the object, despite the improvements it has undergone, still presents manifold dangers, and each operator

will change his method according to the importance he attributes to one or another of these dangers and according to the means, that nature has afforded him, for avoiding or overcoming them.

Every experienced and well-informed operator will approve this way of doing, and even by so doing will admit that there could not be a unique and universal method for the extraction of cataract. If there be a necessity for individualizing the methods, with reference to the cataract and the patient, it is equally desirable to do it with reference to the operator.

There is nothing more deplorable or absurd, or more inimical to progress, than to want to force everybody to take the same route. It will always be the poor musician who has but one string to his instrument, and a poor surgeon who is acquainted with only a single method of operative procedure. Is it not precisely the dominant quality of the great artist that he knows how to adapt himself to all circumstances, to all needs,—in a word, suppleness, mental as well as manual suppleness? How often has it happened that we have been obliged to modify, during the course of an operation, the method which we believed, in the beginning, to be the most appropriate for that case! To be ready for all events, to cultivate no method exclusively, but to possess all—that constitutes surgery worthy the name.

Hence we have never made investigations or exerted effort to find the universal process for cataract-extraction, but to find the means of obtaining, in so different cases, the result invariably desired, viz.: the recovery of sight.

After all, if we admit the propriety of great liberty in the choice of the method of extraction of cataract, is that tantamount to saying that all methods are good ones? Do we indorse him who, under pretence that he handles scissors better than he does a knife, opens the eye after the fashion of the patriarchs in ocular surgery? Or him who would place the operation-wound in the horizontal meridian of the cornea? Or him who would leave the eyes of his patients free from all protective bandage because there have not yet occurred any accidents due to this simple procedure? No! There are, evidently, limits that are to be imposed upon our method of operating. Although there are several things that one may

dare to choose, there are, certainly, others, even among those that have been proposed, that one ought never to permit one's self to do. It is with a view to establishing these limits that we are going to pass in review the different phases of the cataract-operation, employing, as source of inspiration for the task, the experience of our colleagues, as well as our own.

Let us consider, in the first place, the OPERABILITY OF THE CATARACT.

Although, as we have said, experience has proved that operability is in no wise a synonym of *opacity* of the crystalline, there are, nevertheless, some *confrères* with whom the latter is still the principal symptom upon which to base the indications for surgical intervention. Thus Barraquer requires that at least one third of the crystalline be opaque; Chodin, total opacification, or, at least, that of the outer layers of the crystalline; Bagnris, Manz, Schmidt-Rimpler, Waldhauer and others wait for the total opacification.

Others fix, according to the degree of *visual acuity*, the time of their intervention. Mme. Rosa Kerschbaumer operates as soon as vision is sensibly altered; Manolescu, when the patient no longer counts fingers at 3 to 5 metres; Bribosa, at 1 metre; Inouye, at 4 feet; Argyll-Robertson, at 1 foot; Juler, when the patient cannot count fingers at all. "When the patient can no longer read Jaeger No. 16," Critchett says; "when he can no longer read," says Bader, etc.

For some colleagues, it is the *age* which shows the time when a more or less opaque crystalline may be extracted from the eye. According to them, after a certain age, which, for Mooren is 56, for Deutschmann 60, for Hirschberg 50, * for Schweigger † from 50 to 60 years, every crystalline ought to have undergone such a senile transformation that it would permit its extraction without hindrance.

Others, finally, are guided solely by "the patient's interest," ‡

*. Hirschberg, *Centralblatt f. Augenheilkunde*, p. 212.

†. Schweigger, *Ber. med. Gesellsch.*, 2 July, 1890.

‡. Gaupillat writes to us, with reference to this, certain words due to right feeling and we can only approve when he says that, if we consulted more the patients' interest, we should operate on less cataracts; to which we would add that we might operate otherwise than as we do, sometimes.

as they express it: they do not touch a cataract, however opaque it may be, however brilliant a result may be promised, so long as the fellow eye is still good. They would attempt, without hesitation, the extraction of a very imperfectly opacified crystalline, in the case of a still relatively young person, provided its lack of transparency prevents the patient's attending to his business.

We cannot help doubting if, in this way, the real interest of the patient would always be promoted. It was not without reasons, surely, that our ancestors, our masters, have cautioned us against operating on "unripe" cataracts. That which rendered them circumspect, in that respect, was certainly not theoretical speculations or preconceived ideas. It is evident that, as soon as Daviel's marvelous discovery became known, operators went gaily at the extraction of every crystalline whose total or partial opacity had become a hindrance to vision. But they had to recover from such operative ardor. It had been noticed that, if certain cataracts let themselves be removed with the greatest ease, others always show themselves recalcitrant, issue from the eye with difficulty, rarely give kind healings and leave remains which later form secondary cataract that is more bothersome than the primary cataract was. It is true that, owing especially to antisepsis, such complications have become infinitely less to be feared than formerly, but we are nevertheless, like the great majority of our colleagues, of the opinion, that the time for surgical intervention is in nowise an unimportant matter, but that upon its choice greatly depends the success of the operation. And even if we take into account, as in every therapeutic enterprise, the patient's interest, age and vision, these data will not at all suffice to fix, for us, the desirable time for extraction.

An old man may have a cataract which absolutely prevents his reading, and we will advise him to postpone the operation-epoch, if repeated examination has shown us that the opacification of his lens is still in progress. For the inverse reason, we do not hesitate to attempt, upon a much younger person, the extraction of a much more transparent crystalline, if we have

been able to convince ourselves of its stationary or even regressive condition.*

We might say that it is rather the *age of the cataract* than the age of the patient that is of importance to us. The older it is, as an opacification, and the more easily it is disengaged from its capsule, the better result will an operation on it give us. Alf. Graefe exactly expresses our opinion, with reference to that, when he says that "unripe" (*i. e.*, not entirely opacified) cataracts may be extracted with perfect safety, when they distinguish themselves by a very slow ripening (opacification). They are the cataracts with yellow or brown nucleus, with a cortex that is still more or less transparent, as we find them especially in myopes; then, too, the cataracts occupying the posterior pole, at times also the anterior pole, when the nucleus of the crystalline is still entirely transparent; finally the multiple opacities, striated and punctiform, with which the crystalline, otherwise quite limpid, is sometimes, as it were, sprinkled.

If the senile, the classic cataract (which deserves much more than it could formerly have merited, the epithet "*bona et laudibilis*") is generally only the index of an almost physiological change, brought about by age, the form just previously mentioned denotes almost always a profoundly pathological condition of the eye. It is also met specially in eyes affected with a difficulty of nutrition, with choroiditis for instance, and also with myopia, but in cases in which this refractive anomaly is only a symptom of the affection of the uveal tract.†

It suffices to bear in mind the very diverse causes which may engender opacification of the crystalline, in order to understand, without further testimony, how imperfect and fallacious signs

*"The opportune time for the extraction of a cataract is that of its maturity, that is, when the maturity is complete and there has resulted a pathological dehiscence between the crystalline fibres and their implantation upon the anterior, sub-capsular epithelium. It is not true that one cannot, exceptionally, intervene earlier, but, if this be done, one must expect an incomplete clearing up of the pupil, whence more severe post-operative reaction, and a necessity to intervene again, because of the frequency of consecutive cataracts which result from it."

†. Landolt. *La myopie*, *Revue internat. des sciences*. 1879, and on Myopia, London Roy. Ophth. Hosp. Report, Dec. 1879.

the age of the patient and the diminution of vision are, from which to determine the time of the operation. Does not choroiditis affect all ages and do not the affections of the fundus, to which it gives rise, change the visual acuity much more than can be done by the fact of lack in transparency of the crystalline?

Often, it is true, these imperfect cataracts suffice, without other complications, to disturb sight to such a degree that all work becomes impossible for the poor unfortunates who are the subjects of them. The operability of his cataract assumes then, for each of them, the importance of a really vital question. And it is on this account an extremely delicate question for the operator. For the success of the operation is never more important than just with those unfortunate ones, whose sight represents the bread-winner.

It is as much with a view to assure success, as to hasten the moment of deliverance, that it has been attempted to *artificially ripen* the cataract. The first means proposed, with this aim, consisted in the making of a traumatic cataract by puncture, the laceration of the crystalline.* The result of this operation has not always been good. Often a very brisk swelling of the lens, accompanied by iritis and glaucomatous symptoms, have followed it and have necessitated too hasty extraction, done under very unfavorable circumstances. It is for this reason that von Græfe and Mooren advised letting an iridectomy take precedence of the puncture of the crystalline, and that Schweigger,† otherwise very favorable to this method, reserves it for patients not yet out of the forties.

In order to escape the above-mentioned dangers of the puncture of the crystalline, Muter‡ had already advised, in 1813, not to pass the needle into the substance of the crystalline, but

* Gibson. London, 1811. Von Græfe, *Arch. f. Augenheilk.*, I, 2, p. 219, 1854, and *Arch. f. Augenheilk.* X, 2, p. 209, 1864.

† Schweigger, *Berlin. med. Gesellsch.* 2 July, 1890.

‡ Muter. *Practical Observations on various new methods of operation on cataract*, London, 1813.

to make simply a moderate discission fo the capsule. Steffan * speaks highly of his success with this method; in 330 extractions, he made a preliminary section of the capsule 98 times. He did not once have any bad result due to it. Indeed it was in these very cases that he obtained the best acuity of vision.

Förster † has tried to obtain opacification of the crystalline by a still more delicate method, that is to say by simple massage of the crystalline, without lesion of either the lens or its capsule.

As is well known, the author accompanied his procedure with an iridectomy.

It is self-evident that massage of the crystalline is also possible without excision of any of the iris; it suffices to bring the lens into contact with the cornea, by means of a paracentesis (E. Meyer, Copenhagen Congress, 1884). The massage is done through the cornea, sometimes with only the lid, sometimes with the aid of a rounded instrument, as a strabismus-hook or gutta-percha curette, or the like.

De Vincentiis (see the very interesting and very complete thesis that Antonelli, a pupil of Vincentiis, published at Naples, in 1890, on the "*Maturazione artificiale della Cataratta*") advises making the friction in a centrifugal direction, from the centre towards the periphery of the crystalline.

Mooren ‡ uses, to bring about the maturity of the cataract, a process combining puncture, of the capsule, and massage. He commences by opening the anterior capsule by means of a Græfe knife which he passes very obliquely, without letting it enter into the true substance of the lens; then he does the massage through the closed lids. In this way, the author adds, the relations of the lens and its capsule are sufficiently relaxed so that the extraction of the cataract may be performed at the end of from 5 to 8 days. He treats all forms of zonular cataract in this way, and speaks highly of the method.

We have had recourse to the method advised by Förster, each

* Steffan. *Arch. f. Augenheilk.* XXXV. 2, 1889.

† Förster, *Ueber künstliche Reifung des Staares.* Knapp and Schweigger *Arch. f. Augenheilk.*, XII. 1, p. 3; and Zehender, *Klin. Monatsbl. Beilageheft*, 1881, p. 133.

‡ Mooren. *Fünf Lustren ophthalmolog. Wirksamkeit.* Düsseldorf, 1882.

time that ripening has been required by the patient's interest. I do not like to do the extraction in less than a month afterward. I willingly wait longer, if the massage have not brought about a modification in the opacity of the crystalline. I esteem very highly, as will be seen further on, a preliminary iridectomy thus obtained and which is nowhere more indicated than in these cases of cataracts that are both impure and unripe.

"When one practises the massage of the crystalline through the cornea, pressing on the iris is to be avoided with care, otherwise one risks setting up traumatic iritis. It is to avoid this danger and, at the same time, to make the massage more efficacious, that some colleagues mass the crystalline directly, by means of a spatula."*

When we approach the topic of the CORNEAL INCISION necessary, for the extraction, we do not meet great differences of opinion. At all events the arsenal, which was formerly so richly supplied with cataract knives, is considerably simplified, now a-days; the discussions as to the length and breadth, in millimetres, of the blade, have been abandoned, the compass for tracing and measuring, in degrees, the arc of the operation-wound, has sunk into oblivion and, although we have, even lately, heard the extent which it is desirable to give the wound, defined to within one-fourteenth of the corneal circumference. we are pleased to know that operators limit themselves, now, finally, to saying that it is necessary to make the incision conform to the volume of the cataract, at the same time making it rather too large than too small.

It is one of the inestimable benefits of antisepsis to permit us to be no longer so parsimonious with the opening of the ocular globe as formerly, when each millimetre more in the extent of the wound added, by just so much, to the chances of infection.

The great majority of surgeons make this section by means of the Græfe knife. Wecker† extols a still narrower knife. There are only a few who, like Zehender, Schweigger, Steffan

*Bœrne Bettman, A New Operation for the Speedy Ripening of Immature Cataracts,—Chicago Medical Society, 1882.

† Wecker, Ann. d'Oc., 1884, page 219, and Wecker and Landolt, *Traité complet d'Ophth.*, II, p. 1006.

Inoue and others, prefer a broader blade, approaching more or less the triangular knife of the ancients.

Theoretically the somewhat broad knife makes a cleaner wound than does the linear knife, but it is necessary, in order to avoid the dangers that it meets, to have a particularly steady hand, and this suffices for the making of a clean section with the linear knife. The latter presents the advantage over the former that the different phases of incision, puncture, counter-puncture and section, properly so called, are executed successively, while, with the broad knife, a part of the section is made at the same time with the counter-puncture, so that the operator is obliged to fix his attention on at least two points at once.

The fine and elegant Græfe knife, moreover, is adapted to so manifold uses, that, besides being an ideal knife, it can and does, in the hands of some operators, replace the lance, for iridectomy, the cystitome, the discission-needle, indeed even the curette, for the expulsion of the cataract.

The immense majority of our colleagues operate above. So far as we know, only Drs. Waldhauer, A. Græfe, Steffan and Schweigger prefer the *lower* margin of the cornea for the extraction of cataract. This method, from beginning to end, is of extremely easy execution. The eye fleeing instinctively upwards, we have not, at least after the counter-puncture, further need for the fixation-forceps, and we may dispense with the blepharostat, because the wound remains always in the opening between the lids. Thus the operation becomes one most easily endurable by the patient. It was for this reason that we formerly operated by this method.

Our method was, in short, merely the old-time, lower, flap-extraction, without iridectomy, done with a Græfe knife. The lids were held apart and the eye-ball steadied, by the fingers of the left hand. It was, as is readily seen, a method which deserved, among all, the qualification of *simple*. But, leaving out of present consideration the prolapse of the iris, of which we will speak later, it seemed to us that the wound, which was thus in the gutter formed by the two lids, was more exposed to infection than when it was covered by the upper lid.

Moreover, we have noticed, at times, a defective coaptation

of the lips of the wound, the peripheral border being depressed by the lower lid. Finally, the frequent cases in which the excision of a piece of the iris is necessary, seemed to contraindicate this method, because of the blurring of vision, to which the inferior coloboma might give rise. However, the incontestable worth of the colleagues just mentioned, who, for many years, have operated on thousands of eyes, according to this method, seems to prove that the disadvantages, which are inseparable from it, are not very great, especially when compared with its advantages. Nor shall we by any means hesitate to have recourse to it again, whenever, for whatever reason, the upper part of the eye seems intangible.

As to the location of the wound, it is nearly always made in the *limbus corneæ*. In this connection, it is interesting to note that several colleagues, among others Bronner, Chodin, Deutschmann, von Hippel, Samelson and Tacke, declare that they have believed themselves justified in carrying the section into the cornea itself only since the introduction of antisepsis. We well remember, indeed, that the corneal tissue was considered as peculiarly inclined to purulent infection.

At present, we no longer need to be preoccupied, in the choice of the place for the incision, otherwise than with other circumstances which may have influence upon it. A very voluminous cataract, with a cornea of small dimensions, will require us to approach the sclerotic, in order to obtain a large section, without excessive height of the flap. In cases wherein we fear loss of the vitreous, we shall keep, on the contrary, rather within the limits of the cornea.

It will be remembered that von Graefe's aim, in inventing his "linear" section, was to approach, as much as possible, a meridian of the ocular globe, in order to obtain a more nearly perfect coaptation of the wound. It is interesting to note that Panas extols, for the same reason, just the opposite of what von Graefe did, Panas recommending that the section be made as oblique as possible. If Graefe's principle be followed, the surfaces of the section become very narrow; their breadth would be exactly the thickness of the sclerotic, if it were possible to obtain an absolutely linear incision, *i. e.*, make it coincide with a merid-

ian. Panas seeks, on the contrary, a broad section-surface, considering that, the vaster the surfaces that are in contact, the prompter and more solid will be their reunion.

It seems to me that, here, again, the best is to be found in the golden mean. As regards lineality, in the first place, von Graefe never pretended to have obtained it in any rigorous way. Quite on the contrary, the entirely sclerotical location of the puncture and counter-puncture, required by his method, gave so broad borders, to these two parts of the wound, that it was often difficult to disengage the iris, or, indeed, even the *débris* of the cataract, from them. The impaction and herniæ, of the iris, which often constitute undesirable features of the operation, even when performed by master-hands, have forever put us on our guard against sections which involve too great an extent of the tissues. Manipulations in the anterior chamber, excision of bits of the iris, capsulotomy, expulsion of cortical masses, reduction and smoothing out of the iris, etc., become by just so much more difficult in proportion as the wound is oblique and, in consequence, its edges broader.

What we have just said is partly applicable to the *conjunctival* flap. This last forms a perennial subject of controversy between operators. Some abhor it, as a hindrance to the operation, as a receptacle for *débris* and a possible focus of infection. Others consider it, on the contrary, as a protector of the wound against infection from without (Manolescu, Knapp * and others). For my part, according to what I have just said, the conjunctival flap is rather a complication, and I do not at all seek to make it: but if it happen to be made in cases in which, for any reason, I have placed the incision somewhat in the sclerotic, I by no means fear it. It rests merely with me to keep it within moderate limits by turning the knife, toward the end of the section; and cleansing the eye, aided by the spatula that is passed under the flap, seems to me to afford sufficient warrant against the danger of infection. These considerations possess, however, only a very secondary importance, now that antisepsis procures so prompt and perfect healing.

The same is not true of *iridectomy*, which many operators

* Knapp. Trans. Heidelberg Congress, 1886, p. 164.

consider an integral part of the cataract-extraction,* while others condemn it almost absolutely.†

I have reflected much about this question, which is being debated so vivaciously now-a-days. I have operated with and without iridectomy; I have sought the opinion of the foremost authorities among our colleagues, as much by means of conversation as by correspondence and by study of their publications.

Despite the differences of opinion which still separate operators, it does not seem to me impossible to reach an understanding,

* I considered iridectomy as indispensable to assure the lasting success of a cataract-extraction. According to the cases of extraction, without iridectomy, from my statistics, and according to those that I have seen, from those of colleagues, I believe that extraction without iridectomy disposes not only to secondary cataract but also to chronic irido-choroiditis, two affections which gravely hurt the final result of the extraction."—Eperon.

"I maintain the doing of iridectomy in all cases."—Von Hippel.

"I greatly favor the combination of iridectomy with extraction."—Argyll-Robertson.

"I uphold the performance of iridectomy, because it facilitates the expulsion of cortical masses and because I regard as a step backward, indeed, often, even a danger,—the severe *régime* that simple extraction imposes upon the patient."—Manz.

"The cataract-extraction, with iridectomy, is the safest."—Fuchs.

†Prof. Williams, of Boston, writes to us:—"I have long since abandoned iridectomy in extractions. * * * * The use of *cocaine* also increases the facility of placing a minute suture of the corneal incision, in cataract operations, which I was the first to describe and recommend, in a paper published in Vol. VI. of the Reports of the Royal Ophthalmic Hospital, London, in 1867." See, also, Schweigger, Heidelberg Congress, 1888, p. 148, and Panas. Communication made to the *Académie de Médecine de Paris*. Hirschberg. *Centralblatt f. Augenheilkunde*, 1889, p. 264, and in the *Trans.*, of the Heidelberg Congress, 1888, the communications of Gayet, Knapp, Schweigger and Wecker. Wecker justly entitles himself one of the most ardent defenders of simple extraction. "Now-a-days, with the improvements in the operative procedure, as well as in dressing, I have achieved so satisfactory results that I believe myself able to affirm that the simple method can and ought to be applied, with very rare exceptions, to nearly all kinds of cataracts."—Galezowski. *Soc. franç. d'opht.* 1889.

"At present I perform iridectomy only exceptionally and the rare impactions of the iris, in mass, that I have observed, have not prevented, after four to six weeks, having and retaining good acuity of vision."—Bravais.

provided some willingness be brought into play,* concerning this subject, which appears so difficult to clear up.

Here, again, as concerning other points of the subject now under consideration, one sins much by failing to be precise in the definition. Thus we have noticed that many of the champions of *simple extraction*, who seem to recommend it for all kinds of cataract, nevertheless pretty often add an *iridectomy* to their extraction. If, at such a time, one remarks to them that they are committing a breach of the rule, they reply that it is now a question of a complicated cataract, and that they generally understand, by cataract, the classic, true, good cataract.

It is evident that, on such a plan, we might dispute endlessly, for the *good* cataract may be operated upon by no matter what rational method. But in this *practical* article, we want to speak of all kinds of cataract that are met with in adult patients, and speak of them sincerely and without reservations.

This being understood, I do not expect to meet much contradiction when I declare that the extraction of cataract is never simpler, easier or more durable than when performed on an eye in which the *iridectomy has been previously made*.

The coloboma, by showing us the lens, clear up to its equator, permits us to form an exact idea of the dimensions and nature of the cataract. In this vast papillary field, the cystotome makes its way and does its work, without encumbrance. Whether we use a hook or blade, we readily perceive whether or not we have sufficiently opened the capsule, and we may enlarge our incision at will. If we prefer the capsular forceps, we do not incur the risk of seizing the iris. In either case, observation of the equator of the lens informs us as to the position of the cataract and will warn us of the least danger of its luxation. We have, at the same time, leisure to follow the movement that we impart to the cataract, by pressure, and counter-pressure, and we can thus ren-

* Hirschberg (*Centralblatt*, 1889, p. 24), justly says :

"In a purely practical province, like that of cataract-operation, it is specially desirable not to dispute, with blind passion, as if it were a question of theological dogmas." And, later: "Nothing, in this domain, is more injurious than exaggerations."

der its expulsion as slow or as prompt as we desire. And if, for any reason, the forced extraction of the crystalline becomes necessary, traction-instruments find, in the coloboma, a wide open door.

The crystalline out of the eye, it is easy to make the *débris* follow its example. In the first place, we see the *débris* clearly, which is the first condition upon which depends the ridding ourselves of it, and then the *débris* encounters no obstacle in the fold of the iris, which places itself in front of them when the coloboma does not exist.* Moreover, the iris is never bruised, either at the time of the passage of the cataract or by the manipulation necessary for the removal of cortical masses.

Finally, we need not fear prolapse of the iris. We may take leave of the patient, with full confidence, indeed we may give him much liberty. He will retain his bandage the desired number of days, without our being obliged to endanger the healing by premature inspection of the eye; and this inspection is necessary when there is no iridectomy, each time that the iris has not re-entered spontaneously and entirely, without which one is exposed to hernia of that membrane, which hernia is so much the more to be feared in proportion as one has less completely expelled the *débris* of the cataract.

If, despite all, there have remained in the eye some bits of cortex, strongly adherent to the capsule or having escaped our attention because of their transparency, this incident generally, thanks to the coloboma, has no troublesome consequence; even if they

* "Iridectomy makes it very easy to extract the capsule and when one does not succeed in extracting the pieces of the capsule, iridectomy permits the making of a very extended and very exact discission.

"It permits, moreover, the watching of the expulsion of cortical masses."—Tacke.

"Besides the greater protection it offers against impactions of the iris, I consider iridectomy very useful because it facilitates the absolute clearing up of the pupillary field and consequently prevents the formation of secondary cataract. In 130 extractions, I performed, at most, four discissions."—Neese. (Kiew.)

"Iridectomy is very favorable to prompt and complete expulsion of cataract and also to prevent or mitigate the dangers of inflammatory processes, which often follow the best performed operation."—De Vincentiis.

swell, they scarcely come in contact with the iris. And if, instead of being resorbed, they should go on to form a secondary cataract, the pupillary field, made greater by the iridectomy, is nearly always large enough, still, to offer some clear part, which permits satisfactory vision.

Finally, if an ulterior operation should become necessary, the coloboma renders it easier and less painful. But its greatest advantage consists precisely therein, that, by lessening the traumatism of the iris, in facilitating the clearing up of the anterior chamber and in increasing the pupillary field, it considerably reduces the necessity for such secondary interventions.

Now a proceeding which facilitates not only the diagnosis of the cataract but, still more, the most important parts of the operation on it: cystotomy, expulsion of the lens, clearing up of the anterior chamber, which permits avoidance both of traumatism and prolapse of the iris, and, consequently, of the most redoubtable of the complications of that operation, such a proceeding seems to merit the preference over all other methods and one might conclude, from this, that iridectomy ought always to constitute a part of the cataract-operation.

But we must not lose sight of the fact that we have been discussing a preëxisting coloboma. An *iridectomy* that is made *at the same time with the the rest of the cataract-operation*, although it has its advantages, also has its inconveniences which a preliminary iridectomy does not offer.

In the first place, it prolongs the operation; it renders it somewhat more painful and at times complicates it very seriously. Such a complication is met with, specially, in the hemorrhage which sometimes obscures the field of operation in an extremely bothersome way. In this way the capsulotomy becomes very difficult, because the operator does not see clearly what he is doing. It is true that the blood may almost always be removed from the anterior chamber, but it sometimes renews itself so obstinately that the operation assumes a duration that, of itself, is something of an inconvenience, not to speak of the manipulations made for the removal of the blood. In order to profit by a part, at least, of the advantages of iridectomy, without subjecting ourselves to its inconveniences, we sometimes make the

capsulotomy precede the iridectomy. It might be objected, to this mode of procedure, that, the capsule having been opened, the pain caused by the iridectomy might cause a sensitive patient to exert a sudden contraction of the ocular muscles and thus cause too violent expulsion of the cataract. This accident has, however, never yet happened to us. We operate, in the first place, very carefully, and we reserve this method for semi-transparent cataracts, in the case of which kind hemorrhage is peculiarly bothersome; but which, on the other hand, are distinguished for their adherence to the capsule.*

Iridectomy has been reproached with complicating the cataract extraction by a traumatism of the iris. The excision is incontestably a traumatism, but the pressure, to which a non-excised iris is subject during the egress of the cataract and especially because of the manipulations necessitated by the expulsion of the cortical masses, is another traumatism that is none the less to be feared. A clean section of the iris has always been considered less grave than a bruise of it. And although the latter is less to be feared since the introduction of antiseptics, the dangers of its cutting are in a like degree diminished by the same antiseptics.

It has also been said that, although prolapse of the iris is less frequent when the iridectomy is made, this latter by no means excludes it absolutely. This is incontestable.†

* It sometimes seems to us as if these hemorrhages have become more frequent, since we use cocaine and antiseptics in connection with our operations. Anagnostakis, who has made the same observation, attributes it to the influence of cocaine. However this may be, we are careful not to abuse this precious anæsthetic and we use only just enough of it that its effect may last as long as the operation does.

† "In 500 operations done consecutively, with iridectomy, I have had to deal with prolapse of the iris only once."—Tacke.

It is well, too, not to forget what Otto Becker himself said, with reference to his discovery, so often cited in favor of simple extraction. "My investigations were made at an epoch in which everybody still operated with iridectomy, so that I do not believe I am wrong in saying that, among the eyes that I examined, there were, at most, 2 or 3 that had been operated on without, for a score that had been operated on with iridectomy. The sense of my *statement* then, and I still maintain it, to-day, is, that it is always rare that the iris is not found engaged in, or adherent to, the cicatrix. But I do not think it permissible to draw, from this observation, a conclusion in favor of simple extraction."—O. Becker, Heidelberg Congress, 1888, p. 176.

It is not rare to find more or less deformed colobomata of the iris, the angles of the pupillary circle approximating the wound, indeed even a bit of iris visible in one of the extremities of the cicatrix. This annoying accident can, however, be avoided, as we shall see, by means of a complete excision and subsequent reposition of the iris.

Finally, it has been justly observed that the coloboma of the iris makes possible the engagement in the wound of a strip of the lenticular capsule. This danger may be avoided either by the excision of a bit of the anterior capsule, or by a horizontal capsulotomy, or simply by means of a spatula, passed between the lips of the wound, to put the capsule again in its place.

However this may be, the inconveniences, just mentioned, of iridectomy, on one hand, on the other the truly seductive appearance of an eye that has undergone an operation without lesion to the iris, finally the extreme facility of this operative procedure, have led a large number of our colleagues to resume extraction without iridectomy or "simple extraction," as it is called.

It is indeed difficult to withstand the charm of this method which is so simple, so elegant in itself and so inspiring of hope for an ideal result, ideal from the point of view of cosmetics, especially.

But is the *cosmetic* point of view justified, when it is as grave a question as of restoring sight to a blind person? Frankly, I think not. Moreover, the ugliness, of an eye having a superior iridectomy, must not be exaggerated. When I see one of my patients on whom I have formerly operated for the extraction of cataract, I am almost always obliged to raise the upper lid to make sure whether or not he had an iridectomy. It will readily be conceded that a defect which becomes manifest only when one raises the lid of him who suffers the defect, cannot sensibly disfigure its victim, especially when he wears spectacles, as is the rule in such cases. *

* I do not understand the colleagues who, with reference to cosmetic effect, make so much of a round pupil. Since I have been in practice, no patient has ever asked me to so operate on him as to keep a round pupil. The patient desires to *regain sight*, whether it be with a round pupil or with one having the form of a key-hole; that's all one to him, and to me, as a practical oculist, equally.—Steffan, *Arch. f. Augenheilk.*, XXXV, 2, p. 183.

For the same reason, we are rather indifferent to the reproach of dazzling to which, according to some authors, eyes with upper colobomata are exposed. An upper coloboma, covered by the lid, could hardly give passage to much light unless its owner desired that it should. The fact is that I hardly recall having heard persons, who had been thus operated on, complain of too much light. And, in short, if so skillful operators as Græfe and Steffan, for instance, who have operated for years on hundreds of eyes, with lower iridectomy, have hardly heard their patients complain of dazzling, we certainly risk nothing, in that direction, with a superior coloboma. *

Praise has been given the *greater acuteness of vision* and a sort of accommodation which aphakic eyes, having round pupils, enjoy.

We have even heard proclaimed, in an ophthalmic congress, the absence of astigmatism from eyes upon which cataract-operations, without iridectomy, had been done. There is no need, I think, to refute such assertions, which are good for nothing but to show to what extent the sayings of certain authors are open to suspicion. For, if one dare so disfigure facts whose verification is so easy, what good faith can there be in their affirmations whose truth or falsity is not susceptible of so facile proof?

The accommodation, of eyes deprived of their crystalline, does not exist any more, either. That has already been sufficiently demonstrated by Donders. If eyes deprived of their crystalline see relatively clearly at different distances, this is only a stenopaic phenomenon.† Retinal images are, other things being equal, more distinct in proportion as the pupil is narrower. But, in the cases of the majority of those who have undergone cataract-operations, not the pupil, but the opening in the capsule, is the visual aperture. The former may, moreover, by means of the lids, be easily reduced to the desired dimensions, a strategem which ametropes of all kinds have long since found out for themselves.

* Steffan, *Loc. cit.*, p. 184. "No patient of mine has ever complained to me of dazzling, yet I operate downward."

† Fritz Schanz. *Verhandl. der Gesellschaft Deutscher Naturf. u. Aerzte, Halle, 1891.*

As to *visual acuity*, Gayet has been kind enough to compute for us the statistics of 195 cases of cataract upon which he operated in 1880, *with* iridectomy and of 195 cases likewise operated upon by himself in 1890, without iridectomy. Now the average acuteness of vision, in each class, is $\frac{1}{8}$, that is to say, absolutely identical in the two classes. *

Fuchs, A. Græfe, Haab, von Hippel, Samelsohn, Schiess, Swanzy, Manz and, among many others, also I, have found likewise, no difference of visual acuity in the two classes of patients who have been operated upon according to the two methods. And it should not be forgotten that simple extraction is generally reserved for the most favorable cases, while one adheres very willingly to the method with iridectomy in complicated cases. †

According to such facts, the argument of the superiority of the visual acuity given by extraction without iridectomy, is likewise reduced to a very slight matter. In a question like the present, the calculation of circles of diffusion, the optical considerations in which one neglects the influence of the cicatrix on the refringent surfaces and that of the lens capsule, as well as of the *débris* of the cataract on the passage of luminous rays—such theoretical speculations are not important. It is practice and not theory which ought to decide, and which does

* It is well to note that acuteness of vision is generally tested 12 or 14 days after the operation. It goes without saying that it increases, subsequently; but it is hardly admissible that this modification would be different, for eyes operated upon with, from what it is for eyes that have undergone operation without, iridectomy.

† "A person who has been operated upon for the extraction of cataract, who wears a convex lens of $3\frac{1}{4}$ " to 4" focal distance, placed a certain distance in front of his eye, is in no wise hindered, in making his way about, by the increase in his pupillary field. Perhaps rather the opposite would be the case. That is what Berlin has already demonstrated, at the Heidelberg Congress (1869) in his communication concerning the influence of strong convex glasses upon excentric vision."—Steffan, *Loc. cit.*

"I always perform a narrow iridectomy above because it protects most from iris prolapse, while it causes no disfigurement, nor lowering of vision, nor does it affect the power of orientation nor the mobility of the pupil."—Swanzy.

"I think that the optical disadvantages of a coloboma have been unduly magnified."—Sprague.

decide in an infinitely simpler and more conclusive way.

Gayet's statistics, as well as the observation of investigators who, like him, have proved that the degree of vision is the same, with or without iridectomy, settles the question, as to the acuteness of vision, in an almost decisive way. It remains possible, however, that, if the *average* of visual acuteness be equal for the two methods, vision may nevertheless be much better in an eye operated upon without iridectomy, perfectly successfully, than in an iridectomized eye. If this were true, it would follow that, if the simple method gives, when successful, a greater acuity, it leaves other cases below the average obtained by extraction with iridectomy—that, if it be of surpassing excellence in choice cases, it is bad in unfavorable ones.

The combined method is, moreover, far from excluding the ideal, with reference to visual acuity. It has many times given us vision equal 1.00, indeed even 1.25, that is to say, as much as it is possible to obtain.

The degree of visual acuteness could not, therefore, weigh heavily in the balance. Hence, if many colleagues give the preference to simple extraction, it is from other motives: according to them, the intact iris retains the vitreous, prevents the impaction of the capsule and constitutes a bulwark against the infection of the interior of the eye.

This is possible, though rather difficult of demonstration. It is best not to lose sight of the fact that extraction without iridectomy requires a somewhat larger wound and somewhat greater pressure, for the expulsion of the lens, than does extraction with iridectomy. Those are two factors which favor the issue of the vitreous. Besides, if, in case the vitreous were liquified, with atrophy of the zonule, etc., the rapid extraction of the lens by a vectis became necessary, the absence of the coloboma would make this operation singularly perilous. As to the impaction of the capsule, we shall see, further on, that there are several simple means to prevent this, and, if we scarcely ever see infection of the eye, any more, we owe this benefaction to asepsis, and not to the return to the simple method, which asepsis has favored.

For us, the superiority of extraction without iridectomy con-

sists in its *simplicity, ease and rapidity*, and the little traumatism to which it exposes the eye, IN CASES IN WHICH IT IS APPLICABLE.

Indeed, here again, as everywhere else, and perhaps more than in any other part of our operation, it is a question of adapting the method to each particular case, when each method will reward us by the advantages it possesses, while, by operating according to one single method, we necessarily expose ourselves to the undesirable qualities that belong to it. *

Thus we have said that simple extraction implies the dangers of laborious and incomplete evacuation of the cortical masses, of traumatism of the iris and of its prolapse. Now these dangers do not exist in all cases, or at least, not in all cases in like degree. An entirely ripe senile cataract, detaching itself easily

* "I am thoroughly convinced that there is no method of operation suitable for all cases, and I have no confidence in anyone's reports that so many hundred extractions have been made, without change or mishap, by one method only. I think good judgment as to the method of operation is as necessary as dexterity in making it. I am not favorable to fads of any kind, and the last one, that all extractions should and can be made without iridectomy, is all a fallacy, and the reports of so many thus made successively, successfully, I am forced, by my experience, to doubt."—Keyser. (Philadelphia.)

"I think that a definite statement—that iridectomy should or should not be performed—is wrong. Each case should be judged according to its nature."—Juler.

"I have operated with and without iridectomy; it is best to make the method correspond to the form of the cataract."—Schmidt-Rimpler.

"At present the rule I follow is:

1. To operate *without* iridectomy in cases in which the cataract is ripe and the cornea large, which permits the making of a non-peripheral, and still sufficiently extensive, incision.

2. To operate *with* iridectomy in cases in which the cornea is small (for here the peripheral incision is obligatory and the chances of impaction of the iris much increased); moreover, in cases in which the cortex is soft, or the cataract unripe."—Dufour.

"At all events it is best to *choose* the cases in which one can or ought to operate without iridectomy and it is desirable to individualize."—Brettauier.

"It follows that extraction without iridectomy is not applicable to all forms of cataract, but only to senile, ripe cataracts and to the soft cataracts of youth, that is to say, to cataracts in which the cortical substance is easily eliminated. (Landolt, *Centralblatt f. Augenheilk.*, 1879, p. 234). I now add that not even nearly all these favorable cataracts offer themselves as fit for simple extraction."

from the capsule, perfectly admits of this simple and elegant method. White and soft cortical masses, that sometimes remain in the eye after the issue of the nucleus, are very easily removable. Usually the iris replaces itself and the pupil contracts, without the aid of a myotic.

Post-operative prolapse is rather rare in these cases, provided we have taken care to remove all the remnants of cortical substance, and that the patient keep quiet during the first days after the operation.*

If, contrary to all anticipation, the iris should evince a tendency to prolapse, it is best, in our opinion, to excise it before applying the bandage.

We advise, indeed, that one do not incur the risk of prolapse of the iris, which is sometimes produced, even in the apparently most favorable cases, and with all the more reason in cases wherein the iris has not spontaneously resumed its place.†

To reduce a prolapse of the iris the day after the operation for extraction, is certainly a bad proceeding. One thus runs the risk of carrying infection into the interior of the eye, and one is almost sure to fail of accomplishing one's main purpose. The iris, thus replaced, will only exceptionally remain in position: the prolapse will be reproduced.

Impaction of the iris, while it has lost its gravity, since the introduction of antisepsis, nevertheless constitutes a perpetual danger for the eye. By putting the uveal tract in contact with the external world, it exposes the eye not only to one of the most deleterious of infections, but it constitutes the conditions

* At the time when I operated on all kinds of cataract without iridectomy, I believed at first that prolapse of the iris could be prevented by making a corneal section like Liebreich's. This was an error from which I promptly recovered, thereafter carrying the entire wound to the vicinity of the edge of the cornea. Prolapse and impaction of the iris are less frequent when this is done, without counting other advantages of the peripheral, corneal incision.

† This is likewise the opinion of many of our ablest colleagues, like Drs. E. Meyer and Deutschmann. They write us that, in cases of *senile cataract*, they proceed each time as if they wished to get along without iridectomy, but they perform it each time that, after the exit of the lens and cortical masses, the pupil remains "somewhat displaced upward."—(Deutschmann.)

in which, as Snellen clearly pointed out at the London Congress in 1881, a sympathetic affection of the other eye is most easily established. So consecutive glaucoma has again been observed *very recently* by Nuël as a consequence of post-operative impaction of the iris.

We therefore consider *simple extraction* indicated in cases of *simple cataract*, that is to say, cataract that is susceptible of easy elimination and is present in persons who are, moreover, healthy, docile and reasonable.*

In the not infrequent cases of impure or complicated cataract, on the contrary, the iridectomy is a means of facilitating the extraction, a warrant against complications in the course of the healing, and against even later ones; also a guarantee of the reëstablishment of a satisfactory acuteness of vision. And it must not be forgotten that our duty is not at all to obtain a certain number of ideal results, at the risk of losing a few others. It is best, as in target-shooting, to *seek, not to make one single bull's-eye*, but to make the greatest number of *good shots*, the excellent ones coming, then, of themselves. We ought to seek to restore sight to the greatest possible number of our patients.†

* "Simple extraction is as safe an operation as combined extraction (perhaps even safer, on account of the rarity of cyclitic processes.)

But it is certainly superior to it not only from the point of view of cosmetics, but from the optical standpoint.

It could not, however, properly be recommended as a general method, for, as long as we fail to exclude prolapse of the iris in all cases, it is certainly indicated to make an iridectomy whenever the pupil, after the expulsion of all the *débris* and despite repeated attempts at reposition, does not become quite circular or is deformed by movements of the eye and of the lids."—Knapp, Heidelberg Congress, 1888, p. 172.

"As regards the operation that one would perform on one's own father, no hesitation ought to exist, *if he is affected with a veritable, senile, ripe cataract, if he be in such hygienic conditions that he can observe the repose, for a few days, which simple extraction requires*, it is best to operate without iridectomy. The axiom is this: For a simple cataract, a simple extraction."—De Wecker, *Arch. d'Opht.* 1892, p. 351.

† Let us cite, in this connection, the witty observation of one of our correspondents, Dr. B——, who says: "Let us add, between us, that the gratitude of cataract patients being usually in inverse proportion to the purity of the operation, it is not best to seek the ideal for them, but rather the certainty of success for ourselves."

Thus iridectomy is indispensable in cases of synechiæ, each time that the cataract ought to be removed by means of a traction-instrument, as a vectis or curette; it seems to us indicated whenever the etiology and aspect of the cataract, its age, that of the patient, the general condition of the eye, etc., cause to be foreseen a very strong cohesion between the lens and its capsule, a coriaceous cortex, difficult to remove; finally, each time that the patient is incapable of enduring the quiet that is indispensable to prevent a prolapse of the iris.*

We have, besides, the satisfaction of knowing that our way of thinking is shared by most of our colleagues. The majority of them, whom we have interrogated, favor iridectomy, which they perform in the majority of their cataract-extractions.†

There need to be, certainly, very strong reasons for giving the preference to a longer, more difficult, harder method, for patient as well as operator. Still more significant appears to me the fact already cited, of two colleagues of equal merit and like age, of whom one, who has the upper hand in the matter of

* "Impactions of the iris, irites and irido-choroidites, pupillary occlusions and secondary cataract are, especially, much more frequent after *simple* extraction. This method requires, moreover, a tranquility of which many patients are incapable and which, for a great number, is a serious motive for fearing the cataract operation."—Manolescu.

† "I consider iridectomy as very useful, if not indispensable, in all cases in which the cataract is not quite hard, which is very frequently. It insures a good cystitis, an exact and rapid toilet, simplifies the manœuvres of expulsion and renders unnecessary the removal of the bandage."—Bagneris.

"I do simple extraction only in completely ripe, senile cataracts, with prompt reaction of the pupil. And even in such cases this method has not given me better results than has extraction with iridectomy."—Chodin.

"Led by my experience, I have reached the conclusion that the advantages of an operation without iridectomy cannot compensate those of an operation with iridectomy."—Desjardins.

Englebienne likewise declares that he operates without iridectomy only in altogether favorable cases.

"There are always many cataracts whose operation with iridectomy gives a better result than does the simple method."—Schiess.

The other day I showed to a colleague, who was visiting my clinic, some patients upon whom the operation without iridectomy had been done. "That's fine," said he, "it's even too fine, it's *du luxe*." I smiled, without venturing to contradict him.

cataracts, because he is the chief in official service, operates brilliantly according to the simple method, while the other, to whom fall the cataracts that are not officially chosen for operation, keeps, as a general rule, to iridectomy.

A colleague who is an excellent operator, and director of one of the largest clinics in the world, writes to me, with praiseworthy candor, that, at the hospital, he operates without iridectomy, but, in private practice, with iridectomy. Reflect thereon, young colleagues and friends!

Listen, still, to the venerable words of an old master in our art. Professor Stellwag von Carion writes to me: "I practiced the old-fashioned flap-extraction for 25 years exclusively, and consequently acquired great dexterity in that method. So I changed from it with much difficulty, but, since 1869, I do extraction with a broad excision of the iris. Because I learned to greatly fear prolapses of the iris. A large coloboma makes possible, moreover, the complete expulsion of the remains of the cataract, solely by stroking, without the introduction of instruments into the interior of the eye."

Many other colleagues, among whom we may cite Bobone, Dianoux,* Foucher, Hansen Grut† and Osio have likewise resumed iridectomy after experimenting with simple extraction.

* "I practiced, for eighteen months, *l'essai loyal* of extraction without iridectomy; I have entirely abandoned it."—DIANOUX, *Ann. d'Ocul.*, p. 239, 1892.

† "For almost a year I performed the operation *without* iridectomy, the flap having a little more height and being slightly less peripheral. The following are the reasons for my abandoning this method:—I have not had a single loss to deplore and, certainly, the execution of this method is much easier. But, 1st, I have had, in not a few cases, prolapse of the iris after two or three days, or even at the end of a week; in these cases I was obliged to do excision, which I performed at once and, it must be admitted, without accidents. 2nd, in a few cases the round pupil could not be dilated, and a thin, secondary cataract somewhat lowered the functional result. 3rd, It must be conceded that a round pupil has but a third of the size of one that is enlarged by the coloboma of the iris. Hence, the chance that an otherwise perfectly clear route for light is to be found *behind* the iris is, in the operation *without* iridectomy, twice as great as in the case of the operation *with* iridectomy. Hence the necessity of making the dissection of the secondary cataract oftener, in the case of the former method. My statistics, of the three operations, coincide very well with those furnished by Schweigger. Let us add, moreover, that the spectre of prolapse haunts the operator continually, while the operation with iridectomy lets him sleep quietly and see that it is right to do the iridectomy."—HANSEN GRUT, *Ann. d'oc.*, p. 77, 1892.

We have weighed, in what precedes, the *pro* and *contra* of combined and simple extraction and have reached the conclusion that, though the former has its disadvantages, those of the latter are in most cases graver than those of the former and that iridectomy, far from being a useless mutilation of the eye, considerably adds to the safety of our operation.

Hence it seems to us that the patient can afford to pay the price of a certain prolongation of the operation and the slight pain produced by the section of the iris, if he thus obtains more freedom during the treatment that follows and, above all, an extra guarantee of the recovery of his sight.

As to the disadvantages of the combined extraction, it is possible to reduce them to a very slight matter. Thus, as concerns *hemorrhage*, we are to be patient, if that takes place, at the same time guarding the eye against infection, by means of cold, aseptic compresses; or we will remove the blood by means of small cotton tampons, themselves sterilized, and moistened with antiseptic or sterilized water. In case of an exceptionally abundant and rebellious hemorrhage, one should always have the resource of letting the wound cicatrize and finishing the extraction a few weeks later. Then one would have, in fact, made only the *preparatory iridectomy*, as many of our colleagues advise doing in all difficult cases.

Impaction of the lens capsule is most surely avoided by the removal of a large bit of the anterior capsule. If one prefer the cystitome to the capsule forceps, it suffices to direct it horizontally, as is advised by O. Becker and Snellen. The strip thus obtained is hidden under the iris and cannot become engaged in the wound.

As regards the encleisis of the iris, which, as we have said, may happen in spite of the iridectomy, there are two ways of obviating it. The first is to spread out the iris, with the aid of a fine spatula, immediately after the iridectomy, at first (Gayet, Horner, Snellen, Dohnberg and others), and then again before the application of the bandage. We have seen this manœuvre, when executed by a master hand, notably by Gayet, succeed so well that even the microscopic examination, of the eyes thus operated upon, almost never showed the least impaction or pinching

of the iris. This toilet of the iris is indispensable when one makes *small* colobomata.

For my part, I avoid prolapse after iridectomy by always excising the iris as much as is permitted by the extent of the corneal wound. *

When I perform a simple iridectomy I calculate the dimensions of my section according to those of the coloboma that I propose to make. I draw the iris out of the eye and cut it, pressing the scissors strongly against the globe. In this way the iris entirely re-enters, by merit of its own elasticity, and of that of the globe. It rarely happens that I am obliged to disengage the iris from the wound, and to spread it out. If I make a large incision, as is required by cataract extraction, I also make a larger excision of the iris; convinced that the blurring which might result from a larger coloboma, (but concerning which, up to date, I have heard only some operators speak, never those who had been operated upon) is a less grave inconvenience than encleisis, even than the repeated touching of the iris, which is necessitated by the spreading of it out.

Moreover a larger coloboma is very often welcome. We speak of more or less complicated cataracts. In such cases, in spite of all our care, in spite of a perfect capsulotomy, in spite of massage, of washings, of curetting the anterior chamber and the capsular sac, there still remain *débris* of cortical masses.

These, before being resorbed, swell, are often even only imperfectly resorbed, they opacify, become organized, and form with the capsule a secondary cataract.

Now the evolution of this latter will present so much less danger in proportion as the *débris* comes less in collision with the iris, that is to say, as the pupil is larger. The larger it is the more chances there are that a part of the pupil will find itself free from obstruction by the secondary cataract, that it will give

* As will be seen, I have somewhat modified my way of operating since 1879. In an article which I published at that time in *Hirschberg's Centralblatt*, and in which I set forth the basis of simple extraction, I said that I performed, when necessary, a small iridectomy. But it must not be forgotten that, at that time, we were not acquainted with the local anaesthesia of the eye, and that, to render extraction as painless as possible, I then operated below.

access to light and procure good vision for the patient.

The expulsion of cortical masses is unquestionably more difficult when the iris is intact. Secondary cataracts are also, *cæteris paribus*, more frequent under such circumstances, than when there is a coloboma. One is, therefore, often obliged, after a so-called simple extraction, to excise a bit of the iris, whether to arrest an organic, inflammatory process, or to open for light a window beside that which an evil genius has closed. Now if an iridectomy is necessary, is it not better worth while to perform it, before these accidents have been produced, that is to say, on an iris that is still healthy, and not adherent to a secondary cataract?

We go even still further, and claim that if iridectomy ought often to accompany the cataract extraction, there exist some particularly complicated cases, in which it is well to make it precede the extraction by an interval of several weeks.

One thus suppresses the undesirable qualities of the simple method, at the same time lessening those of the combined method, and one places one's self, relatively to the cataract, in the position that we pronounced, at the beginning of this paragraph, to be the easiest, the most desirable for the operator.

Snellen, Becker, Foerster,* and many other colleagues have proved that, after an iridectomy, the cataract ripens more rapidly. This would constitute another considerable advantage of this method. I hear it objected that by thus operating twice upon the patient, one exposes his eye twice to the dangers of infection. This is incontestable, and our faith in the bactericides is not so absolute, that we consider the least wound, even when made with the antiseptic precautions now known to us, as sheltered from infection. So that we never subject our patients to the least operation without absolute necessity.

One always risks when one operates, but one risks more or less; we certainly risk less, by performing, with vigorous aseptic precautions, an iridectomy first, then, after complete healing, the extraction, than if we make the whole attack at once, whether with or without the iridectomy, upon a more or less complicated cataract.

* Foerster, Transactions of the Heidelberg Congress. 1881, page 133.

Even in the pre-antiseptic epoch, we have scarcely lost any eyes with iridectomy, and God knows how much certain operators, who now-a-days decry most the dangers of this operation, have, at that time, used and even abused it.

The danger of infection for an iridectomy is in fact almost *nil*. Steffan,* has even had in 530 extractions, much fewer cases of infection in his operations with preliminary iridectomy, than when he has performed at the same sitting, both extraction and iridectomy.

Moreover, do not those who deliberately practice discission, some weeks after the extraction of the cataract, subject their patients to two operations? Of which the second, however simple it may appear, is certainly more dangerous than a preliminary iridectomy.

But the extraction of an incomplete, but complicated cataract, without iridectomy, exposes the patient not only to two, but to *several* secondary operations: excision, or destruction with the cautery, of the prolapse; operations upon the secondary cataract, which operations, as we shall see, are *all* more dangerous than the iridectomy, and which this latter almost always renders superfluous. We are moreover, in this matter, still far from being alone in our cautions of prudence. Colleagues who find in the *preliminary iridectomy* a prudent safeguard, are more numerous than is generally supposed. Among our correspondents, Bronner (Bradford) performs it, "if possible, always, six weeks before extraction"; Eversbusch says that *he is very fond of it*; Steffan no longer operates, since 1888, without the preliminary iridectomy. Keyser of Philadelphia, who can justly say that, in his large *clientèle*, he has tried all rational methods of extraction that have been proposed, declares squarely that: "The best practice is to make a free iridectomy, six to ten weeks previously to the extraction." So Sprague of Boston finds, "a preliminary iridectomy, done two or three weeks before extraction, the safest procedure." Barraquer performs it in all cases of cataract that he considers unripe; other operators, in all particularly complicated cases.

Prof. Dor declares that if he, himself, had to undergo a cata-

* *Loc. cit.* pages 197-198.

ract operation, he would have a preliminary iridectomy made. For my part, I strongly share this opinion, as my pupils will, without doubt, remember. And, in a general way, I have often repeated to them that when we find ourselves in doubt, whether or not it would be desirable to operate, or which method is to be chosen, there is one very simple means of escape from the dilemma, and that is to ask one's self what he would have done to himself. We need never depart from the observance of this maxim. It is not calculated, it is true, to increase the number of operations or to make us choose hazardous methods, but it is certainly in conformity with the interests of those who grant us their confidence.*

But let us pass to another phase of cataract extraction, that of CYSTITOMY. This is a very important part of our operation, and often exercises a greater influence, than is generally supposed, upon the result. Although it is a subject of much controversy, there is at least agreement concerning this point, that it is best to make it as extended as possible. We differ only as to the choice of the proper means to obtain this large issue for the opaque crystalline.

The method of Gayet and Knapp, which consisted in lacerating the capsule at the equator of the crystalline, and which left intact the anterior as well as the posterior capsule, no longer has many amateurs. Its greatest inconvenience is the necessity of a discission of the secondary cataract in almost all cases.

Gayet, as formerly Wenzel, as Sanson, and more recently Galezowski, and many other of our colleagues, now uses the Græfe knife, whose point he causes to pierce the lens capsule, between the puncture and the counter puncture.

Thus one completes, at once, the section of the cornea and that of the capsule, and one is sure of having opened the latter

* It is true that it is not always easy to induce a patient to let his cataract operation be divided in two. The principal reason, for this aversion from accepting wise counsel, is found expressed in a letter from Dehenne, wherein he says: "The ideal, without doubt, would be to be able to do the operation at two times, with an interval of about a month. But why go and propose to any patient to intervene twice to extract a cataract, when one has repeated to him, in all tones, that the extraction of an opaque crystalline is easier and less dangerous than an operation on corns!"

through a considerable extent. The most leathery capsule scarcely resists a well directed linear knife. The proceeding is therefore not a bad one; however, that which its partisans praise as an advantage of it, that is to say, being able thus to do two things at once, is not, in our opinion, an advantage. We prefer to proceed methodically, and do one thing after the other. The change in direction, which it is necessary to give to the knife, in order to make it pierce the capsule, and to prevent escape of the aqueous humor, which escape is not always avoidable, must often modify the corneal section, which we desire to have clean and in conformity with the plan proposed in the first place.

In the same way concerning the section of the capsule, we like to make it freely, beyond the margin of the pupil, taking away a bit of it, especially in the case of capsular cataract, not being obliged to confine ourselves to the opening made, by the way, with the point of the knife.

The resistance of the capsule being very variable in different cases, we use, for the cystitomy, some times, an extremely fine hook (Snellen) and, at other times, the equally well known, small, triangular blade. In order to be prepared for all emergencies, we have arranged these two instruments on the same handle. The stem of each is, moreover, flexible, in order that we may be able to give them any desirable inclination.

If a capsule prove too resistant to yield easily to the hook, one has only to reverse the instrument, and the blade will certainly overcome it, and if the opening should, nevertheless, appear too limited, nothing is simpler than to enlarge it with the hook. The latter may even serve, in case of necessity, to remove a bit of the anterior capsule.

There is no doubt that, if it were possible to take away a good part of the anterior capsule, the cataract would issue from the eye much more easily than though the most extended of the tearings or sections.

The danger of impaction of capsular strips, between the lips of the wound, would disappear at the same time. The attempts made, by Colsmann, Weber, Becker, Foerster, von Wecker, Meyer, Couper, Alessi, Armaignac, Schweigger, Smith and others, to tear the strip from the capsule by means of forceps, are, there-

fore, most meritorious, and have given excellent results, as we have been able to convince ourselves, as well by observation as by our own experience.

This method does not seem, however, to be yet free from all adverse criticism. It is reported as against it, that even the sharpest forceps, and those most ably directed, sometimes meet an almost invincible resistance, or, at least, such, that the pressure necessary in order to first pierce the capsule, entails the risk of rupturing the suspensory ligament of the crystalline, and of bringing about very annoying accidents; as luxation of the crystalline, escape of vitreous substance, or both these at once. Then, in the absence of a coloboma, it must at times be difficult to seize the capsule extensively enough, without pinching the iris.

It is true that recently, Kuhnt and Smith, of Detroit, (Mich.) * have devised a capsule forceps, whose branches are curved in such a way that they do not come in contact with the iris, when the teeth seize the capsule.

The first combines, moreover, in a happy way, the simple cystitomy with the tearing. After having opened the upper part of the capsule, by means of an ordinary cystitome, he introduces into this wound one of the branches of the capsule-forceps, and thus always succeeds in bringing away a large piece of the capsule.

Smith's instrument having been in our hands only a short time, we have not yet had occasion to experiment much with it; but, each time that we have used it, it has seemed to us to very well fulfill its destination. In general, as we use the capsule forceps only discreetly, and when the iris has been excised, we have as yet had nothing with which to reproach it, unless it has been that it has sometimes declined to serve. In one case, on the other hand, we have been fortunate enough to bring away, with it, the whole cataract, in its capsule, without losing one drop of the vitreous body, and with the most pleasing final result.

It is in this connection to be regretted that one cannot always

* E. Smith, The Journal of the American Medical Association, September, 1891.

remove the capsule at the same time with the crystalline, the former being so often, of itself, prejudicial to the visual acuteness of the operated eye. The operation of Alexander Pagenstecher, cultivated by his worthy successor, Hermann Pagenstecher, has, indeed, up to the present day, remained restricted to a small number of cases, particularly favorable to the application of this method. But we entirely share the opinion of Laqueur,* when he says that antiseptis authorizes us to extend the scope of our operative undertaking, and to attempt especially, oftener, the extraction of the lens in its capsule.

We have just said that we consider cystitomy one of the most decisive acts in the cataract operation. Many accidents are due mainly to the imperfect opening of the capsule, or to a displacement of the crystalline, occurring during this act and escaping unperceived. The easiest means, of guarding against these disagreeable surprises, is to operate only with a perfect light.

The ILLUMINATION that we commonly use, is only too often insufficient for operations on these delicate, transparent or semi-transparent membranes, like the capsule, and at times, let us say at once, or the cortical masses, capable of escaping the surgeon's eye and bringing about, later, serious complications.

Let us be frank, and admit that, a great part of the time, we do not even see the tear we have made with the cystitome. It is the extreme sensibility of our fingers, the advance of the crystalline, the appearance in the wound of soft masses, that indicate to us that the capsule is ruptured. But at times these symptoms are lacking. The cataract does not stir, and, although it seems to us that we have traversed the capsule with our instrument, we are not very sure of the extent of the incision that we have made. If, then, the cataract does not yield to the pressure made upon its equator, one wonders, with anxiety, to what this resistance is due. Could the corneal incision be too limited, or, what amounts to the same thing, could the lens be more voluminous than we had supposed? Is it the iris (when no iridectomy has been made) which resists? Is the cohesion, between the crystalline and its capsule, particularly strong, or is the capsulotomy insufficient? Is it necessary to enlarge the

* Laqueur, *Ann. d'oc.*, 1892, page 79.

corneal wound, or increase the pressure made upon the recalcitrant crystalline? Is it best to have recourse to iridectomy, with which one had supposed one's self able to dispense, or renew the manœuvres of the capsulotomy? Or is it best to resort at once to radical measures, and remove the cataract with a traction instrument? According as the operator recognizes, or fails to recognize, the cause of this little incident, the result of his operation will be a success, a partial success, or even a failure.

A good illumination will surely guide him in the midst of these difficulties. It will instruct him as to the dimensions of the cataract (if there be a coloboma), as to its position, as to its tendency to become engaged in the wound and as concerning the opening that has been made in the capsule.

It is a genuine revelation, when, for the first time, one projects upon an eye the concentrated light from a powerful source. One seems to issue from obscurity, and one wonders, not without reason, how one has ever dared to do gropingly, so to say, so delicate an operation as that upon cataract. We can only applaud Chibret, * the inventor of the ophthalmological phare, and those of our colleagues who, like Abadie, von Hippel, Snellen, von Wecker and others, use the electric light, in operating on the transparent parts of the eye.

This is a great betterment brought to bear upon the cataract operation, upon the capsulotomy, upon discission, and upon what is called THE TOILET OF THE EYE. Indeed if a powerful illumination is valuable during the extraction of the cataract, it is, perhaps, still more so afterward. We all know that the exit of the lens in no wise constitutes the last act of the operation.

Nothing is simpler than to cause to issue from the eye a ripe or unripe cataract, with or without iridectomy, provided one open to it broadly the two doors, that of the capsule and that of the globe. The true difficulty commences, oftentimes, afterward, when it becomes a question of ridding the anterior chamber, and especially the capsular sac, of the lenticular *débris*. However, no one will deny that this cleaning constitutes one of the

* Ophthalmological *phare* of Col. Mangin and Dr. Chibret, *soc. française d'opht.* 1886, page 342.

essential conditions of the success of the operation. It is true, and therein lies one of the inappreciable benefits of asepsis, that the cataractous remnants are much less to be feared than formerly, when they brought about, almost invariably, an iritis with exudations, a secondary cataract, more redoubtable than the primary, indeed even iridocyclitis and choroditis, with loss of the entire eye and threats of sympathetic ophthalmia.

Thanks to the rigorous asepsis, usually observed, now-a-days, the iris no longer takes on inflammation, often the pupil yields to the effect of mydriatics, dilates and, generally, the residue of the cataract resorbs entirely or, at least, partially.

Generally, we say, but not always, and he who trusts in its doing so, thereby often exposes himself to bitter disappointment. All erudite surgeons try, therefore, to obtain, immediately after the extraction, as clear as possible a pupillary field.

The most natural and most inoffensive means, of doing away with cortical masses, is, in our opinion, massage, executed with the lids. This rubbing is infinitely milder than that done with whatever instrument, and it admits modifications, as to its intensity and direction, that a hard body does not permit. Moreover, both the operator's hands can thus act concensually, by pressure and counter pressure; at the same time operating with the extreme delicacy required by manipulations upon a globe opened by a large wound, and lacking its crystalline. No other surgical operation requires so much patience as does the clearing out of the anterior chamber. Patience is already indicated by the time necessary for the renewal of the aqueous humor, which powerfully aids us in our undertaking.

At the same time that we are very prudent concerning the introduction of instruments into the eye, after the issue of the lens, we have often, however, recourse to a little curette, which we have had constructed *ad hoc*, and which has rendered us the greatest service, without having ever acted prejudicially upon the eye which has undergone the operation. It is a very fine curette, flat enough to pass easily under the iris, sufficiently excavated, however, to gather the soft parts and bring them out of the eye. Thanks to its form and to its rounded borders, the curette serves likewise in the reposition and spreading out of

the iris. The instrument bears at its other extremity a flat surface, which is very useful in the *toilet* of the iris and of the wound. Both curette and spatula are of silver, hence easy to render aseptic. Moreover nothing hinders their being made of gold, whose contact, according to Waldhauer, is still milder; or of platinum-iridium, as is recommended by Gruening, because this metal endures being brought to a white heat, without deteriorating in consequence.*

It is with a view to a radical clearing out of the anterior chamber that there have been invented syringes, pumps and hydraulic apparatus of all kinds, to inject into the narrow space, between the cornea and the iris, floods of all sorts of liquids.†

These intra-ocular irrigations are far from having gained the sympathy of the majority of our colleagues. Most of our correspondents tell us that they consider them "useless and dangerous." Many have abandoned them, after becoming convinced, by experience, of the undesirability of these manœuvres. It is only to be regretted that the ingenious constructors, who formerly recommended to us, with so much insistence, their syringes, should have neglected to tell us, with what discretion they use them at present. At most, the tube that one formerly carried even so far as under the iris, now barely enters a corner of the wound, in order to let penetrate into it, no longer "as much as half a pint" of a sublimate solution, but a very modest quantity of an anodyne liquid.

We even seem to have not yet reached an agreement as to the proper extent of irrigations of the anterior chamber. Some recommend them solely for an *antiseptic purpose*,‡ and warn us to guard against trusting to them to expel the cortical masses. Others, on the contrary, propose them as *the best means of obtaining the desired clearness of the pupil*, and hold that, employ-

* Transactions of the Medical Society of the state of New York, 1891 page 354.—GRUENING.

† Von Wecker, McKeown, Uhle, Vacher, Panas, Gayet, Chodin, Terson, Inouye, Wicherkiewicz and others.

‡ "It is only from the time when I adopted the habit of washing out antiseptically (with a boric acid solution of 3 to 4%), the anterior chamber, that I have seen all suppuration of the iris and of the cornea vanish."
—PANAS.

ed as antiseptics, these injections would be most dangerous.* It is best to say that this last opinion has prevailed, and has been confirmed by clinical experience, as well as by that of the laboratory.

For our part, we have never had confidence in this antisepsis of the anterior chamber, convinced that an antiseptic, powerful enough to annihilate in a moment so resistant organisms as the staphylococci, † for instance, must constitute, in itself, a danger for the delicate membranes of the interior of the eye, the endothelium of the cornea, the iris, the hyaloid, etc. Nor have we ever understood the alarming articles, in which, on divers sides, one accuses sometimes cocaine, sometimes one or another of the antiseptic solutions, of producing indelible opacities of the cornea ‡. We have never experienced them, because we always respected the anterior chamber too much to treat it as a bacteriological laboratory. The remarkable experiments of Nuël and Cornil§ have since proved that, if solutions injected into the eye for an antiseptic purpose are inefficacious, as such, they exert on the contrary, for the most part, a deleterious influence on the corneal endothelium.||

* "The washing out of the anterior chamber, with an antiseptic preparation, is contrary to our scientific ideas. We should thus deceive ourselves, to the detriment of our patients."—SATTLER.

† According to Koch the vitality of certain bacteria is so great that they resist for an hour, a sojourn in a sublimate solution of 1: 5,000.—*Mitth a. d. k., Gesundheitsamte*, vol. 1, page 274, 1881.

‡ *Vide*, among others, Mellinger, *Centralblatt f. Schweizer Aerzte*, page 466, 1891.

§ Nuël *Congrès Français d'opht.*, 1889, et Nuël F. Cornil. *De l'endothelium de la chambre antérieure*, etc. *Arch d'opht.*, page 309, 1890.

|| At the congress of Medical Sciences, at Barcelona (1888, page 784 of its transactions), Aguilar read a most interesting work on cataract operations. We find in it the following passage: "We were among the most enthusiastic in applying antiseptic injections, and we made use of the borated solution of von Wecker. Not being in the habit of chloroforming the patient, during a cataract operation, I have experienced great inconvenience in manipulating the irrigator on a free eye, animated by involuntary movements, but the hope, of triumphing over infection, was strong enough to make me disregard these difficulties. But, alas, a suppurative

Intra-ocular irrigations can, therefore, according to these authorities, be discussed only as a mechanical means of removing cortical masses. The liquids used for this purpose ought to be absolutely inoffensive, as 4% boric acid,* or the physiological solution of the chloride of sodium, and at the temperature of the body. Even sterilized water is, apparently, badly borne by the membranes in question. The epithelium of the iris, the lenticular capsule, and especially the hyaloid, do not tolerate more easily than the corneal endothelium, the contact of solutions of the bi-chloride or biniodide of mercury and of other, similar microbicides. I am convinced that many post-operative complications find their explanation in this irrational use of antisepsis.

As a means of making the toilet of the eye, intra-ocular injections are in favor with a considerable number of our colleagues, among whom we cite, as the most eloquent, Gayet, who tells us *iritis destroyed my faith and, for the last two years, I no longer use irrigation.*"

Vacher, one of the promoters of intra-ocular injections, has made, with reference to them, some very interesting experiments. He performed two series of more than a hundred extractions, one with intra-ocular injections, and, in the other series, merely causing the lips of the wound to be touched by a fine stream of borated water. These two series have been equally successful, both as regards the immediate, and as to the final, result; "Thus, since that time," continues the author, "I have less often used intra-ocular irrigation, which demands manual accuracy and scrupulous precautions, that are not always observed. Rigorous asepsis, of the operative field and the lachrymal ducts, renders intra-ocular irrigations useless, when the extraction of the lens has been complete, and the clearing up of the pupil perfect."

"Intro-ocular injections are superfluous as antisepsics, in the majority of cases, and insufficient to remove the remains of the cataract."—KNAPP.

"I have frequently used intra-ocular irrigations, but I have totally abandoned them because they are often followed by a condition of irritation of the eye, in comparison with which the possible advantage, of these irrigations, does not deserve to be taken into account."—A. GRAEFE.

"For a time I tried prudent intra-ocular irrigation, after the extraction of the lens, but I gladly abandoned this detestable way of doing." HANSEN GRUT, *Ann. d'oc.*, 1872, page 77.

* The apparatus used by the eminent Lyons surgeon, for the preparation, and keeping of sterilized water, as well as for intra-ocular irrigations, is described in de Vinay's manual, page 311. It resembled Richardson's atomizer.

that he is "extremely fond" of washings of this kind, made *without the introduction of any instrument*, with the firm, tepid jet.* "They nicely expel the *débris*, restore the pupil and capsule, clear out the blood, and clean the lips of the wound."

Thus used, of course with a perfectly inoffensive liquid, these washings certainly have their *raison d'être*. Still, we reserve them strictly for cases in which the aqueous humor does not suffice for the clearing out of the anterior chamber. We perform them with the greatest prudence, not only as regards the asepsis of the solution, but also as to its quantity and as to the pressure with which it is injected or, rather, introduced into the anterior chamber.†

Since the preceding lines were written, Chibert has announced here‡ the results of his remarkable experiments with the cyanide of mercury.

This author seems to have found, in a solution of 1:20,000 of this salt,§ a powerful antiseptic, which is "without detriment to the exterior transparency of the cornea and of the other media." This solution serves him, therefore, at the same time, for the

* GAYET.—Transactions of the International Congress of Ophthalmology at Heidelberg, 1888, page 129.

† The simplest instrument, resembling a dropper, with metallic tube, flat and curved, of which our friend, von Hoffmann, has made us a present, has served us perfectly for some years. The management of it is very easy and the quantity of liquid, that it contains, amply suffices. The sole reproach we have to make to it, is that the three parts of which it is composed, being, one of metal, the second of glass, and the third of rubber, necessitate special antisepsis for each; the first two the heat of the autoclave, the other needing chemical measures. The author has recently succeeded so well in constructing of glass a flat and fine tube, with a lateral opening that this instrument bears, perfectly, immersion in the antiseptic solution.

‡ *De l'antisepsie de l'oeil*, etc., *Arch. d'opht*, 1892, page 433.—CHIBRET.

§ The complete formula of the solution used by Chibret, in his intra-ocular injections, is as follows:

	GRAMMA.
Hydrargyri Cyanidi, - - - -	0.05.
Sodii Chloridi, - - - -	7.00.
Aquae destillatæ - - - -	1000.00.
Picric acid, traces for a yellowish coloration.	

expulsion of cortical masses and to render antiseptic the contents of the anterior chamber.

SECONDARY OPERATIONS, IN THE EXTRACTION OF CATARACT.

Let us remark that, from the first to the last act in cataract-extraction, conscientious operators have been preoccupied with one thing; that is to free the eye, not only from the opacified part of the crystalline, but also of all the contents of the crystalline sac, if not of the lens in its capsule itself.

It is with this purpose that they make the wound as extended as possible, that many of them excise a bit of the iris (sometimes very regretfully), that they try to tear as large a strip as possible from the anterior capsule, that there have been invented spatulas and curettes, to extract the lenticular *débris*, and that recourse is had to intra-ocular injections.

This preoccupation is among the most fully justified. All the ingenuity expended with this aim, is best applied. It must be admitted, moreover, that it would often be worthy of a better recompense. Finally, although the cataract operation ought to seek to create an absolutely clear pupil, we are far from succeeding in doing this in all cases. Whoever shall give us a sure means, for attaining this end, will have his place marked beside the illustrious Daviel.

It is true that we can consider with great satisfaction the progress accomplished in recent years. In proportion as the healing of the wound has become infinitely prompter, surer and cleaner than formerly, so the *débris* of the cataract, which it is not possible to dislodge from the eye, have considerably diminished in quantity. It has lost, especially as to its gravity, and this despite the hardihood with which we now attack cataracts that would have formerly been considered inoperable.

Nevertheless we nearly always leave the posterior capsule in the eye. Often also, in the case of complicated cataracts, there remain cortical masses, whose forced expulsion would expose the eye to serious danger. The capsule, generally transparent, sometimes, however, opacifies and becomes corrugated. Cortical masses, instead of being resorbed, often form a secondary

cataract, semi-transparent, it is true, but sufficiently opaque to prevent the formation of a distinct retinal image.

The result of our operation thus finds itself more or less compromised and a secondary surgical intervention is indispensable.*

This operation will sometimes consist in an *iridectomy*, or an *iridotomy*, sometimes in the *extraction of the secondary cataract*.

The iridectomy is done most easily with the lance; the iridotomy, by means of one of the knives invented for this purpose, or with von Wecker's scissors. The extraction of the capsular sac, with its contents, by means of an iridotomy forceps, has been particularly cultivated by Panas. It has likewise done us excellent service, in appropriate cases.

In the above mentioned operations, dragging of the iris is to be carefully avoided, and the operation should be done in scrupulous conformity with antiseptic regulations. Otherwise, one incurs the risk of losing, irreparably, the organ that had already been half rescued from blindness.

The dangers of these operations are known to all. Moreover, we shall speak of them still more explicitly in connection with the discussion of discission. The tearing, cutting and opening of the membranule, which obstructs the pupil, in a word, DISCISSION, is, indeed, the secondary operation that is oftenest performed after the extraction of the cataract.

This is the most important intervention, since it is that which must lead us to the final purpose of all our operative undertaking. It might, moreover, seem altogether simple and inoffensive,

* We are not speaking here of this secondary cataract, in which the lenticular *débris, en masse* with the products of plastic iritis, and the iris itself, form a complete obstruction of the pupil. This deplorable condition of the eye, is generally the operator's fault, an irreparable fault, for it has never been said clearly enough: these cases, that are considered so "favorable for the iridotomy," almost never give, and could not give, a satisfactory result. The reason for this is that the inflammation, which is called iritis and irido-cyclitis, because it is designated according to what is apparent to the observer, has involved the entire uveal tract, that the exudate from the iris, that is visible, has been accompanied by an exudate from the choroid, that is invisible, but which will forever prevent the patient's seeing, inasmuch as it has disorganized the retina and obscured the vitreous body.

since it has a bearing only on the slightly resistant parts of the eye, and requires only a minimum wound.

But on this point, the opinions of our colleagues are still very divided, many among them, as Knapp* and Kuhnt, who perform discission, so to say, after each extraction, consider it as absolutely without danger, when performed, of course, with the necessary precautions.

Others, on the contrary, and their number is very great, have recourse to discission only as a last resort. Many tell me that they perform it only when the patient does not see enough to be able to read.†

There must be strong reasons why this should be so; for why abandon the patient with three-tenths of visual acuteness, when a simple tearing of the capsule may give him 80%, and perhaps even normal vision.

Others, indeed, are more explicit, and squarely declare that they reckon discission as among the most dangerous of ocular operations.‡ They have observed after this intervention, so innocent in appearance, acute or chronic iritis and iridocyclitis, fulminant panophthalmia, indeed even sympathetic ophthalmia.

To have once lost, in this way, an eye to which vision had been happily and skillfully restored, suffices to put you forever on your guard against an operation which may have so sad consequences.

It appears, however, that this accident is not very rare. I have before me, printed statistics of a great clinic, in which one of the operators, § has had 2% of iritis in cataract extraction,

* "With the exception of a small number of cases, in which the anterior capsule has been partly removed, no extraction of cataract is complete unless the secondary discission is perfect."—KNAPP.

† "For the last 20 years I have intervened a second time only when the acuteness of vision has been insufficient to permit the patient to go about freely, and to read and write."—PANAS.

‡ Gayet expressed himself as follows at the Heidelberg Congress of 1888, concerning an operation upon capsular opacities, consecutive to extraction: "There is no operation that I fear more. It appears to me always uncertain, often useless, at times very dangerous."

§ TROSSEAU.—*Compte rendu de la clinique des Quinze-Vingts*, 1890-1891, page 29.

and two in sixteen, that is to say, $12\frac{1}{2}\%$ after discission. And although he has been able to perform more than three hundred extractions, without a single case of suppuration, he has lost, from panophthalmia, one eye in sixteen, operated upon by discission, which would represent 6.25 *per cent* of loss. Another surgeon of the same institution,* counts 1.48 *per cent* of panophthalmia for his extractions, and 9.09 *per cent* for his discissions.

To what are to be attributed such grave consequences of an operation which scarcely merits the name?

It is evident that if the instrument, that is used, is contaminated, it can carry the germs of infection even to the centre of the eye, into the vitreous body, which is an eminently favorable soil for the culture of micro-organisms.

In such a case, it is not the operation that should be accused, but rather the operator, for nothing is easier to sterilize, than the point or blade used in discission, in-as-much as it may be brought to a white heat, if necessary, before its entrance into the eye. But it is averred that accidents of this sort have occurred, despite the strict application of the rules of antiseptis, so far as known up to the present.

In all times, dragging, exercised upon the iris and ciliary body, has been incriminated as being able to bring about grave consequences.† It is in order to avoid them, that many of our colleagues use, for discission, two needles, which act in opposite directions, and of which one guards the iris against the traction exercised by the other.

Noyes uses, for this purpose, a method which seems to us preferable to the preceding, because it is more regardful of the vitreous body. After having performed, by means of linear knives, two small openings in the cornea, he introduces through them two very fine hooks, whose extremities penetrate the pupillary membranes. By drawing the two instruments simul-

* CHEVALLEREAU.—*Compte rendu de la clinique des Quinze-Vingts*, 1890-1891, page 23.

† "The least traction upon the ciliary body, especially in an eye already traumatized, may provoke a pernicious irido-cyclitis."—EPERON. Bribosa and Critchett write me to a like effect.

taneously in opposite directions, the discission is made without lesion of the iris or ciliary body.

Other operators have tried to replace the traction-instrument by a cutting blade, the tearing by a section, whether by means of a very fine knife or by means of scissors like von Wecker's. Knives designed for discission sometimes have one,* sometimes two edges.† Good results may be obtained with either kind.

Although certain operators so little fear the laceration of the vitreous body as to perform discission after the mode of the ancient depression, from behind forward, through the sclerotic, others recommend, on the contrary, that the instrument be not turned after its penetration into the pupillary field, but that it be guided as nearly as possible parallelly to this plane, in order not to disturb the vitreous body more than is necessary. (Deutschmann, Dohnberg, etc.)

Knapp‡ and, later, Haab have observed that infection of the eye may arise from the fact that a little thread of the vitreous body, following the instrument in its withdrawal from the eye, becomes placed between the lips of the wound, and, finding itself thus in contact with the ambient air, forms, for several days, a way of communication for infectious micro-organisms.

All these observations appear to us most just, and we consequently take, for each discission, the most minute precautions. It is necessary in the first place, not to let it follow too closely after the extraction. Otherwise, one risks bringing about, by cumulation of operations, an irritation of the eye that creates a soil favorable for infection. It is for the same reason that all

* Knapp's seems to us the best model of this sort.

† The discission knife, that we have recently used, is in all respects like Knapp's, except that it has a blade with double cutting edge; the heel is rounded, so that it entirely fills the opening made by the blade, and renders easy the change in the direction of the latter.

Deutschmann, Dohnberg and Schweigger use a linear knife with a double cutting edge. "This latter makes a clean corneal wound, which promptly cicatrizes and exposes the eye less to hernia of the vitreous body, and to the penetration into its interior of the corneal epithelium," Deutschmann writes us.

‡ International Congress of Ophthalmology, Heidelberg, 1888, Transactions, page 172.

traumatism, notably traction of the iris and of the ciliary body, is to be scrupulously avoided.

But the essential thing will always be to observe before, during and after this operation, as rigorous antisepsis as our present knowledge permits. We proceed, in fact, in case of a simple discission, if possible with more antiseptic rigor even than for the cataract extraction. If the after treatment does not last so long, it requires, in our opinion, as much prudence as that of the extraction. * If the least trace of the vitreous body shows itself in the wound, one should take care to destroy it, by means of the galvano-cautery, as Knapp recommends.

Culver writes us that he does not proceed to a discission, until after having assured himself that there does not exist, and never has existed, a pathological alteration of the vitreous body, in the eye that has to undergo the operation.

I would call attention, indeed, to the fact that the susceptibility to infection, of the various parts of the eye, is very different. It increases from the surface toward its middle, in proportion as the tissues are protected against the deleterious germs, by more delicate membranes and epithelia and by a less active sanguinary or lymphatic circulation.

It follows from this fact that the more the deep parenchymata of the eye seem, in their normal condition, to be sheltered from infection, the more they are exposed to it in reality, in abnormal conditions.

Thus let us consider, first, the lids. Does he who observes the simple rules of cleanliness often have serious accidents after an operation, performed upon these organs, so exposed to all external, injurious influences? Let us next consider the cornea, constantly in contact with the ambient atmosphere, with the conjunctival secretion, a vehicle of all imaginable micro-organisms. When protected by an intact epithelium, does it not resist, indefinitely, even blennorrhagic pus?

The conditions are very different for the interior of the globe,

* "The treatment following discission ought to be sufficiently prolonged and the patient kept under observation until all threat of iritis shall have disappeared. Without this precaution, one is exposed to grave complications."—EPERON.

more rarely reached by violence or deleterious germs coming from without. There are certainly still protective membranes, but they are not as solid as the epidermis, or as the corneal and conjunctival epithelium.

We have seen that the covering, of the posterior surface of the cornea, is destroyed by chemical agents that the anterior surface readily endures. We know the sensibility of the iris and the facility with which germs of infection develop in the cortical substance of the crystalline, debarred of its capsule.*

As regards the vitreous, this is still a very different matter. The hyaloid is an excellent bulwark, so long as it exists, but it is very fragile and, without it, the vitreous body has yielded to infection, without defense and without remedy, and the vitreous body is the centre of the globe. Its infection is equivalent to the ruin of the entire organism. This is why we have always feared loss, indeed even the simple presentation, of the vitreous in the wound, as a most dangerous accident. This is also why we consider discission, and all operations which bring this tissue, so eminently susceptible of infection, into relation with the external world, as most serious surgical intervention.

We have already spoken of a secondary operation, which the extraction of cataract may necessitate, that is to say, the *destruction, by cauterization, of the prolapsed iris, or its excision.*

If we have to do only with a slight impaction, the first of these operations is not exactly dangerous. The same cannot be said when it is an instance of a true hernia. Is it always possible to carry with impunity a red-hot iron into the ciliary region, which has always been known as eminently vulnerable? Moreover, in spite of the destruction of that portion of the iris which is outside the surface of the globe, the impaction in the cicatrix persists nevertheless, with all its dangers.

It is in order to escape this grave annoyance that Panas performs the complete excision of the prolapse, by means of a linear knife and with scissors. It is necessary, for this operation, that the patient be chloroformed, otherwise this painful operation might bring about a formidable loss of vitreous.

This is assuredly a very bold, and very radical method, but it

* Compare CHIBRET, *Arch. d'opht.*, XII, page 434-444, *et seq.*

is not to be denied that it singularly complicates simple extraction, whose consequences it is designed to remedy. *

We arrive, then, at this conclusion; that any of the secondary operations (with the sole exception of the cauterization, which fulfils its purpose only very imperfectly) is more dangerous than the extraction itself. If this is true, must we not logically conclude that the preferable method of extraction is that which exposes the eye least to secondary operations? Now, *cæteris paribus*, it is indubitably iridectomy, especially preliminary iridectomy, which gives us, in great measure, this guaranty. It facilitates the expulsion of the cortical masses, it increases the pupillary field (which has been made a subject of reproach to it!), and prevents the prolapse of the iris.

No one will deny that an iridectomy, performed on a still intact eye, is an infinitely less dangerous operation, than secondary excision, or discission, because the interior of the globe then finds itself still guaranteed, by the lens, against infection. Those colleagues who frankly avow one panophthalmia in sixteen, indeed in eleven, discissions, and those who write to us, more vaguely, that experience has demonstrated to them that it is a *dangerous* operation, with which they have had "very annoying" accidents, and which has caused them to lose many eyes, scarcely mention the results of their iridectomies, which they have made by hundreds, perhaps by thousands. The reason for this is simply that they consider it quite natural to be free from bothersome accidents, consequent upon so anodyne an operation as iridectomy. †

BANDAGES.

However succinct may be this review of the cataract operation, we cannot dispense with a few words concerning bandages. Although certain operators have tried to do without

* "I am profoundly suspicious of excision even with asepsis," says Gayet, (page 132 of the Transactions of the International Congress of Ophthalmology, at Heidelberg), "if it does not bring about phlegmon, it may provoke grave ciliary accidents."

† "The iridectomies have all healed in three or four days, with the greatest ease." TROUSSEAU. *Compte rendu de la clinique des Quinze-Vingts*, 1890-1891, page 21.

bandages, and though others, like Michel * and Alt, † permit their patients to return home after extraction, with the offset of having them come back for consecutive treatment, we believe we express the opinion of the great majority of our colleagues, when we say that a protective bandage is extremely desirable, to assure a prompt healing and exemption from complications.

Also Chisolm, ‡ although he has always shown himself very desirous of reducing post-operative dressing to its minimum, has considered it useful at least to keep up the occlusion of the eye that has undergone the operation.

These conditions, of repose and of prudent care, seem to us particularly important, in cases wherein we have not done iridectomy. § We could not better express our opinion with reference to this, than Gayet || has done in his work, already cited, at the Heidelberg Congress, in which he says: "The operation once finished, if the patient makes a spasmodic movement, we see the redoubted accident" (the prolapse of the iris). This constitutes, therefore, a cause of encleisis; we guard against this, by the care we take to insure the great calmness of the patient, immediately after the operation. As to this matter, we approve fastidious care and precautions that are, apparently, most

* "I operate upon cataract cases in the polyclinic" ("ambulatorisch"), "but with iridectomy."—MICHEL.

† "I operate according to circumstances, in my office or before the class in the dispensary, and allow the patient to go home, either on foot or in the car, and let him come to my office for after treatment," says Dr. Alt, in the St. Louis Weekly Medical Review, of the 12th of December, 1891, page 463, though at the same time extolling the advantages of simple extraction, which he performs almost exclusively.

‡ *Compte rendu du IX Congrès International des Sciences médicales à Washington*, 1887, page 709.

§ Pflueger having noticed, as have many others of us, that the prolapse of the iris is produced, especially under the influence of the movements which the patient makes immediately after the operation, has discontinued doing extractions in the operating chair, and operates upon his patient while he is in the bed in which he is expected to remain tranquil for several days. "The colleagues who have become modern enough to let their cataract patients return home after operation, and to care for them thereafter as ambulatory patients, certainly do better to continue performing the iridectomy," our Berne colleague very justly says.

|| Gayet, *Loc. cit.*, p. 130.

ridiculous. We have an understanding that the patient is not to quit the bed in which he was when the operation was done, that he is to be alone, in darkness and silence, nursed by a person whose steps and ways are familiar to him, and that, abandoning himself to the simple, vegetative life, he is to let the hours pass in quiet somnolence. We would prefer that he were able to sleep the first forty-eight hours, without waking, for the awakening is always a moment of dangerous surprise. If there be needs to satisfy, he must satisfy them, in natural and easy poses, since any constraint may bring about spasm. In a word, it is best to resume the former precautions, from which we have lately had, perhaps, too much tendency to deviate."

This is simple good sense, coming from the eloquent mouth of a good master. It seems to us that all evidence is in favor of the proposition that, to prevent prolapse of the iris, and to obtain a rapid healing of the wound, and as the best warrant against infection coming from without, repose is essential. If we had to undergo a cataract operation, we should prefer that the operator should protect our eye, by means of a firm bandage, even against the involuntary movements of our own hands.

Now what we should demand for ourselves, we have neither the heart nor the right to refuse to our patients. It is true that, exceptionally, one meets patients who are more agitated when one leaves them tranquilly in their bed than when they are permitted to converse with those about them. In other cases, it is the state of their health that interdicts the prolonged decubitus. As a matter of course one will permit the former to have stories read to them, and one will not neglect to let the latter be seated in bed, or in rocking-chair, as much as is agreeable to them. But I admit that, in such conditions, I would not risk the extraction without iridectomy, which requires, up to the time of the healing of the wound, almost absolute repose. *

It is necessary, self-evidently, that the bandage protect the eye without annoying it, especially without making pressure

* "An iridectomy is to be done for every patient who cannot bear to remain lying three or four days without stirring."—PFLUEGER.

upon the eye-ball, which pressure might become prejudicial to a good coaptation of the wound. This aim may be achieved in various ways, and the permission to apply, in each case, the bandage that he regards the most applicable, must be accorded to each operator. Up to the present we have used oval bits of gauze with which to cover the lids; then we fill, with absorbent cotton, the depressions about the globes, so as to obtain a uniform surface, upon which passes the gauze bandage, without compressing the eye. Every part of the bandage that we use, during and after the operation, comes directly from the autoclave and is, consequently, absolutely aseptic.

With few exceptions, we cover both eyes. The bandage holds better; the immobility of the eye, that has undergone the operation, is more complete, and the patient, finding himself thus in relative obscurity, has no contractions of the iris. We can, for the same reason, dispense with darkening the patient's room, which is a very great advantage from a point of view of ventilation and cleanliness.

Of course we see no hindrance to substituting for the bandage, wound around the patient's head, plasters, which, after having passed over the dressings, shall stop at the temples, at the forehead and cheek, leaving the rest of the head free. (Snellen.) Lately we have used, with great satisfaction, a wire gauze mask which wonderfully protects the operated eye, covered with cotton, and which is kept in place by two small rubbers passing behind the patient's head. We have this useful little apparatus from our eminent friend, Fuchs, of Vienna, but it seems to be due to Prout's genius.* It can readily be sterilized, chemically, or, better yet, by the autoclave. Its somewhat hard edges are to be, each time, wound with cotton.

Confident of the importance of rest for the normal healing of the eye, we leave the bandage in place as long as possible; three or four, and even five days. The eyes being then rigorously cleansed, the bi-nocular bandage may often be replaced by a similar bandage, covering only the operated eye, or by protective glasses. Starting out with the idea that all antiseptics lose,

* PROUT.—The American Journal of Ophthalmology, Nov. 1890.

at the end of a certain time, the sterilizing action that they have upon the tissues, Chibret * replaces, at the end of twenty-four hours, the bi-nocular bandage by blue *coquilles* glasses. The operated eye is simply covered with a bit of batting, or the bandage is renewed daily, with a view to dropping into the eye a solution of the cyanide of mercury. Our colleague, Clermont-Ferrand, at the same time, permits his patients to go about, merely enjoining them to avoid very bright light.

ANTISEPSIS AND ASEPSIS.

Only isolated voices are raised against antiseptics, pretending that it is superfluous,† indeed even, “like the whole germ theory, repugnant to common sense,”‡ inferior to the excellent spring water of the capital. Apart from this our colleagues are unanimous in recognizing, in antiseptics, the cause of the greatest progress that surgery has ever accomplished. Even the simplest operations and those that are never accompanied by grave complications, are followed by prompter and cleaner healing, since the principles that Lister, led by Pasteur’s work, has formulated for general surgery, have been applied to their treatment. But it is very especially cataract-extraction that has profited by this fecund innovation.

We now smile at the enthusiasm with which a renowned surgeon, at the end of the first twenty-seven of his cataract operations that were done according to Lister’s method, exclaimed: “In twenty-seven cataract operations there has not been a single suppuration of the cornea nor of the entire eye. The number is not very considerable, but such a series of successful cases has never been observed in the hospital in which I perform most of these operations.”§ We do not doubt that, by continuing to operate,

* CHIBRET. *Loc. cit.*, page 442.

† “For me, the operative technique is all, and it is because we have been unskillful, that we latterly accuse the microbes of a rôle that we have played ourselves.” (WOLFE, *Annales d’ocul.*, Nov. 1891.)

‡ These are textual expressions, found in certain answers to our circular inquiry.

§ ROSSANDER, — *Hyd omraden för den antiseptiska sarbehandlingen* (*Hygiea*), 1879.

since, with the perfected antiseptic and aseptic precautions, this "successful series" has grown considerably larger. Indeed it is by hundreds that one now counts successes before their series is interrupted by the loss of a single eye.

The comparative statistics, that men of our calling, in all countries of the world, have published, are sufficiently well known. They demonstrate, in figures, the eminent advantage that this admirable conquest of modern surgery has exercised upon our operations. The written and oral replies to our inquiry, that we have received, are a no less conclusive proof of this.

For our own part, we repeat, with the same assurance with which we said it in the lecture which constituted the opening of one of our courses of operations: "Much more important even than local anæsthesia are the advantages we derive from antiseptics. It is a veritable and immense benefit; so great that future generations will never know how to appreciate its just value, for they will never have seen absolutely healthy, absolutely well-operated eyes, or those affected with a wound which was at first insignificant, go off in suppuration, to the despair of the patient and the discouragement of the operator." *

Let us not, however, permit ourselves to be blinded by enthusiasm. Infection, apparently so happily combated along the whole line, is far from being finally vanquished. It reappears still, here and there, in a way by so much the more painful for us, because we expect it less. †

But let us not be discouraged by these failures. The discovery of infectious micro-organisms is still so recent that our ignorance, with reference to them, is nothing astonishing, dishonorable or properly discouraging. Let us work, observing

* LANDOLT.—*Progrès médical*, 23rd November, 1889.

† "Already, before the introduction of antiseptics, properly so-called, I had relatively favorable results, (3 to 4% of loss); now I do not have even one case of suppuration in a hundred extractions; but I have not succeeded, more than any other mortal, in entirely suppressing it. However rarely we may be thus troubled in our apparent security, we ought to recognize in it, nevertheless, the proof of the imperfection, generally, of any human enterprise, of ocular antiseptics especially."—SATTler.

without relaxation, each in his own domain, the *savant* in his laboratory, the practitioner at the bedside of his patients. Let us utilize the facts that others discover! But let us guard against mutually borrowing theories! Theory is a language, understood only by the initiated, and which causes the profane to speak and commit stupidities. It is a provisory bridge, thrown out by explorers toward a country still unknown. He who believes himself able to use it with safety runs the risk of foundering or of going by a false route.

We abstain, therefore, in this purely practical article, from entering into the details of bacteriology. We confine ourselves strictly to the territory of the clinician, trying to sum up, in simple language, what experience seems to have demonstrated to be useful in our art.

The aim of our antiseptics is to shield from infection the organ upon which we operate. Now it does not seem doubtful that infection, and that of the most redoubtable variety, may come from the organism itself, from germs whose habitat is at times in parts of the body far removed from the place which our operation concerns, or from substances that the economy engenders, even without the concurrence of micro-organisms. *

Unless it is a question of an ulcer, an abscess or some other palpable affection, whose healing we are awaiting, we are, as yet, nearly unarmed against this AUTO-INFECTION.

It is, on this account, all the more important to subject the patient to a profound general examination, before proceeding to an operation as important as is extraction of cataract. One should not decide upon the latter, before having rid the patient as much as possible of any ill, capable of becoming a focus of infection. But, very fortunately, this species of contamination is by far the rarest. The infection comes oftenest from without; its agents are found on the skin, the hair, the eyebrows and eyelashes of the patient. They nestle in the humors secreted by the mucous surfaces of the eye, and multiply in the lachrymal sac. They ought to be sought, moreover, in

* Compare, in this connection, notably the interesting communication of Panas, to the French Surgical Congress, 1892.

objects that touch the eye, the operator's hands, the instruments, the articles used in dressings, among others the collyria.

As we have remarked above, the epithelia and endothelia guard the eye, in its normal condition, against the noxious influence of the bacteria, whose contact it may thus endure with impunity. Deprived of this protective layer, as is true in the case of a wound, the organ finds itself exposed to the invasion of the enemy. To avoid this calamity, we must seek, therefore, to hold every infectious germ remote from the eye, during the operation, and up to the time of the cicatrization of the wound. It is necessary that every object, that comes into contact with the eye, should be free from septic organisms.

Now we know two ways of obtaining this asepsis. Let us name, first, the surest, namely, HEAT. No organism can resist a temperature of 120° . * This fact seems to have been uncontestedly demonstrated.

Besides heat, we possess CHEMICAL MEANS, substances which, whether pure or in solutions of certain concentration, destroy, at the end of a certain time, the bacteria known up to the present time. Only it is evident that what causes the death of one organism, may also kill another, and many bacteria are more tenacious of life than is the physiological cell. The difficulty is, therefore, to efficaciously combat the infectious germs, without prejudice to the operated eye; to find, in the whole number of antiseptics, that which has only one cutting edge; or, if the cutting edge is double, to manage it in such a way as to utilize only the one that we wish to.

As to the *hands* of the operator and his assistants, as they will scarcely endure a sojourn in the autoclave, one can and one ought to attack them, first, energetically, with soap and warm water, expel from them all the adherent contaminations, with a brush and the nail cleaner. Then one has to remove from them fatty bodies, by plunging them in absolute alcohol, and should sterilize them by means of a solution of a powerful antiseptic, as the sublimate (from 1:1000 to 1:500), the biniodide of mercury, recommended by Panas, Listerine, a combination

* (Centigrade) 248° , in the Fahrenheit scale (Translator's foot-note).

of menthol, eucalyptol and boric acid, formulated by Randall, resorcine, used by Englebienne, etc., etc. After this powerful disinfection, it is perhaps well to dip the hands in a less concentrated solution of the same antiseptic or, indeed, in sterilized water. The majority of our colleagues proceed directly to the operation, without drying the hands. I confess that, to me, it is disagreeable to operate with moist hands. Fearing, on the other hand, to contaminate them, either by drying or by touching, involuntarily, non-sterilized objects, I take care to pass them, as they finish the antiseptic bath, into *sterilized gloves*. They are simple cloth pockets, having a rubber band that keeps them rather tight at the wrists. The hands, therein, become dry in all safety. I may touch whatever I choose to, without risk of infecting them again. I do not remove the gloves before I take up the instruments. This is a little means of simple and practical antisepsis and I can warmly recommend it to my colleagues.

In spite of the relative facility with which one disinfects his hands, and although, in ocular operations, they do not come in direct contact with the wound, I never undertake a cataract operation after having touched other eyes. I perform private operations in the morning and, at the clinic, always operate *before* the other consultations.

The articles used as parts of the surgical dressing, absorbent cotton, gauze *rondelles* and ribbons, the mask mentioned before, the collyria and water used during the operation, all are sterilized in a Chamberland's autoclave, which produces steam at 120°.

There is no objection to letting non cutting instruments, also, stay in it; notably the blepharostats, and those which serve in the intraocular injections, the silver sounds, the spatula and curettes may be put into it, without harm, provided they have metallic handles. Ivory splits and cracks, in so high a temperature.

As to *cutting instruments*, there must be, for them, a *dry air autoclave*, because they would rust in dampness. One ought, moreover, watch very attentively, that the temperature do not exceed 120°, * otherwise the steel risks a loss of its

[* 248°, Fahrenheit. Translator's note.]

temper. One of the most competent instrument manufacturers tells us that, very often, the thermometers of autoclaves are far from being trustworthy, and that they continue to indicate a temperature of a little above 100° (212° Fahrenheit), when it has already passed 200° Centigrade, a temperature deleterious to the temper.

On this account, some have attempted to disinfect instruments by plunging them in *boiling water*. Experience seems not to have been unfavorable to this simple procedure. It is best not to forget, however, that some pathogenic germs resist a temperature of 100° .[†] Boiling water is not, therefore, an absolutely trustworthy antiseptic. So the majority of operators seek to obtain, *chemically*, the asepsis of instruments. But we meet here another difficulty, that of finding an antiseptic liquid sufficiently active to destroy the bacteria, without being detrimental to the cutting edge of the instruments.

The substance which, up to the present, seems to best fulfill these conditions, is the *oxycyanide of mercury*, in solution of 1%, or even 1:200. Chibret recommended this salt of mercury to the International Congress at Heidelberg. Vignal has subjected it to the most profound study, from the bactericide point of view. Many surgeons, among them myself, use it with great advantage.

We leave the instruments for at least forty minutes in a solution of the oxycyanide of mercury, 1:200. This solution being very irritating to the eye, we substitute for it, next, sterilized water, whence the instruments pass directly into the hands of the operator.

In an article already cited, which appeared in the July issue of our *Archives*, Chibret recommends substituting *cyanide of mercury*, for the oxycyanide, since the latter will not always be furnished in a condition of perfect purity and, used in its commercial form, would injure steel. Remaining ten minutes in a bath of the cyanide of mercury, 1:100, suffices, according to this

* VINAY. *Manuel d'asepsie*, page 62, COURBOULES *thèse de Lyon*, 1883., KITT, *Centralbl. f. Bacteriologie*, 1888, Vol. III, page 573.

author, to sterilize the instruments. Then it is well to pass the instruments to a weaker solution (1:1500.) *

As will be seen, we are easily enough able to obtain asepsis, according to our present knowledge, as regards our hands, the instruments and the bandages.

The asepsis of the *field of operation* presents much more difficulty. Although the epidermis of the face (and notably that of the eye-lids) of the patient, his eye-brows, lashes, etc., endure as energetic a cleansing as the hands of the operator, this is not true of the mucous membrane, so easily irritable, that covers the internal surface of the lids and the external surface of the globe. This membrane forms, moreover, in the *culs-de-sac* the *plica semilunaris* and the lachrymal ducts, veritable receptacles for bacteria, † so much the more dangerous, since they remain in intimate and constant contact with the wound.

Steffan very justly remarks also, that the conjunctival sac, in which our operative wound is, is more difficult to protect against infection coming from without, than is the abdomen, because of its connection with the lachrymal sac and with the nasal and buccal cavities. The multitude of methods suggested for obtaining asepsis of the eye, and the complexity of their use, are the best proof of their insufficiency and of the uncertainty in which we still are, with reference to them.

It is difficult to reproach anybody for having permitted himself to be carried too far by antiseptic zeal, since we have not

* Permit me to mention briefly, here, a few substances employed for the disinfection of instruments. They have been pointed out to us by colleagues, though we personally have not used them. Biniodide of mercury 1:20,000, (PANAS); a concentrated solution of salicylic acid, (Dufour): Salicylate of mercury, 1:5000, (Vacher); Hydronaphthol, (Swanzy); Resorcine (Englebienné); the permanganate of potash (Critchett); a boiling solution of soda, 1:100, (Dohnberg, Eversbusch, Schroeter). Besides the antiseptics, it may be well to examine the instruments, immediately before their use, by means of a strong, magnifying lens, as Eversbusch, Nordensen and others recommend. One thus discovers, not only defects in the cutting edge and in the point, but, moreover, the infinitesimal foreign bodies, that sometimes adhere to the instruments, in spite of the bath whence they have come.

† GAYET, CHIBRET, SATTler, WIDMARK, HAAB, KUHNt.

yet found a means of procuring assured asepsis of the eye; but I am convinced that we have often gone astray and, with the best intention in the world, done, in this respect, more harm than good. Thus those colleagues, who subject the eye to a thorough washing, with a sublimate solution of 1:2000, with 3% carbolic acid, who fill the conjunctival sac with iodoform, or with yellow ointment, after the operation, etc., incur the risk of provoking an inflammation with secretion, which seems to me to imply precisely the danger that it is sought to avoid.

Clinical observation teaches us that, in order that infection take place, there is necessary, not only the presence of bacteria, or of noxious substances, but also a soil propitious to their action. There exist, incontestably, inflammations and even suppurations, without bacteria, * and which none the less hinder, in the most annoying way, the healing of the wound. Now I have a strong feeling that, by treating the eye with irritant agents and manipulations, we start up the conditions that are propitious to all kinds of inflammation and infection; in short, to all pathological processes.

The confession of a skillful operator, who is, at the same time, an erudite bacteriologist, and who attributes to the irritating effect of a too strong antiseptic the loss of two eyes, upon which he operated for cataract, is, in this point of view, very significant. And has not Hermann† proved that, if he injects under the skin of a rabbit, either an aqueous solution of carbolic acid, or a sublimate solution, and then microbes, this suffices to provoke a notably less quantity of pathogenic germs, than when similar microbes are afforded an opportunity to act upon a tissue not previously subjected to an antiseptic injection.

Merely the manipulations, designed to cleanse the eye, but executed with too little care, may suffice to bring about a lesion of the protective layers of the eye and open ways for infection.‡

* LEBER.—*Die Entstehung der Entzündung*. Leipzig, 1891.

† *Annales de l'Institut Pasteur*, 1891, page 243.

‡ Compare Chibret, *Loc cit.*, page 145.

It is well here, as everywhere, where our therapeutics still move in relative obscurity, to remember the adage, true as it is old: "*Τὸ δὲ πρῶτον τὸ μὴ βλάπτειν*," "*Primum non nocere*." * We are to choose then, in the host of antiseptics, that have been recommended, that which is the most efficacious and at the same time the least irritating to the eye. And then it has always seemed to me that the advantage of the manipulations, that are undertaken with an antiseptic aim, is far from being due solely to the bactericide action of the substance used, but comes in great part from their *mechanical* effect, from the washing. Perhaps we do not kill as many microbes as we sweep away with the mucus, the secretions, the epithelial scales, the impurities of all sorts, sojourning in and on the lids, affording the microbes an asylum and favoring their development. †

My friend Sattler writes me that, after prolonged antiseptic bandaging with a sublimate solution of 1:5000, there detaches itself, from the conjunctiva, a fine pellicule that contains epithelial cells and a quantity of micro-organisms. It is for this reason that it is best to wash the eye generously and thoroughly, to rid it of all these dangerous substances, but to take great care not to introduce new ones or, as we have said, to provoke a condition of irritation or a lesion which may become the starting point of an inflammation, with or without bacteria.

It is impossible to mention here all the solutions employed with the aim of preparing the eye for operation. The most efficacious, and certainly the one most used, is that of the *bichloride of mercury*, 1:5000, originally advocated by Sattler. The most resisting bacteria seem to lose, in it, their vitality, in a few minutes. Moreover, the eye generally bears it well, especially when it is lukewarm, which augments still more its antiseptic efficacy. Panas recommends the *biniodide of mercury*, as being, in weaker solution, as efficacious as, and less irritating than, the sublimate at 1:5000. According to Chibret, the cyanide of mercury, ‡ in solution in water, 1:1500, added to 1:7000 of the

* See also BARDE *compte rendu* of his clinic, for the year 1891, page 14.

† See DIANOUX, *Ann. d'oc.*, March 1892.

‡ CHIBRET. *L'antisepsie par le cyanure de mercure*, *Arch. d'opht.*, 1892, page 437.

chloride of sodium, has bactericide power equal to that of a sublimate solution of 1:1500. Moreover, this solution would be still less irritating, to the mucous membranes, than would a sublimate solution.

Boric acid in saturated solution, especially extolled by Schmidt-Rimpler,* is particularly well borne, but its antiseptic action seems much inferior to that of the mercurial salts above mentioned. This solution seems to us, therefore, like that of the chloride of sodium, (6 or 7:1000), or sterilized water, indicated rather for the mechanical cleansing of the eye, during and after the operation.

Other substances, by penetrating into the interior of the globe, would involve the risk, as we have above seen, of determining in it an annoying irritation. In order to prepare the organ for operation, one will need to consider first the *lachrymal apparatus*. The ducts are to be probed and cleansed very carefully, by means of repeated injections of an antiseptic solution. If any secretion indicates the presence of a lachrymal disorder, it is best to postpone the operation until a cure of this has been accomplished.

Many colleagues fill the inner angle of the eye, after the operation, with iodiform. The odor of this substance being very disagreeable, we use iodol instead. Haab obliterates the lachrymal puncta, by means of the galvano-cautery, and Deutschmann, by means of a few sutures, after section of the puncta, at the least threat of an affection of the lachrymal sac. The conjunctiva is to be not only bathed, but irrigated, protractedly, by an antiseptic solution.

Gayet uses, for that purpose, a blepharostat, whose hollow arms, pierced with little apertures, are placed in connection with a receptacle containing a solution of the sublimate, 1:6000. An irrigator, from which one throws the jet upon the everted lids, into all nooks and corners of the conjunctival sac, does this work well.

Gayet, Chibret, Kuhnt and others cleanse the conjunctiva

* This author seems to now prefer chlorated water, for purposes of ocular antisepsis. (See *Deutsche med. Wochenschrift*, 31, 1891).

thoroughly, besides, by means of a tampon of cotton, on a stylus and soaked in an antiseptic solution.

It is well to wash the conjunctiva, the night before the operation, and to leave the eye under an antiseptic bandage, wet (if the skin is not too sensitive) or dry, but aseptic, up to the moment of the operation, when the washing is to be repeated.*

It is incontestably due to these antiseptic measures, that we have just outlined, but which admit of many modifications—it is due to these measures, rigorously undertaken, that the cataract operation gives results, to-day, of which one would not have dared to dream thirty years ago. Professor Manz is justified in saying, that our failures no longer seem to constitute more than the inevitable allowance which must be made for the inherent imperfection of any human work. ~~Is it necessary~~ *Original* ~~for us~~ to stop there, convinced that we have attained all that is humanly possible? We don't think so.

As all admit, we still have a few complete failures, and then some half losses, or, as we call them, by euphemism, semi-successes, that are more numerous. It is permissible to hope, that we may yet be able to notably reduce the number of them, especially that of the latter, for, after the good, there is still the better, which, if it really merit its name, is not an enemy of the good. How shall we accomplish this further improvement? Bacteriology, especially in its application to surgical practice, is still making progress; we shall finally succeed in warranting our patients against noxious influences, in a way that will be, at the same time, simpler and more efficacious. We must not, however, expect *everything* from the future and, because of the unknown, forget what has already been acquired by science. Thus we are not to let ourselves be dazzled, by the success of local antisepsis, to such a point as to neglect the care to be given to the rest of our patient's body. It will always be repugnant,

* Nuël remarks that, often, the non-operated eye shows itself more irritated than the other, and that its conjunctiva secretes, under the bandage, more than that of the operated eye. He attributes this phenomenon to the fact that a sound eye is generally less carefully cleansed than the one upon which we expect to operate, and that herein is found a proof of the efficacy of this cleansing. So he leaves each suspected eye bandaged for two days before proceeding to operate on it.

to the true surgeon, to operate on an unclean person, in a dirty place. Antisepsis is, as a matter of fact only cleanliness pushed to its ultimate extreme; nothing is, therefore, more justifiable, than to cause the patient to undergo a radical soaping, before subjecting his eye to the cataract operation. It is not rare that we thus make discoveries of the highest importance, from the etiological point of view as well as from that of special precautionary measures, to be taken during and after the extraction of the cataract.

Our colleague in Japan, Inouye, preaches even by practicing, by taking, himself, and having his assistants take, a complete bath, before operating for cataract-extraction.

Since we know that hairs are the bearers of the predilection to infection, we have cut, when necessary, the eyebrows and, generally, the hair of the patient's head if it be too exuberant. Bobone has it shaved; Fuchs envelops the head in linen, soaked in an antiseptic solution. These are certainly excellent precautions, but we ought not to forget ourselves, in this antiseptic zeal. The observation of one of our friends, a most distinguished gynecologist, who has seen the statistics of his laparatomies noticeable bettered since he has taken to the envelopment of his head, with an aseptic cloth, during the operation, is very significant. Hence we can only applaud Randall, when he writes that he washes and brushes, not only his hands, but also his face and beard with soap and water, first, and then with Listerine, before commencing a cataract-operation.

If the fine statistics of Brettauer, and others who are forced to operate for cataracts in hospitals, with an environment of suppurating wounds, prove that aerial contagion is not greatly to be feared, nobody will deny that the purity of the air is as important for our patients as is the cleanliness of their beds and clothes. Moreover, in spite of the jealous care that we take, not to abandon, to mercenary hands, either our instruments or our patients, we are not, however, the only ones who touch them, and how could we expect respect for antisepsis, from a personnel with whom the simple notions of cleanliness are lacking.

Finally, antisepsis and cocaine, those two great acquisitions of modern surgery, often gratify in vain, with ill-deserved suc-

cess, hands that would have abstained from touching a bistouri, at the epoch when the surgeon found all his salvation in the perfection of his operation. It remains no less true that the good operator will find his recompense in more numerous, and more nearly perfect, successes.*

RÉSUMÉ.

Cataract extraction has become, in this age, a much less dangerous operation than it formerly was. This progress is not attributable to changes in the operative method, ~~but~~ to a more profound acquaintance with the nature of the evil, ~~which~~ is due to the discovery of cocaine, which, by the local anaesthesia that it effects, sensibly reduces the danger arising from the indocility of the patient; and is still more due to antisepsis, which conjures the much greater danger of the infection of the eye. This is not by any means equivalent to saying, as certain publications would have us believe, that, now-a-days, all cataracts may be attacked with impunity, with equal facility, and by the same simplified method. Neither cocaine nor antisepsis nor anything else that may be hereafter invented, in the domain of surgery, will ever prevent there being considerable variation, in the opacity of the lens, that is given the common name of cataract. According as this is due to one or another cause, as it is more recent, or older; harder or softer; smaller or more voluminous; as it belongs to one person or another, etc., the operations upon it will need to be different.

The dangers of this operation, have been considerably reduced, and that in nearly the same proportion for all forms of cataract. For senile cataracts, ripe and uncomplicated, they have become almost *nil*. This is why some have been able to adopt extraction, without iridectomy, and others to allow much liberty to their patients, after operation.

But incomplete or complicated cataracts, while often permitting extraction by the same method, are always entitled, in our opinion, to special precautions as to the operative methods, as well as with reference to the after treatment.

* STEFFAN. *Arch. f. Augenheilk.* XXXV, 2, 1889, and *Klin. Monatsblätter*, XXVII, Oct. 1889, page 406.

Very far from seeking one sole method, and wishing to impose it upon everybody, under the name of the simple, or natural method, or that of Daviel, we shall seek, on the contrary, to modify our method according to the needs of the case, to adapt it to the nature of the patient, as well as to that of the cataract and to all the attendant circumstances.*

So we are to profit, not only by the conquests of modern surgery, but still more by the patrimony, so conscientiously and, often-times so painfully, acquired by our ancestors. And, with reference to the old masters, we specially hope that the admirable zeal, with which they sought perfection, in the execution of their operations, will not be allowed to cool.†

By observing as profoundly, by operating as perfectly as they, armed as we are, with marvelous resources, with which they were unacquainted, we cannot fail of the aim that humanity imposes upon us, of realizing, in the cataract operation, a last possible maximum of success, with reference to number as well as in perfection.

* The late Sir Wm. Bowman wrote to me, but a short time before his death: "You are perfectly right, I never laid down a method of extraction, universally applicable; I always in every case operated as seemed to me at the time best for the individual treated. I cannot doubt that the problem of what is to be accounted the best method, in any particular class of cases, will still have to be worked out by our successors, and by theirs too! but ever remaining open to modifications, to suit the thousand personal circumstances of the patients."

† Our venerable Russian colleague, Waldhauer, who, for forty years, has practised our art, with a master's hand, attributes the dexterity, in cataract operation, that he has acquired, in great part to fencing, which he has always cultivated with ardor, as well as to the systematic operative exercise, that he has not ceased to practice on the eyes of animals, and human cadavers.

WHERE TO PLACE THE AXES OF CYLINDRICAL
LENSES OF SPECTACLES IN CASES OF
OBLIQUE ASTIGMATISM.

Written for the Ophthalmic Record by

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The most careful oculist sometimes finds difficulty in satisfactorily placing the axes of cylindrical lenses in spectacles to be worn by persons with oblique astigmatism.

Of course skill, time and care are the best safe-guards against errors, but, given these, there often remains a doubt as to the best angle at which to place the axis of the cylinder.

Dr. G. C. Savage, Editor of the *Ophthalmic Record* advances the theory that the reason for this is, in many cases at least, the rotation of the eye-balls by oblique muscles, and that the rotation is in order that the retinal images may fall on corresponding parts of the two retinae, thus avoiding double vision.

In the first number of the *Ophthalmic Record* Dr. Savage elaborates and demonstrates his theory on this subject under the title of "The Harmonious Symmetrical Action of the Oblique Muscles in all Cases of Oblique Astigmatism."

To prevent as much as possible this rotation during the tests for astigmatism he urges that such eyes be tested one at a time under the full influence of a mydriatic, an opaque disc being placed in front of the other eye. For several reasons that is the advisable procedure, and I suppose it is the usual one with most careful oculists.

In those cases in which we are still in doubt as to the location of the best meridian, "at one moment the patient indicating that it is at a certain angle and, at the next moment, five or more

degrees removed from that point," he says there is rotation of the eye-balls by the harmonious symmetrical action of the oblique muscles.

I accept Dr. Savage's theory, and think it a proof of remarkable scientific acumen, but have been somewhat disappointed that he has not given more definite instructions for getting the best practical results from a knowledge of his theory.

The only special rule he gives in the article referred to above for setting cylinders, is the following: "If the best meridian in hypermetropic astigmatism is in the temporal quadrant and there is doubt as to whether the axis should be at a certain angle or 5° or more nearer the horizontal, the latter point should be chosen."

This is correct when the best meridian in each eye is in the temporal quadrant, and the same is true of the nasal quadrant. It does not hold good however when the best meridian of one eye is in the temporal, and the other in the nasal quadrant.

I believe I can give a rule covering all cases of oblique astigmatism, and one which will serve as a satisfactory "working formula," even if the examiner does not understand Dr. Savage's theory.

It is well to remember that the "best meridian" in astigmatism, is that meridian occupied by the axis of the plus cylinder, which corrects hypermetropic astigmatism simple or compound; and occupied by the axis of the minus cylinder, which corrects myopic astigmatism simple or compound. Therefore I may, for brevity's sake, use the terms "axis" and "axis of cylinder," instead of "best meridian," and as practically synonymous with it; and when speaking of the axes of the cylinders, I shall for convenience, refer to the ends of the axes above the horizontal. Bear this in mind, as it is important.

Now, as to the rule. It applies to those cases only in which, after careful examination by the methods heretofore indicated, you are still in doubt as to the exact angle the axes of the cylinders should occupy in the spectacles. The rule is as follows: *In those cases in which the axes of the proper cylinders for the two eyes diverge, place the cylinders at those points which will give the axes the greatest divergence permitted by the tests;*

and in those cases in which the axes converge, place them at the points which will give them the greatest convergence permitted by the tests. To illustrate this rule, let us consider a few cases, all of oblique hypermetropic astigmatism.

Case 1. In the right eye you are in doubt between 105° and 115° , and in the left eye between 75° and 85° . According to the rule you give them the limits of divergence allowed by the tests. That is, you place the axis of the right lens at 115° , and that of the left lens at 75° .

Case 2. In the right eye you are in doubt between 75° and 80° , and in the left between 100° and 105° . In this case, the axes converge, and according to my rule you converge them still more; as much as the limits of the tests will allow. Place the right at 75° and the left at 105° . In both of these cases Dr. Savage's rule would hold good, although in No. 2, the "best meridians" are in the nasal quadrants.

Case 3. In the right eye the points of doubt are 115° and 120° and in the left 100° and 105° .

Although in the right eye the axis is in the temporal quadrant while in the left it is in the nasal quadrant, still they diverge, and according to our rule we make them diverge more; that is place them at the angles farthest apart; for the right eye at 120° and for the left eye at 100° .

Case 4. In the right eye the points in doubt are 95° and 100° and in the left 105° and 110° . As in case 3 so in this, the axis in the right eye is in the temporal quadrant while that in the left is in the nasal, but the axes in the two eyes in this case converge instead of diverge as in case 3. Therefore according to my rule we converge them more—as much as the tests permit. That is, we place the axis of the cylinder for the right eye at 95° and that of the left eye at 110° .

These four cases illustrate all kinds of oblique hypermetropic astigmatism.

In all cases of myopic oblique astigmatism simple or compound, reverse the rule: *converge* for *diverge* and *diverge* for *converge*.

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DR. LANDOLT AND DR. CULVER.

We are sure that every reader of the *Record* will feel indebted to Dr. Landolt for the thorough and exhaustive paper on "Cataract-Operation in Our Time" which he has given us. The source of the paper will insure its being read; and no one can read it without feeling enriched.

In like-manner all will feel under obligation to Dr. Culver, through whom Dr. Landolt has spoken in English. The translation is lucid, and has been accomplished at the expense of much time and labor on the part of Dr. Culver.

This paper on "Cataract-Operation" occupies 72 pages of the *Record*, and the author has adhered to his subject, having nothing to say of the etiology, pathology and symptomatology of cataract. The chapters on cataract, in our standard works on the eye, include all these, and yet we find everything said in from 20 to 74 pages (De Schweinitz, 20; Berry, 26; Fusch, 34; Schmidt-Rimpler, 35; Noyes, 36; Wells, 72; Meyer, 74). It is true that the page in most of these works is larger than that of the *Record*; but it is equally true that no where in English books or journals can so thorough and exhaustive a paper on cataract-operation be found as Dr. Landolt's paper, presented in this issue. The *Record* congratulates itself in having been chosen by the author as the medium of publication.