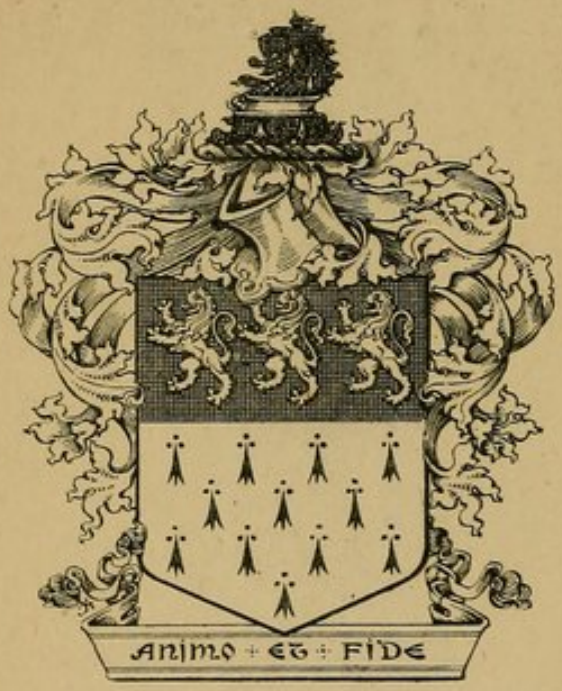
A treatise on cataract : intended to determine the operations required by different forms of that disease, on physiological principles / by Philip Chilwell de la Garde.



Charles A. Oliver.

A

TREATISE ON CATARACT.

Flindell, Printer, Exeter.

A TREATISE ON CATARACT,

INTENDED TO DETERMINE

THE OPERATIONS REQUIRED BY DIFFERENT FORMS OF THAT DISEASE,

ON

PHYSIOLOGICAL PRINCIPLES.

BY

PHILIP CHILWELL DE LA GARDE,

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1821

To JOHN ABERNETHY, F. R. S.

SURGEON OF ST. BARTHOLOMEW'S AND CHRIST'S HOSPITALS,
&c. &c.

SIR,

TO your protection I submit this treatise, encouraged by that kindness which has ever accompanied your instructions, a kindness scarcely exceeded by the splendor of your professional fame.

I am,

Sir,

Your respectful and most obedient servant,

P. C. DE LA GARDE.

EXETER, Dec. 14th, 1820.

PREFACE.

THE following Treatise is founded on two essays read before the medical society of St. Bartholomew's Hospital. The first, on the physiology of the visual organ, and the pathology of cataract, in Oct. 1818: The second, in the ensuing spring, on the treatment of the same disease. Influenced by friends then present, the author submits his opinions to the profession. He has reduced his pathology to a system. Experience confirms his physiological views, which remain unaltered. The practical department is essentially similar. Extracts from works of acknowledged importance are substituted for an abreviated description of the various operations.

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INTRODUCTION.

THE importance of a disease arises from the frequency of its occurrence; from the influence of the organ in which it occurs; and from the derangement, to which the functions of that organ are liable from its supervention.

Were I desired to point out a disease, remarkably distinguished for these characteristics, I should name cataract. It is of frequent occurrence; no age, sex, or temperament is exempt from its attack. The loss of vision, attendant upon cataract, altogether deprives the patient of the exercise of a most useful and important organ; the individual retaining a glimmering only of that light, which has ceased to communicate impressions from external objects.

In reviewing the history of the treatment of this disease, we find, that the labors of the

profession have been commensurate with the importance of the subject. The attention of surgeons has been sedulously devoted to the investigation of the phenomena attending its formation and curative treatment; and if few diseases have exercised more talent, few, in a practical point of view, have more amply repaid the pains bestowed upon them. The antients, although mistaken as to the real nature and situation of the disease, endeavoured to remove the opaque substance, and to re-establish a passage for the transmission of light. Its occasional removal encouraged them to persevere; and their methods (originally erroneous and imperfect) gradually improved, as their progressive acquirements in anatomy and physiology dispelled the obscurity in which the subject was involved. Consequently this disease, although surrounded by parts of the most extreme delicacy of texture, of high susceptibility, and in which the sphere of action is confined to the narrowest limits, is now treated with a degree of success, perhaps unparalleled in any other branch of operative surgery.

But cataract has not excited interest as a disease only; in common with the other affections of the eye it has been, and must still continue to be, a fertile source of inquiry to the physiological and pathological investigator. The peculiar structure of the organ affected, enables us to look in, and to detect the secret operations of nature.

The advancement of professional information on the anatomy of the eye, and the discovery of the actual situation of cataract, were accompanied by unwearied surgical observation. Accident, at length, demonstrated the possibility of removing the opaque matter from the eye by extraction, and the previous discoveries were sufficient to indicate the means, by which this object was attainable in other cases. The novelty and boldness of this scheme, and the success of its projector, procured for it the patronage it deserved. Many of the profession however, either prejudiced in favor of the old method of depression, or afraid to undertake an operation to which hey were unaccustomed, and which evidently was more difficult to exe-

cute, opposed its introduction. A spirit of rivalry and party feeling was the result, producing that rapid progress towards perfection, by which both methods have been distinguished. But the attendant advantages were not unmixed with alloy. In the heat of controversy, the partisan, hurried away by the tide of feeling, prefers an obstinate defence of his own opinion, and the subversion of his opponent's, to an elucidation of the truth by calm reasoning, and accurate deduction. Hence a degree of partiality was unfortunately introduced into the discussion of this question, which certainly has proved prejudicial to the interests of science. Each party extolled the superiority of its favorite operation; each painted its advantages in the most glowing colors; the danger and imperfection of either method were carefully softened down, whilst they mutually pointed out the defects of a different treatment with illiberal anxiety.

Amongst other unfortunate effects, which sprung from this feeling, was, inattention to that most important maxim, that the skill of

the operator should be equal to the difficulty of the operation. The consequences of this culpable inconsiderateness must be apparent; yet there is reason to believe, that numerous failures were necessary, to induce many practitioners, to reflect, soberly, on the inefficiency of their dexterity to execute the methods patronised by others. This, undoubtedly, may be attributed to the unqualified manner in which certain operations were recommended by the highest authorities on this subject. Had they impressed upon their readers the difficulties arising from such indiscriminate application, and the dexterity required to surmount them, as strongly as they blazoned forth the advantages of their particular systems, many an eye would have been saved from destruction.

But the narrow views of party feeling impeded the progress of science. Men who had labored to establish the superiority of a favorite treatment, would not allow, that some operations were better adapted to one form of the disease, than to another. I cannot better express my own feeling on this subject, than by

introducing a remark which Mr. Stephenson has made on his own operations, that, " no single " process, however well adapted it may be to " one or more species of the complaint, is " equally and indiscriminately applicable to all. " It is indeed to the maladaptation of the reme- " dy to the condition of the affected organ that " we must attribute the most frequent cause of " failure in the treatment.

In the following pages I shall describe the varieties of cataract, and their complications with other diseases and affections of the eye. I shall then proceed to state the physiological and pathological opinions, which I entertain respecting this disease, pointing out the facts, on which they are founded, and the arguments, by which they are supported. Lastly, I shall insert the best descriptions of the more remarkable operations, which at various times have been proposed and recommended. The objections, to which these operations are liable, will be noticed, and the cases, to which they are particularly applicable, determined. The difficulty of one branch will be considered, and the

propriety of its continuance in general practice will be discussed. Little novelty in the practical part is introduced, as I esteem the operations, already before the profession, perfectly adequate to the removal of every cataract.

I thus hope to give such a general view of the different methods, by which this disease is treated, as can at present only be attained by the perusal of many volumes.

A TREATISE ON CATARACT.

CHAP. I.

WHEN an opacity exists in the crystalline lens, in its capsule, in the humor Morgagni, or in either of them, the opaque matter is termed a Cataract.

I shall not introduce the opinions, which the antients entertained, respecting the nature or situation of the opaque body. That would be unnecessary, since all their opinions on the subject were erroneous. An acquaintance with them is not of any practical importance at this period; except that it might account for the frequent failures, to which the early treatment was liable. As illustrating medical history, they might prove interesting; but being collected in almost every work, which has appeared on this subject, they must be too familiar to require repetition.

Cataract may be idiopathic or the result of external violence.

The first symptom announcing the commencement of the idiopathic disease is a certain cloudiness, by which the patient's sight is obscured. This gradually increases, and when a strong light prevails, considerable inconvenience is experienced: but in the evening, or with a moderate degree of light, tolerable vision may still be enjoyed. This state is not of long continuance: by degrees the eye sees less distinctly, until the power of distinguishing light from darkness alone remains. In some cases the more striking colors, or even the outlines of large bodies, are still perceptible. Whatever may be the state of the cataract, an obscure light is most favorable to vision.

When an eye is examined in an early stage of this complaint, a slight haziness only, behind the pupil, can be perceived. A gradual increase in its density is discovered by subsequent examinations, until it becomes conspicuous to the most superficial observer. The accession of light continues to influence the actions of the iris.--- Such are the symptoms of cataract when uncon-

nected with other diseases. The time occupied from its commencement to its completion varies considerably; the average may perhaps be stated at from twelve to eighteen months.

Here it may be advisable to explain a circumstance, which has already been mentioned, that cataractous patients perceive objects more distinctly as the light is less vivid. It has been stated, that the opacity commences in the centre, infringing on the circumference of the lens by degrees; and, that the actions of the iris are uninterrupted. In the early stage of the disease, an iris, uncontracted by the stimulus of a powerful light, may allow a sufficiency of rays to pass through the transparent portion of the lens to give a tolerable degree of vision; and even in its ultimate state, the light will meet with the slightest obstruction at the margin of the crystalline. A similar assistance is afforded on the dilatation of the iris, by the application of Belladonna. So beneficial is this application, that I have known persons, who considered themselves cured by it, whilst laboring under the earliest stage of this disease. Indeed the Belladonna, during the progressive advance of the

opacity, is of constant utility, and may be resorted to, until the increasing blindness enforces the necessity of an operation.

The opaque body, forming cataract, varies essentially in different cases. The crystalline and its appendages undergo various alterations, which, as they materially differ from each other, constitute the different species, into which cataract has been divided. Hence the distinctions of lenticular, capsular, caseous, milky, of large or small, soft or hard, and, in old authors, of ripe and unripe cataracts.

The importance of distinguishing the nature of the cataract, previous to the performance of an operation, is universally acknowledged: the difficulty, nay the impossibility, of forming an accurate diagnosis has been as generally allowed. The shades and colors of the opaque matter have been minutely observed. It was hoped that from these information might be obtained, and the white, the green, the yellow, the slate, the blue and the black cataract have been enumerated. Perhaps by these appearances the judgment of the operator may occasionally have been influenced; but from all which has

been said upon this subject, no rules, for the formation of a positive diagnosis, can be collected.* The attainment of this desirable object having occupied much of my attention, I give the following arrangement as its result. The distinctive marks are obvious, and I trust that they will clear up the difficulty.

The genus cataract is divided into three

* Scarpa says:—"All that has been hitherto written, and "taught, upon this subject, has not that degree of certainty, "which can serve as a guide, in practice; and the most expe- "rienced oculist of the present day, is not able to determine "with precision, what the nature and consistence of the cata- "ract is, upon which he proposes to operate; nor whether the "capsule be yet transparent, or not, although the lens be "evidently opake."

On this passage Sir William Adams remarks:—"In this "opinion, the learned professor I must observe, is certainly "mistaken; for although I admit, that no written, or verbal "description, can convey to an inexperienced practitioner, an "accurate idea of the various kinds and shades of cataract, "yet, repeated observations will teach it to such an extent, "if the operator has sufficient opportunities for making them, "that an oculist of just and accurate observation, will rarely "be deceived in his opinion, of the nature of the cataract, upon "which he is about to operate."

Pott says:—"It is agreed by all, who have carefully con- "sidered this subject, and who are ingenuous enough to speak "the truth, that the mere color of a cataract furnishes no proof, "to be by any means depended upon, relative to its consist- "ence; and that they which appear greyish, or blueish or like "whey, are sometimes found to be firm and resistant, while "the more equally white ones are often perfectly soft."

species, viz. the organised lenticular; the disorganised lenticular; and the capsular or membraneous.

I. The organised lenticular is that species, which has usually been denominated the firm, solid, or lenticular cataract. Of this species there are three varieties, not differing in any important point, but in appearance only.

The first, when viewed through the pupil, resembles a piece of white cornelian; the opacity is uniformly diffused, excepting that the density is slightly increased towards its centre.

In the second, the nucleus only of the lens is diseased. The opaque portion bears a considerable resemblance to the first variety, but its surface is of course much smaller.--- The exterior of the crystalline retaining its natural transparency, the cataractous nucleus appears to be suspended in the centre of the pupil. This variety certainly is not progressive towards an opacity of the whole lens: those cases which I have seen had existed some years, but the opacity was confined to its original boundary. These cases are rare, and I believe they are always congenital.

In the third, we perceive a denser opacity, combined with the iridescence of the opal, and from that point of the lens, which lies in the axis of the eye, lines of division appear radiating towards the circumference. From these lines others arise. By the first the surface of the lens appears to be divided into triangular portions, and by the second those divisions are subdivided. This variety has not the same uniformity of shade as the first, but although a considerable difference, in this particular, is observable betwixt the different parts, yet there is the most evident regularity of arrangement in the whole. This appearance exhibits the natural structure of the crystalline; it demonstrates the seat of the disease, the existence of the original arrangement of its fibres, and the healthy and transparent state of the capsule. Indeed I believe an opacity of the capsule never exists in the organised lenticular species, at least it is an uncommon occurrence.

The size and consistence of this species are supposed to vary considerably. Undoubtedly it may be firmer in some instances than in others, and variations may exist with respect

to size; nevertheless, as the original structure is not lost, I am inclined to doubt, whether its departure from the natural standard is as great as has been represented. The chrystalline, in different subjects, has different degrees of firmness, and an equal difference may be observable in its diseased state. The centre of the lens is, originally, a harder structure, than might easily be believed; and, that its firmness may sometimes be augmented by disease, is not improbable. Where the cataract has been described as exceedingly soft, I conceive that its organization has been destroyed, and that it might be referred to the caseous variety of the disorganized species.

II. The disorganized lenticular species includes the caseous, fluid, and milky cataracts, which constitute three varieties. Notwithstanding the wide difference which may appear to exist between them, yet that difference is referable to color and consistence, rather than to more important characteristics.

The first or caseous variety, being removed from its capsule, is found to consist of a substance resembling thickened honey; it is

homogeneous and devoid of the slightest trace of structural arrangement. In color it generally varies from organized cataract; it is more dull, and is commonly cream colored, inclining to yellow.

The second, which I have simply denominated the fluid, bears a striking resemblance to the incipient organized cataract; sometimes indeed exhibiting that denser haziness, by which the more advanced stage of that species, in which it resembles white cornelian, is characterized. This variety is not common.

The third, is the milky cataract, remarkable for its peculiar whiteness.

Although the fluid is distinguished from the milky variety, yet the difference consists in color only, and not in fluidity.

An opaque nucleus, considerably wasted, is frequently found in the caseous and milky varieties. Whether this occurs in the fluid, I am not prepared to say: in those cases, which I have seen, there was none.

III. The third species, the capsular, is easily distinguished by its membraneous appearance

and irregular opacity. It is, in fact, a membrane opaque to a certain extent, but spotted and flecked with brighter white. If the reader will imagine a piece of silver paper placed behind the iris, an adequate representation of capsular cataract will be afforded.

Congenital cataracts are generally of the disorganized lenticular, or capsular species ; but exceptions are not uncommon. That, which is called secondary capsular or membraneous cataract, takes place, when an opacity of the capsule occurs subsequently to an operation, which has removed the crystalline.

The above description of the more obvious appearances in different cataracts will, I believe, be found correct; but as a discrimination of the various shades may sometimes be difficult, even to an eye habituated to these examinations, and as color alone might occasionally lead to fallacious conclusions, it is necessary, that some other character should be recognised, as that, on which a positive diagnosis may be founded. This may be found in the healthy or diseased state of the capsule. In those cases where the structure of the lens is preserved, its capsule

retains its natural pellucidness.* On the contrary, a disorganization of the crystalline is invariably accompanied by opacity of the capsule.†

It is then by the capsule, that I distinguish the organized from the disorganized lenticular species. It may be objected, that granting the accuracy of this statement, yet the difficulty of ascertaining the state of the capsule, and of

* There would seem to be an exception to this rule in the species of cataract mentioned by Sir Wm. Adams; he says:— "Richter, Wenzel, and Scarpa who have written so largely "upon cataract, and have published cases of its varieties on "which they have operated, have not recorded any instance "of this remarkable species: in which the posterior part of the "capsule is alone affected with opacity, while the anterior part "of that membrane, and the crystalline lens, remain perfectly "transparent." The silence of the above mentioned authors induces me to believe, that it is of very rare occurrence. I have seen one case only, which appeared to possess these characteristics: in this, it was difficult from the remoteness of its situation, positively to determine the seat of the opacity: it certainly appeared concave, as if the posterior portion of the capsule was the part affected; but as much inflammation had previously existed in the interior of the organ, the opaque matter might be formed of lymph deposited upon, or in the vicinity of that membrane. For a further consideration of this subject, see the chapter on medical treatment.

† Baron de Wenzel, speaking of the cataracts, which are met with in young persons, says, that "the crystalline humor "is generally milky; and both the anterior and posterior portions of the capsule are also at the same time opaque."

distinguishing its opacity from that of the matter it envelopes, is a barrier which must be insurmountable. To remove this objection, it is necessary to state the component parts, by which the disorganized lenticular cataract is formed: it is a semi-opaque capsule including opaque matter or fluid, which varies in color and consistence. Capsular cataract is a whitish membrane, opaque to a certain extent, but spotted and flecked with brighter white. Through this membrane, which is still semi-transparent, the color of its contents is visible, whilst the white flecks and spots, from their greater density, preclude an equal transmission. Thus then the cataract will assume the general hue of its contents, which will present an appearance, modified by the varying density of the medium through which they are seen. A caseous cataract for instance retains a general cream colored appearance, but its surface exhibits several irregular marks of a considerably lighter tint. In the milky cataract the aspect will be dense white, but on this ground irregular spots of a brighter hue will be visible. In the fluid cataract the flecks are sometimes

so minute as to render their detection less easy, but, I believe, they will never pass undiscovered by a careful examination.

The uniform cloudiness, or angularly partitioned surface of the organized cataract so remarkably differs from the above mentioned appearances, that any observations on the obviousness of the distinction are unnecessary. That such a distinction is highly important must immediately be acknowledged, but this I shall endeavour still further to illustrate in my observations on the operative department.

CHAP. II.

HAVING ascertained the peculiarities of the cataract itself, the general condition of the organ will still require investigation. The eye, in common with other parts, is liable to many irregularities of formation: these irregularities, and the affections, which are most frequently combined with this disease, will, at present, form the subject of consideration.

The malformations of the eye contract the circle of our exertions, and create difficulties, which can only be obviated by adapting our efforts to the condition of the affected organ. The same may be said of some diseased alterations of structure; whilst by others the natural arrangement and organization have been so totally subverted, that they would be rather aggravated, than relieved by surgical operations. For instance, that paralytic state of the optic nerve, (which, whether it be referable to local or to cerebral affection, is found by experience to resist every attempt at recovery) must immediately suggest the impropriety of an operation.

The first peculiarity of the eye upon which I shall treat, is a deficiency of size in the anterior chamber. This peculiarity may be occasioned either by the smallness of the cornea, the diameter of which varies considerably in different subjects: or the cornea may be considerably flattened, which indeed is a common occurrence among old persons, or among those whose vision was originally presbyopic: or, it arises when the iris projects forward with unnatural convexity. Now it must be evident, that in pro-

portion as either of these circumstances prevail, the anterior chamber will be narrowed, and the difficulty, with which any instrument is to traverse more or less of that space will be increased.

The second is a deficiency in the projection of the eye, which is either absolute or relative. In some persons, from the depth of the orbit, the eye is situated at a greater distance from the surface of the face than is usual : in others, a similar effect is produced by the smallness of the globe of the eye. By an extraordinary projection of those ridges of bone which form the orbital ring, (for instance of the frontal or malar) the access of the operator to the eye will, to a great extent, be obstructed. An unusual narrowness in the opening of the tarsi offers an equal impediment. It need scarcely be observed, that from any of these causes, peculiar difficulty arises, when it is necessary that an instrument should traverse the eye in the plane of the iris : the difficulty increasing in proportion to the distance of the anterior surface of the eye from the point of introduction. Perhaps it is unnecessary to add, that in both these

peculiarities, the difficulty of using an instrument will be augmented, in the same ratio as its surface is increased.

A third peculiarity is some inequality in the circle of the iris; but if the symptoms have a favorable tendency, the irregularity may be considered as immaterial.

The diseases, which may accompany cataract, may be thus classed :---opacity, adhesion, relaxation, paralysis, and generally diseased structure.

The opacities are situated in the cornea, and may be the result either of pustules or ulceration, or the effect of wounds. Should they be extensive, and situated in the axis of vision, it will be difficult to ascertain the existence or nature of the cataract, the removal of which could scarcely prove beneficial. But if the centre is clear, the removal of the diseased lens certainly ought to be attempted. In effecting this, however, we should recollect, that all cicatrizations are newly formed parts, and their powers of vitality inferior to those of original tissues. We must therefore be careful not to inflict any injury upon them, since they may be

incapable of assuming a reparative action. Indeed, when the cornea has been subjected to a frequent recurrence of diseased actions, an operator would not be justified in inflicting extensive injury, even though he should avoid the limits of cicatrization.

The adhesions are, first of the iris to the cornea, which may be the consequence of ulcerations or wounds, which have perforated the latter tunic. The aqueous humor having escaped, the iris becomes entangled in, or applied to the perforation, until the aperture is closed, and it is united to the cornea by adhesive inflammation. This being completed, the aqueous fluid again collects, and the iris retreats to its original station, excepting at the adhering point. A diminution of the anterior chamber is thus effected, which must impede the facility of traversing that cavity; and should the instrument be of large dimensions, the passage undoubtedly will prove impracticable.

The second are adhesions of the iris to the capsule of the crystalline. These adhesions take place in consequence of some inflammatory process, which has existed in the iris. The

symptoms are sometimes of so marked a character, as to constitute the disease termed iritis; but as that inflammation appears to be particularly prone to adhesion, and as it is attended with little pain, attachments may occasionally be formed, though unknown to the patient.

Should the history of the patient, therefore, induce us to believe, that internal ophthalmy has existed, prior to our examination, we may presume that the existence of these attachments is extremely probable. Again, as they more frequently occur when the capsule is diseased, we may expect to find them combined with capsular and disorganized lenticular cataracts. Should we fail to discover them by a common examination, we shall facilitate our search by the application of Belladonna. If they exist, we shall observe, that the pupilary margin will be detained at the adhering points as the dilatation proceeds; so that, instead of being regularly circular, it will assume a denticulated appearance.

We are to consider these unions as narrowing the pupil, so that its dilatation must be

partial; and if this dilatation is forcibly effected, as by the passage of the lens, it is probable that the iris will suffer essential injury.

The relaxations are those of the cornea and sclerotica.

These affections of the cornea are, first, staphyloma, either partial or general. If the disease includes the whole surface of the cornea, the alteration of the tunic precludes the possibility of ascertaining the nature of the cataract; except we are aware of its previous existence. The partial staphyloma is commonly progressive towards the general disease. In the one an operation is highly improper, and even in the other, our hopes of affording benefit must be slender.

The second is the conical cornea, which is sometimes congenital. The effect of this disease is to produce a myopic state of vision, and the destruction of the crystalline has been recommended to diminish the excessive refraction. We are, therefore, justified in attempting its removal, when it is already affected with opacity.

Yet at the best the case is unfavourable: if the myopy is, to a certain degree, removed, the

vision must continue very imperfect from the irregular refraction of a conical body. The permanence of this sight, imperfect as it is, will be very uncertain; for it is the tendency of these corneæ to become staphylomatous, or to terminate in ulceration of their apices. The impaired condition of the cornea, in the above-mentioned diseases, would render any surgical interference hazardous and imprudent.

The relaxation of the sclerotica is usually denominated hydrops oculi. In this case a thinning of the coat ensues upon an undue accumulation of the humors, and consequently the eye appears evidently increased in size. Its contents give it a blueish cast, the natural opacity of the membrane being considerably diminished. In the most favorable of these cases, unattended with cataract, the sight is materially impaired. This may be attributed, partly to the irritation, in which the distention originated; and partly to the mechanical disarrangement of the relative distances of the component parts. Although the removal of cataract from such an eye, may possibly be attended with some benefit; yet it must be allowed, that conjoined with every other

disadvantage, such a part, so morbidly irritable, is but ill adapted to sustain the violence of an operation. This must be the care under the most favorable circumstances, but very frequently the sensibility of the retina is totally destroyed.

In this class, it is evident that the obstacles to recovery are great, and in some particulars insurmountable. In these cases we must be guarded, since indiscriminate adoption brings many superior methods of treatment into disrepute. The most favorable cases only, should be selected, and even then, it is prudent to state the uncertainty of success, under which the operation is performed.

A paralysis of the optic nerve is a frequent attendant on cataract. The existence of this combination can generally be discovered. The history of the complaint will inform us, that at the period, when some slight perception of light remained, the patient, far from enjoying any remission from blindness at a moderation of the rays, has perceived a sensible aggravation of his infirmity. We shall probably learn, upon enquiry, that frequent headaches have been experienced, and that muscæ volitantes, and other

ocular spectra were amongst the first symptoms of the complaint. That these have gradually terminated in a blindness, so absolute, as to render night and day undistinguishable.

On examining the eye, the greenish shade of the cataract will, in many cases, be sufficient to determine our opinion. By those who have seen it before, the glaucoma, as this peculiar appearance is denominated, must instantly be recognized. The haziness is not intense, and bears considerable resemblance to the opalescence of the chrysoberyl. The pupil is sometimes contracted,* but more frequently dilated; and either the contraction or dilatation is usually permanent. Cases occur, in which the iris retains some motion, but it is generally irregular and not answerable to the impression of light. The appearance of tortuous veins, on the conjunctiva, may be regarded as a strong evidence of an unhealthy state of the retina.

In considering the reliance to be placed on the above symptoms, we are to remember, that

* The contraction frequently depends upon adhesions, and, of course, is permanent; this constitutes closed pupil, and is not the appearance to which I allude.

incipient cataract is frequently accompanied with such nervous irritability of the organ, as to produce muscæ volitantes. This irritability often ceases spontaneously, or yields to the usual remedies; the integrity of the eye remaining uninjured. In ascertaining the state of the iris, no conclusion can be drawn from its activity, unless we exclude the light from the other eye. The sympathy between these organs is such, that the iris of an amaurotic eye, frequently acts in perfect correspondence with that which is unaffected; but the instant the light impinges on it singly, the pupil dilates, and continues in that state until it is again submitted to the influence of sympathy.

In the combination of these diseases, our first attention should be confined to the amaurosis. This disease is susceptible of cure in its incipient stage, and should the surgeon succeed in removing the symptoms which demonstrate its existence, he may then proceed cautiously in his operation. But if its obstinacy is such as to defeat his endeavors, then the removal of the cataract cannot be attended with a successful conclusion.

The generally diseased structure, to which cataractous eyes are liable in common with others, includes such a variety of degree and character, that a definite description of the appearances would be equally difficult and extensive. I shall therefore endeavour to describe those extremes of this class, from which the intermediate affections approximate.

As the first, I mention that disorganization of the vitreous humor, by which its cellular structure appears to be destroyed; the unrestrained humor being found in a state of fluidity. The symptoms, which indicate this alteration, are, a tremulous motion of the iris and cataract, at the slightest movement of the head. In all those cares of fluid vitreous humor, which I have witnessed, this singular appearance has invariably occurred. Many have supposed, that this condition of the organ is attended with such other disease, as to destroy every hope of restoration. That a disease of the vitreous humor may frequently be combined with other material derangement, is not only probable, but certain: but when it is affirmed, that this is constantly the case, I an-

swer, that such conclusion is unwarranted, and that the cases, to which I have alluded, were in direct contradiction. In those there were no other symptoms which had an unfavourable tendency, and the result of the operations was uniformly successful. That such was the state of the humour, was fully confirmed during the operation: the eyes were rendered very flaccid by the escape of the vitreous fluid, although the punctures in the sclerotica were made by small and exceedingly well constructed needles.

A description of the other extreme will appear to many an unnecessary intrusion, but the case, which I contemplate at this moment, was sent from a considerable distance to a public institution in London by a medical practitioner in the country, under the promise, that a cure would be effected by an eminent surgeon of that establishment. To prevent such promises, and their attendant disappointments, may not be altogether improper. The eye was evidently distended to an unnatural degree, the sclerotica was universally thinned, and vessels carrying venous blood followed a serpentine

course over its surface. The iris had altogether disappeared, not a vestige remained. The capsule of the crystalline had only one point of attachment to the ciliary circle: this was at the upper part, and the distinction between the aqueous and vitreous humors being lost, the capsule, containing a large yellow nucleus, now striking the cornea, and then rebounding into the vitreous humor, swung backward and forward with every motion of the head. The posterior part of the eye, had it possessed more brightness, would have borne a close resemblance to the tapetum of herbiverous animals.

Although perhaps incorrectly placed in this chapter, since cataract is not combined with it, yet I could discover no better opportunity of mentioning the possibility of mistaking an early stage of medullary sarcoma. Of this disease I have seen several cases, prior to its extending beyond the vitreous portion of the cavity. It exhibited the general hue of mother of pearl, and would not have deceived those accustomed to inspect cataractous affections. Being, however shewn a case, which had arrived at the fungated stage, by a physician, he informed

me, that when he first saw the patient, he thought the disease was cataract, and had advised a young surgeon in the neighbourhood to remove it. Fortunately the surgeon hesitated, not choosing, I believe, to undertake an operation of that description. His account of its appearance precisely agreed with what I had before observed.

CHAP. III.

IN the preceding pages the term cataract is defined and the varieties, as to color and consistence, which it exhibits in different instances are pointed out. Those diseases and malformations, with which it may occasionally be associated, are then described. This course I was induced to pursue, because the success of our operations must be very precarious unless we are thoroughly acquainted, both with the pecu-

liarities of the cataract itself,* and with those diseases and disorders, by which the structure and relative position of the neighbouring parts may be altered materially, or totally destroyed.

Having concluded these preliminary observations, a further delay in treating of the operations may, possibly, appear unnecessary. Were they to be regarded as purely mechanical in their intention, which indeed is the case with several, they ought to form the objects of our immediate consideration: it is, however, to be remembered, that the greater number are merely subservient to the excitement of previously existing powers. A moment's reflection will suggest the necessity of examining the situation of these agents, the laws by which they are regulated, and the circumstances, under which

* Pott, having denied the possibility of ascertaining the nature of a cataract, observes;—"it would be exceedingly "pleasant, as well as advantageous, if we could, previous to "an operation, know the true state of an opaque crystalline; "it would enable a surgeon to determine the mode of opera- "ting with more precision, and to explain what his intention "by such method was: it would give satisfaction to himself as "well as to standers by; and make that appear to be judicious "and rational, which under our present uncertainty, has often "the appearance of being accidental, and done at random."

they may be called into action with the greatest facility and advantage. Without this, precipitance or misapplication may produce absolute failure, or procrastinate success.

I propose then, in the following series of propositions, to discuss those physiological points connected with the eye, which may be considered as the principal guides in our surgical operations.

1st. The crystalline lens is an organized body.

2d. In cavities the actions of the absorbent and exhalent systems are equal.

3d. The vitreous humor is secreted with less rapidity than the aqueous, which is principally secreted in the anterior chamber.

4th. The solvent power of the aqueous and vitreous humors over the opaque crystalline is slow, and only partial in its operation.

5th. The ultimate removal of the opaque lens is effected either by its own absorbents, or by actual contact with those situated on the walls of the anterior or posterior chambers, or with those dispersed through the hyaloid tunic.

The crystalline lens is an organized body. The various opinions of different anatomists, respecting the nature of the crystalline, must be attributed to its apparent insulation from surrounding parts, and to the difficulties attending the examination of so delicate a texture. By some it has been regarded as an homogeneous mass; by others it has been esteemed not only as organized, but as indued with contractility. Some have even asserted, that its nerves, and nutrient vessels allow of demonstration.

Now on observing this body, if we merely considered it as a mass composed of concentric lamellæ; if we merely considered the different degrees of its consistence, diminishing in density from its centre to its surface, we might believe, that it was formed by depositions of an homogeneous, unorganized substance, secreted from the internal surface of the capsule, and that by some unknown process, the centre had acquired a degree of solidity, which the surface or later formed part did not possess. In short, that it might be either formed by secretion, or that it might be a simple accretion of parti-

cles, which occurring successively had produced a lamellated appearance, analogous to that which we perceive in many urinary calculi.

On the other hand, the strongly marked triangular divisions which we perceive in some cataracts, or in the lens when dried, appear to argue some other arrangement than simple deposition or accretion. Confirming this opinion, we find that this appearance is not dependent upon disease, or upon any change produced by drying. The three principal lines of division may be demonstrated in the undiseased and recent crystalline; and the external layers admit of removal, in three several portions, with the greatest facility. The separation appears to be continued even to the centre. This I am aware may not be considered sufficient proof of any regular organization; but these triangular portions are each formed of numerous parallel fibres of extreme tenuity. These fibres have their origin at the principal lines before mentioned; then taking a curved direction they are inserted at the corresponding points of the opposite superficies. Now granting, (although contrary to the assertion of some) that we can-

not perceive the vessels by which this most delicate body is supported, yet how can we deny that it possesses an organized structure, or suppose that it is not regulated by the same laws with other organized parts; since its fibres equal muscular fibre in divisibility and regularity of arrangement? This structure may be demonstrated on the recent lens to a considerable depth, although less distinctly than in one which has been immersed in boiling water.

A well-known phœnomenon of cataract, may here be introduced in support of this opinion. When considerable inflammation, or congestion arising from any other cause, has existed in the interior of the eye, this disease is a frequent consequence. Hence* many believe, and pro-

* Sir William Adams is of opinion, that in these cases the opacity commences in the capsule. He says, "Syphilis may "be ranked among the causes of cataract, and I am of "opinion that in such cases the opacity is always at first "seated in the capsule (though it may afterwards sometimes "extend to the lens,) and generally arises from an inflamma-"tion of that membrane, and not from coagulable lymph "having been effused from the inflamed vessels of the iris, and "deposited on its anterior surface."—"Inflammation of the "iris, or capsule of the lens, (not of the syphilitic kind) is a "source of capsular cataract, which is frequently succeeded "by opacity of the lens itself."

bably not without reason, that the cataract originated in this congestion. On the supposition that the lens is a mere homogeneous secretion or deposition, it might be said that the inflammatory action of the neighbouring parts had wrought an entire alteration of the secreted substance. But if such was the case, where should we expect to find the change? Surely in those parts, which might have been added since the commencement of the inflammatory action, or which, from their situation, were most exposed to its influence. This does not happen: the centre of the lens, the point farthest removed from the influence of the surrounding parts, is the first which is affected with opacity; whilst its periphery, which is almost in contact with its capsule, remains unaltered, for perhaps a very considerable period. Ought we not then to attribute the opacity to the action of vessels in the lens itself, which vessels are influenced by, or participate in the vascular congestion of the rest of the organ.*

* Further arguments, in favor of the organization of the crystalline, may be found in an appendix, in which its influence in focal adjustment is considered.

In cavities, the actions of the absorbent and exhalent systems are equal.---This proposition is so self evident, that a discussion of its correctness is unnecessary. A predominance of the absorbent system would cause a collapse of the walls of the cavity; a predominance of the exhalents would produce an unnatural distention.

The vitreous humor is secreted with less rapidity than the aqueous, which is principally secreted in the anterior chamber.---It occasionally happens, that a more or less considerable portion of the vitreous humor is discharged from the eye during some of the operations for cataract. Not unfrequently, where a large quantity has been lost, the size of the organ is permanently diminished. In those cases which terminate favorably, a period of some days is required to repair the loss, which has been sustained; and after all, it is doubtful, whether the deficiency is not supplied by the aqueous humor, which may flow back through some laceration of the capsule. An escape of the aqueous humor, on the contrary, seldom requires more than a few minutes for its renewal, which is frequently effected almost instantaneously.

The structure of the different parts of the chambers of the eye, point out, as I conceive, the anterior chamber as the part, in which this active secretion is principally performed. The boundaries of the anterior chamber are the iris and cornea; those of the posterior, the iris, corpus ciliare, and capsule of the crystalline: the aperture of the pupil allows the freest communication. We will first consider the iris, a membrane common to either chamber. Its structure is highly nervous and vascular: from the number and magnitude of its vessels, we might, a priori, suppose it capable of secreting a considerable quantity of fluid. On further examination, however, we shall find that this conclusion is applicable to its anterior surface only. The posterior exhibits an appearance widely different: we here find it covered by a thick viscid substance, the pigmentum nigrum. If, as Doctor Hunter supposed, this dark pigment be really a membrane, it is not such an one as we should suppose to be possessed of very active powers of secretion. If it be itself a secretion, its formation is probably but slow; and this idea is favored by the common opinion, which esteems it analogous to

the rete mucosum.* If the rete mucosum be destroyed, its restoration is slow in the extreme: and if they are actually the same substances, the probability is, that they are governed by the same laws, and produced in the same manner. The corpus ciliare is similarly circumstanced as the uvea. To return to the anterior chamber, we find the cornea lined with a membrane, supposed to be of the serous order, and consequently an active agent in secretion. Whether this membrane is extended over the anterior surface of the iris has not been ascertained. Such a continuation is probable, as serous membranes, in every other instance, are applied to their cavities on every side. We are to recollect, that the pupil of the fœtus is filled with the membrana pupillaris, by which the two chambers are completely separated. This membrane is probably a portion of the serous bag; and if this supposition is correct, the analogy between the membrane of the anterior chamber, and other serous membranes is complete. Upon the whole, we must consider the principal secernents of the

* Both these substances are altogether wanting in Albinoes, and some other white animals.

aqueous humor as residing in the membrane attached to the anterior surface of the iris, and to the posterior surface of the cornea. Perhaps the capsule of the crystalline may contribute, but this is dubious.

The solvent power of the aqueous and vitreous humors over the opaque crystalline is slow, and only partial in its operation.---That the crystalline, when broken in pieces, denuded of its capsule, removed from its natural situation, and exposed to the aqueous or vitreous humors, very commonly disappears, is a fact universally acknowledged. That the simple exposure of its surface to the aqueous humor, by opening the anterior part of the capsule, is frequently sufficient to produce a similar effect, is a point which has been equally well ascertained. This has hitherto been ascribed to a solvent property possessed by the aqueous and vitreous fluids, of which menstrua, from the apparent effects produced on cataract, the aqueous is esteemed the more powerful. It is to be shewn, that no solution of the cataract results from its exposure to these humors; that their action is restricted to those portions, which are detached from their

natural connexions; that the central or firmer portions frequently resist this action altogether; and that the action itself is confined to a very gradual crumbling or disarrangement of the organic particles.

Pieces of cataract disappear less readily in the posterior than in the anterior chamber, although the aqueous humor must be equally in contact with such pieces in either situation. If the disappearance of cataract, thus circumstanced, is occasioned by solution, how is it, that this solution is not effected with equal rapidity in the one, as in the other situation?

I have several times observed cases, in which the crystalline has been entirely broken up, and a considerable part has remained in the posterior chamber, from which a small piece has projected through the pupil. This projecting portion, being entirely clear of the iris and cornea, has remained for a considerable period without any alteration whatever. The lenticular matter, to which its basis was attached, has been gradually removed; its own substance remaining unaffected, until it has fallen into the anterior chamber. Now if the aqueous humor is a

solvent, how did it happen that its action was confined to a flat surface, but partially exposed, whilst an irregularly conical projection, immersed in it, had not even its apex dissolved? This is very different from the circumstances attending the solution of other substances.

This opinion is confirmed by the general belief amongst the antients, that caseous cataract was incurable. In attempting to depress it, their needle passed through its centre, consequently the aqueous humor must have been freely admitted, yet the cataract was not removed. The caseous, as well as the milky cataract, is destitute of every trace of organization; its solution therefore ought to be more speedily effected. Experience has proved the contrary. It may be said, that caseous matter is not soluble, although solid cataract is; yet a portion of this matter will disappear, sooner than an equal portion of the firm cataract, if placed in the anterior chamber. The assertion, made by Wenzel, that in cases of extraction no portion of lens allowed to remain in the capsule will be removed, is too general, and must be ascribed to prejudice; yet we must suppose

that he had seen numerous instances of this kind, ere he could give such an opinion, in direct opposition to Pott and Richter.*

Sir Wm. Adams has related a striking case of this kind. The subject was a lady seventy years of age, from whose eye a cataract was successfully extracted, so as to enable her to see minute objects. A fragment of opaque lens, the size of a large pin's head, lay behind the iris during the operation; it afterwards ascended and got within the pupil, where it remained undissolved until death, six months afterwards by atrophy; although the activity of the absorbents had been so great as to produce extreme emaciation, it continued unchanged. This he ascribes to a disorder of the general health of the patient, which deprived the aqueous humor of its solvent property. I have seen cases very similar to this: in these no general

* I should be sorry if I appeared to erect my arguments upon uncertain ground. On re-considering this passage, it strikes me, that the unfortunate results attending these cases may with equal, perhaps with greater, probability be ascribed to the opacity of the capsules. This partial retraction does not, in the slightest degree, affect the statement of Wenzel, or the cases which have occurred to Sir Wm. Adams and myself.

disturbance of constitution has existed, and absorption has at the same time been rapidly carried on in the anterior chamber. Now as these portions are completely separated from their nutrient vessels, and as the aqueous humor is freely admitted to them, why are they not dissolved, if that fluid is a menstruum?*

In cases where the cataract has been broken up by an operation, I have witnessed the occurrence of a destructive process, which, however, is very different from solution. Taking any single portion, as an example, the process has proceeded thus; first, the laminæ separate; these laminæ afterwards split in the direction of their fibres: when arrived at this stage, they usually fall from their situation, and come in contact with parts in their neighbourhood;

* These circumstances, related by various authors, and confirmed by my own observations, convince me, that the power of absorption in the capsule is but feeble, and that in many cases of disease it ceases to exist. On looking over Sir William Adams's treatise, I find that he has arrived at a similar conclusion: "the power of the absorbents in the capsule of the "lens is inconsiderable, compared with that of the same class "of vessels, with which the concave surface of the anterior "chamber of the eye is furnished."

when this does not happen the fibres themselves, at length, break: after this, their gravity, of course, prevents their retaining their insulated position.* During this process (which is very tardy) I could never observe any diminution of the opaque substance; yet it is probable that the medium, by which the particles are held in union, is removed. This is rendered the more probable by the succession of the separations; for they are slow in proportion as the opaque or fibrous parts are more contiguous. Thus the laminæ separate first, then the fibres, and finally the particles of the fibres. Again, on opening a capsule containing the remnant of a crystalline, we frequently find, that it remains unchanged during any period. Now in the nucleus the fibrous matter is pecu-

* Mr. Ware's description of this process is very similar to my own: "A kind of crack in the opaque crystalline is usually "perceived on inspection. The number of these cracks gra- "dually increase, until at length the humor assumes an ap- "pearance like that of jelly half dissolved. In a few instances "the crystalline humor has continued a long time in this un- "dissolved state, but in general the pupil has speedily after- "wards become quite clear."

liarly condensed, and here this process encounters the most obstinate resistance. The whole indeed is an effect resulting from the loss of vitality, which the crystalline has sustained; and, instead of being dependent upon the aqueous humor, every crystalline, when removed from its natural connexions, would undergo similar changes, provided it were protected from the contact of the atmosphere, and the consequent siccation or putridity. A process similar to this, in all probability succeeds a necrosis of the lens, and reduces it to caseous or milky cataract.

The ultimate removal of the lens is effected either by its own absorbents, or by actual contact with those situated on the walls of the anterior or posterior chambers, or with those dispersed through the hyaloid tunic.---Under the last head, the inconsistencies attending that train of reasoning, which would attribute the removal of cataract to solution, were exhibited. The present question then is, how is it removed? The answer, by the absorbents; but as solution does not convey its particles to those absorbents, it is necessary that such particles should be

placed in immediate contact with them. In the next place we have to determine the situation of those agents.

That the lens, its connexions being destroyed, becomes a passive substance, and must be removed through the agency of the absorbents of other parts, is an inference from which it is impossible to dissent. I conceive, that it will be sufficient if it is shewn that the crystalline possesses an apparatus, adequate to its own removal.

If the capsule be opened, as in the operation of Conradi, and the structure of the lens be wounded and disturbed, such florculi of the cataract as may fall into the anterior chamber, are rapidly absorbed. In the mean time, the wound inflicted on the lens enlarges in every direction, the capsule exhibiting scarcely any perceptible alteration. Do we attribute this effect to the lymphatics of the capsule? We must not, for it is not to the surface of the lens that this process is confined; its very centre shares in the destruction. Since then an effect is visible, where the cause cannot act, we must not remain satisfied with such an explanation. Is it not

rather attributable to the organization of the crystalline; that, that being wounded, its own absorbents remove its own substance, and that, if the aqueous fluid assists, it is as a stimulant rather than a menstruum?

Perhaps it may now be adviseable, that I should give a summary view of the process of removal, adducing the evidence contributed by each proposition in support and confirmation of the others; thus substantiating the truth and correctness of the principles, which I propose for the direction of our surgical undertakings.

The operator having broken up the cataract, and placed one half in the anterior chamber, allowing the other half to remain in the posterior, the first portion is commonly removed in about one third the time required for the removal of the latter. Completely disorganized by art, we are to view it as a foreign body submitted to the action of living parts. How remarkable are the phenomena! Why should those portions, which are thrust into the vitreous humor, or which remain in the posterior chamber, endure longer than those, which are projected into the anterior? Putting the

vitreous humor out of the question, it must be acknowledged, that the aqueous is one and the same fluid in either chamber, and consequently ought to act equally on the portions of cataract, whichever may be their situation. Yet we find this is not the case.

Let us examine this process when differently circumstanced. We see a small wound of the lens extending its limits in every direction, even through the central solidity. The cataract is in its natural situation, surrounded by its own peculiar envelope, and consequently, if organized, still supplied by its own nutrient vessels. The aqueous humor is only admitted through a trifling aperture, and this same fluid is found insufficient to dissolve a detached, unnourished fragment, which it surrounds in every direction.

Do not these facts discountenance the idea, nay, do they not disprove the existence of solution?* On the contrary, is not the progress

* Mr. Saunders, who believed solution to be indispensable in the removal of cataract, has the following remark: "in "congenital cataract, after the crystalline lens is converted "into an opaque substance, it is gradually absorbed: and in "proportion to the progress of absorption, the anterior lamella

precisely agreeable to the rule, that in cavities the absorption balances the secretion? If the fragments are placed in contact with those parts, where we believe secretion to be active, they rapidly disappear; if in contact with those parts, where we believe secretion to be slower, the progress of the cure is proportionably slow; if so situated, as not to be submitted to the influence of either, they remain unremoved instead of undergoing solution.

CHAP. IV.

AS the opinions of some authors, if well grounded, would decidedly invalidate several, which are maintained in the preceding chapter,

" of the capsule retires upon the posterior, until they form one " membrane, which is white, opaque, and very elastic. This " is the conversion of the lenticular into the capsular cataract: " all that is capable of being absorbed nature herself removes, " and she only fails to accomplish her purpose, because the " capsule cannot be destroyed by this process." Now here the absorption is undeniable, but where is the solvent?—some may say it is the humor morgagni, but that fluid is constantly present, and, if a solvent, ought invariably to act as such.

it is necessary that those should be mentioned by which the latter are particularly discountenanced. Having placed the statements, on either side of the question, before the reader, I shall then proceed to detect and exhibit the fallacious reasoning of the opposite arguments.

Perhaps I may excite surprise by pursuing a subject, apparently so extensive. If it be supposed, that I intend to canvass the merits of every bare assertion, it will soon be evident that such a surmise is unfounded. My examination will extend to such only, as are supported by analogy and physiological reasoning. As this is undertaken by few writers on this disease, the extent of my disputation will not be formidable.

Sir William Adams observes: "it will be "granted me, without much hesitation, that no "solid body, in any part of the system, admits "of being removed by the absorbents, without "first undergoing solution. A supposition to "the contrary, involves the absurdity of be-"lieving, that the finest and most delicate series "of vessels in the body, whose largest trunks "are with difficulty made visible by dissection, "and whose smaller tubes are not cognizable to

" the senses, and can only be proved to exist by " analogical reasoning, should possess the me- " chanical power of abrading the solid sub- " stance of bone. The power of these vessels " in absorbing fluids is undeniable, and it is " equally certain, that portions of exfoliated " bone are removed by them, and carried into " the general system; but their structure shows " the impossibility of their exercising a suffi- " cient force, for this purpose, upon solid sub- " stances: it is, therefore, more than probable, " that solution takes place, as a preliminary " process to absorption. This reasoning applies " with equal force to the absorption of solid " cataracts, &c." I cannot accede to such a postulate, nor grant, " that solution takes " place as a preliminary process to absorption:" I must dispute the argument in toto.

Compared with the veins and arteries, the absorbents may well be called " the finest and " most delicate series of vessels in the body." However a comparison between them is scarcely allowable, as a consideration of the offices of these different systems will shew. In the sanguineous, the arteries carry out the blood, the

greater part of which is brought back by the veins. Here the veins correspond with the arteries; they are the sluices or channels through which the blood flows in a given direction. At the distal extremity of the arteries, commences another series of vessels, the capillaries, which are depositors and builders of parts : it is with these that the lymphatics correspond, as removers of parts deposited. When we consider how nearly the quantity of blood returned to the heart, corresponds to that which was sent from it, the difference being appropriated to the capillaries, we may calculate, that the lymphatics are not only their equals in activity, but likewise in size, and probably in strength of texture. This can only be proved by cutting off the supply from the great lymphatic trunk, for we know, that, in ordinary cases, it maintains an equilibrium in the circulation. We must also remember, that absorption is equally universal as deposition ; it is probable, therefore, that each capillary is accompanied by its absorbent, analogically to the veins and arteries of the sanguineous system.

To estimate the power of the absorbents, it is necessary to recur to their corresponding

capillaries, and now let us suppose them erecting this bone, which the absorbents must afterwards remove. That the capillaries supply the materials with which parts are subsequently formed, is not only a subject of general belief, but even admits of demonstration, for the gritty particles of phosphate of lime are found in the vessels, which permeate fœtal cartilage. Here then, vessels deposit particles of an hard substance; and such being the case, we may safely infer, that the corresponding vessels may remove them on similar conditions. The minuteness of each individual vessel argues nothing in opposition to this inference, for we have only to suppose, that the particles removed correspond to its calibre. Indeed all difficulty vanishes, when we reflect on the astonishing divisibility of matter, and remember, that an ultimate particle almost baffles human comprehension.

Thus far I have argued from analogy, and have shewn, that my opinion is supported by probability. By accurate observation of the facts attending the absorption of bone, we may convert this probability into certainty. The

exfoliated sequestrum frequently lies unaltered for months, and even years, imbued with purulent discharges. At length, on washing off the pus, we perceive that granulations have arisen. The pus is almost immediately regenerated, but at every removal we find the number of granulations increased, whilst their course remains indented on the solid bone. In this manner the process is continued, until the whole, or a considerable portion is removed. Now if the pus could dissolve the calcareous phosphate, there would be no necessity for absorption, for then, every time the sore was cleansed, a portion of the bone would be removed. This cannot happen, for the exfoliation will lie macerating in the surrounding fluid, for an almost indefinite period, without any perceptible alteration. But, it may be asked, since the removal is confined to the neighbourhood of the granulations, may not those vascular bodies pour out some solvent fluid, which may be reabsorbed by them? To this there is an insuperable barrier: as the granulations are almost constantly immersed in pus, if they secrete any thing else than purulent matter, that other secretion must immediately

be diluted by the surrounding fluid. Supposing this to be the case, we must allow the dilution either to be, or not to be a solvent. As the removal is entirely confined to the granulated portions, it proves, that the supposed dilution is not a menstruum.

The pus then is not a solvent; if the granulation secretes a menstruum, it must immediately be diluted by the pus: but this supposed dilution or mixture, is not a solvent: yet the earthy matter is removed wherever granulations are formed: therefore as the fluids do not dissolve, the absorbents must remove without solution.

Sir William, however, does not solely rest his argument on the apparent incapability of the absorbents, but adds, "in young persons, in "whom the arterial system is predominant, "solid cataracts, it is well known, dissolve "much more speedily than in old persons, in "whom the absorbent system is in the greatest "state of activity; which facts coupled with "the immediate removal by absorption, of the "milky or fluid cataracts, after being operated "on, indisputably prove, that the facility of "absorption in every cataract, depends upon

" its ready solution and not on the activity of " the absorbents."

Now the predominance of the arterial over the absorbent system, in the young subject, amounts to this, that the body increases gradually, and from the greater deposition of new than absorption of old matter, the various parts are extended and amplified. So far his assertion is correct. But it is the comparative influence of these two systems in cavities, which forms the subject of our consideration; for foreign matter, deposited in them, must be removed by their absorbents. Then, in cavities, I deny this predominance, in these it has no existence; for if such inequality of action did exist, the infant must, of necessity, labour under hydrothorax, hydrocephalus, ascites, and hydrophthalmia.

And yet it is undeniable, that the animal processes have more energy and activity at an early, than at an advanced period of life. I can, nay I do believe, that the secernents may, in our youth, pour a large quantity of fluids into the eye in a given time, but then as active an absorption must as constantly be maintained. Therefore, I have no doubt, but that the absor-

bents of the eye are more active in the infant, than in the adult. But we must not wholly attribute the rapid removal to this superior activity; the different consistence of cataracts in persons of different ages must be considered; for although I would maintain the capability of the absorbents to remove solid matter, yet I do not suppose, that they execute this task with the same facility, as they would absorb a fluid. As for milky cataract, it may possess as much fluidity as the humor with which it is mingled, and offer no more resistance to absorption.

But a favourite theory never wants evidence, however inadmissable it may prove on examination. Thus the advocates for solution produce the case, in which the point of a cornea knife was left in the anterior chamber, and afterwards removed by absorption, as a proof of the astonishing solvent property possessed by the aqueous fluid. As that humor, in common with every other, holds several neutral salts in solution, nothing is more natural, than that such chemical changes should occur, as may soon oxydate the metal: its solution and subsequent removal would equally take place on any other

absorbing surface. But surely this solution of a metallic salt or oxyd cannot prove, that the dissolving fluid will act in the same manner on an animal substance. We should be equally justified in supposing that the boiling water, which dissolves the muriate of soda, must operate a similar change on muscular fibre.

It is universally expected, that an author should not only have made the subject, of which he treats, the object of his particular attention; but, that he should have enjoyed considerable opportunities of acquiring practical information respecting its ordinary phenomena. That these rules are inapplicable to M. Delpech, will appear to every oculist, who peruses the article "Cataracte," in the dictionaire des sciences medicales. Although aware, that it is neither unprecedented nor improper to submit abstruse or doubtful points to the investigation of the philosophical republic, he will nevertheless be startled at the interrogations occurring in these paragraphs. Several of them relate to well ascertained and generally acknowledged facts, and would fail in suggesting a doubt in the mind of a pupil of three months standing at an ophthalmic institution.

The principal point which he endeavours to establish is this, that every cataract is preceded by necrosis of the crystalline. If this be admitted, my opinion, that the removal of the lens may be accomplished by its own absorbents, is completely overthrown. My own arguments on this subject are before the reader; those which are advanced by M. Delpech require investigation. To prevent misconception, I shall introduce the series of propositions, by which this hypothesis is illustrated, together with such other sentences as contribute to its elucidation.

" La cataracte spontanée n'est guère que le partage de la " vieillesse; cependant il ne manque pas d'examples de cette " maladie sur de gens peu avancés en âge: ou peut même en " citer qui on été observées sur de jeunes gens, et même sur " des enfans; mais dans la plupart des faits de cette dernière " espèce, la cataracte à été la suite ou d'une inflammation " profonde du globe du l'œil, ou d'une contusion, ou d'une " blessure fait par une instrument piquant, qui a intéressé le " cristallin."

" Aux yeux de tout physiologiste accoutumé à observer la na- " ture, les faits sont assez nombreux maintenant pour conclure " que la cataracte membraneuse, soit primitive, soit secondaire " ou consécutive, tient, comme à sa cause prochaine, à un état " d'inflammation legère et prolongée, qui à pour effet de pro- " duire un accroissement de nutrition, lequel peut aller jusq'à " suffoquer le principe de la vie dans cette membrane délicate, " et la faire se séparer des parties voisines, ainsi qu'il arrive

" quelquefois; mais on ne peut appliquer la même pensée à la " cataracte cristalline: comment supposer l'inflammation dans " un organe dont les moyens de nutrition sont inconnus."

" 1°. La cataracte spontanée est si communément ob- " servée sur des vieillards, que l'on peut la considérer comme " leur appanage presque exclusif."

" 2°. Elle est fort commune aussi chez ceux qui, par état, " sont habituellement exposés à une vive lumière; on l'observe " souvent chez les verriers, les fondeurs, &c."

" 3°. Il serait intéressant de vérifier si les sujets peu " âgés qui en sont affectés, sans avoir été exposés à aucune " des causes accidentelles connues, ne sont pas dans un état " de vieillesse prematurée soit par rapport à toute la constitu- " tion, soit par rapport aux yeux seulement, et en tenant " compte des infirmités de la constitution primitive de ces " organes."

" 4°. Le cristallin cataracté, habituellement plongé dans " l'humeur de Morgagni, s'y fond souvent en grand partie, et " quelquefois même complètement, en se réduisant en flocons " blanchâtres mêlés de sérosité."

" 5°. La parfaite uniformité de la petite quantité d'humeur " de Morgagni dont on trouve entouré quelquefois le cristallin, " sans qu'on puisse s'assurer s'il à perdu quelque chose de son " volume, porte à croire que la fonte commencerait seulement " dans ce derniers cas, et que ce phénomène serait le resultat " constant de l'opacité du cristallin."

" 6°. Quand le cristallin cataracté est déplacé, soit qu'il " ait été brisé et jeté par fragmens dans la chambre antérieure, " soit qu'il ait été plongé dans le corps vitré; quand il à été ex- " trait et soumis à la macération, sans le contact de l'air; il pre- " sente les mêmes phenomènes; il se réduit en flocons blan- " châtres; cette conformité de phenomène ne suppose-t-elle " pas une conformité d'etat; et s'il est incontestable que dans " ces derniers cas le cristallin est privé de la vie, n'est il pas " très probable qu'il est dans le même etat avant d'être " déplacé?"

" 7°. La couleur jaune s'établit peu à peu dans le cristallin, " par l'effet de progrès successifs de l'âge, et elle n'est jamais

" plus marquée que dans le cas de cataracte, le cristallin ayant
" conservé sa transparence, mais ayant perdu une partie de son
" volume, et ce corps étant entouré d'une couche plus ou moins
" épaisse de matière ficconneuse blanche, dans laquelle il
" semble dégénérer et se fondre: cette remarque peut être
" faite, même sur des sujets d'un âge peu avancé. La couleur
" dont il s'agit serait elle le signe de la decrepitude du cris-
" tallin, et de sa mort prochaine?"

" 8°. Pourquoi des blessures, même légères, qui suffisent
" pour donner lieu à la cataracte, ne suffiraient elles pas pour
" éteindre la vitalité dans cet organe où elle doit être bien
" faible, puisqu'on ne connait pas ses moyens de communi-
" cation avec le reste du solide vivant, et avec les principaux
" foyers de la vie."

" La cataracte ne serait elle donc que la nécrose du cris-
" tallin? C'est au temps et à l'expérience à décider cette
" question; mais nous ne pouvons dissimuler que nous somme
" fort portés à la decider par l'affirmative, à regarder les
" matières molles qui entourent le cristallin, comme le résidu
" de la dissolution physique et de la décomposition chimique
" de ce corps, et les couleurs diverses de ce même résidu, ou
" du cristallin lui-même encore solide, comme le résultat
" purement accidentel des nouvelles combinaisons qui s'operent
" dans les principes divisés de ce même organe, déjà frappé
" de mort."

To assert that spontaneous cataract is but the lot of advanced age, is an unjustifiable generalization. It is not probable, that more than one of an hundred elderly persons is affected with that disease, for the slight yellowish tint, which so frequently occurs in those subjects is not indicative of incipient cataract. Its occurrence in young persons is indeed com-

paratively rare, but in the majority of these cases there is no evidence of the pre-existence of internal inflammation.* The accession of opacity, independently of inflammatory action, is certainly exemplified in the numerous class of congenital cataracts. On the latter part of this sentence it may be observed, that where the cataract originates in external violence, it has no claim to the title of "Cataracte spontanee."

In the next sentence, we have some curious reasoning on the proximate cause of this disease. That chronic inflammation will thicken a membrane, destroy its pellucidness, or even alter or impede its functions, is undeniable.† Nevertheless the death of the membrane is not implied, nor is the opinion supported by analogy. Although we are not precisely acquainted with the manner in which the lens is nourished, yet

* I have seen a great number of cases of internal inflammation, but they have all occurred in adults. The youngest of several hundreds of these patients was in his fifteenth year, and was under treatment for venereal eruptions.

† In this manner we must explain the disorganization of the lens, which constantly attends disease of the capsule. As well as containing the crystalline, the capsule must likewise transmit its nutrient vessels; disease may interrupt this latter function, and necrosis of the lens is inevitable: but the vitality of the capsule itself is not implicated.

the question, whether we can conceive it susceptible of inflammation or not, admits of decision. Death is the cessation of life; M. Delpech asserts, that the lens dies, he must therefore allow that it has lived. Vital actions must therefore have existed in the lens, and these under a state of unnatural excitement, would constitute inflammation.

We now arrive at his series of propositions, the very first of which cannot be admitted, whilst our attention is so frequently called to congenital cases. The second is admissible. It simply shews, that constant irritation may excite inflammation, which may destroy the transparency of animal substances. As functional derangement, and alteration of structure in the interior of the eye are frequent amongst the persons alluded to, it cannot excite our surprize, that the crystalline should sometimes participate in the general affection. But, if we contend for necroris of the lens, the analogy ceases, for the other textures do not perish.

On the third it may be observed, that there is no evidence, either of local or of constitutional debility. The little patients appear

equally strong and healthy as other children. Neither does the affected organ labour under a greater degree of local debility, than when the disease has originated in external violence. Inflammation, when it supervenes, does not possess a more alarming character in the one, than in the other class of patients, nor is there any perceptible difference in their vision.

To the fourth proposition I accede.

The fifth, as far as it relates to the gradual disorganization being limited to cataractous crystallines, is unobjectionable; but it is difficult to conceive whence the inference was drawn, that this phenomenon is invariable. Indeed the present appears inconsistent with the preceding proposition, for the latter says, "le cristallin cataracte s'y fond *souvent*," whilst in the former this dissolution is stated to be the "resultat constant." That numerous class, which I have called organized lenticular, is an exception. In this, the humor morgagni is as limpid as though the lens were in an healthy condition, the crystalline suffers no diminution of bulk, and its organization appears unaffected, there are no flocculi, and indeed, but for its opacity, no altera-

tion would be apparent. It may be contended, that a considerable time must elapse before the dissolution is rendered evident. I have seen a cataract, which has existed fifty years, without being diminished either in bulk or solidity. All who have had frequent opportunities of witnessing the operations of ophthalmic surgery, must have observed old cataracts, from whose capsules there has not escaped the smallest quantity of flocculi mixed with serosity. The process described by M. Delpech frequently (*souvent*) takes place, but I deny its occurrence in the most extensive species of this disease.

The last proposition involves the present, the sixth. The phenomena of displaced crystallines, and of organized lenticular cataracts do not coincide, therefore, a similarity of condition is improbable. M. Delpech need not have asked if it was very probable, for he might have told us that it was very certain, that a solid animal mass falling into whitish flocculi, must have lost its vitality, previous to its undergoing such a change.

Of the seventh. It must be admitted, that, in advanced life, the crystalline, not unfre-

quently, assumes a yellowish tint, which however does not diminish its transparency. The nucleus of a disorganized lenticular cataract is opaque. The opacity of a cataract appears less dense after its removal from the eye, than whilst it remains in situ ; but still it differs widely from an aged crystalline. The whole description is erroneous, for it is universally agreed, that the opacity commences in the nucleus, and not in the exterior of the lens. Respecting its dissolution, it is naturally to be expected, that where a part of various degrees of compactness dies, the softer, especially if they are the external parts, will first exhibit appearances of disorganization. This assumption of color in old age is to be ascribed to a change, in which other textures participate, but which does not indicate the loss of vitality. The process is more strongly exemplified in the arcus senilis of the cornea, in which case sloughing or ulceration are not more frequent than in the earlier part of life, although the reparative powers are evidently diminished in energy.

Of the eighth it may be said, that notwithstanding our ignorance as to the immediate

mode, by which a communication is maintained between the general systems and the crystalline, yet it can scarcely be doubted that a communication does exist, and we conclude, that it is adequate to the purposes required. To suppose then, that every wound capable of destroying the pellucidness of this part, must do so by killing it, is suppositious in the extreme.

After the description of cataract, which has been given by M. Delpech, it requires neither time nor experience to decide, that it must be attended, if not occasioned by necrosis. The part which has lost its structure, and which is reduced to an homogeneous pulp, can no longer exist as a living body. It is to be remembered, however, that this description applies to the disorganized lenticular cataract alone. How it was possible entirely to overlook the organized lenticular species it is difficult to conceive. To use his own argument, crystallines when deprived of life and submitted to maceration, without the contact of air, are converted into whitish flocculi. Cataractous crystallines macerate in the humor morgagni without the contact of air.

Some of these crystallines undergo the change which has been described, which proves that they are dead; but others remain unaltered, therefore they are not dead.

CHAP. V.

THE treatment of cataract has been divided into medical and surgical: these will form the subject of our immediate consideration.

When the nature of cataract was imperfectly understood, and when the operations were coarse and ill directed, the ignorance or chicanery of the oculists loudly advocated the efficacy of their various medicines and applications. The numerous failures which attended these methods, eventually brought them into disrepute with regular practitioners. Heister, whose knowledge on this subject was extremely limited, and whose judgment consequently was more exposed to the influence of a general prejudice, makes the following remark; "to say the

"truth, medicines will generally have little or "no effect, when the disorder is confirmed "or inveterate, notwithstanding what some "may boast of their wonderful arcana for this "purpose."

Few practitioners, at the present time, would attempt to remove this disease, if situated in the lens, by any other means than an operation: and even those, who conceive the possibility of overcoming a recent affection of the capsule, must, from their frequent failures, view their most active agents with distrust. I believe, that nothing short of an operation will effect the cure of any form of genuine cataract; but as many persons, well acquainted with this disease, have placed reliance on other remedies, and recorded successful cases, it is but fair, that the circumstances, by which their judgment might occasionally be rendered erroneous, should be exhibited.

The cases of lenticular cataract appear to have been the result of external violence. If the injury was a puncture of the capsule, that stimulus, together with the admission of the aqueous fluid, might excite the absorbents

entirely to remove the crystalline: if a blow, the capsule probably was ruptured; then the cataract would be similarly circumstanced. The cases related by Mr. Ware, with perhaps one exception, were of this description. During the progress of the cures ether was applied to the eye, as a stimulant, and to its operation Mr. Ware attributes the removal of the opaque substances. The application of the ether might not retard, but undoubtedly did not accelerate the cures.

A similar explanation is applicable to those cases mentioned by Mr. Pott: "writers of credit "have mentioned, that a cataract may be formed "almost instantaneously, by external violence. "There is no doubt of the fact; I have seen it "four different times. Whether this be not an "affection of the capsula merely, I much doubt; "or rather am much inclined to suspect, that it "most frequently is. In three of the four, "which have fallen under my observation, the "opacity has gradually disappeared after the "inflammation, in consequence of the blow, had "gone off; and the eyes were left as clear as "ever. A consequence which, I think, may be

" accounted for by supposing the opacity in the " capsula only; but cannot, if we suppose it " to be in the corpus crystallinum itself." Had resort been made to internal medicines, or external applications, the successful events would have been refered to their operation.

Those which were denominated capsular cataracts, were probably the depositions, which so frequently attend inflammation of the internal membranes. That depositions of lymph may, and frequently are taken for diseased capsules, repeated experience has confirmed. This lymph is sometimes removed with considerable rapidity, the crystalline and its capsule remaining unaffected. A case of this kind came under my notice several years since. A woman laboured under a very serious attack of iritis. It had proceeded to such an extent, that, in addition to the appearances usually exhibited by cases of this description, the pupil was completely filled by lymph. It strongly resembled a caseous cataract; but I was able positively to ascertain its nature, not only from the history, but by observing, that it was so accumulated, as to make a considerable projection anteriorly. I

pointed out this case to several students, who all agreed, that the lens or its capsule were opaque; I then desired them to view it obliquely, upon which they acquiesced in my opinion. This patient was no sooner under the full influence of mercury, than the deposition began to decrease; and in a short period, not a vestige remained, with the exception of several slender adhesions.

Another case may tend to illustrate the same proposition: this occurred in a female, a physician's patient at St. Bartholomew's Hospital. As I was passing her, I observed that one of her eyes was cataractous. I stopped, and found on examination, that it was of the organized lenticular species, being that variety which exhibits triangular divisions. It was the best marked case I had ever seen, and the capsule was beautifully pellucid. But what particularly excited my admiration, was a large red vessel, which crossed the pupil in an horizontal direction, and divided its area pretty equally, The vessel commenced at an adhering point of the iris, and running upon the capsule, disappeared under the curtain of the iris on the opposite side. I

regret that the pupil was not dilated with Belladonna, but as she was a medical patient I was unwilling to interfere. The statement, which she gave of her disease, was, that some years before she had had an inflammation of the eye, which was not very painful, but had destroyed her sight. In this case lymph must not only have been deposited, but subsequently organized, as the remaining vessel proved, yet the capsule did not retain the slightest opacity, excepting at the adhering point, where it was exceedingly faint.

In some cases of iritis a slight haziness is very perceptible: this has been pointed out to me, as an affection of the capsule. Upon the truth of this observation I will not undertake to decide; but it may be remarked, that in such a disordered state of the organ, we may easily be deceived by appearances.

On this point Sir Wm. Adams gives his opinion in the affirmative: speaking of the blindness which attends venereal inflammation, he says; "this state of the disease, is accom-
"panied merely with a haziness of the capsule,
"which usually disappears, within forty-eight

" hours after Ptyalism has been produced, when " vision is again restored to its natural clear- " ness. Were there any deposition of lymph, " on that part of the capsule opposite to the " pupil it must be visible when first examined."

Now according to my definition of cataract, it must be acknowledged on the authority, not only of this statement, but of the assertion of other surgeons in whom I place much confidence, that one form of the disease is curable by internal remedies. But this strict adherence to words may not elucidate the truth with greater certainty. Surely no comparison can be made between a slight uniform haziness, depending upon a sudden increase of vascular action, and the dense and irregular opacity of capsular cataract. Let it be understood, therefore, that although I deny the efficacy of any other remedies than operations in such cataracts as have been particularly described; yet that I admit, that the powers of nature, especially if assisted by the efforts of art, may be capable of removing that slight affection, which is the result of an active inflammation.

But another fruitful source, from which the

fame of medical treatment has originated, was an opinion, that the appearances of sparks, floating cobwebs, &c. were the general symptoms of approaching cataract. Those, who acted under such an impression, might frequently suppose, that the preservation of sight was attributable to their remedies, and that they had actually succeeded in curing incipient cataract, where none had ever existed. This opinion was prevalent amongst the antients, and those of a later period, who have acceded to it, have done so, from neglecting to examine the facts from which their conclusion was drawn. It has long been known, that such symptoms attend nervous disorder of the visual organ, and that although a similar affection may sometimes precede the occurrence of cataracts, yet that it is by no means a necessary attendant.

The operations, which have been proposed for this disease, aim at one common object; the removal of the opaque body, by which the passage of the rays of light, in the visual axis, is obstructed. They admit of three great divisions, according to the method by which this object is accomplished.

1st. Depression: in which the cataract is depressed beneath the pupil, or otherwise displaced from that space, which the luminous radii should traverse.

2nd. Extraction: in which the opaque substance is absolutely taken from the organ.

3rd. Absorption: in which the cataract is so circumstanced, as to procure its total removal through the agency of the absorbents.

These different methods, with their sub-divisions, must be resorted to, in different cases, agreeably to the choice or judgment of the operator.

CHAP. VI.

ALTHOUGH depression was the operation more generally known and practised by the antients, yet several passages from their works remove the possibility of a doubt, that they were likewise acquainted with extraction. Avicenna, is decisive on this point: "homines

" quidem habent vias diversas exercendo curam
" aquæ, quæ sit cum instrumento, ita ut quidam
" sint qui disrumpunt inferiorem partem cor-
" neæ: et extrahunt aquam per eam; et hoc
" est in quo est timor; quoniam cum aqua,
" quando est grossa egreditur albugineus."
From this, and corresponding sentences of other authorities, we may collect, that the escape of the vitreous humor, during the performance of this operation, was strongly impressed upon their minds: the dread of this accident, in all probability, rendered depression the prevailing method.

Depression has been practised in Europe from the era of Celsus; and, it has been used in India, with considerable modifications, from time immemorial.

Although unacquainted with the nature or situation of the malady, and possessed of a very imperfect knowledge of the anatomy and relative situation of the surrounding parts, yet even the depression of Celsus strongly resembled the operations lately practised by Hey, Scarpa, and Callisen. As this method has attained to its

highest degree of perfection in their hands, I will transcribe their directions for its performance.

Mr. Hey directs, that "the sclerotis should "be pierced towards the centre of the eye." He then proceeds: "by this method the eye is "rendered steady, and the needle will pass "through its coats without any danger of "wounding either the iris or ciliary processes. "When the needle has pierced the coats of the "eye, it must be pushed forward in the same "direction; till so much of the instrument is "introduced, that its point when brought for-"wards, will reach the centre of the crystalline. "It is not absolutely necessary that the needle "should be introduced at one determinate dis-"tance from the ciliary ligament. Indeed the "want of steadiness in the eyes of some patients "renders this impracticable, but I consider the "distance of about one-sixteenth of an inch "to be the most convenient."

"If, in bringing forwards the point of the "needle, I perceive the cataract to advance, "and dilate the pupil; I then know that the "cataract is firm, and that the needle is in con-

" tact with its posterior part. The pressure,
" used in bringing forwards the cataract, some-
" times causes the needle to sink so far into
" the crystalline, and become so much entan-
" gled in its more tenacious part, that the
" depression may be completed, though the
" instrument has not been seen through the
" pupil. When, therefore, the appearance
" which I have mentioned takes place, I do
" not persist in bringing forwards the point of
" the needle, lest the iris should be injured by
" too great dilation of the pupil; but I depress
" the point, and at the same time carry it back-
" wards. If this motion of the needle removes
" the cataract from its place, and leaves no
" appearance of an opaque capsule, the opera-
" tion is usually concluded without any further
" trouble. If the cataract does not follow the
" motion of the needle, I cautiously bring
" forward its point through the softer part of
" the crystalline, till I can see my instrument
" through the pupil, endeavouring at the same
" time to pierce the capsule; and then proceed
" in my attempts to effect the depression. In
" these attempts I always move the needle

" backwards as well as downwards, for the " operator ought always to be sure, that his " needle is behind the ciliary processes, when " he moves it upwards and downwards. Before " I withdraw the needle, I usually elevate its " point a little, to see whether the cataract rises " again when the pressure is removed. If it " does the pressure is renewed once or twice; " and the needle is then withdrawn."

" After the crystalline has been depressed, " if the least opacity appears in the capsule, it " ought not only to be pierced with the needle, " but removed as far as is possible; avoiding " long continued efforts, as these are more dan- " gerous than a repetition of the operation."

Callisen is very concise; having introduced his needle in a similar manner to Mr. Hey, and ascertained the solidity of the lens by its following the motion of the instrument, he says: " depressio tunc omnino indicatur. Acus " nimium in superiorem lentis partem impin- " gitur, quæ tunc, depressa apice versus infe- " riora et exteriora et in imam humoris vitrei " partem detruditur, tali modo ut cataractæ " anterior superficies ad inferiora et paullo

" anteriora spectet, et tota cataracta ad inferi-
" orem et posteriorem humoris vitrei partem
" ducatur, quod interdum unico ictu contingit;
" suspicari tunc licet, lentem una cum capsula
" depressam, vel forsan totum humorem vitreum
" simul inversum esse, et cataractam crystalli-
" nam altera superficie sursum, altera deorsum
" spectare. Si motu acus depressorio haud
" inferiora petat cataracta, sed circa axin suam
" moveatur, ad superficiem magis, quam ad
" centrum lentis deprimendæ, acum agere con-
" cludimus, adeorque directionem depressoriam
" mutandam esse. Alii cataractam solidiorem
" acu, ad superiorem partem superficiei anteri-
" oris ducta, reclinare malunt, ita ut superficies
" anterior sursum spectet, quod optime nobis
" quoque successit." He then finishes his operation in the same manner, as may be seen in Mr. Hey's description.

Professor Scarpa's method differs considerably from those of Hey and Callisen: he describes it as follows; " supposing the eye
" to be operated on is the left, the surgeon
" taking the curved needle in his right hand,
" as he would a writing pen, with the convexity

" of the hook forwards, the point backwards,
" and the handle in a direction parallel to the
" patient's left temple, should rest his fingers
" upon the temple, and boldly perforate the
" eye-ball in its external angle, at rather more
" than a line from the union of the cornea
" and sclerotica, a little below the transverse
" diameter of the pupil, gradually moving the
" extremity of the handle of the needle from
" behind forwards from the patient's temple,
" and consequently giving the whole instru-
" ment a curved motion, until its bent point
" has entirely penetrated the eye-ball, which is
" effected with the greatest readiness and ease.
" The operator should then conduct the con-
" vexity of the needle upon the summit of the
" opaque crystalline, and by pressing upon it
" from above downwards, cause it to descend
" a little, carefully passing the point at the
" same time between the corpus ciliare and the
" capsule of the crystalline lens, until it be
" visible before the pupil, between the anterior
" convexity of the capsule of the lens and the
" iris. Having done this, he should cautiously
" push the hook with its point turned back-

" wards towards the internal angle of the eye,
" and consequently beyond the centre of the
" opaque lens. The operator then inclining the
" handle of the instrument more towards him-
" self, should press the curved point of it deeply
" into the anterior convexity of the capsule, and
" substance of the opake crystalline, and by
" moving it in the arc of a circle, should lacerate
" the anterior convexity of the capsule exten-
" sively, remove the cataract from the axis of
" vision, and lodge it deeply in the vitreous
" humor, leaving the pupil perfectly round,
" black and free from all obstacle to the vision.
" The needle being retained in this position for
" a short time, if no portion of opake membrane
" appears behind the pupil, which would require
" the point of the instrument to be turned to-
" wards it, in order to remove such obstacle, the
" surgeon should give the instrument a small
" degree of rotatory motion, in order to disen-
" tangle it easily from the depressed cataract,
" and should withdraw it from the eye in a
" direction opposite to that in which it had
" been introduced, that is, gently inclining and

" turning the handle towards the patient's left " temple."

Depression is applicable to the organized lenticular cataract alone: in that species it meets with the necessary degree of solidity, and the capsule which remains is unaffected with opacity. This capsule, however, if not removed from the axis of vision, is liable, at some future period, to become opaque. It is for this reason, and as a precautionary measure, that its free laceration is recommended by Scarpa in every instance.

The operations recommended by the above quoted authors for the other species of cataract, cannot be esteemed operations for depression, but are rather referable to the absorbent practice. This has been accurately distinguished by Callisen, who, speaking of the disorganized lenticular species, says, " tunc omne negotium " in eo versatur, ut capsula lentis in variis locis " dissolvatur, et resorptioni materiæ opacæ lo- " cus concedatur. Quæ dissolutio perficitur " apice acus ad varias directiones motæ, sub hoc " opere per pupillam rite observandæ, ne uvea

"nec iris lædatur. Hæc capsulæ dissolutio "non solum ad posteriorem et inferiorem, su- "periorem et interiorem partem fit, sed apex "acus commode quoque per pupillam in came- "ram anteriorem oculi caute inducitur; unde "pars cataractæ in hanc cameram effunditur "et humori aqueo admiscetur, precipitatur, "resorbetur." These directions, not only prove that he esteemed depression impracticable in these cases, but convey the best advice to an operator, who may have commenced his operation under a false impression of the nature of a cataract.

In performing the operation of depression, according to either of the methods, which have been described above, it is desirable that the operator should ascertain, whether adhesions may not exist between the iris and the capsule. If this circumstance is neglected, the patient may be exposed to serious injury: this subject however, will be again mentioned, when the depression of the ancients is discussed. This complication being ascertained, the laceration of the posterior portion of the capsule, previous to the depression of the crystalline is

advisable. The laceration being completed to a sufficient extent, the lens may be removed from its envelope, and depressed into the vitreous cavity. By this precautionary measure, than which nothing can be easier to execute, we avoid that violence, which the iris must sustain from the immediate removal of an adherent capsule. We are not however to remain satisfied with having cleared the pupil for the present, it is our duty to prevent the possible formation of secondary membraneous cataract. For this purpose we are, on quitting the depressed crystalline, to direct the needle towards the capsule; then piercing it and carrying the point of the instrument into the anterior chamber, that membrane is to be freely lacerated by vertical and horizontal motions. The operation is then completed.

It may be remarked, that it is imprudent to introduce the needle within a line of the junction of the cornea to the sclerotica.

The extent of recently accumulated information, both with respect to the anatomy of the eye, the nature and phenomena of the disease, and the various functions of the organ,

has rendered the use of the needle of almost universal application. If, on trial, the nature of the cataract forbids the operator to persist in his depression, he undergoes no embarrassment, but instantly resorts to other measures, which are slower in their operation, but as certainly efficacious. The fear of wounding the vitreous humor, or the ciliary processes has ceased; the presence of opaque portions, which will not admit of depression, excites no uneasiness, and their subsequent removal is no longer doubtful. To these advantages it may be added, that this operation does not require the same remarkable dexterity as some others, that comparatively speaking, its performance is easy; that it may be practised at an early age; and that, if conducted with the requisite precaution, it is rarely attended with serious inflammation.

With this flattering picture before us, it cannot but excite our astonishment, that operations so similar in their execution as the ancient and modern, should nevertheless have been attended with such different results. In proof of my assertion, that these operations agree in the leading features, the description which has

been transmitted by Celsus, is here subjoined: the resemblance must immediately be recognised. " Acus admovenda est, aut acuta, aut " certe non nimium tenuis, eaque demittenda, " sed recta, est per summas duas tunicas medio " loco inter nigrum oculi et angulum tempori " propriorem, e regione mediæ suffusionis sic, " ne qua vena lædatur. Neque tamen timide " dimittenda est, quia inani loco excipitur. " Ad quem cum ventum est, ne mediocriter qui- " dem peritus falli potest, quia prementi, nihil " renititur. Ubi eo ventum est, inclinanda " acus ad ipsam suffusionem est, leniterque ibi " verti et paulatim eam deducere infra regionem " pupillæ debet; ubi deinde eam transiit, ve- " hementius imprimi, ut inferiori parte insidat. " Si hæret, curatio expleta est. Si subinde " redit, eadem acu magis concidenda, et in " plures partes dissipanda est: quæ singulæ et " facilius conduntur, et minus late officiunt. " Post hæc educenda acus recta est."

Having compared the ancient with the modern treatment, we must now consider the remarkable disparity of success, by which they were attended. The view, which will be taken

of this subject, may reconcile accounts, which are apparently inconsistent. For this purpose it is requisite that we should examine the effects, which might result from the limited information of a former period.

In the first place, it was impossible that those surgeons, who esteemed the cataract a pellicle in the posterior chamber, could distinguish betwixt the species, or judge whether it was adapted to their operation. Of absorption they had no idea, the absorbent system was hitherto undiscovered, and the removal of the opaque substance was solely attributed to a mechanical process. If this failed, the operator was without resource, and the blindness was considered irremediable.

Now for the sake of illustration let us suppose a case, and we shall soon perceive the unfortunate consequences, which must have ensued. It is a caseous cataract: the needle is introduced, depression is commenced, the capsule bursts, its contents are evacuated, the operator concludes that further attempts are fruitless. And indeed they are, for both the caseous matter, and the floating edges of the

capsule will continue to elude his needle, and escape depression. We know that the contained substances on their evacuation will soon be removed, and from the necessary dimensions of the laceration, the greater portion probably has escaped. We know, that a judicious laceration of the capsule will be attended, subsequently, by its retraction. But the ancients did not think thus; and why did they come to such a conclusion? Because an opacity remained, and sight was not restored. And where did this opacity reside? in the diseased capsule, which constantly attends a dissolution of the crystalline. Retraction could scarcely follow their laceration, for it possessed neither the necessary form, nor extent. This subject will be considered more particularly, when treating on membraneous cataract.

A consideration of the above suppositious case, will sufficiently account for that assertion of Heister's, "that it is indeed difficult to "couch a variegated or marbled cataract, as "being too soft, and not yet arrived to a due "consistence." The latter part of this quotation induces me to remark, that the patient

was frequently consigned to darkness for years, whilst the practitioner waited for what was termed, the ripening of the cataract. The ripening was an erroneous opinion, that the lens possessed a degree of firmness, proportionate to its age. Now, if it was universally believed with Heister, that or marbling or variegation indicated a deficiency of firmness, and that time would remove such appearances, and increase the solidity, there could have been little hope that an operation would ever have been attempted.

On the same principles we may account for his opinion, that " the cataract is also worse " as it degenerates more from the pearl color." By a pearl coloured cataract he undoubtedly intended that species, which I have called organized lenticular. If this be granted, it will sufficiently account for the success, which he anticipated from such appearances; for this species most readily admits of depression, no soft portions are detached from it, and the transmitted light meets with no obstruction from the pellucid capsule.

The complication of other diseases with cataract was, probably, but slightly regarded: from the confusion of terms this remark is perhaps more particularly applicable to the amaurotic.* Of the other complications, the most frequent and serious consequences must have resulted from the adhesions of the iris to the capsule. These adhesions are very common, but, in many cases, not discoverable without the application of Belladonna. As that, or analogous applications were much neglected, many of these unnatural unions must have escaped detection. The mischief which must have ensued, when a forcible effort was made to thrust the capsule to the bottom of the eye, may easily be conceived. The ancient applied the flat surface of his broad spear pointed needle, and endeavoured to depress. He must then either have broken through the opaque body, which if the capsule was much diseased and thickened, he frequently could not have accomplished: or forcibly have ruptured

* The term suffusio was common to cataract and amaurosis. At a later period the latter disorder has been called black cataract.

the adhesions, which could not be done, if they were strong or numerous: or have dragged and stretched the iris, and if the adhesions would not then give way, either have lacerated its texture, or separated it from its ciliary attachment.

With this violence the practice of the modern is strikingly contrasted; every movement of the needle indicates, that the operator considers himself as acting on susceptible surfaces; he applies the edge and point of his delicate instrument to open the centre of the capsule, or to loosen its adhesions. He is conversant with the disease, consistent in his design, but patient and considerate in his procedure.

To the ignorance therefore of the ancient oculists, to the coarseness of their instruments, and to the unskilful use which was made of them, must be attributed the ill success which attended their treatment by depression. This has been so well illustrated by Fabricius ab Aquapendente, that we shall require nothing more to account for the frequency of their failures. "Primum igitur vidi chirurgos hu-"jusmodi operationem privatim profitentes,

" quos merito ocularios apellamus, interdum " bene et feliciter operatos fuisse, sæpenumero " etiam infeliciter, quia interdum ab ipsis uvea " tunica nimium diducebatur, interdum rumpe- " batur, ex quo vel admodum amplificatum, vel " distortum etiam pupillæ foramen redditum est, " cum visus læsione; interdum sub operatione, " oculus universus intus conturbatur cum cæ- " citate ejusdem oculi. Non raro succedebant " postea magnæ inflammationes similiter cum " ipsius visus ablatione; nonnunquam si nihil " apparebat in oculo, tamen male omnino ho- " mines videbant, neque causa ulla patebat. " Propter hos omnes eventus, credidi chirurgos " propositos potius eam, quam arte operari, et " fortuito eventus provenire."

Another material disadvantage under which they laboured was this, that being unconscious of the seat of the disease, the defective vision, which attended their successful cases, remained inexplicable: under these circumstances, it could not be expected that they should remedy the deficiency.

But highly as this treatment has been improved of late years, yet objections remain

which cannot be removed. These are two in number; for although the list has been vastly augmented by the advocates of extraction, we are to regard them as the frivolous pretexts only of a party, or as complaints formerly well founded, but inapplicable to depression at the present moment.

The first, is the irritation which the cataract may excite, in its new situation at the bottom of the eye. The second, is its reascension, by which, either the transmission of light may be again obstructed, or a dangerous inflammation induced by its pressure on the uvea.

That the symptoms attributed to the friction of the cataract upon the retina have been much exaggerated, does not admit of doubt; and yet there is reason to believe, that occasional mischief may be produced. This is acknowledged by the accurate and unprejudiced Callisen, although he gives the preference to depression. "Cataractam duriorem depressam, guttam sere-"nam induxisse pluries vidimus." We are informed by some, that even ulceration of the retina has been produced, but this probably is

an uncommon occurrence. When the vitreous humor is in an healthy condition, its consistence is probably sufficient to prevent any mischievous degree of pressure: but when it is completely disorganized and fluid, much injury may be very possible.

On these cases it has been well remarked by Sir Wm. Adams, that, "whoever has seen "its (a solid, undivided lens) effects, when "suffered to remain in the anterior chamber, "where absorption proceeds so much more "rapidly than in the vitreous humor, without "its nucleus being divided, can readily imagine "how much more certainly, inflammation and "ulceration of the retina, must follow, when "the undivided lens is depressed in a fluid "vitreous humor, and is consequently lodged "upon that exceedingly delicate membrane, in "which the seat of vision resides."

He informs us moreover, that the lens, inclosed in its capsule, may, in these cases, be detached from the ciliary processes on the application of a very trivial force. By this circumstance the removal of the lens, if not

altogether prevented, would be much procrastinated.* On account of these untoward accidents depression should not be peformed, when the vitreous humor is evidently disorganized.

With respect to the reascension of the lens, but few, even of the warmest advocates of depression, deny that such an accident may occasionally happen, in defiance of the dexterity of the most experienced operators. Scarpa has however given a different statement: "with "respect to the crystalline depressed, in the "manner now described it never rises again."

* Scarpa remarks, that, "the opake crystalline removed "from the axis of vision and lodged in the vitreous humor, "provided it is deprived of its investing membrane, gradually "diminishes in size from its circumference towards its centre, "and ultimately disappears altogether."

The following extract from Callisen will confirm this observation. "Cataractam autem depressam, capsula vasisque "destitutam, lente consumi, nullumque ad postremum sui "vestigium relinquere, compertum est. Interdum cataracta "depressa, quoad volumen minuta, post aliquid temporis spa- "tium, data quadam occasione, per pupillam in cameram "anteriorem oculi transiit, et si dolor ac inflammatio vigeant, "extractionis necessitatem induxit. Sparsim quoque lens "depressa, durior præcipue, immutata in fundo oculi remanet, "et post annos iterum ascendere potest, et extractionis neces- "sitatem inducere. Hæc observationum diversitas inde pen- "det utrum lens sola, remanente capsula, depressa fuerit, an "una cum capsula, in qua adhuc inclusa est; in posteriori "casu vix unquam resolutionem admittet."

We are informed however that it occasionally occurs in his own practice. The opinion he ascribes to " inexperienced oculists only, who " have mistaken a secondary membraneous " cataract, for a reascended lens."

However completely the cataract may have been removed from the axis of vision, yet its occasional return to its original situation, or even its passage into the anterior chamber is sufficiently authenticated. Either of these events may be attended with unfortunate consequences. Should it merely reascend, vision is again obstructed. But this is not the worst effect: it is ascertained that pressure on the posterior surface of the iris excites irritation to a remarkable degree. The consequence of this irregular pressure is most commonly an inflammation, upon which the most energetic treatment can scarcely impose restraint. The practice necessary, under these circumstances, is sufficiently obvious; the crystalline must either be depressed, or again broken up. The former is generally to be preferred.

These measures are to be taken, not so much with a view of immediately restoring vision, as

to relieve the iris from a constant source of irritation, and thus to secure the eye from more extensive injury.

If the lens, or its nucleus enters the anterior chamber, it commonly occasions considerable disturbance. This must be ascribed, either to the excitement produced by a hard and ponderous nucleus, or to the unnatural distention, which the iris must endure from the softer, yet bulkier substance of a perfect crystalline.

If absorption proceeds favorably, it may not be adviseable to interfere; but on the appearance of inflammation, no time should be lost in removing the irritating body through a section of the cornea.* We must no longer rely upon

* "Lenti autem, quæ sub operatione, vel integra, vel in frustula divisa, in anteriorem oculi cameram delapsa est (quod in senibus, in quibus marcida est plurimum cataracta, interdum accidit,) si inflammationem excitet, corneæ incisione exitus est parandus; interdum tamen, sponte dissolvitur."—Callisen. —See likewise a similar opinion, by the same author, in a preceding note.

The reader will find by referring to Mr. Ware's cases of spontaneous removal of cataract, that a nucleus, after having disappeared for some months, reascended, passed through the pupil, and occasioned such irritation in its new situation, as terminated in the destruction of the organ. Mr. Ware recommended extraction, but his patient refused to submit to that operation.

absorption; for on the commencement of inflammation, that process ceases; nor will it be recommenced, until the irritation has totally subsided. This I believe was first observed by Mr. Stephenson, and his remark has been repeatedly verified by my own observations.

Depression is always performed with an instrument called a needle. Of this instrument there are numerous varieties. Almost every oculist appears to have indulged either his caprice, or vanity. The old spear-pointed needle was a coarse instrument, and, from the breadth of its shoulders, must have been dangerous in the hands of the inexperienced. The needle used by Mr. Hey has the advantage of being more manageable and less hazardous in its employment. Its semicircular edge cannot, however, enter the eye with facility; nor will it, in many cases, pass through the substance of a firm cataract, without such force as might prove injurious. The preferable instrument for this operation, is that used and recommended by Professor Scarpa. It must however be remarked, that his needle is less manageable from the

length of its shank, and its excess of curvature. By correcting these defects, it becomes a safe and powerful instrument.

CHAP. VII.

THE ancients were acquainted with extraction, yet the deficiency of documents, relating to their practice, consigned it during a long period to oblivion. Passing over some neglected or forgotten notices in ancient writers, we may, without injustice, concede the merit of orignality to its revivors. I shall no longer mention this treatment as the invention of an early period.

The discovery of the true seat of cataract opened a wide field for adventurous speculation. The first idea of extraction however originated in accident: it was an effort to relieve an eye under peculiar circumstances, and not a predetermined experiment, the result of a train of

reasoning deduced from recently acquired information.

Several cases occurred to Petit and St. Yves, in which the opaque crystalline passed through the pupil into the anterior chamber. The displaced cataract was removed through a section of the cornea, and their bold, yet judicious proceedings were attended with complete success. We are informed by St. Yves, that his object was to relieve the irritation which had arisen. "The cataract," he tells us, "by "pressing very much the iris, occasioned vio- "lent pains in the head, attended with want of "sleep for three months before." We cannot but admire and respect the justness of the reasoning, which encouraged him to undertake so novel an operation: "at that time I had never "heard of the like operation; but reflecting "that I had often opened the cornea, to dis- "charge the matter of an abscess lodged behind "it, I concluded I might safely do the same, in "regard of a solid body." M. Mery, who was present, profited by the hint, aud recommended extraction under every circumstance.

It was again brought forward to public notice by Daviel, who found the profession ready to grasp at the hope afforded by any novelty. The numerous failures which attended depression, the frequent return of the cataract to the visual axis, the sufferings which the patient frequently endured, all concurred to destroy the confidence, which it had once possessed. Its efficacy was distrusted, its consequences were viewed with apprehension; and to complete its degradation, the more respectable members of our profession, despairing of success, consigned the treatment of cataract to the ignorance and chicanery of itinerant empirics. The dexterity of some of the early patrons of extraction, and the success which attended it, joined their influence to the prevailing feeling. When to this was added the absolute removal of the opaque substance, and the impossibility of its regaining its former situation, (an accident, so much and so deservedly dreaded,) its reputation was hastily established.

The interest excited by such an important innovation on former practice, amongst surgeons,

whose talents were equal to their opportunities of investigation, conduced to the rapid progress which it made towards its present state of perfection and simplicity.

But extraction had to traverse a rude and complicated course. The number of instruments, with which it was at first encumbered, required to be reduced; until that crowd of inventions called specula, once supposed to be absolutely requisite, were found by experience to be as unnecessary as they were injurious, and were discarded and censured by the first authorities. To the Baron de Wenzel we are indebted for much of this simplification and improvement, and if we blame the partiality, perhaps I may say the misrepresentation, which occurs in the work published by his son, yet his own fame, in improving and bringing to perfection this difficult operation, must remain unsullied. These are his directions: "When the "eye is still, and so turned towards the outer "angle of the orbit, that the inner and inferior "part of the cornea, through which the point "of the instrument is to come out, may be "distinctly seen, the operator is to plunge the

"knife into the upper and outer part of this "tunic, a quarter of a line distant from the "sclerotica, in such a direction that it may "pass obliquely from above, downwards, pa- "rallel to the plane of the iris. At the same "time the operator must depress the lower lid "with his fore and middle fingers, which are "to be kept a little distant one from the other; "and must take the greatest care to avoid all "pressure on the globe, which is to be left per- "fectly free, as the surest way to diminish its "power of moving.

"When the point of the knife has pro- "ceeded so far as to be opposite to the pupil, "it is to be dipped into this aperture, by a slight "motion of the hand forward, in order to "puncture the capsule of the crystalline; and "then, by another slight motion, contrary to "the former, it must be withdrawn from the "pupil, and, passing through the anterior cham- "ber, must be brought out near the inferior "part of the cornea, a little inclined to the "inner angle, and at the same distance from "the sclerotica, as when it pierced the cornea "above. If the knife has been well directed,

" and the fore and middle fingers of the hand op-
" posite to that which holds the instrument, have
" been properly applied, the section of the
" cornea, thus completed, will be found suffi-
" ciently large, its shape will be semi-circular ;
" and it will be quite near enough to the margin
" of the sclerotica.

" When it is found difficult to divide the
" cornea, it would be extremely improper to
" use force in pushing the instrument through
" it: and it is of equal importance to remem-
" ber, that the practice of drawing the knife
" backwards and forwards should be carefully
" avoided: since by this method, there would
" be danger of finishing the section imperfectly,
" and making it too small. The instrument,
" on the contrary, should be steadily, but
" gently, pushed forwards in the direction that
" was at first given to it; and the nails of the
" fore and middle fingers may here prove useful,
" by supplying a resisting substance, on which
" the incision may be finished without a shock.

" When the capsule of the crystalline hu-
" mor is divided by the same process with
" which the section is made through the

" cornea, the incision forms a flap, which re-
" sembles that of the cornea, but upon a smaller
" scale. This mode of dividing it, is attended
" with many advantages. It is more expedi-
" tious, performing that at once, which, ac-
" cording to other methods, requires two or
" three repeated efforts; and it fatigues the
" eye less, and is therefore less liable to bring
" on accidents after the operation."

Mr. Ware, who translated the Baron's work, remarks in a note, that " this process " of puncturing the capsule with the same in-" strument that is used for dividing the cornea, " and at the same time, is rather a work of " dexterity than usefulness; and, as it is often " attended with much hazard of wounding the " iris, he has not hitherto thought it adviseable " to adopt it." To avert this accident, which is one of the most serious objections to extraction, Wenzel recommends as follows: " the " most simple, as well as the surest method to " avoid wounding the iris, when it becomes " entangled under the edge of the knife, is " to press the iris gently down with the fore " finger applied over the cornea, at the same

" time that the middle finger, is employed in " keeping the lower lid from rising. In conse- " quence of this, the iris will instantly be found " to retire, and quit the knife, which is then " steadily to be pushed on, until the incision be " completed."

Perhaps Mr. Wathen's mode of dividing the cornea may be preferable, as being less hazardous, and requiring less of manual dexterity. It is the method generally practised by the most distinguished oculists of the present day.

" The point of the knife is to enter the cor- " nea on the side next the angle of the eye, " about one tenth of an inch above its trans- " verse diameter, and a little anterior to its con- " nexion with the sclerotica. The knife thus " introduced, is to be pushed on slowly, but " steadily, without the least intermission, in a " straight direction, with its blade parallel to " the iris; so as to pierce the cornea towards " the inner angle of the eye, on the side oppo- " site to that which it first entered, till one " third part of it is seen to emerge beyond the " inner margin of the cornea, and the point of " the knife approaches the commissure of the

" eye lids in the greater angle of the eye. When
" the knife has reached so far, the punctuation,
" or that part of the operation, which is prepa-
" ratory to the section of the cornea, is com-
" pleted. The broadest part of the blade is
" now between the cornea and iris; and its cut-
" ting edge below the pupil; which of conse-
" quence, is out of all danger of being wounded
" by it. At this time, as every degree of pressure
" must be taken off the globe of the eye, the
" fingers both of the operator, and his assistant,
" are to be instantly removed from that part,
" and shifted to the eye lids; these are to be
" kept asunder, by pressing them gently against
" the edges of the orbit; and the eye itself is
" to be left entirely to the guidance of the
" knife; by which it may be raised, depressed,
" or drawn on either side, as shall be found ne-
" cessary. The aqueous humor, being now
" partly, if not entirely evacuated; and the
" cornea, of course, rendered flaccid: the edge
" of the blade is to be pressed slowly down-
" ward, till it has cut its way out, and sepa-
" rated a little more than half of the cornea
" from the sclerotica: following the semi-cir-

" cular direction marked out by the attachment " of the one to the other."

Should the operator follow these latter directions, the capsule will require to be opened by another instrument. This part of the operation is usually effected by a curved pointed piece of steel, fixed in the same handle with the curette. The surgeon having waited a few seconds, after completing the section, until the eye has recovered its tranquillity, introduces the instrument beneath the flap of the cornea, and directing its point through the aperture of the pupil, scratches the anterior surface of the capsule. Some surgeons use an instrument resembling Mr. Hey's needle, but curved towards its extremity; this is not only safer, but in every respect superior to the former. Mr. Wathen recommends the kisistome of M. de la Faye, but canulæ and concealed lancets do not possess the requisite simplicity.

This being completed, Mr. Wathen directs that the eye should again rest a little. The lids are then to be opened, " and a gentle pres- " sure is to be made upon it, by applying the " blunt and convex extremity of the curette

" upon the conjunctiva, just below the wound " of the cornea. By this means, if the cataract " has formed no adhesions, and the aperture " made in the capsule and cornea are suffi- " ciently large, the cataract will gradually rise " out of its capsula, and pass through the " pupil into the anterior chamber of the aque- " ous humor; from which its own weight " will bear it down, through the wound of the " cornea, and leave it upon the cheek." After giving directions for extracting any remnant of the chrystalline, and returning any protrusion of the iris from between the lips of the wound, by means of the scoop of the curette, he adds: " This being accomplished in each eye, the " flap of the cornea is to be smoothed, and the " edges of the wound exactly adjusted to each " other, by the convex extremity of the curette, " and by gently rubbing the end of the finger " over the upper eye-lid when shut."

The eye is then to be lightly bound up. The admission of light into the room should be carefully prevented. It is not an unusual practice to allow the patient to look around him, as soon as the operation is completed;

this is very reprehensible; for not only may the stimulus, afforded by the light, excite inflammation in the irritated organ, but such spasm has sometimes occurred, as has been attended by the complete evacuation of the vitreous cavity.

The extraction of the crystalline is a difficult operation in all cases; in many, extremely hazardous; and in some, absolutely impracticable. The only cases to which it is adapted, are those of lenticular affection with pellucid capsule. This will immediately become evident, when it is stated, that a removal of the capsular membrane* endangers the escape of the vitreous humor. It is true, that the Baron de Wenzel would discourage the apprehension, but, no unprejudiced oculist will deny, either the frequency of such occurrences, or the serious consequences which are to be apprehended.

The various complications, which are detailed in a former part of this treatise, render extraction incompatible with safety. A diseased cornea may prove inadequate to the

* This, of course, is indispensable, when the capsule proves opaque.

reparation of such extensive injury. The section is made by the largest instrument used in ophthalmic surgery. This must traverse the anterior chamber, and whatever diminishes that cavity must increase the difficulty of its passage. Thus a small flat cornea, a projecting iris, or adhesions between these membranes, must impose difficulties proportionate to their unnatural deviation. An iris adhering to the capsule must be submitted to a violence, adequate to rupturing their connexion, ere the crystalline can pass the pupil. The vitreous humor, in a state of disorganization, can offer no resistance to the spasmodic action of the recti: the complete evacuation of the eye is, in this case, an almost unavoidable consequence. It appears, therefore, that a very considerable proportion of cases, cannot, with propriety, be treated by this method.

The grand recommendations of extraction are, that the opaque body is removed by a single operation, and that, by its positive abduction from the organ, the possibility of its regaining its original situation, (thereby again obstructing vision, or producing permanent injury by the

irritation which it excites,) is completely prevented. On the latter is founded its claim of superiority to depression. Whoever peruses works expressly written to advocate or defend this method, will find numerous assertions of its superior merit. It must, however, lose the credit of removing the numerous dangers and apprehensions therein adduced, which, on an impartial view, it is sufficiently apparent, are altogether suppositious and unfounded. In fact, the dangers of depression have been exaggerated to enhance the merit of extraction.

As those cases, to which extraction is inapplicable, are already pointed out, I shall merely consider the dangers, which, even under the most promising circumstances, may attend its performance.

The first, is a premature escape of the aqueous humor, in consequence of which the iris approaches the knife, which it immediately infolds. On the occurrence of this accident, we must resort to the frictions which are recommended by Wenzel, and have been already noticed in this chapter; yet notwithstanding

that this manipulation may prove highly serviceable, still its efficacy has no claim on our implicit confidence. This event may be produced, either by some spasmodic action of the ocular muscles, which, occasioning considerable pressure upon the organ, may force the aqueous fluid through the incision at the side of the cornea knife: or, in consequence of some irregularity in the wedge-like form of the knife: or lastly, from an unsteadiness in the hand of the operator occasioning it to deviate from a regularly progressive motion. The first cause is beyond the reach of art: but the second and third may commonly be removed by good instruments and habitual dexterity.

Spasmodic action of the muscles is the most formidable occurrence in the practice of extraction. It frequently happens, that as soon as the capsule is opened, the crystalline is projected from the eye with a degree of violence truly astonishing. When we reflect on the delicate structure of the iris, we must instantly perceive, what injurious consequences may ensue from such an abrupt transmission of the smallest crystalline: but when we compare

the pupilary aperture with a full sized cataract it is evident, that the mischief must indeed be serious. In these cases the iris is not only bruised, but frequently torn to a considerable extent. But spasm is not the only cause of this accident; a deficiency of size in the section of the cornea, subjects the iris to very undue pressure. It is therefore particularly necessary, that the directions for making the section be carefully followed: for if the surgeon, fearful of wounding the iris, has made the incision approach towards a transverse direction, he will expose that membrane to dangers, perhaps as imminent, as any which could result from a positive division of its fibres.

The expulsion of a larger or smaller quantity of vitreous humor, is another frequent consequence of convulsive exertion. Sometimes the eye is completely emptied, in which case vision is destroyed; but where the quantity is small, little danger is to be apprehended, excepting from the destruction of the iris, which membrane is similarly circumstanced as in the sudden expulsion of the crystalline. This accident may frequently be occasioned by the

undue pressure of the fingers or speculum. Indeed the slightest pressure upon the eye, from the commencement to the termination of the operation, is dangerous. Although this expulsion commonly occurs immediately after the removal of the lens, yet its liability continues, until the edges of the incision are completely united. The eye, therefore, should not be opened, until sufficient time has elapsed for the completion of this process, lest, by removing the support of the palpebra, we should induce that unfortunate occurrence. All violent exertions, as coughing or vomiting, should be controled as much as possible; and for this reason it is imprudent to perform extraction on such as are subject to hysteria or epilepsy.

When the iris, paralysed by the violence it may have sustained, loses its power of constraction, it frequently becomes entangled in the lips of the incision. When some of the vitreous humor has escaped from the hyaloid tunic and presses on the uvea, a similar effect may result from its partial protrusion. A little care will generally remedy this evil in a mechanical point of view; but where it is owing to paralysis,

inflammation, and subsequently closed pupil, are probable consequences.

In an organ composed of such delicate textures as the eye, the extensive injury inflicted by this operation, must, of itself, appear sufficiently formidable. In fact, when not attended by any unfavorable circumstance, destructive inflammation frequently ensues.

This must inevitably happen when the edges of the section do not unite. In those eyes which are liable to habitual inflammation, attended with pustules or ulcerations, we can scarcely expect that the uniting process will be favorably accomplished: for not only, are the vital powers deficient in energy in all cicatrizations; but the irritation to which the organ is subjected, can scarcely fail to excite its mobid irritability. The maladaptation of the divided edges, is another cause which retards or prevents their adhesion: on this point therefore it is necessary to be scrupulously attentive: as also, that they are not separated by the insinuation of the inferior palpebrum. To prevent the latter, the Baron de Wenzel recommends that the section should be made

obliquely, or even upward instead of downward; in the latter case the wound is completely covered by the superior palpebrum. This method possesses considerable advantage, and is executed by simply reversing the instrument.

It sometimes happens that, when the patient is advanced in life, no union is effected. Whatever may be the cause, the effects are equally destructive; for on the union of the lips of the incision, as it is observed by Sir James Earle, "depends not only the success of the operation, "but the very existence of the globe of the "eye itself."

In addition to these objections which are founded upon the accidents to which this operation is liable, there are others, by which it is necessarily attended.

The capsule, which remains, may, at some future period, become secondary membraneous cataract; and this is the more probable, since its laceration is accompanied by highly excited vascular action in its neighbourhood.

The untractable behaviour of children, and the involuntary motion of the eye, which unceasingly attends upon congenital cataract,

render its performance impracticable, unless some restraint is laid upon the organ. As such restraint is unavoidably attended by external pressure, it is extremely hazardous. The use of specula is now universally deprecated, but as it is absolutely required in the cases, which I have just mentioned, the more intelligent advocates of extraction defer their operation, until the age and judgment of the patient entitle him to their confidence. The vacillating motion of eyes congenitally affected, never ceases until some time has elapsed from the removal of the cataract; it is therefore useless to wait, since they are not calculated for extraction.

Many different cornea-knives have been recommended by different oculists. I believe they may be reduced to two: Wenzel's, the outline of which resembles the common lancet, and Beer's, which is a perfect wedge. The latter instrument is generally preferred.

To obviate the dangers and difficulties connected with this treatment, attempts have been made to vary the method of eduction.

Sir James Earle, who appears to have taken

the hint from Heister, proposed to extract the cataract, through the sclerotica, with an instrument consisting of a pair of forceps and concealed lancet. I am not aware that this operation has been practised by any other person, but rather suspect, that the profession immediately consigned it to oblivion. As a surgeon, ardent in his professional pursuits, he is, however, entitled to our respect.

Another mode has been lately instituted by Sir Wm. Adams, intended for those cataracts, which, by the firmness of their consistence, would resist the action of the absorbents. The pupil being dilated with Belladonna, his process is as follows: "the first part of the operation "should be conducted precisely as if the cata-"ract were of the soft kind, by introducing ". the two edged needle, through the sclerotica, "a line behind the iris, with its flat surface "parallel to that membrane. Its point is then "directed through the posterior chamber, on a "line with the transverse diameter of the opa-"que lens, when its edge should be turned "backwards, and a complete division of the

" capsule, and lens, should be attempted, in the
" manner which will be hereafter more particu-
" larly described. If, upon trial, the lens be
" found too hard to admit of an immediate
" division, the point of the needle should be
" withdrawn a little, and then carried something
" below the line of the transverse diameter of
" the cataract, when, upon making pressure
" with its flat surface against the latter body,
" it becomes dislocated, and the upper part
" tilts forwards, through the pupil, into the
" anterior chamber, after which, without any
" difficulty, it may be entirely carried through
" the pupil, and with its posterior part turned
" forwards. When this is effected, the ope-
" rator with the point of the needle, (taking
" care, however, not to wound the iris,) should
" lacerate or cut in pieces, the remaining
" part of the capsule, throughout the whole
" extent of the circumference of the dilated
" pupil, by which means secondary cataract
" is certainly avoided, unless an adventitious
" membrane be formed, in consequence of
" inflammation. Having accomplished this

" important part of the operation, the needle " is to be withdrawn, when the operator should " proceed to extract the opaque body."

" The patient should now be laid down on " a table, on his back, with the head somewhat " raised, which is a far preferable position to " his sitting in a chair, whereas the latter posi- " tion is the best for executing the primary " part of the operation, namely, the bringing " the opaque lens into the anterior chamber. " The operator then makes an opening in the " temporal margin of the cornea, with a lancet " or double edged extracting knife. The open- " ing is enlarged both upwards and downwards, " with a small curved knife, in shape and size " similar to the probe pointed-knife described " by Baron Wenzel, with the button removed, " until it is made sufficiently large to admit of " the free passage of the lens; through which " a small hook is introduced, with its flat sur- " face between the anterior part of the iris, and " the posterior part of the lens, which should " be carried to the centre of the pupil; the " curved point is then turned forwards, and " the cataract laid firm hold of, when it is

" extracted without any difficulty. By this " means, the cataract is extracted, without " any pressure being made upon the ball, and " through an opening much smaller than what " is required, in the usual operation of extrac- " tion. Should the cataract separate, while in " the act of extraction, which is sometimes " the case if it be brittle, the fragments may " be extracted separately, either with the hook " or a small scoop. I am not, however, very " solicitous to remove every fragment of the " cataract, for if some of them are so small as " to elude the hook or scoop, I allow them to " remain, as they are sure to sink to the bottom " of the anterior chamber, where they usually " dissolve before the opening in the cornea has " healed sufficiently, to admit of the eye being " used; and as the opening is made vertically, " at the outer margin of the cornea, they do " not interfere with its healing, as would be " the case were the section of the cornea made " in the usual manner."

" If, notwithstanding the application of Bel- " ladonna, the pupil appears too small, to admit " the passage of the cataract through it, the iris

" may be first enlarged with the iris scalpel, " and the cataract afterwards brought forward " by it into the anterior chamber."

The pretensions of this operation are such, as entitle it to our serious consideration. I believe we shall find them well founded. It is no slight recommendation, that its first stage has all the advantage of an examination, the result of which determines the surgeon in the prosecution of his measures. A contracted state of the anterior chamber, whether proceeding from a convex iris, or a small or flattened cornea, presents the most serious difficulties to extraction in its usual form. By the transposition of the cataract the objection is removed; the iris is placed in security, the crystalline forcing it backwards out of the way of the instrument. The same remark is applicable to a small or retracted eye; in these cases the section is frequently imperfect, but " in " the latter case our opening can be made, " without any difficulty, at the outer margin " of the cornea, with the point of the knife, " sufficiently large, to admit of the entire " extraction of the lens; and by directing the

" patient to turn the eye towards the nose, the " external part of the cornea, where the open- " ing should be made, is brought sufficiently " forward, beyond the level of the margin of " the orbit, to enable the operator fully to " accomplish his wishes."

The iris is not liable to the same violence from sudden expulsion of the crystalline, or of the vitreous humor; in fact it appears entirely to remove the dangerous effects of spasm. As the incision being vertical, the insinuation of the inferior palpebrum is impossible: by its action indeed the edges will rather be adjusted than disturbed. The lens being fairly placed before him, the operator will have a certain guide for the requisite extent of his incision. It is important, that the injury should not be more extensive than is necessary.

The objections, to this treatment, must now be shewn. Its performance is objectionable from its complexity. There is a puncture posteriorly, and an incision anteriorly; an upright position, and an horizontal position; a needle, two knives, a hook, scoop, and speculum. The eye must endure an operation of some length,

and the injury will, in the aggregate, prove considerable. However cautious and dexterous the operator, yet the iris must frequently suffer from injurious pressure betwixt the lens and cornea; and this, united to the forcible dilatation of the pupil, must frequently be attended with destructive consequences. Notwithstanding the countenance given to that measure by Daviel, Bart, and Wenzel, yet I am convinced, that the generality of English surgeons would shrink from dividing the uvea to procure the transmission of the crystalline. This membrane will likewise be much endangered by the destruction of the capsule, for as it is altogether, or in a great measure, concealed by the lens, the operator will use his needle under great disadvantages. The management of the hook in an irritable eye must be difficult: the iris concealed by the crystalline, and in contact with it, might very possibly be torn by the instrument. That membrane may likewise be gathered up, and dragged between the lens and the edges of the incision during the extraction: this accident would

inflict such injury, as must destroy a texture so delicate.

In one case only, can be recommended its performance: it is, where the large nucleus of a disorganized lenticular cataract remains, the vitreous humor being in a state of disorganization. In such a case there is little hope of procuring absorption: the nucleus is a dead isolated mass, and the absorbents of the capsule have proved inadequate to its removal: if placed in the anterior chamber, it may produce destructive inflammation; if depressed, it will immediately sink upon the retina, where it may induce amaurosis. The common mode of extraction will almost certainly prove unsuccessful. Here then the new method may be practised with advantage; but for many reasons the capsular part of the operation, should be postponed until another occasion. It would tend to prevent the lens from slipping back through the pupil, when it would immediately sink; it would greatly retard the escape of the vitreous humor; and the iris would be exposed to less risk of injury.

CHAP. VIII.

THE possibility of relieving cataractous patients through the agency of the absorbent system, has long been known: it is, however, of late years only, that it has formed the professed object of the oculist. The absorbent practice was occasionally referred to, when depression proved impracticable, even previously to the time of Pott, and his reliance on this process formed one motive, which determined his preference towards depression. The same principle has guided the practice of Hey, Callisen, Scarpa, and others, their first object being depression, from which method they never deviated, unless their efforts had proved ineffectual.

To that eminent surgeon, Mr. Saunders, we are indebted for the regular institution of this practice. It includes a variety of operations, one the adoption, and another the invention of the projector: and others, in which they have been considerably modified. Upon each of these operations I shall comment as I

proceed, and having presented the most important, I shall discuss the merits of the general practice.

The first, which was invented by Conradi is thus described in Mr. Saunders's posthumous work " he (the surgeon) penetrates the cornea " as near to its junction with the sclerotica as " it will admit the flat surface of the needle to " pass, in a direction parallel and close to the " iris, without injuring this membrane. When " the point of the needle has arrived at the cen- " tre of the dilated pupil, he does not boldly " plunge it through the capsule into the lens, " and perform any depressing motion; it is a " material object with him not to injure the " vitreous humor or its capsule; neither does " he lift the capsule of the lens on the point of " the needle, and by forcibly drawing it forward " into the anterior chamber, rend it through its " whole extent. Such an operation would dis- " locate the lens, deliver it into the anterior " chamber, or leave it projecting in the pupil, " and stretching the iris; and, although its soft " texture in the child should exempt him from " any disorganizing inflammation, the most

" favorable result will be a permanently dilated " iris, deforming the eye. He proceeds with a " gentle lateral motion, working with the point " and shoulders of the needle only on the sur- " face and centre of the capsule, in a circum- " ference which does not exceed the natural " size of the pupil. His object is permanently " to destroy this central portion of the capsule: " merely to pierce it would not answer his " intention, because the adhesive process will " speedily close the wound. Having acted " upon the centre of the anterior lamella of the " capsule to the extent which he wishes, he " gently sinks the needle into the body of the " lens and moderately opens its texture. In " doing this he may, if he pleases, incline the " edge of the needle, by which motion the " aqueous humor will escape, and the lens will " approach his instrument; but at the same time " his field for operating will be diminished by " the contraction of the pupil. The needle and " speculum are now to be withdrawn, the eye is " lightly covered, and the patient put to bed."

" Nature now performs her part of the cure, " and the lens loosened in its texture, and

" through the aperture in the capsule subjected " to the action of the aqueous humor is gra- " dually dissolved and absorbed."

" A single operation sometimes suffices, and " a cure is completed in the course of a few " weeks; but if the process does not advance " with sufficient rapidity, the operation may be " repeated once or oftener, interposing at least " a fortnight between each operation. If the " adhesive process has counteracted his former " operation on the capsule, he will take care " now to effect the permanent aperture in its " centre, and he may use greater liberty than at " first in opening the texture of the lens."

In this operation there is much to be admired: the extent of the injury is very limited, the needle penetrates insensible parts only, and no change is produced in their relative position. The principal object in the operation evidently is, to excite a natural process without producing alarming disturbance. This object is so desirable, that we ought anxiously to guard against its failure.

Such extensive laceration of the capsule, as is here recommended, will, I conceive,

frequently be followed by delivery or dislocation of the crystalline. It is surprising that this did not occur to Mr. Saunders, or to his editor: aware that a simple slit might occasion this misfortune, they might easily have perceived that so extensive a removal of the supporting membrane, might be attended with similar consequences. Perhaps the allusion to the closure of the wound by the adhesive process, was intended to justify this hazardous proceeding. The apprehension of union in the divided edges of the capsule, is altogether unfounded: the impression, which induced them to obviate such occurrence, is sufficiently evident. The solution of the lens in the aqueous humor was, in their opinion, a sine qua non; and the closing of the aperture would have superseded the possibility of such solution. Admitting the lens to be protected from the stimulus of that fluid, we have reason to believe, that the action of the lenticular absorbents would continue; since in examining old cataracts, produced by puncture, the lens is usually found either wholly removed, or reduced to an unconnected nucleus, although

a reparation of the capsule seemed to have been actually accomplished. It is, however, easy to avoid both the danger and the inconvenience of these effects. If we make an elliptical wound, sufficiently large to allow the needle to work freely, so as to penetrate the substance of the cataract deeply, no danger either of its closing, or of a prolapsus of the crystalline will occur. A further removal of the capsule may be effected by a subsequent operation, when the diminution of the lens renders its escape less important.

His second operation is performed in the following manner. "The needle is passed "into the eye at the distance of a line behind "the junction of the cornea with the sclero- "tica. If the surgeon chooses to exceed the "line, he is still more secure, for the nearer he "approaches the junction of the tunics, the "more liable he is to an accident, which will "for the time defeat his operation. As the "iris, is intimately connected with the corpus "ciliare, this ligament, if the instrument be "entangled in it, will be detached from the "sclerotica, to which tunic it has a very

" slender attachment, and the iris itself will " appear to be torn from its insertion, the blade " of the instrument being seen between it and " and the sclerotica. This accident is rather " frequent, but it is never followed by any " untoward result, if the instrument be imme- " diately withdrawn. As soon as the needle " has penetrated the tunics, he gently depresses " its handle so as to direct its point towards " the capsule through the thin edge of the lens, " and steadily projecting its flat surface between " the capsule and the lens, he arrives at the " centre of the capsule, which he opens, taking " the same precaution as in the anterior opera- " tion, not to rend it extensively, lest he should " dislocate the lens. He now cautiously opens " the texture of the lens, suffering the flocculi " to fall into the anterior chamber, but not " projecting into it any considerable portions " of the lens, for the process of its solution and " absorption is best accomplished in its natural " position."

This latter operation is, in every respect, inferior to the former. Instead of wounding the cornea, which is scarcely indued with sen-

sibilty, and slightly susceptible of excitement, the operator must penetrate the conjunctiva, sclerotica, and choroides, membranes of an highly vascular texture, and peculiarly liable to inflammatory action. The needle then pierces the edge of the crystalline, and finally penetrates the capsule. Now as Mr. Saunders's needle only cuts as far as the shoulders, and as its edges are exclusively employed in opening the membrane, it is evident, that the lens must rest on the blunt portion of the instrument by which it is transfixed. Thus at every movement, by which the surgeon works an aperture in the capsule, the cataract must accompany the needle; it will probably be dislocated, whilst from its vascular connexions separation is unavoidable. Even should the needle traverse the space occupied by the humor morgagni, without entangling the crystalline, yet its action on the surface of that body must frequently induce the same consequences; and the danger will be much increased, if the operator depresses the point into the lenticular substance.

These operations were intended for the len-

ticular cataracts of children, and as their chief dependence rests on the action of the lenticular absorbents, they are evidently adapted to those only, which retain their organization and vitality.

Perceiving that the progress of the operations would be exceedingly tardy in adult cases*, Mr. Saunders "first operated through "the posterior chamber with his larger needle, "with which he freely divided the capsule, and "cut up the lens in its seat, disregarding its "flocculi, or even small pieces which fell in "abundance into the anterior chamber, even up "to the margin of the pupil." "The end in "view was sooner obtained, but frequently "at the expence of dangerous inflammation." "This latter circumstance induced him to sacri- "fice expedition to security; and he latterly "treated these cases by his posterior opera- "tion." This determination surprises me,† for

* "In the adult, if the texture of the lens is nearly uniform "and permeable, the cure is completed in a space of from "three to five months; but if the texture is firmer, and the "nucleus large, the cure cannot be accomplished in less than "seven months."—*Saunders on Cataract.*

† On re-perusing Mr. Saunders's work since the above was written, I find that, "he finally attempted to diminish "inflammation by performing his anterior instead of his pos- "terior operation."

the reasons already stated when the merits of the anterior and the posterior treatment were compared.

Although absorption proceeds with considerable activity immediately after the operation, yet, having arrived at a certain extent, it gradually declines. This may be attributed to the recovery of the lens from the first effects of the injury it received, and to its becoming accustomed to the stimulus of the aqueous fluid. The consequence however is, that repetitions of the operation become occasionally necessary, and in adults, where the process is slower, the number may sometimes amount to six or seven.

The safety of these operations, especially of the anterior, deserves our confidence, and compensates for the delay of their repetition. The state of the organ in the most successful cases is a more important consideration. We find, that the aperture in the capsule is too small; for although it may equal the size of the pupil, at its medium of dilatation, yet, under certain circumstances, it must not only narrow the field of vision, but produce an unpleasing deformity. It is unnecessary to dwell upon

this point, for it must immediately strike those, who inspect the plates by which Mr. Saunders's work is accompanied.

The conclusion to be drawn from these considerations is this; that notwithstanding the soundness and beauty of the principles, by which these operations are directed, yet they do not fully accomplish our wishes, and would become more valuable if judiciously modified.

Desirous of relieving his patients with greater facility, than could be accomplished by the methods, which were last considered, Sir Wm. Adams has proposed a variety of operations on the absorbent principle. His new method of extracting cataract, has been already noticed; but he uses it in those cases only which were specified. He subsequently states, "the leading principle of my practice, is, that "the operation of effecting the solution, and "absorption of lenticular cataract, should be "performed in all ages, and in every combina-"tion, of that species of disease, in preference "to all other operations, when it can be done "with safety."

The pupil being dilated with Belladonna, and the patient properly situated, he proceeds thus: "having secured the eye by a gen-
"tle pressure with the concave speculum,
"introduced under the upper eyelid, I enter
"the two-edged needle through the sclerotic
"coat, about a line behind the iris, with the
"flat surface parallel to that membrane. I
"then carry it cautiously through the posterior
"chamber, without in the slightest degree in-
"terfering with the cataract or its capsule, till
"the point reaches the temporal margin of the
"pupil; when I direct it into the anterior
"chamber, and carry it on to the nasal margin
"of the pupil, in the line of the transverse
"diameter of the crystalline lens. I then turn
"the edge backwards, and with one stroke of
"the instrument cut both capsule and cataract
"in halves. By repeated cuts in different di-
"rections I afterwards divide the opaque lens
"and its capsule in many pieces, and at the
"same time take particular care to detach as
"much of the latter as possible from its ciliary
"connexion. As soon as this is accomplished
"I turn the instrument in the same direction

" as when it entered the eye, and with its flat " surface bring forward as many of the frag- " ments as is in my power, into the anterior " chamber, by which I frequently leave the " upper part of my pupil perfectly free of " opacity.

" In all cases when the fragments of the " opaque crystalline are placed in the anterior " chamber, their solution and absorption are " much more rapid, and less irritation is pro- " duced than when they are suffered to remain " behind the iris.

" When the anterior chamber is large, I now " generally push the whole of the divided ca- " taract through the pupil at the first operation, " in which situation it becomes dissolved in " about a month or five weeks; and an exten- " sive experience has convinced me that this " practice will be always attended with suc- " cess when the cataract admits of its nucleus " being cut in pieces."

This method is best adapted to the organized lenticular species of cataract. That alone affords sufficient resistance to enable the needle to divide its nucleus. The caseous

variety would undoubtedly admit of division; but it frequently contains a hard nucleus, and is invariably accompanied by diseased capsule. In the division the nucleus will probably elude the edge of the needle; imbedded in a soft substance, it does not offer an adequate resistance, and would usually be thrust aside. Thus then, although the cataract may be repeatedly intersected by the instrument, yet on bringing it forward into the anterior chamber, that cavity will be distended not by the caseous matter only, but by a hard nucleus, and by portions of capsule, so unnaturally thickened by disease, as effectually to resist absorption. That irritation may frequently supervene, when the absorbents prove inadequate to their task, will be readily admitted. Neither can a solid nucleus be deprived of its irritating properties by simple division.

The cure will be much accelerated, by transferring the fragments from the posterior to the anterior chamber: the time will, on an average, be diminished in the ratio of three to one. This, undoubtedly, is an object of importance; but repeated observation assures me, that when

the transposition is performed to the extent recommended, viz: filling the anterior chamber, it is frequently succeeded by destructive inflammation. This, I assert without hesitation, for I have seen it occur in the most favorable cases, where the softness of the whole lens has allowed its freest division. Simple distention may be followed by mischievous consequences.

But time is not the only object of this method; it is intended to render a repetition unnecessary. A single operation may occasionally succeed, but commonly a second is required for the removal of floating portions of capsule. Much reliance unquestionably may be placed on the dexterity of the operator; but although remarkable, it will not succeed invariably.

We should keep in view the principles by which this operation is regulated, as they may prove of essential service; recollecting, however, that, when they are applied in the manner above recommended, security must be resigned for expedition.

The practice of Mr. Saunders in cutting up

the lens, and leaving it in the posterior chamber, was rendered hazardous by the irregular pressure of its fragments upon the uvea. The practice of Sir Wm. Adams is unadvisable, from a distention of that membrane in an opposite direction. In their comments upon absorption, they have advanced assertions so contradictory, as to require explanation. Mr. Saunders, describing his posterior operation, says, "the process of solution and absorption "is best accomplished in its natural position;" whilst Sir Wm. Adams states, "that when the "fragments are placed in the anterior chamber, "their solution and absorption are much more "rapid, and less irritation is produced."

Both are correct: Mr. Saunders merely wounded the lens in situ, and its natural connexions being undisturbed, its own absorbents occasioned its destruction. Less irritation, no doubt, was experienced, than if he had crowded the anterior chamber with unconnected fragments. But in the operation of Sir W. Adams, the structure of the lens is at once destroyed, and its fragments reciprocally act, and are acted on as foreign bodies. These, therefore, will

excite the least irritation, where they produce the least pressure, and where their continuance rendered shortest by the activity of the absorbents. Besides pressure is more injurious on the posterior, than on the anterior surface of the iris.*

We have seen that Mr. Saunders's treatment is safer, but that Sir Wm. Adams's is more expeditious and more effectual. To combine these important qualities should be our next endeavour. The latter method is hazardous from displacing such substances as by their hardness or quantity may excite irritation: if the quantity could be first diminished, and the harder portions removed, then every objection would be avoided.

By a treatment proposed by Mr. Travers,

* This circumstance is curious, it may be thus explained: whenever the muscles of the eye act, they compress it, the humors at the same time tending forward through the pupil. Now if the solid portions are in front, then the iris will be relieved from their pressure whenever the muscles act, for the aqueous fluid, passing through the pupil, will, by distending the cornea, increase the size of the anterior chamber, and consequently float the contained fragments. But if they are behind the iris, not only will the current force them against that membrane, but by obstructing its course they will be carried before it, thus continually distending the iris, and violently dilating the pupil.—See the Appendix on focal adjustment.

these desirable objects are attained. As the preparatory operation, he recommends that of Conradi; " in performing this operation for the " soft cataract, the operator may pass his needle " through the cornea or the sclerotic. The " former mode commands the advantage of " giving no pain, exciting but slight inflamma- " tion, and ensures the laceration of the trans- " parent capsule." He subsequently adds; " when a cataract of firm consistence has un- " dergone a partial absorption from one or more " operations with the needle, and still does not " readily separate into fragments, the introduc- " tion of the needle, posterior to the iris, gives " the surgeon the advantage of couching it. " This I have often done to the great satisfaction " of the patient, who escapes, owing to the " diminished bulk of the lens, the inflamma- " tion which occasionally follows the primary " operation of couching."

This treatment may be applied to the caseous variety, but as our principal dependence must be placed on the lenticular absorbents, I shall consider it as appropriated to the organized lenticular cataract.

Mr. Travers does not carry this practice to its most beneficial extent. He resorts to its latter stage, only when the lens is not broken into fragments by the operation of Conradi. This is not sufficient; it should not only accelerate the cure, but accomplish that destruction of the capsule, which is so imperfectly performed by the method of Mr. Saunders.

To attain its full advantage, the anterior operation should be performed. If the lenticular absorbents remove not a sufficient quantity, and appear to diminish in activity, it may be repeated at the end of a fortnight. A second repetition will seldom, if ever, be required. In about a month the cataract will be prepared for the posterior operation, which should be performed by dividing and comminuting both lens and capsule, as directed by Sir Wm. Adams. Some of the fragments may be projected into the anterior chamber, the remainder should be removed from the axis of vision, as much as is practicable. In a fortnight the fragments will be completely absorbed,

so that the total period will seldom occupy more than six weeks.

I have quoted Mr. Travers, since he is the only author, with whom I am acquainted, who has published directions of this tendency. He however, has drawn a sketch only, which has since been completed. I am not aware when it was first practised, but it was performed, with almost unvarying success, at the Exeter Eye Infirmary by Mr. Barnes, as early as 1813. I am happy, that this introduction of his name allows me publicly to acknowledge my obligations to my first instructor in ophthalmic surgery.

Of the various methods, which constitute the absorbent practice, this last, undoubtedly, demands the preference. Superior in safety, none are more complete, none more expeditious.

Perhaps my predilection may be ascribed to early prejudice. It is not my desire, that the reader should accede to a mere assertion: let him weigh the merits of this treatment impartially, and I shall be justified in anticipating his acquiescence.

The preparatory operation is seldom accompanied by a blush of inflammation. This is not surprising when we consider the delicacy of the instrument, the insusceptibility of the parts, and the small extent of the injury. The division of the cornea does not exceed the thirteenth part of an inch in extent, and the wound of the capsule need scarcely be twice that dimension. Through this narrow aperture the needle acts upon the crystalline, and its nucleus is gradually reduced to the most delicate flocculi by repeated gentle touches. These minute portions, falling through the pupil into the anterior chamber, can scarcely excite irritation either by their bulk or solidity, whilst they offer but a trivial resistance to the absorbent system. The remainder of the lens is immediately acted on by its own absorbents, and if the operation has been pushed to a sufficient extent, it is probable, that the more solid part will be completely removed before the process of absorption declines. When this is not the case, the operation may be repeated. The nucleus of the lens, the great source of inflammation, and the grand obstacle to absorption

is thus removed without pain, and without danger. The capsule, and external layers of the crystalline may then be removed as completely, as could be effected by the boldest, or most hazardous operation.

Other operations might be described, but those already cited are the most important. The whole practice is highly valuable for its gentleness; for its complete removal of the opaque lens, and of the capsule which might subsequently become opaque; for its facility of performance; and lastly, for its happy application in early infancy.

In opposition to these advantages, it must be confessed, that a repetition is usually required. This circumstance is peculiarly obnoxious to the feelings of some surgeons, but if the countenance of a most respectable authority will afford them satisfaction, the perusal of the following passages, from Mr. Hey's treatise, may not be unserviceable.

"Surgeons, who undertake the operation of "couching, should not be induced by their "desire of completing the cure at one ope-"ration, to use long continued efforts to

"depress or break down a cataract. By such "efforts there is great danger of injuring the "eye. It has been too much considered as a "matter of disgrace to the operator, if sight has "not been immediately restored to the patient. "The fear of this disgrace has probably con- "signed many an unhappy sufferer to irreme- "diable blindness. A cautious procedure "though more slow in its progress, more surely "arrives at the desired end.

"One principal thing to be kept in view "by the operator is, to do no harm. If he "secures this he will almost certainly do some "good, and often much more good than he "expects."

CHAP. IX.

IN considering the treatment of disorganized lenticular cataract, two circumstances particularly demand attention: the opaque capsule, by which that species is invariably accompanied; and its consistence, which is frequently

devoid of solidity. By the one, extraction is rendered hazardous; from the other, depression becomes impracticable. The causes of these difficulties were explained, when those operations were considered.

Measures are, however, recommended by various writers for the removal of these inconveniencies. To a certain extent they are well adapted to that purpose; and was there no preferable method of removing the disease, any hesitation to adopt them would be unjustifiable. But with the utmost assistance of art and dexterity, extraction and depression must, in these cases, be attended with difficulty and danger: and since there are methods less dangerous, more practicable, and equally efficacious, the ablest operator, who undertakes these operations, makes but a wanton demand upon his dexterity.

It is then to the absorbent system, that the removal of the opaque body must be confided: but before we proceed, we must reflect on the altered condition of the crystalline. Its vitality has ceased, its structure is destroyed; we must regard it as a foreign body, insusceptible of

stimulus, and incapable of action. It is useless then to abandon it to its own destructive processes; its substance must be submitted to the neighbouring textures. As this species consists of three varieties, it is necessary to treat of each separately: and first of the caseous variety.

The operation of Sir Wm. Adams, in which he cuts up both lens and capsule, would appear peculiarly appropriate, since it places the fragments in contact with absorbing surfaces, whilst the soft consistence diminishes the liability to inflammation. Hence it is better adapted to these cataracts, than to such as preserve their structure and vitality. Still it is not altogether unobjectionable; the opaque matter may exist in such a quantity, as may distend the iris, and excite irritation. A nucleus, varying in size and firmness, is frequently concealed in the caseous substance, and may produce most serious consequences. To this it may be added, that in addition to opacity, the capsule frequently becomes unnaturally thickened: the membrane, thus altered, may not only resist absorption, but act as an irritant. If

this operation is performed, the caseous matter only should be introduced into the anterior chamber: the capsule, especially its larger portions, and the nucleus, when its existence is ascertainable, should be depressed to the inferior part of the organ. Then the obstruction to vision is removed, whilst the dangers, ensuing upon irritation of the uvea, are much diminished.

But where a repetition of the operation is immaterial, a more cautious practice is advisable. The operation of Conradi, may under these circumstances, be practised with advantage. The anterior surface of the capsule being lacerated to a small extent, a considerable quantity of caseous matter may be transferred to the anterior chamber, by movements of the instrument. The gentle pressure, made by the vitreous humor upon the crystalline, will gradually protrude the remainder through the pupilary aperture. Its portions will thus be successively presented to the action of the absorbents.

If the capsule is not opened too extensively, the expulsion of a nucleus is scarcely

possible. Indeed, independently of its dimensions, the gravity of that body would produce its subsidence below the edge of a well formed aperture; so that, however diminutive the remnant of the crystalline may be, yet this alone would render its escape improbable.

The case is thus reduced to a capsular cataract, and the cure must be completed by a subsequent operation. This will presently be described, when that species comes under consideration.

The milky variety may have its contents evacuated by the operation of Conradi. A simple puncture is sufficient, as the fluid immediately escapes, and readily mingles with the aqueous humor. It is then reduced to the capsular species.

We are advised by some to complete the cure of the milky variety by a single operation: it is easily accomplished, by introducing the needle posteriorly to the iris, but, for several reasons, a slower process is preferable. Notwithstanding their fluidity, yet the milky contents occasionally stimulate the neighbouring structures, and induce inflammatory action.

The puncture of more susceptible membranes, conjoined with extensive laceration of the capsule, are aggravating circumstances. The parts are so obscured by the milky effusion, that the iris might be seriously injured by an inexperienced operator. Lastly, the same reasoning which applied to the capsule and nucleus of the caseous, is equally applicable to those of the milky variety.

The fluid cataract may be treated as the capsular; its contents appear to be of a less stimulating quality than those of the milky variety, their opacity is so trivial as scarcely to obscure the iris, and I have never seen it combined with a nucleus.

CHAP. X.

CAPSULAR cataracts must be differently treated, according to the degree of alteration, which the capsules have undergone. In some cases the texture appears unchanged, although

the pellucidness is destroyed: in others we meet with such partial thickening, as has suggested the idea of calcareous deposition. They may be thus classed :---those, which can be submitted to absorbing surfaces ;---those, which admit of division, and subsequently of retraction ;---those, the division of which is impracticable.

The first are such as are usually denominated secondary membranous cataracts, the capsules of the fluid cataract, and sometimes those of the milky variety. The second very commonly belong to caseous and milky cataracts. The last, most frequently occur in the capsular species.

This peculiar thickening in the latter species is not surprising for idiopathic capsular cataract is only the concluding stage of the disorganised lenticular varieties. The absorbents sometimes entirely remove the crystalline, but more commonly their operation is resisted by the firmer portion of the nucleus.

It is, however, almost impossible, precisely to estimate the firmness of a capsule: the question must frequently be decided during

the operation. Should the membrane appear remarkably opaque; should the spots be peculiarly dense; and so elevated, as, when viewed obliquely, to give the cataract an embossed appearance, we may conclude, that it will offer considerable resistance.

The needle must always be introduced through the sclerotica in cases of capsular cataract.

The first division may be treated in the following manner, as recommended by Sir Wm. Adams. "The instrument I employ in these "cases, is a needle with a very slight degree of "curvature at its point; with which I rupture "the capsule very freely, when it will admit of "it, until the pupil is perfectly clear throughout "its whole extent."

Scarpa is more minute in his description of his method of removing secondary membranous cataract. "The surgeon having turned the "point of the curved needle towards the pupil, "should perforate the membranous cataract "from behind forwards; or, if its borders leave "an interval between them, sufficient to admit "the convexity of the instrument, he should

" pass the hook through the opening; then " turning the point of it backwards, he should " conduct it horizontally between the iris and " the membranous cataract, as near as possible " to its attachment with the zona ciliaris, and " pressing the point of the hook into it, and " into each border of it in succession, some- " times rotating the instrument between the " fingers, as if to twist the portion of capsule " round the point of it, he should lacerate it as " much as possible in every part of its circum- " ference, so as to clear the whole ambit of the " the pupil; and having collected all the pelli- " cles or flocculi together, should push them " with the point of the needle through the " pupil into the anterior chamber of the aqueous " humor."

In the second series of cases this free laceration is neither practicable, nor advisable. Several lacerations should be made from the centre to the ciliary processes, in the manner which Scarpa has directed, but the twisting should be omitted, for it is not desirable that any portion should be detached. The floating edges will soon retract behind the iris, leaving

the pupil free from obstruction. Mr. Stephenson's needle, which cuts on its concave edge, seems peculiarly adapted to this operation.

The third series is not very common; but I have seen capsules so tough, that they could not be penetrated by the needle. In these cases the following operation, described by Sir Wm. Adams, will generally be attended with a successful result. "When the capsule "is so much thickened, that laceration cannot "be effected, I proceed to detach it completely "from the ciliary processes, except at one "point: it should then be repeatedly pressed "with the point of the needle, until the capsule "can no longer be seen within the area of the "pupil. This point of attachment seems to "prevent the capsule from floating in the "axis of vision, an evil which I have fre-"quently seen, when the capsule was wholly "detached. This point of attachment may be "chosen either in that part of the ciliary circle "situated below the margin of the pupil, or "externally towards the outer angle of the "eye; in either case, the capsule, being thus "extensively separated from its natural con-

" nexions, becomes softened in the vitreous " humor, where it gradually contracts into so " small a compass, as in no respect to impede " the passage of light to the bottom of the " eye; while, from the small attachment to " the ciliary processes, it cannot again move " from its situation, even should it not ulti- " mately become absorbed." He might have added, that the membrane is thus prevented from intruding upon the anterior chamber, and there producing disturbance by its mechanical excitement.

I particularly remember a case of this description, where the texture of the membrane was so changed, that although containing a small flake only of nucleus, it was reclined backward without folding. An adhesion was left at the inferior margin. The event was completely successful.

Delpech, and other continental surgeons, conceive, that earthy matter is deposited on these capsules. Under this impression, they positively recommend extraction. This is more hazardous, and indeed in every respect inferior to Sir Wm. Adams's treatment.

The above-mentioned operations unite safety with expedition, to a greater extent than any others, with which I am acquainted. Excepting Mr. Saunders's, none can vie with them for the former quality; but in his, several repetitions are sometimes required. This at once decides the superiority of the methods which are here recommended, for by them any capsular cataract may be cured at a single operation.

The various operations required for the different species of cataracts, whether simple, or complicated with malformations or diseases, are now described. Their peculiar merits, with other circumstances connected with this subject, will be considered in another chapter. The present will be concluded with the following general observations.

Whatever may be the state of the organ, or whatever the treatment proposed, considerable advantage will result from the previous application of Belladonna. It will not only detect adhesions, which otherwise might pass undiscovered; but enlarge the field, in which the instrument must act. Do we perform

extraction; the iris is retracted from the edge of the knife. If depression; the dilated pupil allows a more accurate inspection of the movements of the needle. If Conradi's operation; a larger surface is presented to the instrument.

This application may be repeated with advantage a few hours after operations, in which the lens is wounded, but not displaced. Should internal inflammation follow, the adhesions will be formed whilst the pupil is dilated: this advantage is obvious. When support is required, (as after extraction,) this dilatation would be injurious. The same remark applies, where the cataract is simply depressed. If the iris is dilated, the substance displaced may be protruded into the anterior chamber. This accident, though less dangerous in itself than pressure a posteriori, yet requires a more serious operation for its remedy. In the latter, the opaque body must be extracted through an incision of the cornea; in the former, the repeating of the depression is sufficient.

During an operation, the position of a patient, deserves attention. His usual situation is in a chair, opposite to the surgeon, whose seat is more elevated. The assistant stands behind, and supports the patient's head upon his breast.

An horizontal position is to be preferred. The patient should be laid on a table, his head supported by pillows. In this posture he is much steadier, than in that commonly recommended. Sitting, the patient may disturb the assistant by a sudden start, all will be disconcerted, and considerable inconvenience may arise. The firm resistance of the table will effectually prevent this accident. The assistant will have a better view of the eye, and his co-operation will be more effectual. The operator will see the superficial parts of the organ as well, and the more deeply seated parts better. In extraction, the danger of sudden evacuation will be much diminished. This is observed by Sir Wm. Adams, and is adduced in favor of his method: it is equally applicable to the common operation. Perhaps

its greatest recommendation is, that, by changing his situation, the surgeon can use his right hand on either eye. To those who seldom operate, this is a very important advantage. It is prudent to recollect, that however admirable the experienced oculist may be, in feats of dexterity, yet to his earlier attempts many eyes must have been sacrificed.

During twenty-four hours after an operation, the regimen should be strictly antiphlogistic. Should no inflammatory symptoms supervene, we may gradually relax; but, even in the mildest operations, the patient should not return to his accustomed habits before the fourth or fifth day. In the severer operations, the space of ten days, or a fortnight, may be required, even in the most favorable cases.

The patient should be placed in a bed considerably elevated at its head. The room should be darkened, but not heated. These measures should be continued for a longer or shorter period, according to the severity of the operation. A shade may frequently be substi-

tuted on the third day, in cases of a milder description.

There are two inflammatory attacks. The first is the common phlegmonous inflammation accompanied by the usual symptoms of redness, pain, and intolerance of light. To obviate the consequences, bleeding, generally or topically, must be practised with a vigour proportioned to the violence of the attack. Saline purgatives are also required.

The second attack, to which these cases are liable, appears to depend on the peculiarities of the parts. The iris receives its supply of nerves from the visceral, or great sympathetic system. The stomach, and other digestive organs sympathize with the iris, and frequently undergo considerable disturbance, when that membrane has suffered violence. These re-act upon the vessels of the head, and a painful determination of blood is the consequence. These are the symptoms. Within a few hours after the operation, the patient feels considerable nausea: this sometimes proceeds to vomiting, which may afford relief;

but as the spasmodic exertion is highly dangerous, it should, if possible, be prevented. On inspecting the eye, it exhibits a slightly yellowish tinge, but is totally devoid of unnatural vascularity. A short period, perhaps an hour, having elapsed, the patient begins to complain of head-ache, accompanied with a dull, but severe pain over the eye-brow: the action of the temporal artery is evidently increased. A short space must still elapse, before the conjunctiva betrays any remarkable vascularity; and when that appearance is assumed, it differs from the blush of active inflammation. These cases, if unchecked, would terminate in closed pupil.

The first object must be, to evacuate the bowels by some active purgative. This will usually be found sufficient, but should it fail to afford decisive relief, it must be assisted by general bleeding. The Baron de Wenzel, proposes the exhibition of opium. If it succeeds in allaying irritability it is well; but where determination to the head results from visceral disorder, it must be considered a doubtful remedy.

The distinction of these inflammations is important: in the first, the pain supervenes upon increased vascularity: in the second, the pain precedes the local inflammation.

CHAP. XI.

THE relative merits of the different operations have been stated in the preceding chapters. A further comparison may yet be acceptable. By considering the operations abstractedly, we may arrive at unjust conclusions. We may examine a particular method, we may find much to admire, and little to excite disapprobation, yet it may be necessary to balance the difficulty of the execution with the skill of the operator. With this view the operation by the knife, may be compared with those performed with needles.

This comparison is particularly required, since unfair impressions have arisen from the vivid descriptions, and unqualified recommen-

dations of controversial writers. Such is the case with extraction: its advocates in general, and particularly the Baron de Wenzel, present the brilliant prospect of restoring sight to the blind in a few seconds, concealing the difficulties of its performance. Extraction, when confined to surgeons adequate to its performance, is less objectionable; but an operation of such extreme nicety should be attempted by those only, who are possessed, in an eminent degree, both of natural and acquired dexterity.

This opinion is supported by many surgeons of distinction. Sharpe says: "to be candid, I "perceive that the difficulty of the operation, "is too great to be universally practised."--- Callisen: "depressio haud adeo difficilis est "quam extractio, quæ consummatam dexteri- "tatem, vix a multis chirurgis expectandam "poscit, si nitide et omnimode ad regulas artis "constituetur." Sir James Earle, speaking of extraction, says: "this is an operation very "difficult to be accomplished, and cannot be "well done without great dexterity and prac- "tice, it is therefore principally confined to a

" few operators, which alone is a great incon-
" venience to those, who, residing at a distance,
" require such relief." Dr. Farre observes, that, " surgeons who can extract well, are " entitled to make this election: but it is too " well known how very limited the success of " extraction in general practice has proved." More might be adduced, but these authorities are sufficient. Fortunate will it prove for the inexperienced oculist, if he considers them seriously. Let him constantly remember, that although extraction is an expeditious remedy, and in many cases well adapted to the disease, yet, from its difficulty, it is ill adapted to general practice. On this account, it should be restricted to those, who enjoy peculiar advantages of practice.

From these objections the needle is exempt: the operations, in which it is used, are more easy of execution: serious consequences from the awkwardness of the operator, cannot so frequently arise, as in extraction. No surgeon is justified in attempting to extract cataract, unless he is perfect master of the simpler operation.

When treating on extraction it was stated, that owing to an involuntary motion, which became more obstinate by habit, it was not adapted to congenital cases. The untractable behaviour of children is a more common, and an equally powerful objection. These two circumstances would demand such restraint upon the organ, as would be attended with imminent hazard. The advocates for extraction recommend our waiting, until the child arrives at years of discretion: the delay deserves our censure. The steadiness of a patient during an operation, cannot be relied on if he is under the age of fourteen or fifteen: frequently much later. To leave patients blind and uneducated so many years, whilst in possession of remedies applicable to infants, betrays unpardonable obstinacy. Especially since the capsule is usually diseased, and the cases eventually prove unfit for extraction. Independently of this, another objection presents itself; the powers of the eye diminish, and relief may come too late.

In confirmation of these observations the testimony of two gentlemen may be introduced, whose extensive acquaintance with

the congenital disease entitles their opinions to our confidence. Sir William Adams observes, that "not only a number of years "are lost to the patient who is thus suf- "fered to remain in a state of blindness, but "when the child is born with cataracts, and "they are not early removed, the very worst "consequences would result from the long "delay; the rolling motion of the eyes be- "comes so confirmed, and the retina so insen- "sible from inaction, and the patient thereby "acquires such a great degree of indolence in "the employment of his eyes, that it frequently "happens the most successful operation, when "performed under these circumstances, contri- "butes but little to the blessing which he had "hoped to obtain." Dr. Farre has the following remark: "the retina, by a law common to all "the structures of an animal body, for want of "being exercised fades in power. Its sensibi- "lity, in many of the cases cured at the ages "of four years and under could not be surpassed "in children who had vision from their birth: "but at eight years and even earlier, the sense "was evidently less active: at twelve, it was

" evidently more dull: and from the age of " fifteen and upwards, it was generally very " imperfect, and sometimes the mere perception " of light remained."

The operations for depression and absorption are equally simple; it might be difficult to instance one, as easier on performance than another. Neither can any distinction be made in respect to the age and constitutional peculiarities of the patient: the faults or advantages of either method are inherent.

The various operations, divested of the influence of extraneous circumstances may now be considered. An operation should, in the first place, be decidedly efficient with respect to the disease. Now supposing we have to treat that species of cataract (the organized lenticular) which is equally adapted to either branch of treatment, let us examine the respective merits in this particular. The object is to obtain a permanent removal of the opaque lens from the axis of vision. By depression we obtain the removal, but we cannot answer for its permanency. We need not insist upon its

return to the axis of vision, with the serious consequences which may follow; for, with the exception of Scarpa, none of its advocates deny the possibility of its occurrence. The gradual diminution of the depressed crystalline has, however, afforded a favorable argument to some of its ablest supporters. At the same time they candidly own, that a considerable period must elapse, ere a total removal can be accomplished. It is unnecessary to point out the mischief, which may accrue to the patient before this desirable process is completed.--- Formerly this practice was liable to another objection, the capsule retained its original situation; this however has been avoided by modern practice.

But in extraction the capsule is not removed, it is a measure, which is decidedly inconsistent with the patient's safety. By this method then, the patient remains exposed to a recurrence of the disease. Secondary membranous cataract is probable, although the injurious pressure of the lens, and the possibility of its return to the visual axis are removed.

From these dangers the absorbent practice is exempt; by it, both the crystalline and its capsule are obliterated.

Having dwelt on the greater danger of extraction, and even of depression, as compared with the absorbent practice, it is needless to recapitulate.

The length of time occupied by the cure, and the repetition of the operations, are the strongest objections, to which the latter treatment is liable. To this it may be answered, that although the time undoubtedly is prolonged, yet the aggregate of confinement in the several operations will seldom equal that, which is required for extraction or depression: and that these latter operations are incomplete, whilst a radical cure is effected by absorption.

Finally, I give the preference to the absorbent, over the other great branches of practice, for the following reasons:---From the facility of its performance it is adapted to general practice, which extraction is not. It is applicable to children, or to nervous, timid, or hysterical adults, which extraction is not. It completely removes all parts liable to opacity:

this does not happen in depression or extraction, for a capsule remains after the one, and a crystalline after the other. Lastly, the injury inflicted on the eye is less in the absorbent than in the other practices, which is of consequence in every case, but especially where habitual irritability exposes the organ to frequent ophthalmia.

AN APPENDIX;

WITH REMARKS AS TO THE AGENTS BY WHICH THE FOCUS OF THE EYE IS ADJUSTED TO VARYING DISTANCES.

AN attendance during five years at an extensive ophthalmic institution at Exeter, had familiarised me with the phenomena of diseases of the eye. I became aware of the presbyopic state of vision, which follows a removal of the crystalline. Experience had shewn, that in the generality of these cases, the eye, with the assistance of a convex glass, was enabled to discern objects distinctly at a given distance; but when the object receded from, or approximated to the organ, much of its power of accommodation was destroyed; consequently, another lens of longer or shorter focus became necessary, when the alteration of distance was considerable. Thus a lens, which enabled the patient to walk comfortably, and to distinguish

and avoid large objects, was useless in reading when the application of a glass of shorter focal distance was required. I was aware, that in children the power of adjustment was much superior, that generally they required the assistance of one glass only, and that some could read without any lens whatever. These circumstances are mentioned to assure the reader that they were observed merely as facts.

Previously to residing in London to complete my professional education, I was acquainted with the descriptions of the eye, which occur in the works of Winslow, Sœmoring, and other anatomical writers. The investigation of the textures of this organ, had not been the motive of my occasional dissections. My information as to its physiology and anatomy, were equal. The adjustment of the eye to varying distances, I understood, was occasioned by the action of the recti muscles, an explanation which appeared plausible.

At the first anatomical demonstration which I attended, the crystalline was stated to be an homogeneous and unorganized mass. Since this account appeared to degrade it to the rank

secretions, and to deny it vital actions, I could not concede my unqualified belief.

On another occasion I was informed, that on drying the crystalline cracked at several points, and that, in this state, it exhibited a lamellated appearance. With these circumstances I was already acquainted: but in the same lecture I heard, for the first time, that Mr. Hunter thought he had detected muscular fibres attached to tendons, by the action of which, he proposed to account for the variation of the ocular focus. The subject was dismissed in a hasty manner, so that I did not learn, whether Mr. Hunter intended the ciliary processes by the muscles and tendons, or not; this however was the impression left upon my mind. The whole was described as a dreaming aberration of that mighty genius. This opinion the more readily influenced me from my knowledge that the lecturer had been the warmest advocate and elucidator of Mr. Hunter's opinions.

Engaged with a friend in the dissection of eyes, he carelessly took one of the crystallines on the point of a probe, and exposed it to the

flame of a candle, until the exterior was completely charred. He then withdrew the probe, when delicate white fibres, protruding through the perforation, attracted our attention. As the appearance was new to us, we broke up the lens, which we found to be composed of similar fibres. The same treatment of the remaining crystallines produced precisely the same effect. It immediately occurred to me that these must be the muscles and tendons to which Mr. Hunter had alluded; on inquiry, my supposition proved correct.

Not recollecting any such opinion in Mr. Hunter's works, I concluded that it had been expressed orally, but not otherwise published: my engagements at that period, precluded me from pursuing the enquiry. The discovery however, convinced me of the organization of the crystalline.

In the ensuing summer, the composition of two papers on cataract, intended for a medical society, occupied my attention. I then found, that an acknowledgement of the organization of the crystalline enabled me to explain many phenomena, hitherto inexplicable, attending

the progress and cure of that disease. The fibres of the lens were described as radiating from the centre of its anterior and posterior surfaces. This was sufficient for my purpose. I mentioned Mr. Hunter's opinion as now corroborated; and adduced the diminution in the power of adjustment, when the eye was deprived of its crystalline, as a further proof. At the same time some other agency, more active in early than in advanced life, was recognised. This power was ascribed to the recti muscles.

On reading these papers every thing passed without objection, excepting my description of the structure of the lens. It was not the arrangement, it was the existence of the fibres, which was disputed. Upon this, crystallines, which had been exposed to the flame of a candle, were exhibited. But prejudice was powerful, and although the minutest and most perfect fibres were distinguished by all, yet they were attributed to cracking, splitting, in short to any thing but organization. I argued, that if the substance was homogeneous, the cracking would be irregular. It was then surmised,

that the fibres were formed during the coagulation, and a similar phenomenon was pointed out as occurring in the fibrin of blood. I replied, that it was very doubtful whether fibres could be formed in this manner; but granting that it might be so, yet, as the heat had been applied irregularly, the fibres would have disposed themselves in various directions; for if the mass was homogeneous, the particles would have arranged themselves as readily in one direction as in another, whereas it was proved to demonstration, that the arrangement was completely regular. Again I contended, that the fibrin became fibrous by a natural, probably by a vital, process, and that even supposing the cases parallel, yet that fibrin forms a mere unsymmetrical interlacing of fibres, in which one part bears no relation to another.

This opposition induced me to examine with greater accuracy. Having boiled the lens, and inspected the fibrous arrangement, my first description proved erroneous. Three equidistant grooves radiating from the centre, on either side of the recent lens, were now observable: from these the fibres had their

origin. With a favorable light, this disposition of the grooves and fibres might be distinguished in the unprepared crystallines of the sheep and ox. This only confirmed me in my former opinion, as it exhibited an evident design for inserting the fibres advantageously.

Four theories have been proposed for the explanation of focal adjustment. One ascribes it to a motion of the crystalline backwards and forwards by means of the ciliary processes, which by some are esteemed muscular.---A second supposes the dilatation and contraction of the iris to be sufficient.---A third refers the effect to an increase in the convexities of the crystalline.---A fourth to an elongation of the organ in the axis of vision. The first is an assumption, which does not admit of proof, and which is not indispensably necessary to the explanation of the phenomenon. The second does not furnish the result required, and is frequently disproved. On the third and fourth I shall make some observations.

Little has been written on this subject, which is deserving of attention, that has not been published in the later treatises. My

observations are therefore confined to such opinions, as have appeared in recent works.

To commence with a paper written by Mr. Young. His representation of the appearance of the crystalline precisely accorded with that which I have constantly observed. In his description he states, that the lens consists of numerous laminæ, each of which consists of six muscles. In this he is incorrect, for the lines from which the fibres originate, as in penniform muscles, are analogous to tendons; and the crystalline can be viewed in no other light, than as bearing a decided analogy to those muscles, denominated complex penniform. In addition to this he states, that the lens is supplied with nerves and blood-vessels, which most abound near it greatest circumference. This is probable, but has not been confirmed by my personal observation. His opinion is, that by the contraction of its fibres the crystalline becomes more spherical, in consequence of which alteration of figure its refractive powers are increased, and that it is the sole instrument by which focal accommodation is effected.

Mr. Hunter had not, it appears, proceeded far on this subject. He merely gives it as his opinion, that the accommodating power resides in the crystalline. His death, unfortunately, put a stop to the experiments, which he was preparing to institute.

Dr. Hosack's paper is the next in succession. He undertakes to overthrow the theory advocated by Mr. Young and Mr. Hunter, and to correct the accurate representation given by the former. His drawing represents the fibres of the lens, as I had done in my first description. Considering the advantage he had enjoyed, in having read Mr. Young's account, little credit seems due to his accuracy.

Having combated, with very efficient arguments, the opinion, that focal accommodation can result from the dilatation and contraction of the iris, he proceeds to review Mr. Young's description. That gentleman had called the lens muscular, as if contractility were the exclusive property of the muscular fibre. This Dr. Hosack considered as fair ground upon which to commence his attack. He (Dr. H.) insinuates, that muscle cannot be muscle, nor

tendon tendon, unless they possess opacity and color. We find insects, however, whose transparency and want of color give them the appearance of glass; yet in them we do not doubt the existence of muscular or contractile substance.

Then reckoning with Lewhenhoec that there are two thousand laminæ in the lens, he proceeds to shew, that according to Mr. Young, it must consist of twelve thousand muscles. Dr. Hosack appears to congratulate himself on this point, deeming their action beyond human comprehension. It has been stated that my opinion differs from Mr. Young's; but supposing him correct, why may we not comprehend the action of twelve thousand, as easily as of twenty muscles? Is it, that they cannot produce an uniform action, or contract simultaneously? Dr. Hosack must have forgotten, that our largest muscles are formed of myriads of fasciculi, and each of these fasciculi of myriads of fibres, so minute as to have baffled the ablest microscopical observers. Is it that a muscle the twelve thousandth part the size of a crystalline exceeds our comprehension?

Why should it? Do we not acknowledge, that every leg of a fetal cheese mite has its apparatus of flexors and extensors? Of these objections it may be said, that they disprove nothing; and few will be found, who will think them worth much attention.

It would appear, that much of his opposition to Mr. Young's statement originated in his own misconception. By the muscles Mr. Young undoubtedly meant the fibres, which become white on coagulation; whilst Dr. Hosack, determined to regard nothing as muscular which is not coloured, supposed that the muscles were distinct from these layers, and his search failed of consequence.

Finally he states, that the adjustment of the eye to varying distances is certainly not attributable to any change in the lens, because we can, in a great measure, see without it. In support of this assertion he quotes Haller and De la Metherie in opposition to Dr. Porterfield, who had asserted, that persons, whose eyes were deprived of the crystalline, lost the power of accommodation. From these quotations it appears, that Haller deduced his opinion from an

individual case, in which a single artificial lens was found sufficient for every distance. De la Metherie by saying, that the crystalline might be removed without injury to vision, merely proved, that he was a most critical observer, or had no practical information on the subject.

We will now consider his own hypothesis. It is this : the contraction of the recti muscles will tend to reduce their curves to a rectilineal direction. A lateral pressure will be effected on the eye, where it meets the arcs of the muscles; by these means the globe will be elongated in the axis of visiou, and its focus be adapted to neighbouring objects. To prevent the retraction, which must otherwise follow this powerful action, he supposes that the two oblique muscles are employed in retaining the eye forward, Aware that they might not be deemed sufficient to counteract the retracting power, he concludes that the fat in the posterior part of the orbit will contribute an adequate degree of support. Here I shall leave his argument for the present, trusting in another place sufficiently to demonstrate its futility.

On this subject Sir Everard Home has written various papers, rendered particularly valuable by the delicate and satisfactory experiments, by which they are illustrated. He was fortunate in meeting with a patient, from whom it was necessary to extract one lens only. After many careful and patient trials the case appeared similar to that mentioned by Baron Haller. Pursuing this subject with his usual ardor, he constructed, with the assistance of Mr. Ramsden, a very ingenious apparatus for measuring the convexity of the cornea under different circumstances. The result of the experiments was, the undeniable agency of the cornea in focal adjustment. Experiments were then instituted upon the cornea itself, which membrane was found to possess considerable elasticity. From all this he felt assured, at that time, that the adjustment was to be referred to the cornea alone, under the influence of the external muscles.

Sir Everard however continued to prosecute his inquiries: the result of his experiments was made public in the Croonian lectures. His apparatus was altered and improved. Its

application induced this conclusion, that the alteration of the convexity of the cornea was not sufficient to account for the whole extent of focal adjustment. He supposed it limited to about one third the range of variation. The remainder he ascribed to an advance of the crystalline in consequence of the pressure of the vitreous humor, and to a complete elongation of the axis of vision. He was inclined also to coincide in opinion with those, who had attributed muscular powers to the ciliary processes. To the crystalline he denied the power of altering its convexities; its fibrous and laminated structure is, he conceived, intended to prevent reflections in the passage of the rays through media of different densities, and to prevent spherical aberration. Since this, he has published another case of cataractous patient, in whom the power of accommodation was preserved.

On first meeting with the results of these experiments, Mr. Young felt convinced of their accuracy; but having afterwards himself instituted a new series, he resumed, with increased conviction of its correctness, his original opinion.

Perhaps the experiment the most decided in its tendency was, the immersion of the cornea in water, which being a medium of equal refracting power with itself, would prevent its influencing rays of light by any change in its curvature. This experiment was performed on his own eye, and it appeared, that the range of the adjusting power was not contracted. By this and other experiments, he appears convinced, that no alteration occurs in the curvatures of the cornea, adequate to account for the phenomenon.

Although the results of several series of experiments have been already given, their details have been omitted; since every change in the organ may be explained by reasoning so conclusive, as to supersede the necessity of other demonstration. Where practicable this is to be desired, since the performance of delicate experiments must be liable to frequent and considerable error. By referring to the above treatises, it will be found that many there related, produced different results in different hands, a fact which strongly tends to invalidate their evidence.

But the testimonial of Mr. Young, must be considered so superior to mine, that I cannot resist transcribing it. "I must remark, that "every person, who has been engaged in expe- "riments of this nature, will be aware of the "extreme delicacy and precaution requisite, "both in conducting them and in drawing "inferences from them; and will also readily "allow, that no apology is necessary for the "fallacies, which have misled many others, as "well as myself, in the application of these "experiments to optical and physiological "determination."

The agents of adjustment are two: the crystalline acting by its own powers; and the cornea which is under the influence of external pressure.

In the crystalline we observe a remarkable arrangement of fibres, such as (supposing the fibres indued with contractility,) appears best adapted for altering its convexities. On observing in this body so peculiar a structure; and that, on its removal, the eye suffers so material a deficiency in the adjusting power, how can we refuse to acknowledge its

influence? The cases, adduced by Haller and Sir E. Home, may be offered in opposition. These cases are remarkable, but admit of explanation. At present it is sufficient to state, that from similar observations, Mr. Ware made a similar deduction with myself. The authority of his opinion, on this point, must be allowed to possess considerable weight in opposing the testimony of Haller. Without availing myself of Mr. Young's distinction between perfect and distinct vision, I cannot allow, that one or two anomalous cases ought to have weight in our decision.

Sir E. Home's experiments prove, most decidedly, that the cornea is susceptible of an increase of curvature. This I regard as that other adjusting power; a power, which is retained, in various degrees, by different persons after the removal of the crystalline, and which is usually more conspicuous in young, than in old, persons. By Sir Everard Home's estimate, this alteration of convexity will account for about one-third of the range of focus which the eye possesses. The remainder he conceives to be made up by the elongation of

the eye, from muscular compression. Thus he attributes to an elongation of the organ, the effect which I have ascribed to an alteration of the crystalline. His opinion is to be disproved, by shewing the incapacity of the acting powers to produce the elongation required.

Let us commence by reviewing the parts. The four recti arising from the posterior region of the orbit run forward, and are inserted by expanding tendons into the eye, near the part where the sclerotica forms its function with the cornea. These tendons coalesce, so as to form a complete tendinous circle. Sir E. Home says, that the expansions are continued through the substance of the cornea; but this would prevent the variation of curvatures, which he has proved. Tendinous substance is inelastic, and it is absolutely necessary, to allow the changes which he has assumed, that the cornea should possess elasticity.

The two obliqui are inserted laterally; the one posteriorly and externally, the other rather anteriorly and internally: the points, from which they act or originate, are anterior to

their insertions. The action of the recti, which would elongate the whole eye, would at the same time retract it: it is universally allowed, that no such retraction occurs. What are the powers resisting their contraction? We are told the oblique muscles, and the fat at the posterior part of the orbit. It is found so, but the lateral insertion of the one oblique, and the posterior insertion of the other, will flatten the eye by increasing its lateral dimensions. If the action of the obliqui can prevent that retraction, which the recti would produce, then the flattening power of the one set of muscles, will be equal to the elongating power of the other set; consequently, these their effects will be neutralized. But the obliqui cannot possess so much power, the fat therefore must make up their deficiency. Its power of resistance must be equal to the preponderating power of the recti. It proves so; and what is the result? That the flattening power of the obliqui, and the posterior resistance or flattening power of the fat, will exactly counterpoise the action of the recti. Yet a flattening of the globe cannot occur, for the obliqui can only have this effect

in opposition to the elongating power, and the fat simply offers a passive resistance, and that in proportion to the lateral pressure and retracting power of the recti. Since the powers are equal, and are so of necessity, the globe of the eye will be compressed, but neither flattened nor elongated. But its contents will endeavour to escape from the compression, and this must be effected at the least resisting point. This will be through the ring of the recti tendons, for here, and here only, there is no external resistance. Here they meet the elastic cornea, which yields to their pressure to a certain extent, and then resists with a power equal to the compression. On the relaxation of the acting power, its elasticity restores the parts to their original situation.

Enough has probably been said to prove, that the only alteration, which can take place in the external configuration of the eye, is at the cornea. But if more is deemed necessary, let us remember, that we possess the full power of adjusting the eye, when viewing objects obliquely. If a general elongation of the organ was necessary this could not be done, for the

globe would be elongated irregularly from the irregular pressure of the muscles: but if they, in conjunction with the surrounding fat, effect a general compression only, then the humors will equally tend towards the cornea, as above described. But the greatest advocate for the power of the cornea attributes to it but a third of the focal adjustment. This is confirmed by the removal of the lens: the accommodating power is diminished, we will say in the proportion of two-thirds; and yet precisely the same muscular actions take place, and they act with even greater facility upon the cornea, the resistance offered by the lens being removed. Here then I return to the points from which I commenced, that an increase in the cornea and crystalline adapt the focus of the visual organ to neighbouring objects.

It may be demanded why the adjusting power in the child is more independent of the crystalline than in the adult? There appear to me to be three reasons. Elastic substances possess greater elasticity at an early, than at an advanced, age; consequently, the cornea of the child is susceptible of greater alterations of

curvature, than that of the adult.---The younger the child, the more nearly does its crystalline approach to a sphere; consequently, it is not susceptible of so great an alteration of curvatures as in the adult.---Lastly, the lesser degree of density which is possessed by the lens of a child reduces its power of refraction towards that of the neighbouring humors; it cannot therefore act so important a part in the adjustment of the organ.

Thus I conceive, that in very early life the accommodating power is to be attributed to the influence of the muscles on the cornea. In proportion as the elasticity of the cornea diminishes, the density and power of the lens increase. In the latter stages of life the cornea entirely loses its function, and the crystalline being incapable by its single power, of accommodating the eye to short distances, the organ becomes permanently presbyopic.

PRACTICAL OBSERVATIONS

ON THE INSECURITY OF THE USUAL METHOD OF RESTRAINING HEMORRHAGE FROM THE TEMPORAL ARTERY.

The following remarks were originally intended for a professional society. Since their subject is occasionally connected with the treatment of cataract, they may not appear misplaced in the present volume.

PRACTICAL OBSERVATIONS, &c.

THE hemorrhage, which frequently follows a division of the smaller arterial branches, excites surprize. The consequences claim an equal attention. To those who are familiar with operations, the ill effects of these accidents are well known. They are aware of the consternation and of the dangerous tendency, of such a circumstance in the case of a patient, in mind irritable, and in body debilitated by previous anxiety and suffering. Death I have not seen actually ensue, yet I have seen sufficient to convince me, that such hemorrhage, long continued, may produce serious and permanent injury. I have observed divisions of the posterior auris, of the external pudic, and of vessels

supplying the nymphæ, attended by alarming symptoms of exhaustion. I have seen from the division of scrotal and preputial arteries blood lost in large quantities. By those, who have not directed their attention to surgery, these cases may be considered rare; but they may be assured the occurrence is neither infrequent, nor of trivial importance.

That a remarkable determination of blood to, or some peculiar irritation of, a part, should contribute to produce this hemorrhagic disposition of its vessels, must be admitted; and leads immediately to the subject of these prefatory remarks.

Repeated experience of the insecurity of the usual practice, determined me, to tie the lower orifice of the temporal artery, after opening that vessel for the abstraction of blood.

A recurrence of bleeding may be naturally expected if we rely on pressure: first, because the temporal artery, and even its branches, are considerably larger than those which I have already adduced as instances: secondly, because it is seldom opened unless there exists consider-

able determination to the head; or some near and active inflammation, as of the eye: and thirdly, because the pressure is of itself sufficient to excite such irritation in the divided vessel, as to produce a reaction attended by hemorrhage far greater than the operation occasioned. From these causes, the loss of blood, during the absence of a medical attendant, may prove not only troublesome, but dangerous, and therefore should not be treated with inattention.

I will endeavour to illustrate the effect of determination to the head. A patient laboring under some epileptic affection was desired by his physician to be bled largely. The anterior branch of the temporal artery was opened by his surgeon, who received the blood in a hand basin. Being a bold operator, he was perhaps gratified by the cross fire, which proceeded from either orifice; yet he certainly was not aware that he had removed 56 oz. of blood. Satisfied with the quantity, he desired me to secure the vessel. This was not easily accomplished: the upper orifice bled very freely;

upon the lower no pressure appeared to impose restraint; in defiance of my efforts it continued to throw its column of blood with astonishing power. At length I succeeded in securing it by means of a needle. Now, had such an hemorrhage occurred in a situation where medical assistance could not have been readily procured, the patient might have perished.

I shall proceed to cases of secondary hemorrhage. In three instances I have seen an aneurismal sac formed at the point of division. With the event of the first, I am unacquainted. In the second, a cure was effected by compression. In the third, a rupture took place during the night; and it was not discovered by the nurse until a very considerable quantity of blood had escaped. A few minutes after the discovery I saw the patient; he was pallid, his pulse scarcely perceptible at the wrist, his extremities cold, his mind affected with low delirium; yet the blood continued to issue, although, probably, with diminished rapidity. As a long time had elapsed after the operation, and as the

sac was small, and constantly covered by his night-cap, it had not attracted attention. This patient, notwithstanding his youth, exhibited an exsangueous appearance, which could be attributed to the hemorrhage only.

The circumstances under which this patient was placed, were favorable. He was in a public hospital, and had therefore an attendant at night, which, in similar cases, would have been deemed unnecessary. On the discovery of the bleeding, medical assistance was obtained before five minutes could have elapsed. Supposing such a case to have occurred in a remote country situation, it is probable, that one fainting would have succeeded another during the night, and that the morning would have discovered the patient in the last stage of exhaustion. Even then, it is more than probable, that many hours must have elapsed before a surgeon could be procured.

A recital of all the cases of secondary hemorrhage, which I have remarked, is unnecessary. They have varied in extent, and are accidents, attached to a considerable portion of cases of arteriotomy.

Another case occurs to me which clearly evinces the trouble and anxiety, which may attend the usual method of securing the vessel. Directed by a physician, I opened the temporal artery of a man labouring under inflammatory fever. About a pound of blood was removed, when the vessel ceasing to bleed, I divided it completely, placed the edges of the wound in opposition, and applied a compress on the course of the artery. In about a week, increased determination to the head became evident, and shortly after blood issued from the wound in considerable quantity. Before I arrived, a pound at least had escaped. The compress was removed, the band was tightened, and the hemorrhage ceased. A week had scarcely elapsed, when similar symptoms returned, and with them the hemorrhage. Having instructed the attendants how to act during my absence, in case of a recurrence, a much smaller quantity of blood was lost. The case did not terminate here: the bleeding returned twice in the course of the ensuing fortnight; whilst the irritation excited by the compress had caused an ulceration immediately above the Zygoma.

It may be objected, that pressure should have been abandoned, and evaporating lotions substituted. Such means were not neglected; evaporation from the head had been constantly maintained, but as this did not prove sufficient, mechanical restraint was indispensable.

From this case may be drawn deductions, recapitulating my former remarks. First, that when such congestion exists in the head, generally, or in any part of it individually, as may require abstraction of blood from the temporal artery, we are to regard it not only as a vessel of importance, but as one under peculiar excitement, and having an extraordinary hemorrhagic tendency. Secondly, that vascular irritation and excitement are liable to an increase in a proportion equal to the irritating nature of the external circumstances, with which they are connected: and that, consequently, the irregular pressure of tight fillets and hard compresses must be injurious, by maintaining that sanguineous determination, which the arteriotomy was intended to remove.

FINIS.

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