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ON THE PATHOLOGY OF INTRAOCULAR CYSTS.

By E. TREACHER COLLINS,
Curator of the Museum.

In a paper on cysts of the iris, published in 1867,* Mr. Hulke, after drawing attention to the frequency with which they are associated with penetrating wounds of the cornea, suggested, "that in some instances, perhaps, the cyst may originate out of a portion of Descemet's membrane, which may have been torn away from the back of the cornea by the penetrating foreign body and carried before it into the iris." Having collected a large number of recorded cases, he showed that there are four varieties of cysts of the iris:—

"1. Delicate membranous cysts, with an epithelial lining and clear limpid contents.

"2. Thick-walled cysts, with opaque thicker contents.

"3. Solid cystic collections of epithelium, wens or dermoid cysts.

"4. Cysts formed by deliquescence in myxomata."

Rothmund,† in 1872, in treating of the same subject, mentioned three cases in which a growth on the iris resulted from an eyelash being carried into the anterior chamber. He also stated that cysts might arise from portions of skin or of the epithelial coating of the eye carried in, in the same way.

Monoyer‡ pointed out that the term cyst was inapplicable to the solid growths on the iris, which he found were composed of concentric layers of epithelial cells. He prefers the name "epithelial pearl tumour of the iris," a name originally applied by Virchow to similar growths in

* Ophth. Hosp. Rep., vol. vi, p. 12.

† Klin. Monatsb. f. Augenheilk., vol. x, 1872, p. 191.

‡ Annales d'Oculistique, 1872, p. 249.

other parts of the body. The term *cholesteatoma*, suggested by Müller, has also been used for them.

Masse,* in 1881, experimented on rabbits, introducing into their anterior chambers through an incision in the cornea and grafting on the iris small pieces of conjunctiva and skin, and subsequently in 1883 bits removed from the surface of the cornea. From these grafts he has found develop both epithelial pearl tumours and true cysts.

Implantation-cysts which are spoken of as dermoids of the limbs have been found following such slight injuries as pricks of the finger with a needle. These cases and some of cysts occurring in animals, the results of prods in the side with the sharp iron spike used by cattle drovers, have been collected and described by Mr. J. Bland Sutton.†

That cysts the result of implantation of epithelial cells, should occasionally occur in the substance of the cornea itself, as well as in the anterior chamber or on the iris, is what might be expected, and is demonstrated by the following two cases:—

CASE 1 (*Register No. 2983*).—*Epithelial Implantation-Cysts in the Cornea following a Perforating Wound with a Shot.*

John C., aged 27, was admitted under Mr. Tay, at the Moorfields Hospital, on June 22, 1887, with the history of having been wounded in his right eye and right lower lid by a shot 18 months previously.

On examination of the right eyeball after removal it was found to be shrunken, measuring only 18 mm. antero-posteriorly, and 19 mm. laterally. There were puckers in the sclerotic behind the insertion of the recti muscles. The cornea was small, measuring 8 mm. laterally and 4 mm. vertically. There was a depressed cicatrix at its upper part. After the eye had been hardened and opened by an anteroposterior vertical section, the lens was found to be absent, the retina detached everywhere except at the optic disc and the ora serrata; it formed a

* *Gaz. d'Ophth.*, Paris, 1881, p. 275. *Ibid.*, 1883.

† *Hunterian Lectures*, Royal College of Surgeons, 1889.

thick plicated cord in the centre of the globe. No foreign body was discovered in the eyeball.

Microscopical examination shows in one section at the seat of the cicatrix in the cornea a collection of epithelial cells continuous with the surface epithelium dipping down into its substance. Other sections show several isolated clumps of epithelial cells, some of them quite deeply situated in the fibrous tissue of the cornea. The larger of these patches have spaces in the centre of them, which contain a few streaks of a sort of hyaline substance; probably the coagulated remains of the fluid contents of these cysts (Fig. 1). On careful examination of the cells composing these patches of epithelium, the outermost are seen to be the largest and most perfect, the inner ones being more flattened.

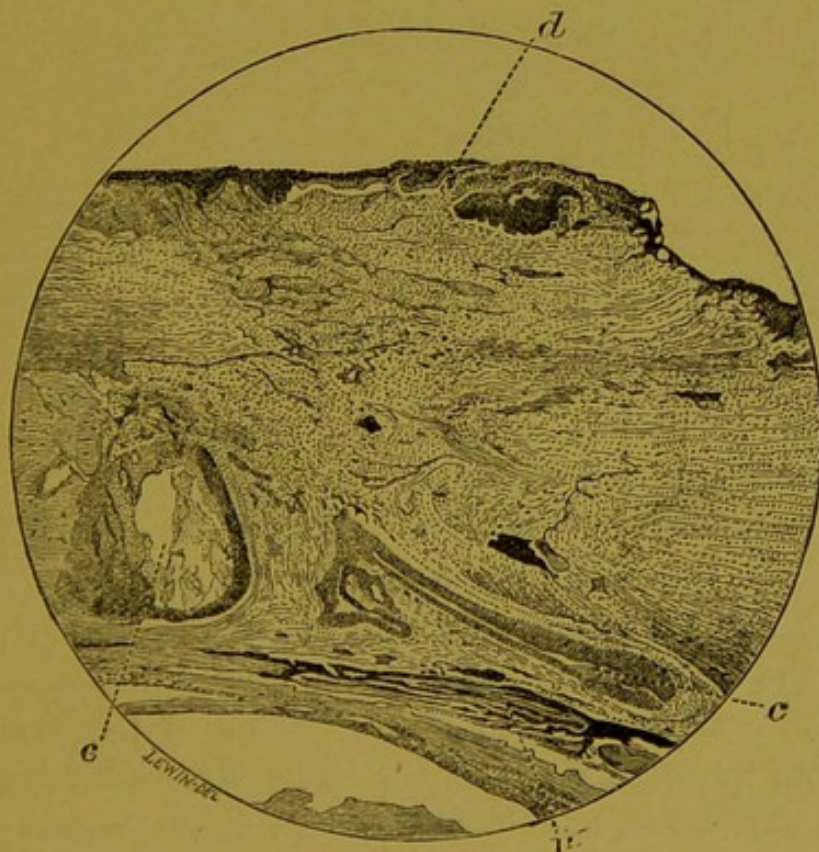


FIG. 1.—Section of a portion of the cornea from Case 1, showing spaces surrounded by epithelial cells in its substance.

c, Cyst. *d*, Descemet's membrane. *u*, Uveal pigment of iris.

In sections stained with picro-carmin the outer layers of cells in the patches above mentioned are of a red colour, and the inner ones of a yellow.

It is doubtful if these isolated clumps of epithelium are entirely separate collections or only processes cut off the main mass seen dipping in.

CASE 2 (*Register No. 2889*).—*Epithelial Implantation-Cyst in the Cornea in a shrunk Eye after Extraction of Cataract.*

Titus J., aged 25, was admitted into Moorfields Hospital under Mr. Lawson, on June 10, 1889. He had been operated on for cataract 12 months previously elsewhere. He had not had any sight in the eye since. He stated that the eye was spoilt on account of his having vomited after the operation, on recovery from the anæsthetic which had been administered to him. The eyeball after enucleation was found to be much shrunk, the sclerotic puckered, and the cornea very small. On section the choroid was found detached from the sclerotic on one side, some yellow-coloured tissue filling the space between. The lens was absent. The whole interior of the globe was filled with folded retina.

Microscopical examination of the cornea shows a number of patches of small round cells between its fibres, which are very irregular. There are numerous blood-vessels in the superficial layers. In its centre is a large cyst lined by several layers of epithelial cells. This cyst is quite separate from the surface epithelium. There is a second smaller clump of epithelial cells, without, however, any central cavity in it. Some streaks of a hyaline substance are seen in the interior of the cyst (Fig. 2).

The way in which the cysts in the above cases have been formed is evidently as follows. At the time of the injury, the entrance of the shot in Case 1, and the puncture with cataract knife in Case 2, some of the epithelial cells from the surface of the cornea have been transplanted into its substance, and have there proliferated. As they have increased in numbers, the central ones have become much pressed upon, and consequently have broken down and liquefied.

As can be easily imagined, the firm tissue of the cornea would offer considerable resistance to the proliferating cells, and consequently there would be little

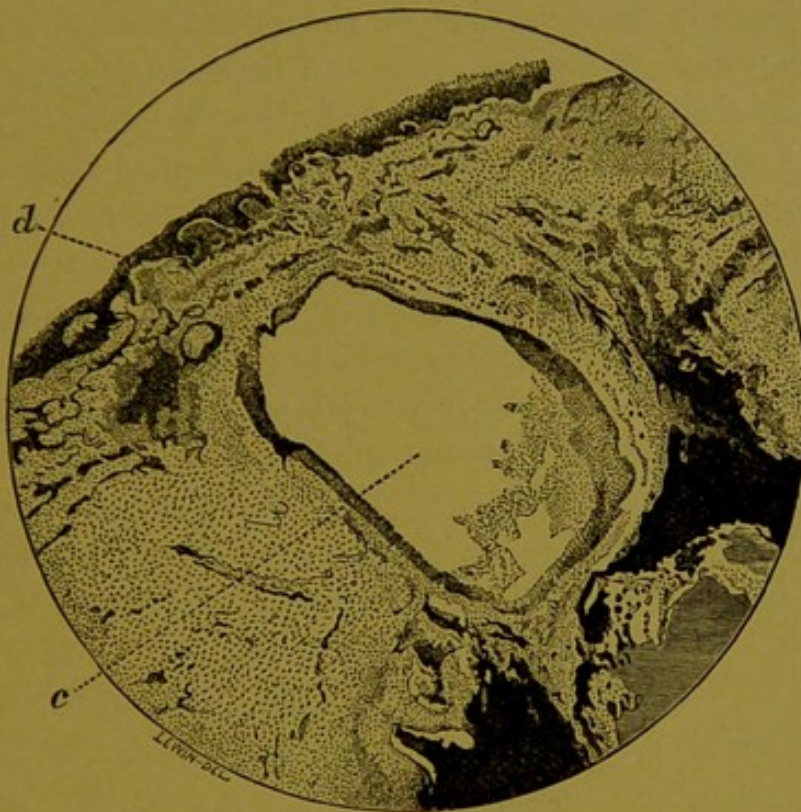


FIG. 2.—Section of shrunken cornea in Case 2, showing a cyst in its centre lined by epithelial cells.

c, Cyst. *d*, Descemet's membrane.

tendency for the cysts to expand, and the central breaking down would take place early. On the surface of the iris, however, very little pressure would be exerted on the grafted cells, and the resulting tumour would be more likely to take on the character of a solid growth composed of laminated layers of epithelium. In the substance of the iris more resistance again would be experienced, and more likelihood of central degeneration and liquefaction.

Masse obtained cysts as well as epithelial pearl tumours by transplantations into the rabbit's anterior chamber. It would seem, then, that epithelium when thus transplanted may behave in one of two ways. It may either cornify, as it does on the surface of the skin, and thus form a laminated tumour, or the cells may break

down and liquefy after having reached a certain stage of development, as they do physiologically on a secreting surface, and thus form a cyst with fluid contents.

The nature of the contents of these implantation-cysts would vary with the nature of the implanted epithelium.

Supposing some of the epidermis to have been engrafted together with some cells from a sebaceous follicle, we should expect a sebaceous cyst to result. Graefe* has described a case in which the cyst was found to contain short hairs and sebaceous matter. One recorded by Strawbridge† “was lined with a layer of squamous epithelial cells, swollen, and in an advanced stage of fatty degeneration. These cells were free from each other, and were surrounded by granular matter, fat, and cholesterine crystals.” In Snell’s case‡ the contents of the cysts is described as consisting of “a number of very large, clear, closely-packed cells, like fat cells, in which no nucleus was discernible, of cholesterine crystals in great numbers, of a large quantity of fatty matter, both in the purely granular and oily forms, of pigment cells and granules in small quantity, of sparsely scattered tessellated epithelium, and of a homogeneous finely granular material.”

If the epithelium of the conjunctiva be implanted, we should expect a cyst with mucoid contents. Richard§ described a two-lobed cyst of the iris of opal blue colour, containing a gelatinous liquid. In Turner’s|| and Fewer’s¶ cases the contents were spoken of as partially turbid.

Regarding some of the cysts of the iris as resulting from implantation of pieces of epithelium, it is not surprising to find that occasionally they are multiple;

* Archiv f. Ophth., III, 2, p, 412.

† Trans. Am. Ophth. Soc., 1878, p. 385.

‡ Ophth. Hosp. Rep., vol. x, p. 208.

§ Gaz. Hebdom, T. i, 1082.

|| Monthly Journal of Med. Sciences, vol. i, p. 270, 1841.

¶ Klinische Monatsb. f. Augenheilk., 1873, p. 110.

that they re-form after simple puncture, and that they recur after attempts at removal.

Thus Knapp* reports a case in which "the cyst originated in a scar from a foreign body in the vitreous. Six years after the successful removal of the foreign body the cyst made its appearance. It was cut out, but returned about a year later. It was removed again. The operation was rather a desperate one with forceps and scraping hook." Ultimately the case did well.

Critchett† has published a case in which a portion of the cyst was in the anterior chamber, and a portion sub-conjunctival, shaped like an hour-glass. The pathological examination of the cyst made by Brailey is given; there were several layers of flattened epithelial cells on its inner wall.

Sattler holds a different view to the one above given as to the manner in which detached portions of epithelium introduced into the anterior chamber give rise to cysts. He considers that the continued pressure of a foreign body gives rise to irritation, and stimulates to increased activity the surrounding tissues, so that the interstices of the iris become enlarged by serous exudation, and thus an interspace filled with serum formed. He would class them as exudation cysts. This view leaves unexplained the lining of several layers of epithelial cells found on their inner surface.

There are very few cases of cysts occurring in the cornea recorded, and as far as I have been able to ascertain none similar to the two above mentioned. Alt‡ describes four eyes in which he found cysts in the parenchyma of the cornea, in all of which there had been a perforating wound. In two, the cysts were lined by uveal pigment; he thinks that some particles of uvea were carried into the corneal wound at the time of per-

* Trans. Am. Ophth. Soc., 1880, p. 104.

† Ophth. Hosp. Rep., vol. ix, p. 53.

‡ Arch. of Ophth. and Otol., 1878, vol. vi, p. 317.

formation, and then proliferated and destroyed the surrounding corneal tissue. Of the other two, one had perfectly smooth walls, and the other a number of trabeculæ passing from one to the other. In neither is any mention made of a lining of epithelium. He thinks most probably these cysts were the result of corneal abscesses.

Samelsohn* has also recorded a case of cyst in the substance of the cornea, which on a puncture being made into it gave exit to a clear liquid. No microscopical examination was made. Small cysts or vesicles on the surface of the cornea are met with most commonly in staphylomatous or old glaucomatous eyes; probably in these it is only a later and more extreme degree of the condition described by Fuchs† as giving rise to the corneal haze in glaucoma. Case 3 and Fig. 3 illustrate the condition in a very marked manner.

Some of the projections that form on the surface of the cornea, and look like vesicles, are not, however, of this nature, and can hardly be described as cysts or vesicles at all. They appear to be small protrusions of an œdematous fibrous tissue. Case 4 demonstrates this.

CASE 3 (*Register No. 2687*). *Anterior Staphyloma with Vesicles in the Corneal Epithelium.*

James D—, aged 4, was admitted to Moorfields Hospital, under Mr. Tweedy, in August, 1888, with a large prominent anterior staphyloma of his right eye, T. +2, and a nebula of his left cornea. His eyes had been bad since infancy, probably as the result of ophthalmia neonatorum.

The right eye was enucleated.

Pathological Examination.—Cornea is much enlarged and thinned; it has an irregular mottled opacity on it superficially. Its posterior surface is lined by a network of the uveal pigment of the iris. There is considerable bulging in the ciliary region, especially above. The ciliary processes and muscle are much stretched and atrophied. The lens is absent; a small fibrous

* *Klin. Monatsb. f. Augen.*, 1872, p. 310.

† *Archiv f. Ophth.*, xxvii, 3, p. 66.

nodule on the uveal pigment at the back of the cornea shows the position of the remains of its capsule. The choroid has several large patches of atrophy in it with deeply pigmented margins. The optic nerve is cupped.

Microscopical Appearances of the Cornea.—There is a small amount of round cell infiltration between the most anterior layers of the cornea. Its epithelial layer has a large number of cystic spaces in it of very various sizes, mostly of an oval shape. Some of these spaces have their anterior walls ruptured, and open on the surface. All of them are separated by a layer of cells from the anterior elastic lamina of the cornea. The posterior surface of the cornea is lined by uveal pigment; neither the endothelium of Descemet's membrane, nor any of the stroma of the iris can be distinguished (Fig. 3).

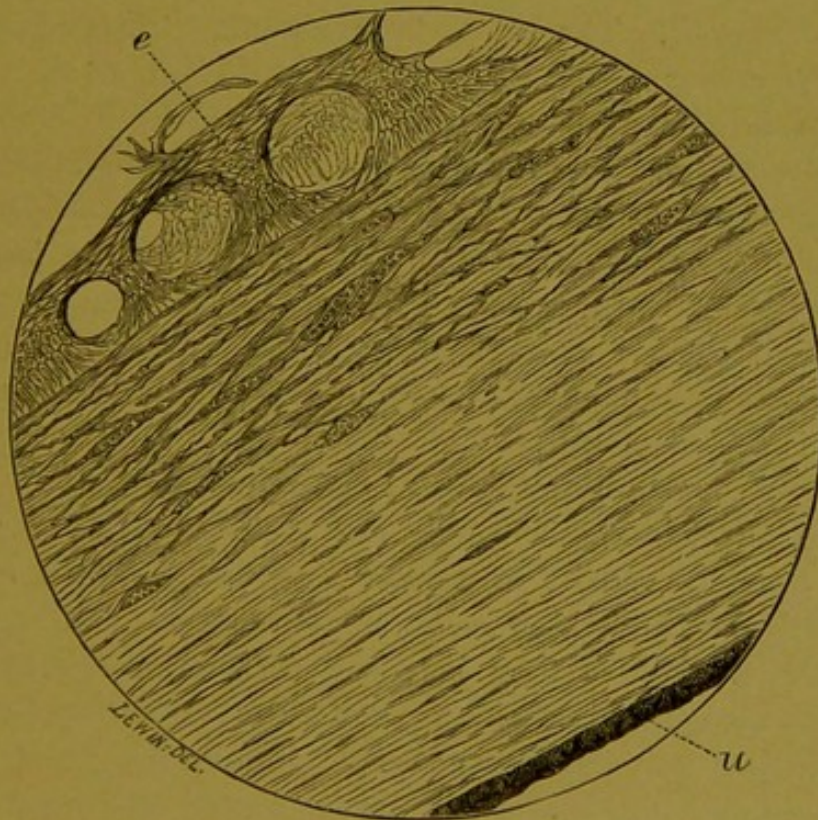


FIG. 3.—Section of cornea from Case 3, showing vesicles in its anterior epithelium.

e, Epithelium. *u*, Uveal layer of iris.

CASE 4 (*Register No. 3039*). *Spurious Vesicles of Cornea.*

William A——, aged 20, was admitted under Mr. Streetfeild, to the Moorfields Hospital in March, 1881, with well marked hereditary syphilitic kerato-iritis in both eyes. Both corneæ were bulged forwards and had diffuse interstitial deposit throughout. There were total posterior synechiæ and a condition of bombé iris on both sides. The tension of the left eye was +. Iridectomy was twice performed on this eye.

In January, 1890, the patient came complaining that during the last few months his left eye had rapidly increased in size and become very painful. It was then excised.

Pathological Examination.—Antero-posterior diameter measures 32·5 mm.; lateral, 25 mm.; vertical, 23 mm. The portion of the globe in front of the recti muscles is extremely staphylomatous. The cornea is much enlarged, opaque, and of a bluish colour. On its surface are several small vesicles; the two largest measure respectively 4 mm. × 3 mm. and 8 mm. × 4 mm. The thickness of the cornea is uniform, but thinner than normal. The iris is adherent to the posterior surface of the cornea throughout the greater part of its extent, the pupillary margin being the only part free. It is much atrophied. The lens is healthy. Vitreous shrunken. The choroid has large patches of atrophy in it; in these situations the retina is adherent to it.

Microscopical appearances of the cornea:—

Sections passing through the vesicles above mentioned show them to consist of a loose irregular network of fibres, with angular branching cells and covered on the surface by epithelium. Where they join the cornea they become constricted, the epithelium dipping down into the constriction. Thus in sections passing near to one side of a vesicle, there appears to be a small mass of loose fibrous tissue separated entirely from the rest of the fibrous tissue of the cornea by a layer of epithelium. The anterior elastic lamina cannot be traced in the neighbourhood of the vesicles (Fig. 4).

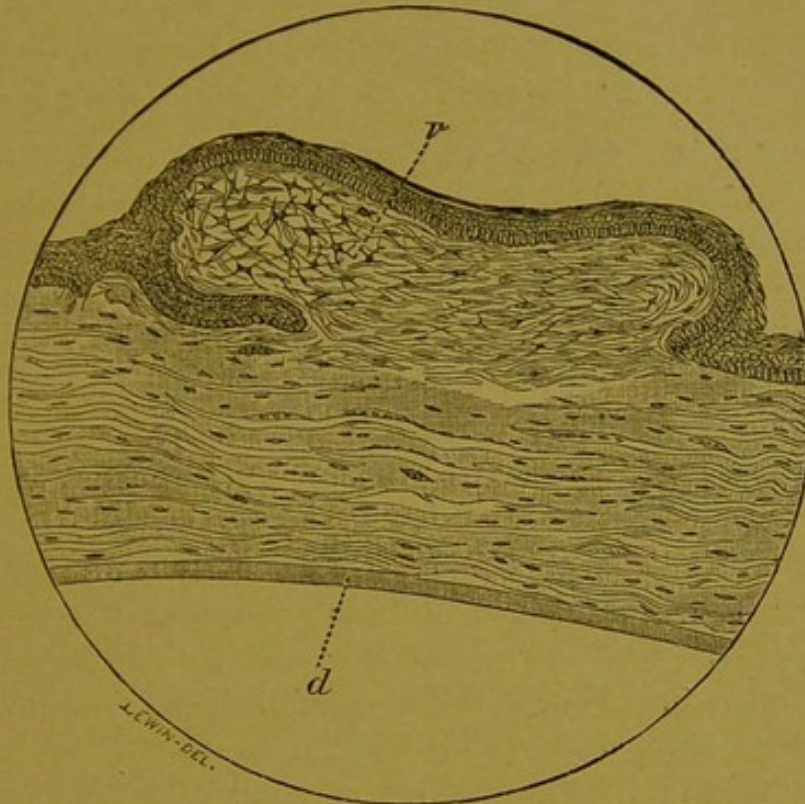


FIG. 4.—Section of cornea in Case 4, showing a localised collection of œdematous fibrous tissue on its anterior surface.
v, Spurious vesicle. *d*, Descemet's membrane.

The first class of iris cysts mentioned by Mr. Hulke in the article before referred to are probably not implantation-cysts. They are, he says, "delicate membranous cysts with an epithelial lining and clear limpid contents." The cells lining them are arranged in the form of a single pavement layer; thus differing markedly from his second class in which the cells are several layers deep. These cysts might be termed *endothelial cysts*, and the others *epithelial cysts*, for the former I believe arise entirely from mesoblastic structures, while the latter are due to implantation of epiblastic tissue into subjacent mesoblast.

The endothelial cysts occasionally follow an injury to the eye, by no means necessarily a perforating wound. At other times they appear to arise spontaneously, as in the following case, of which Mr. Nettleship gave me the specimen to examine microscopically, and has kindly permitted me to record my results.

CASE 5.—*Serous Cyst of Iris. No History of Injury to the Eye.*

Fanny P., æt. 44, was admitted to St. Thomas's Hospital on July 18th, 1889. She stated she had always had good sight until the previous summer, when she noticed some slight irritation in her left eye. Nothing was observed abnormal until September, when a small black, half-moon shaped speck appeared at the outer margin of the iris. In the mornings a little redness near this part of the eye was noticed, which passed off, however, when she had been out in the air some little while. The eye felt uncomfortable—a little pricking sensation in it from this time. Occasionally it watered. The light or the heat of the fire always made it seem worse. The speck has gradually increased in size. She has never had any actual pain. Has never had any injury to the eye. She has always been strong and healthy, never laid up with any serious illness. Her father died of heart disease; there is no history of rheumatism, cancer, or gout in her family.

Patient is quite healthy; there is no disease of any organ. Heart and lungs are normal. Urine, sp. gr. 1017; no albumen.

In her left eye, downwards and inwards, at the ciliary border of the iris is a small ovoid swelling of a black colour, about $4\frac{1}{2}$ mm. long by 4 mm. broad; the edge is sharply defined. It is protruding from the iris into the anterior chamber. All the lower part of the eyeball is slightly congested, and around the margin of the tumour is a small patch of ciliary congestion. There is tenderness at this spot. The pupillary margin of the iris in the neighbourhood is bulged, but otherwise normal.

V. = $\frac{6}{12}$ Hm. $\cdot 5 \frac{6}{6}$ partly. By focal light the walls of the cyst are seen to be translucent, and at its outer margin some fibres of the iris appear to be stretched over it. The posterior wall seems to be thinnest at its upper part, and some light can be transmitted through it.

On July 19th, the patient being under an anæsthetic, two incisions were first made through the cornea with a Taylor's knife; one just above the upper margin of the cyst, and one below its lower margin. These two incisions were then joined

by means of a secondary knife. At this stage the cyst ruptured. The iris with the cyst then prolapsed through the wound, and was cut off; the cut ends of the iris were replaced.

On July 23rd it was noted that the anterior chamber had re-formed, and that the eye was doing well.

Microscopic examination of the portion of iris and the cyst which were removed showed the following conditions:—

The cyst is situated nearer the anterior than the posterior surface of the iris. It is entirely in front of the uveal layers, some of the iris stroma intervening between its posterior wall and them. There is also a small quantity of stroma in front of the anterior wall of the cyst. It is lined with a layer of flattened endothelial cells, resting on a very distinct basement membrane. This latter is best seen on the posterior wall, where it stands out as a sharply-defined bright line, and on examination with high powers can be seen to be composed of closely packed nucleated fibres. The layer of cells on its inner surface in some places is composed of only a single layer. In other parts several layers are seen. This appears to be due to the cyst having become folded in places, and cut obliquely so as to show the lining epithelium on the flat.

CASE 6.—*Cyst growing from the upper part of the Iris. Probably of similar nature to that in the previous case.*

Mary W., aged 18, was admitted to Moorfields Hospital under Mr. Hulke, on November 24th, 1884. For the previous fortnight she had noticed a slight aching around the right eyeball, but had had no severe pain. Seven days ago a companion had noticed a growth at the upper portion of the eye. She had never observed that the sight of her right eye was not so good as that of her left. She had never had any injury to the eye.

On examination, a small ovoid cystic-looking swelling, measuring $3\frac{1}{2}$ mm. by 4 mm., was seen occupying the upper portion of the angle of the anterior chamber. The swelling was translucent, and the iris-tissue could be seen through it. The radiating fibres of the iris were best seen at the sides, but there was a faint longitudinal striation over its anterior surface also. There was a slight depression in its lower extremity. In the cornea over the cyst was a white line resembling a cicatrix.

V. = R. $\frac{6}{36}$ \bar{c} + .75 cy. axis 40° down and in = $\frac{6}{12}$; L. $\frac{6}{6}$ Hm.
 .75 $\frac{6}{6}$ and Ji.

On November 26th, under an anæsthetic, a corneal incision was made upwards with a Graefe's knife, and the cyst and a portion of adjacent iris drawn out and cut off. A piece of the cyst remaining behind was removed by a Tyrrell's hook.

Schmidt-Rimpler* has recently written on this class of cysts; he gives the details of a case in which there had been no perforating wound. "He considers that such cysts originate in the closure of one of the crypts always present in the iris. These crypts, according to Fuchs, dip into the iris tissue as deeply as the position of the vessels, and from the latter the lymph streams pass through them to the anterior chamber. These lymph streams have been demonstrated by experiments with fluorescin injection in rabbits (Schick). Anatomical researches, and especially the examination of the anterior surface of the iris by Zehender's binocular lens, have shown that these pits in the iris are frequently bridged over in front by bands, or completely by a thin membrane. In one instance, Fuchs observed (microscopically) a fine non-nucleated membrane closing the opening of a crypt.

"It seems legitimate to assume that such a membrane might become thickened as a result of disease, and thus the anterior outlet of the crypt be occluded; the same pathological conditions might block any lateral communications between the crypt in question and adjoining ones, and the lymph would then be unable to escape into the aqueous. The gradual accumulation of this secretion would soon lead to dilatation of the cavity so formed, and its encroachment on the surrounding iris tissue. The endothelial lining membrane of the cyst, Schmidt-Rimpler thinks is derived from the endothelium which dips into

* Arch. f. Ophthal., vol. xxxv, p. 1.

the crypts from the anterior surface of the iris. Under the irritation of the enclosed lymph, growth of this normally existing endothelial layer occurs; and this lining membrane is thickest on the posterior wall of the cyst.”*

In the two foregoing cases, the cysts, it will be noticed, commenced to grow in the periphery of the iris, that is, in the portion described by Fuchs† as the marginal zone of the ciliary portion, the characteristic of which is the number of apertures on its surface which gives it a sieve-like appearance. This would then have been the part of the iris in which *a priori* it would have been expected that a cyst might arise in the way described by Schmidt-Rimpler. Beneath the endothelium on the anterior surface of the iris, there is what Fuchs describes as an extremely fine boundary line. This, under the irritation caused by the distention of retained secretion, has, in Case 5, become thickened and given rise to the basement membrane.

De Wecker speaks of a form of cyst occurring in the anterior chamber after penetrating wounds, in which there has been an infolding of the iris and the formation of an anterior synechiæ. The cavity thus shut off becomes distended by the secretion of aqueous fluid. Knapp‡ and Alt§ have met with cases of a similar nature. The formation of a horseshoe-shaped posterior synechia, and following on that a localised condition of bombé iris, gives rise to a condition of things often indistinguishable clinically from a cyst in the substance of the iris. The following is a case in point:—

CASE 7 (*Register No. 2983.*) *Localised Condition of Bombé Iris simulating a Cyst of the Iris.*

Charles P., aged 19, admitted to Moorfields Hospital on October 17th, 1889, under Mr. Tay. Five weeks previously his

* See Abstract in *Ophth. Rev.*, vol. viii, p. 372.

† *Archiv f. Ophth.*, vol. xxxi, p. 39.

‡ *Archives of Ophth. and Otology*, vol. i, p. 411.

§ *Lectures on the Human Eye*, p. 94.

left eye had been injured with a chip of iron, while he was employed at his occupation of boiler making. A chip was removed at the Colchester Hospital. He had been unable to see with the eye since the accident. It was a perfectly good eye previously.

On examination of the eye, the cornea was found to be vascular at the lower part. There was a linear opacity in it, starting at the sclero-corneal margin down and in, and running upwards and slightly outwards. It started superficially, and then became deep, having some layers of clear cornea in front of it at the upper part. It terminated about the centre of the prominent portion of the iris.

The lower part of the iris was of a dull yellowish-grey colour: at the upper part was a dark prominence with a scalloped margin below; on the surface of this prominence the striated fibres of the iris could be seen. It was not translucent. No reflex could be obtained, no pupil being seen. T. was -2. V. = bare p. l..

The right eye was healthy. V. = $\frac{6}{6}$ and J. i.

The eye was enucleated. After hardening, an antero-posterior vertical section was made. The following condition was then seen:—Lying in the centre of the vitreous was a foreign body covered with lymph. The vitreous was detached from the retina in the greater part of its extent. Passing forwards from the foreign body to the posterior surface of the lens was a fibrous band. The lens was small and shrunken, and surrounded nearly entirely by organised inflammatory tissue. The lower part of the iris was united to this inflammatory membrane. The upper portion of the iris was bowed forwards forming the prominence above described. The retina had some creases in it. The choroid was detached from the sclerotic anteriorly. Microscopical examination shows the cystic space to be bounded anteriorly by the posterior uveal surface of the iris, and posteriorly by the anterior capsule of the lens. Some inflammatory tissue is seen uniting the pupillary margin of the iris to the lens capsule internally, and the anterior of the ciliary processes to the lens capsule externally (Fig. 5).

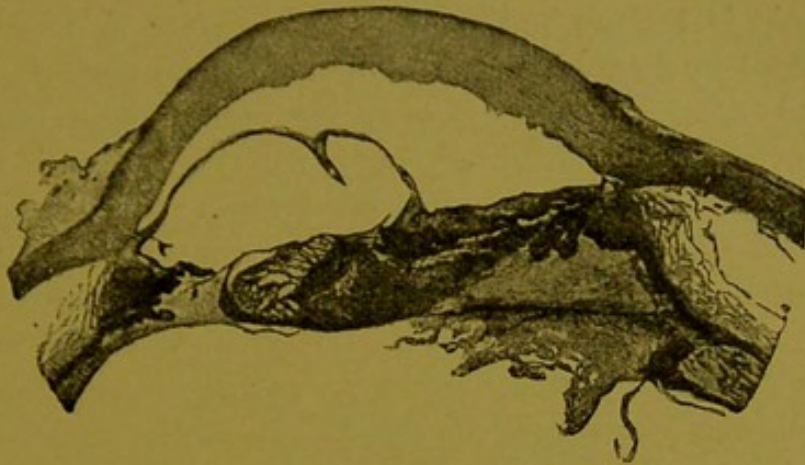


FIG. 5.—Section of front half of eye, showing the localised condition of bombé iris in Case 7.

(From a photograph by Mr. E. Collier Green.)

The next case is also one in which the clinical appearances of a cyst in the tissue of the iris were simulated by a very different condition of things.

CASE 8 (*Register No. 2982*).—*Dislocated Lens giving rise to the Appearances of a Cyst of the Iris.*

James M., aged 66, was admitted to Moorfields Hospital under Mr. Couper, on October 15, 1889. Seven weeks previously, while chopping wood, a piece flew up and struck his right eye. The piece that struck him had a sharp point at one end of it. He could not say if the piece entered the eye or not. His eye bled a little after it was struck. He was unconscious for two hours after the blow.

On examination, the eye showed some general haze of the cornea. At the corneal margin down and out, slight bulging of the sclerotic. The remains of a hæmorrhage at the lower part of the anterior chamber. Up and out a prominence of the iris, presenting the appearance of a cyst. The iris was of a grey colour; this prominent part was nearly black, and the fibres of the iris were plainly marked on its surface. The pupil was oval in shape, the long axis of the oval being down and in. No reflex could be obtained from the fundus. T. + 3. V. = Hand movement.

Pathological Examination of the Eye after Enucleation.—The eyeball opened by an antero-posterior horizontal section. The lens is dislocated and lying at the outer side of the globe, on the outer part of the ciliary body, with its long axis antero-posterior, so that its inner lateral margin presses forwards the iris and ciliary body almost into contact with the posterior surface of the cornea, thus causing the appearance that was thought clinically to be a cyst. The angle of the anterior chamber is markedly narrowed in its entire circumference. A membrane stretches across the pupil. The vitreous is detached posteriorly from the retina, and the latter is detached in places from the choroid. The optic disc is deeply cupped.

Microscopical examination shows the iris and ciliary body, where they are pressed upon by the lens, to be extremely atrophied. The ciliary muscle and processes are almost completely gone, and the merest trace of the uveal layer of the iris can be distinguished (Fig. 6).

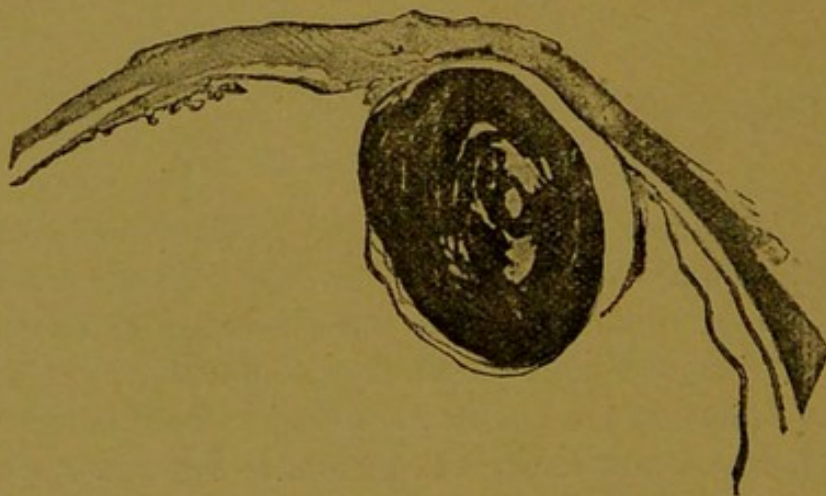


FIG. 6.—Section of front half of eye in Case 8, showing the displacement of lens which gave rise to the appearance of a cyst of the iris.
(From a photograph by Mr. E. Collier Green.)

CASE 9—*Case of True Cyst of the Iris with Uveal Pigment on its Anterior Surface.*

Thomas S., aged 64, was admitted into the Moorfields Hospital under Mr. Tay, on October 14, 1886. The sight of his left eye he stated had been failing two years, and of his right

six months. He had never had any pain in the eyes, nor had he noticed anything wrong with them beyond the failure of sight. He had not had any injury to his left eye.

He was a stout, plethoric, white-haired man, with a slight arcus senilis in each eye. In the right, the pupil was active; there were some opacities in the lens. $V. = \frac{3}{60}$. T. n. In the left, the pupil was active; the iris of a blue colour. Projecting from behind the lower margin of the pupil was a deep brown mobile mass, having a sharply defined curved margin with a slight notch in its centre. The lens was cataractous, nearly mature. $V. =$ Hand reflex. Projection good. T. n. (Fig. 7).

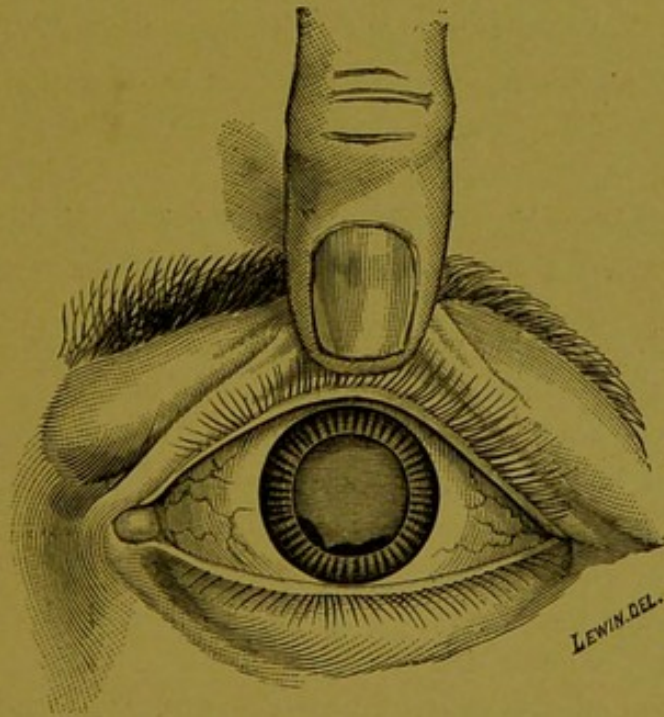


FIG. 7.—Showing cyst of iris with uveal pigment on its anterior surface.
Case 9.

The dark mass was considered to be one of two things, either a melanotic growth or a cyst. To clear up the diagnosis, it was decided, in performing extraction, to make the incision and the iridectomy downwards.

This was done on October 28, an incision being made in the sclero-corneal margin. The iris, including the dark mass, was then grasped with forceps, in doing which the dark part

collapsed. The lens came away nearly completely; no sign of any new growth could be seen. The eye made a rapid and satisfactory recovery.

Examination of the piece of iris removed showed that the dark mass was evidently of a cystic nature.

This case, it will be seen, differs from all those previously mentioned, in that there was no history, nor the least sign of there having been any inflammation in the eye, and yet the cyst had uveal pigment on its anterior wall.

In order to throw light on its mode of formation, I will relate another, which, though differing in some respects, helps to explain the position and origin of the cyst in Case 9.

CASE 10 (*Register No. 2950*).—*Cyst of Iris situated between its Two Layers of Uveal Pigment.*

William J., aged 10, was admitted into Moorfields Hospital under Mr. Tay, on September 4, 1889. When three years old, he had injured his right eye with a pair of scissors, and since that time had been unable to see with it. The eye gave him considerable pain at times. He could only distinguish light from darkness with it. T. was +1.

After enucleation there was found to be a slight prominence of the sclerotic beneath the external rectus muscle. There was a nebula of the cornea at the inner margin. At the upper and outer quadrant the iris was more prominent than elsewhere, being here in close contact with the posterior surface of the cornea, and of a slightly bluish tint. The remainder of the iris was of a greenish-yellow colour. There were some posterior synechiæ. At the lower part of the anterior chamber was a collection of blood. The lens was mobile, opaque, and of a yellow colour.

After hardening and making an antero-posterior vertical section, there was seen, in the upper part of the iris, a cystic space lined on both sides by uveal pigment. The lens was

composed of a dense yellowish-white capsule, with calcareous deposit in it. The central portion was of fluid consistency. Immediately behind the lens a membrane stretched across the globe. The retina was detached at the lower part from the ora serrata to the optic disc. In the centre of the outer half of the globe, corresponding to the prominence of the sclerotic noticed externally, there was a depression where all its tissues were adherent, and from this point several puckers in the retina radiated.

Microscopical examination of the anterior half of the eyeball shows:—Some collections of red blood corpuscles in the anterior chamber. An inflammatory membrane composed of fibrous tissue on the anterior surface of the iris, much thicker in some parts than in others. Close to the pupillary margin in one place it has given rise to adhesion between the posterior surface of the cornea and iris. The membrane stretches right across the pupil between the free extremities of the iris. The angle of the anterior chamber on both sides is blocked by adhesion of the root of the iris to the posterior surface of the cornea. It is still further blocked on one side by thickening of the above-mentioned inflammatory membrane. The tissue of the iris is thinned; markedly so in some places. In the posterior part of the iris, on one side, a large cystic space is seen bounded on all sides by a layer of uveal pigment. The uvea at the tip of the iris is seen to divide as it passes backwards into two widely separated layers, which re-unite at the root of the iris. Some organised inflammatory tissue posterior to the uvea, and between it and the lens capsule, goes to thicken the posterior wall of the cyst. The ciliary processes are much atrophied and stretched. The lens is composed of a network of delicate fibres, irregular hyaline masses and granules of calcareous deposit (Fig. 8).

In the last case it will be seen there has been a separation of the two layers of uveal pigment on the posterior surface of the iris, and exudation of fluid into the space thus formed. The arrangement of the uvea on the iris I find is best studied in sections which have been bleached by first immersing them in some water with chloride of

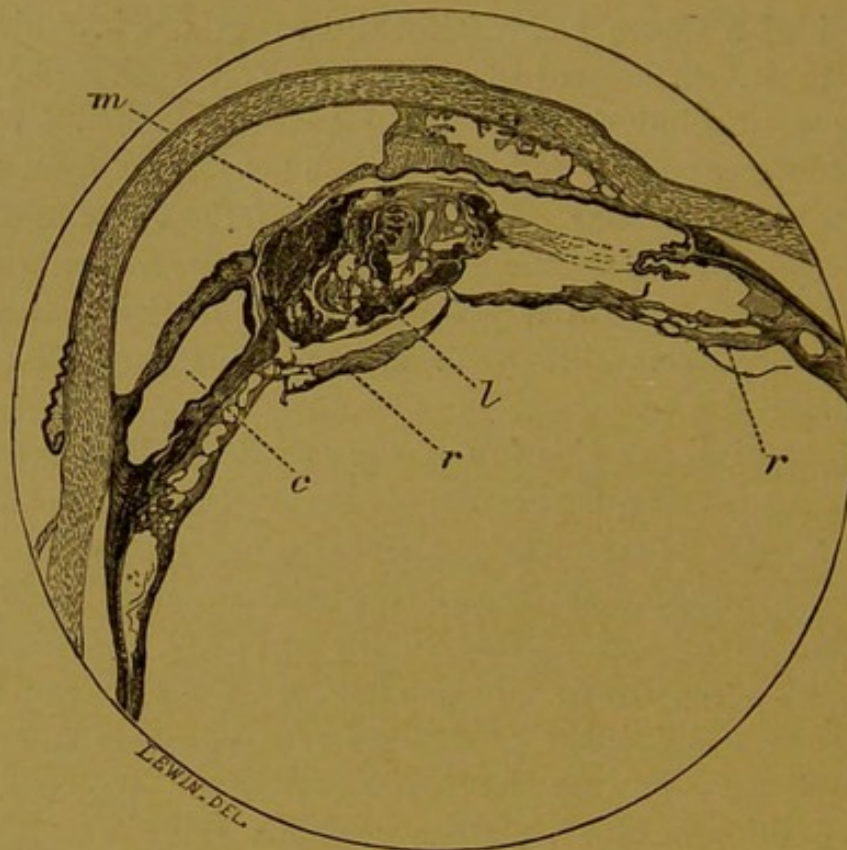


FIG. 8.—Section of anterior half of eye in Case 10, showing a cyst situated between the two layers of uvea on the posterior surface of the iris.

c, Cyst. *m*, Inflammatory membrane in pupil. *l*, Lens. *r*, Detached retina.

lime in it, and then in water acidulated with one or two drops of hydrochloric acid. They require to be passed backwards and forwards from these two solutions several times before the pigment is destroyed. The sections can be afterwards stained with logwood. In a typical transverse section of the iris thus prepared, the anterior layer of the uvea, which is continuous externally with the uvea of the ciliary body, and internally, at the pupillary border, joins the posterior layer, is seen to consist of a single row of flattened nucleated cells. The posterior layer, which is the most deeply pigmented portion of the whole eye, and the last to become bleached, is continuous externally with the unpigmented cells forming the pars ciliaris retinae, and internally, as above stated, joins the anterior layer.

At the root of the iris the transition from the unpigmented quadrate cells of the pars ciliaris retinae is seen to commence. Besides acquiring pigment, the cells become much elongated and wedge-shaped, the bases of the wedges being all directed backwards, the result being that the posterior surface of the outermost portion of the iris has a convoluted outline, the cells being arranged in little groups with depressions between them. On tracing the iris inwards, these depressions become much shallower and separated further apart. From about its centre to the pupillary border it presents a smooth surface, the cells here being of a regular columnar shape. Throughout this layer the nuclei of the cells are situated in their posterior halves. These two layers form the foremost portion of the primary optic vesicle. Detachment of the retina from its uveal layer is of common occurrence. The detachment of the two uveal layers on the posterior surface of the iris from one another may be considered as an analogous condition. Slight detachments are seen frequently in various pathological states, especially in eyes of youthful patients. It is of more frequent occurrence than detachment of the whole uvea, for the anterior layer, like the uvea in the posterior parts of the eye, has firm connections to the mesoblastic structures.

That the separation of the two layers should become so extensive as to give rise to the appearance of a tumour has not, I think, before been suggested. That such was the condition in Case 10 is proved by the pathological examination, and I think it seems the most probable explanation of the appearances seen in Case 9.

Fig. 9 shows an iris with a small cyst on its posterior surface formed by separation of its two uveal layers. It occurred in a case of sarcoma growing in the ciliary body; the pressure of this tumour on the base of the iris gave rise, not only to oedema of its stroma, which is seen to be swollen, but also to effusion of fluid between its two uveal layers, and so to the cyst.

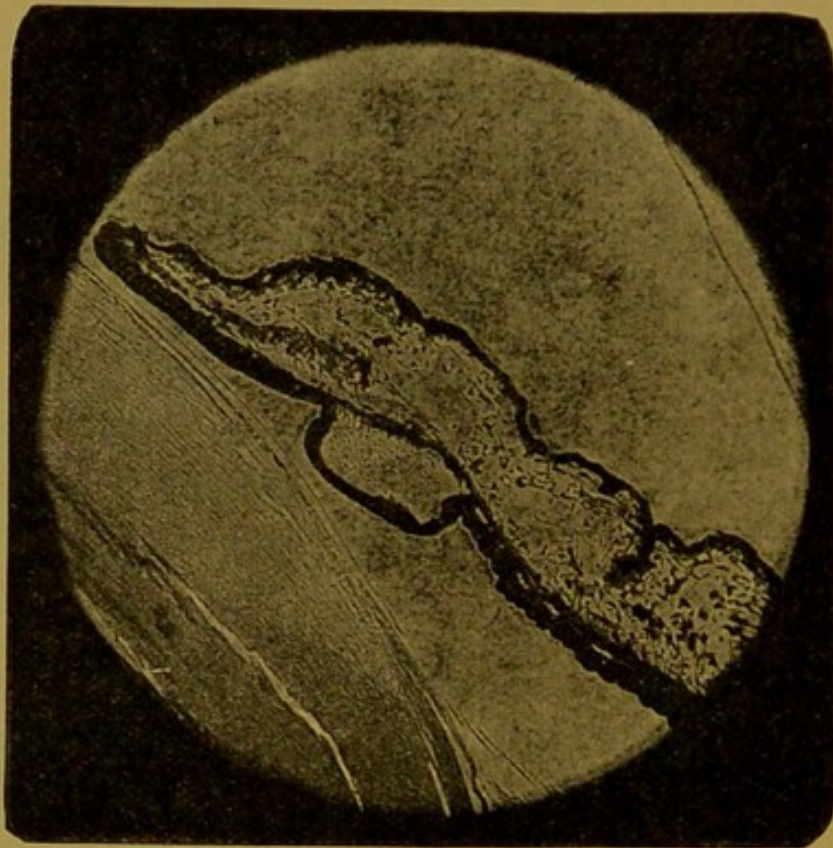


FIG. 9.—Showing a small cyst situated between the two layers of uvea on the posterior surface of iris.

(From a photograph by Mr. E. Collier Green.)

It has been suggested that some cysts of the iris have a congenital origin—that they are connected in some way with the ocular cleft. A case shown by Mr. Lang at a recent meeting of the Ophthalmological Society gives the most striking confirmation of this view. In it there was a coloboma of the iris downwards, and a cyst connected with the limb of the iris at the side of the coloboma.

Mr. Osborn* also has pointed out that occasionally a fissure of the iris is left after the cure of these cases. (This might be due to the cyst growing in the substance of the iris and expanding it, so that on its removal part of the thickness of the iris would be removed also.) He quotes, moreover, in connection with this point, Mr. Wharton Jones's case, where inflammation set in as the result of puncturing the cyst, and, as a consequence, "the matter

* St. Thomas's Hospital Reports, vol. vi, p. 69.

of the cyst worked its way outwards at the junction of the cornea and sclerotic by a narrow passage;" and continues, "Now if such a cyst was growing from some dilated or unobliterated portion of the ocular cleft, no more likely channel for the exit of its contents could be found."

A form of congenital cyst connected with the ocular cleft in the choroid in cases of microphthalmos has been described by Professor Kundrat, and was dealt with by Mr. Lang in the last number of these Reports. It is needless to repeat what has been there stated. The following annotation which appeared in the "Lancet," however, is interesting in connection with the fact that I found retinal elements in the walls of that cyst.

Dr. Monacho* recently exhibited at the Cataluña Academy and Laboratory of Medical Sciences, a little girl of 13 months, the subject of double anophthalmos. The eyelids, lacrymal apparatus, and orbits appeared to be well-formed, but there was no eye on either side, a simple cavity being seen on separating the lids. This cavity was invested by the conjunctiva, which apparently rested on some firm, fibrous basis, in which movements could be detected, as if it represented rudiments of the ocular muscles. In the thickness of both inferior eyelids a kind of bursa or cyst could be felt, that on the left side being the larger, and having a whitish coat, like the sclerotic, which could be seen through the conjunctiva posteriorly, where it was thin and transparent. This became tense during crying, and the child was observed to press it frequently with her hands, and then to smile, a phosphene or subjective sensation of light being probably thus produced.

The similarity of this case to that recorded by Mr. Lang is obvious.

Small cystic spaces between elongated bundles of Müller's fibres immediately behind the ora serrata are very common. Dr. Blessing regarded it as the normal condition between the equator and the ora serrata. In an eye

* Lancet, May 26, 1888.

recently brought to me by Mr. Lawson, which previous to removal seemed perfectly healthy, and which was enucleated on account of an adjacent sarcomatous growth, I found numerous spaces of this description in this region. These spaces are, however, only visible microscopically; cysts which look more or less like white currants adherent

Register No.	Name.	Age.	Duration and nature of affection.	External appearances.
2883	Joseph N. ..	29	Left eye injured with a fork 20 years ago; was operated on here at that time, but has been unable to tell light from dark with it since. Fresh inflammation in it during the last 2 months.	T.-. V. = no p. l. Two cicatrices, one in the centre of the cornea, and the other at its junction with the sclerotic above. Pupil blocked with opaque membrane; posterior and one anterior synechiæ.
2965	Daniel S. ..	50	Accident to his left eye 26 years ago from a gunpowder explosion; could see well with it after the accident. Sight began to fail in 1872. It has been painful for the last 14 days.	T.+2. V. = no p. l. Iris is slightly discoloured; posterior synechiæ. Pupil eccentric. Lens cataractous.
2971	Solomon D. ..	38	Said to have had congenital cataracts. Left eye operated on at Warsaw 20 years previously. A scissors operation was performed here on it in 1876, and a considerable quantity of fluid vitreous escaped. For the last 3 months it has been painful.	T.n. V. = no p. l. Episcleral vessels injected; anterior chamber deep. Coloboma upwards closed by an opaque membrane. Posterior synechiæ.

to the outer surface of a detached retina, are less frequently met with, but, according to my experience, are not very rare. Thus, during the past two years at Moorfields, I have found nine eyes containing cysts of this description.

The details of these cases I have arranged in tabular form below :—

Macroscopical appearances on section.	Microscopical appearances.		
	Retina.	Choroid.	Optic nerve.
Retina completely detached from the optic disc to the ora serrata and thrown into folds behind the lens. A large cyst projects from its outer surface in the posterior part.	The cyst is situated between the two nuclear layers. Throughout the retina, Müller's fibres are much elongated.	Atrophied.	
Retina detached from optic disc to the ora serrata. Small cyst projects from its outer surface. Angle of anterior chamber constricted. Lens shrunken.	The cystic spaces in the retina appear to commence in the inter-nuclear layer; Müller's fibres are everywhere much lengthened and hypertrophied.	Some colloid excrescences projecting from the elastic lamina.	
Retina detached in the lower half from the ora serrata to the optic disc; <i>in situ</i> above. There is a small cylindrical process of retina passing from the detached portion to the choroid, to which it is adherent. There is a small cyst a little behind this. Considerable pigmentation of retina at the upper part.	Has everywhere undergone extensive changes. It is in greater part made up of an irregular network of fibres and scattered nuclear bodies. There are numerous spaces of various sizes between the fibres. In some places these have coalesced and formed cysts. A coagulated homogeneous substance is seen in the interior of these.	Numerous colloid excrescences projecting from the elastic lamina, some of them are knobbed and project into the substance of the retina, causing considerable disturbance of the uveal pigment. There is a large excess of pigment in places, but no inflammatory infiltration.	The fibrous tissue of the nerve is much increased, and nerve fibres decreased. There are numerous very small round spaces along the track of the nerve fibres on the inner surface of the lamina cribrosa.

Register No.	Name.	Age.	Duration and nature of affection.	External appearances.
2972	Mary Ann H.	41	Left eye was struck with a fist 14 years ago, and went blind at once. It has been painful during the last 5 months.	T. - 1. V. = no p. l. General haze of cornea and an irregular brownish opacity at the lower and inner part. Pupil widely dilated.
2977	Joseph D. ..	30	Right eye "went blind from inflammation 7 years ago;" no injury then. A week ago he knocked it with his finger.	T. +. V. = no p. l. General haze of cornea. Aqueous turbid, a hæmorrhage on surface of iris. Lens opaque.
3080	Josias E. ..	32	Left eye struck by a piece of gun-cap 13 years ago, after which sight became dim. Five years ago "took cold" in the the eye, and the sight went completely. During the last month it has been painful.	T. + 1. V. = no p. l. A yellow spot in the centre of the lower half of the cornea. No iris can be seen; the whole cornea gives a dark reflex.

Macroscopical appearances on section.	Microscopical appearances.		
	Retina.	Choroid.	Optic nerve.
<p>Umbrella detachment of retina.</p> <p>Two cystic protrusions from the posterior part about the size of currants; they are filled with a coagulated gelatinous substance similar to that found between the choroid and retina.</p>			
<p>Lens is white and of stony hardness throughout.</p> <p>There is some calcareous deposit in the retina, which is detached from cora serrata to optic disc.</p> <p>There are seven small cystic protrusions from its outer surface, one of them much pigmented; and in the choroid beneath it is an atrophic patch, with deep pigmented margin.</p>	<p>Extensive degenerative changes of the nerve elements, and considerable increase of the fibrous tissue; numerous spaces of various sizes throughout.</p> <p>The larger cystic spaces contained a homogeneous substance.</p>	<p>Much atrophied; a few colloid nodules project from the elastic lamina.</p>	<p>Considerable increase in the number of cells in optic nerve adjoining sclerotic. Also increase in the amount of fibrous tissue.</p>
<p>Anterior chamber deep, and full of blood clots. Anterior synechiæ. Lens absent. Vitreous shrunken.</p> <p>Retina detached from cora serrata to optic disc; there is a large cyst in the middle of its substance at the lower parts, not projecting more to the inner than to the outer side of it. Blood clots between retina and choroid.</p>	<p>Tissue much disorganised, composed of a network of fibres and nuclear bodies. In the interior of some cysts a delicate network can be seen.</p>	<p>Much atrophied.</p>	<p>Deeply cupped and excavated; nerve fibres very much atrophied.</p>

Register No.	Name.	Age.	Duration and nature of affection.	External appearances.
3081	Ellen G. ..	56	Right eye went blind suddenly 6 years ago, without any pain or inflammation. A blow on the same eye 4 months ago.	T.n. V. = no p. l. Cornea has a central circular patch, discoloured with blood. Blood clots in anterior chamber.
3083	Alfred H. ..	46	Right eye injured 4 or 5 years ago; blind since then. Painful during the last few weeks.	T. + 2. V. = no p. l. Nebulæ of cornea; anterior chamber full of dark blood.
3105	James T. ..	27	Right eye lost by inflammation in early childhood; said to have been burnt with caustic.	T. - 2. V. = no p. l. Cornea flattened, vascular, and opaque.

The condition of the retina found in the above cases corresponds to what has been described by Dr. Iwanoff,* under the name of "œdema of the retina," which condition always precedes the formation of cysts. He suggests it may be due to granular or calcareous degeneration of the capillary blood vessels.

In all my cases, and also in those recorded by Mr.

* Archiv f. Ophth., 1869, vol. ii, p. 88.

Macroscopical appearances on section.	Microscopical appearances.		
	Retina.	Choroid.	Optic nerve.
Retina completely detached from ora serrata to optic disc. In the outer half two transparent cysts project from its outer surface. Lens opaque and calcareous.	Nuclear layers in places are distinctly made out. Other layers are indistinguishable. Numerous spaces of various sizes left between the trabeculae of the network of fibrous tissue of which it is chiefly composed.		
Retina completely detached from ora serrata to optic disc. At the posterior part near the optic disc are two small, cystic protrusions from its outer surface. Cyclitic membrane behind lens. Lens displaced backwards by hæmorrhage into anterior chamber. Iritic angle much narrowed.	Great increase in the fibrous tissue elements. Ganglion cells, and rods and cones almost entirely gone. The external walls of the cysts in some places exceedingly thin. Numerous small spaces throughout of various sizes.	Atrophied.	Deeply cupped. Large increase in the number of nucleated cells. Nerve fibres diminished.
Retina detached from ora serrata to optic disc. Projecting from its outer surface are several cysts of various size, one very large. There is some pigmentation on it. Lens shrunken with a calcareous patch in it.	Considerable increase in the fibrous tissue of the nerve, and in the number of nucleated cells.

Nettleship,* and in three by Mr. Lawford,† the eyes had been quite blind for some considerable time previous to the enucleation. In all these cases, too, the retina was in part detached, and in by far the majority completely so. When we reflect on the distribution of the vessels in the retina; how they pass in and out at the optic papilla; how

* Ophth. Hosp. Rep., vol. viii, p. 343.

† Ophth. Hosp. Rep., vol. ix, p. 208.

they are distributed only to the retina itself, and form no anastomoses with the choroidal vessels; how the arteries have their usual coats, while the veins consist of a single epithelial layer, outside which is a lymphatic sheath, the suggestion at once occurs that an œdematous condition of the retina would be most likely caused by some changes in the optic nerve itself; which, while being insufficient to arrest the blood-flow through the thick walled arteries, yet would cause considerable venous congestion by pressure on the thin-walled veins, and arrest in the lymphatic streams in the sheaths outside them.

I have shown in the table that a change which would be likely to produce this condition of things was present in the nerves of every case where I made a microscopical examination, and, in that none of the cases had any perception of light, I think it may be taken that some atrophic changes had occurred in them all.

If an atrophic condition of the optic nerve was sufficient to produce cysts of the retina in these cases, should not atrophies arising in other ways have a similar result? I think there is a second determining cause, and that is that the retina shall be detached. When it is supported on one side by the choroid, and on the other by a consistent vitreous, cysts do not form. When, however, the tissues are abnormally lax, with only subretinal serous fluid externally, and a fluid or shrunken vitreous internally, no obstacle is offered to the wide expansion of the lymph spaces, and effusion of fluid into the tissues around them. When this œdema has persisted for some time, a large increase in the connective tissue elements takes place, similar to what occurs in other parts of the body where the lymph streams are obstructed. Thus we find the large hypertrophied bundles of Müller's fibres, and an increase in the areolar tissue network of the retina. The reason why the outer layers of the retina yield and give rise to the cysts may be, as suggested by Mr. Lawford, that it is the direction of least resistance; or it may be due to the

arrangement of the lymphatics. In that the blood vessels are confined in their distribution to the inner layers of the retina, not penetrating the outer molecular layer, it is natural to suppose that the chief lymph supply is in the outer layers, and consequently, in the œdema, larger spaces would be formed in them.

Mr. Nettleship says:—"In two specimens which I have examined the relation of the 'œdematous' or 'cystic' part of the retina to the outer tissues of the eye was such as to suggest that some inflammatory affection of the sclerotic and choroid, followed by bulging outwards of the tissues, had been instrumental in causing the out-growth of Müller's fibres, which constitutes the most marked feature of the retinal changes."

In a third case he summarises the processes which probably occurred as follows:—"1st, adhesion of the outer surface of the retina to a small patch of choroid by inflammatory effusion; 2nd, detachment and more or less shrinking of the retina surrounding the adherent patch; 3rd, a separation of the inner and outer layers of the adherent part of the retina, with over-growth of Müller's fibres; 4th, owing to the continued retraction of the surrounding detached retina, the part which, by its outer layers, remained adherent to the choroid, became at last separated from that structure, and formed the outer wall of the cyst-like patch on the retina."

Given an œdematous condition of retina, such adhesions and such shrinkings would doubtless tend to stretch and break down thin partitions between adjoining spaces, and thus to be the determining cause as to the site at which the cysts appeared. Cases numbered 2971 and 2977 support this view. In the others, however, there is no evidence of such an explanation being applicable.

The following case is a very exceptional one; in it a cyst occurred in the retina (possibly congenital in origin), the eye being otherwise perfectly healthy. The patient was a private one of Mr. Tweedy's; he brought me the

eye to examine microscopically and has kindly given me his notes of the case to publish.

Cyst of the Retina.

Miss H., æt. 7 years, was first seen May 4th, 1889. A few months previously the parents had noticed a slight divergent squint of the right eye, and this had increased.

On examination, the right eye could only distinguish hand-movements in the lower part of the visual field. The cornea was clear and bright; the anterior chamber rather deeper than the left; the pupils of the eyes were equal. The media were clear, but from the upper and lower borders of the optic disc was a broad white band, like opaque nerve fibres, which extended circularly around the macular region. This area thus enclosed formed a prominence at the posterior pole of the eye, having a circumference of about 5 discs breadth.

The temporal side of the patch was jagged, woolly, and flocculent looking. The summit of the prominence could be seen with about +9D. and the disc with +2D.

On the surface of this area were many fine blood clots and a delicate network of new vessels; the normal retinal vessels were varicose and dilated. Some of the central vessels ran along the broad white bands, which extended from the upper and lower margins of the disc.

The case was watched for about a month, but did not undergo any material change in appearance. As a new growth was believed to exist, the eye was excised on June 24th with the concurrence of Mr. Couper, who saw the case in consultation.

Pathological Examination.—The eyeball was opened by an antero-posterior section. The anterior portions of the globe appeared quite normal. In the retina, on the outer side of the optic nerve, was found a cystic space, measuring 6 mm. laterally. Its anterior wall was thicker than the posterior; around the upper and lower margins of the cyst white lines were seen passing.

Microscopical Appearances.—The cyst is formed by a separation of the outer and inner nuclear layers, that is in the outer molecular layer. On tracing the retina from the margin of the optic disc, as it proceeds outwards the layers are not

distinct as on the inner side. The two nuclear layers and the nerve cell layer can be distinguished, but they are irregular and not sharply defined. At the margin of the cyst the two nuclear layers diverge, the inner one can be traced throughout the inner walls of the cyst, but the outer one soon becomes indistinguishable in the outer wall.

In the inner wall of the cyst numerous circular spaces are seen, which are bounded by dark, well-defined margins. In some parts, especially near the anterior extremity of the cyst, these circular spaces have united and formed larger irregular spaces of various sizes. In others, three or four of these circular spaces are in contact, separated only from one another by their dark margins. In the part of the retina beyond the cyst several similar round spaces are seen in its outer layers. In the inner wall of the cyst the blood vessels are numerous; their walls are thick and the lymphatic sheaths around them dilated. The fibres of the optic nerve lose their medullary sheaths before piercing the lamina cribrosa. The choroid beneath the cyst is healthy (Fig. 10).

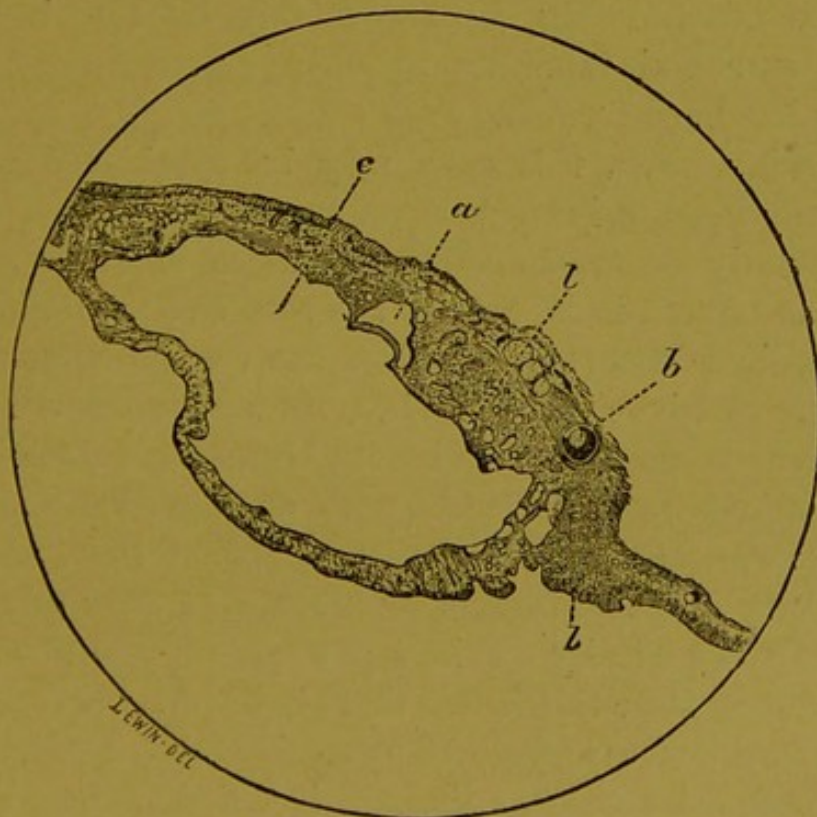


FIG. 10.—Section of cyst of the retina in the case of Miss H.
l, Dilated lymphatics. *a*, Space formed evidently by union of dilated lymphatics. *c*, Cyst. *b*, Blood-vessels.

In considering the cause of the cyst in this case, the first point, I think, is to determine the nature of the white lines which were seen encircling it both ophthalmoscopically and after excision. They were certainly not opaque nerve fibres, for the fibres of the optic nerve, as I have stated above, can be distinctly seen to lose their medullary sheaths at the lamina cribrosa. The only things that can be seen microscopically which will account for them are the small regularly circular spaces with well defined walls, the distribution of which in the parts of the retina around the cyst and in its anterior wall corresponds to that of the bands described by Mr. Tweedy. These spaces are certainly not blood vessels in section, in none of them can any red blood corpuscles be seen. They must, I think, be enlarged lymph vessels cut across. It is evident that the large cyst has been formed by the junction of numbers of these small spaces, for all stages can be found from where two or three of them are in close contact, being separated only by the dark lines which surround them, up to where an irregularly shaped cavity has been formed.

I think, then, this case may be considered to have primarily been a lymphatic nævus of the retina, and, as occasionally occurs in such structures in other parts, a cyst has formed in its centre, the result of breaking down of partitions between several of the vessels composing it. Support is given to this view by a case shown at the Ophthalmological Society by Mr. Gunn, on July 4th, 1890. The patient was a little girl with a congenitally microphthalmic eye, in the conjunctiva of which the lymphatics were very much enlarged, tortuous, and very prominent. Ophthalmoscopically a raised pale patch could be seen in the fundus. Here the fact of there being dilated lymphatics in the conjunctiva suggested strongly that the patch in the retina might be due to a similar dilatation of those situated in it.

I only know of one reported case in which a tumour of

the retina could be seen with the ophthalmoscope, and which afterwards, on pathological examination, proved to be a cyst. That is one of M. Panas.* An account of the second eye of this same patient has recently been given by Dr. Darier.† In it a tumour, presumably retinal and cystic as in the first eye, had been watched to gradually increase in size, and involve the whole fundus.

* Anatomie Pathologique de l'Œil.

† Archives d'Opht., 1890, p. 203.

the first thing which he saw in the
 morning on his arrival in the
 city. That in one of the streets
 the second eye of the same patient has recently been
 given by Dr. Darnley. It is a most singularly
 and as in the fact of the eye being
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