Catalogue of the museum of the Royal London Ophthalmic Hospital, Moorfields : part II inflammations.

CATALOGUE OF THE MUSEUM

OF THE

Royal London Ophthalmic Hospital,

MOORFIELDS.

PART II.

INFLAMMATIONS.

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DESCRIPTIVE CATALOGUE OF SPECIMENS IN THE MUSEUM.

BY

E. TREACHER COLLINS, Curator.

Series II.—Inflammations of the Eye.

Subseries (A).—*Following Ophthalmia.*

Most of the eyes included in this section had the sight in them destroyed during purulent ophthalmia by ulceration of the cornea. The two chief factors which cause ulceration in purulent ophthalmia are the lowered state of the nutrition of the cornea, due to swelling of the ocular conjunctiva bringing about an arrest of the circulation in the capillaries at its margins, from which the lymph which circulates through it is derived, and the presence of infective material in contact with it. The epithelium on the surface of the cornea in purulent ophthalmia soon becomes softened and hazy; in this condition abrasions are easily produced, through which infective material finds access. It would also seem that infection sometimes occurs through the intact epithelium, especially if the pus be kept pent up in contact with it, as it often is, by a fold of the thickened conjunctiva at the sclero-corneal margin.

The extent, depth, and results of ulceration vary considerably. The sequelæ of the severer forms are necessarily the best illustrated in this collection, composed as it is chiefly of excised eyes.

The amount of cell exudation thrown out about the base of an ulcer is not always the same; generally there is sufficient when developed into scar tissue, not only to replace the fibrous tissue of the cornea which has been destroyed, but to lead to thickening where the ulceration has occurred. (Nos. 1, 5, 19, 20, 24, and 39.) Sometimes however, it is so little that the fibrous tissue of the cornea is not replaced, and a facetted surface is left over which the epithelium spreads. In such cases, too, there is such a slight excess of cells in the substance of the cornea that it remains transparent at the seat of the ulcer (No. 28).

Perforating ulcers necessarily involve some escape of the contents of the globe: this may be only aqueous humour or it may include the lens and vitreous. After the escape of the aqueous humour the iris is brought into contact with the back of the cornea and an adhesion is frequently formed between them, the inflammatory exudation in the neighbourhood of the ulcer uniting the iris to it (No. 23). If such an adhesion involves the whole of the pupillary margin then the normal circulation of fluids through the pupil into the anterior chamber becomes arrested; and an accumulation of them occurs between the iris and lens, forcing the former forward into contact with the cornea so that the anterior chamber is obliterated and a large posterior chamber formed (Nos. 6, 7, 22, 26, 30, and 38). The obstruction to the exit of fluids from the eye which is thus brought about leads to an increase in the intraocular tension. The cornea having been recently inflamed and softened stretches before the increased pressure, becoming staphylomatous. In children the cornea and sclerotic are more elastic than in the adult, and in them frequently not only the cornea expands but the whole globe becomes enlarged (Nos. 7, 21, 26, 36, 38, and 39). The seat of perforation which has become closed by newly-formed scar tissue will remain sometimes as a thickened patch in the centre of the thinned expanded cornea (No. 39); at others it yields to the tension more

readily than the corneal tissue itself, so that on the summit of the staphylomatous cornea a second more staphylomatous part is formed (Nos. 22 and 26); or the cicatricial tissue filling the perforation may be the only part that expands, the cornea elsewhere retaining its normal dimensions (No. 34).

In severe cases of ulceration the whole cornea except a narrow ring at its extreme periphery is destroyed; when this occurs the iris is left exposed and partly prolapses (No. 30); granulation tissue then springs from its surface and unites with the rim of cornea that has been left, the pupil becoming filled by an inflammatory membrane. Ultimately the granulation tissue organises into fibrous tissue, epithelium spreads over its surface, and in this way a new, thick, staphylomatous pseudo-cornea becomes formed, lined on its inner surface by the uveal pigment of the iris (Nos. 1, 5, 19, 20, and 24. See Fig. 8).

In many cases of perforating ulcer of the cornea the lens escapes; when it does it usually leaves its capsule behind, which often remains adherent to the cornea. By such an adhesion it assumes a much more advanced position than that which it normally occupies. This advance in position is still more increased if the cornea becomes staphylomatous. The advance in the position of the lens capsule causes a dragging on the fibres of the suspensory ligament, and on their points of attachment to the ciliary body and the retina at the ora serrata. The ciliary processes become elongated, and a fold of retina from the region of the ora serrata is often drawn forward, so as to overlie to a greater or less extent the inner surface of the ciliary body (Nos. 27, 31, 32, 33, 34, and 35. See Fig. 7). A hernia or protrusion of a portion of the lens substance through a perforating ulcer occasionally occurs (No. 29).

If, after a central perforating ulcer of the cornea, the lens remains in the eye it will generally be found that an anterior polar cataract has formed. These opacities are seen microscopically to be due to a proliferation of the cells lining the

anterior capsule, which is brought about by the contact of the lens and the inflamed cornea. In some cases the opacities are raised above the surface of the rest of the lens in a pyramidal form (No. 20; Fig. 8), in others they are flat (Nos. 22, 24, 26, and 30). Tags of membrane at times pass between the scar tissue in the cornea and the centre of the capsule of the lens (Nos. 20 and 28).

When the lens and vitreous have escaped through a perforating ulcer of the cornea, the eye collapses and becomes shrunken and puckered. So great is the change that some of these shrunken eyes undergo, that the individual parts of them cannot be clearly differentiated microscopically. In most of them the sclerotic, though much diminished in area, is considerably increased in thickness (Nos. 16, 18, and 37). It also becomes puckered, the folds which form in it being usually situated beneath the insertion of each rectus muscle.

In eyes in which the cornea has become ulcerated in the course of an ophthalmia, the inflammation is frequently not limited to it. The uveal tract becomes involved, and inflammatory effusions are poured out into the anterior chamber (No. 3) and vitreous. Frequently the latter becomes shrunken and detached (Nos. 5, 15, 22, and 27), sometimes the retina is detached also (No. 15). As the result of inflammation or stretching the choroid is frequently found atrophied (Nos. 13, 15, 22, 27, 31, 36, and 39). Occasionally bone develops on its inner surface (No. 23). The pigment epithelial layer commonly undergoes extensive changes, the cells composing it growing into the substance of the retina and giving rise to patches of various irregular shapes and sizes (Nos. 11, 13, 21, 27, and 36).

No. 1.—The outer half of the left eye of a girl, aged $2\frac{1}{2}$ years. When she was six months old its cornea was ulcerated. She was very ill at that time and not expected to live, though without any definite malady. There was never much discharge from the eyes. There is a large, thick, staphylomatous cornea,

which is lined throughout by a network of the uveal pigment of the iris. The lens is absent. Its capsule, with a small amount of cortical matter still in it, is partially adherent to the cornea. The retina is in position.

No. 2.—The front half of the right eye of a girl, aged 10, who had had ophthalmia neonatorum, and perforation of the right cornea at the age of three weeks. There is a somewhat irregular staphyloma of the cornea, with its apex thinned and of a blackish colour. The iris is now almost entirely detached from the ciliary body, it is to a great extent adherent to the inner surface of the staphylomatous cornea. The ciliary body is convex instead of concave on its inner surface, probably due to detachment of it from the sclerotic: the area enclosed by its processes is considerably diminished in size. The lens was transparent; it has been removed from the specimen.

No. 3.—The lateral half of an eye, the cornea of which had been perforated from ulceration during ophthalmia neonatorum. The corneal leucoma left is afterwards said to have spontaneously suppurated, but the date at which this occurred is not stated. The cornea shows a perforation of considerable size, close to one margin, at the seat of the original opacity. In other parts it appears normal in curve, thickness, and transparency. The anterior chamber is full of pus. The iris is thickened and the pupil irregular. The lens is absent. The other parts are apparently healthy.

No. 4.—The lateral half of an eye of which there is no previous history. The cornea is flattened and has a large central depressed scar in it, in which the iris is involved. The lens is absent. The ciliary processes are drawn somewhat forwards and inwards. The vitreous is much shrunken and detached from the retina posteriorly.

No. 5.—The lateral half of the left eye of a child, aged one. When three months old it was ill for a fortnight with sores about the anus and thrush, during that time the eye became inflamed and the sight was destroyed. The cornea is represented by a thick staphylomatous mass of fibrous tissue, it is densely opaque, and lined throughout on its posterior surface

by the uveal pigment of the iris. The nucleus of the lens has escaped, an adhesion passes between its capsule and the pseudo-cornea. The vitreous is shrunken. The retina is in position.

No. 6.—The lateral half of an eye the sight of which was destroyed during purulent ophthalmia. No further history is known concerning it. The cornea is slightly staphylomatous; the much atrophied iris is spread out on its posterior surface and adherent to it. The lens is situated in its normal position, but is shrunken and calcified. The choroid and retina are in apposition, the uveal pigment on the inner surface of the former shows considerable disturbance.

No. 7.—The front part of one lateral half of an eye, the history of which is unknown. There is extreme thinning and general bulging of the part of the globe situated in front of the insertion of the recti muscles. The thinning includes all the tunics. The ciliary body and anterior portion of the choroid are extremely atrophied; on the inner surface of the latter are some well-defined patches of a pale colour due to absence of the pigment epithelium. The iris is adherent to the cornea. The retina is *in situ*.

No. 8.—The two halves of an eye, opened by an equatorial section and mounted in separate cells. The only history known concerning it is that the sight was destroyed during purulent ophthalmia. A little to one side of the centre of the cornea there is an irregular prominent opacity. The iris is adherent at the seat of the opacity, and elsewhere is in contact with the posterior surface of the cornea. A small semitransparent mass at the back of the iris is all that remains of the lens and its capsule. The retina is in position and apparently healthy. There is a narrow crescent of choroidal atrophy at the outer margin of the optic disc, exactly such as is seen in myopia.

No. 9.—The front half of the right eye of a boy, aged $1\frac{1}{3}$. The sight of it had been destroyed by a perforating ulcer of the cornea due to purulent ophthalmia in infancy. At the time of excision the T. was +1 and the cornea opaque at the centre but clear at the periphery. The centre of the back of the

cornea is covered by a patch of black pigment; between this and the margin of the iris is an irregular belt of cornea free from pigment, elsewhere the iris is in contact with the back of it. The ciliary processes are stretched forwards and atrophied. The lens is absent.

No. 10.—The front half of the left eye of a girl, aged 9. The sight of it was destroyed during purulent ophthalmia in infancy. At the time of the excision the tension was increased. The whole cornea is enlarged, in its lower part is a thickened patch of cicatricial tissue. The much stretched and atrophied iris tissue lines the whole of the posterior surface of the cornea, except in the region of the scar. The ciliary area is greatly increased in size, the ciliary processes are atrophied, the lower half of them being scarcely distinguishable. The lens is small and round in shape, it is suspended from the upper part of the ciliary body, its suspensory ligament elsewhere being absent; a few shreds only of the vitreous are left. The optic disc was deeply cupped.

No. 11.—The front part of the lateral half of a left eye. It was excised when the patient was 18 years old, the sight having been destroyed during purulent ophthalmia in infancy. There is a central pigmented scar in the cornea. The iris is everywhere in contact with the cornea; behind it is some grey tissue, probably remnants of the lens and shrunken vitreous, adherent to which is a narrow fold of retina. Behind the ora serrata there is considerable pigmentation of the retina, in the form of densely black dots and branching lines.

No. 12.—The posterior half of the right eye of a man aged 22. The sight of it was destroyed by purulent ophthalmia in infancy. At the time of excision the globe was somewhat shrunken and the cornea was opaque with calcareous deposit in it. The choroid is considerably atrophied, especially in the neighbourhood of the optic disc. The pigment epithelium behind is almost entirely absent; in front it is very irregular, being arranged in the form of little circular patches some of which are complete rings. A certain amount of this pigment is in the retina, as can be seen where the latter is separated from the choroid at the line of section.

No. 13.—The posterior half of the eye of a girl which had a large anterior staphyloma; there is no further history respecting it. The choroid and retina were in apposition when the eye was first opened, but the latter has become partly displaced. The choroid is much atrophied, especially in the region of the yellow spot, where there is a large patch through which the sclerotic shines. The pigment epithelium on the inner surface of the choroid shows considerable disturbance; in places it is absent altogether, in others it is accumulated in the form of spots and rings. At the equator of the globe there are many patches of pigment in the substance of the retina. The optic disc is deeply cupped.

No. 14.—Portions of the right eye of a girl, aged 11, the sight of which had been destroyed by purulent ophthalmia. The sclerotic and cornea are preserved in two halves to show the shrunken and thickened condition of the former; by the side of these parts is a small, irregular cup of bone, with a central aperture in it posteriorly for the passage of the optic nerve. Much brownish choroidal tissue is left adherent to its external surface.

No. 15.—The two lateral halves of an eye mounted in separate cells. All that is known concerning it is that it was blinded during infancy by purulent ophthalmia. The globe is much shrunken and somewhat flattened from before backwards owing to alteration of the corneal curve. The cornea is flattened and considerably diminished in diameter; the iris lies in contact with its posterior surface, there being no anterior chamber. The lens is absent and the vitreous is much shrunken and opaque. The retina is detached from the optic disc up to the ora serrata, but retains its adhesion at these points; it is shrunken but quite membranous. The pigment epithelium on the inner surface of the choroid is much disturbed, it presents a somewhat "worm-eaten" appearance.

No. 16.—The two lateral halves of an extremely shrunken eye, mounted in one cell. It was removed from a person, aged 50, on account of inflammation and pain, which had come on shortly before. The sight of it had been lost during purulent ophthalmia in infancy. The globe measures 7 mm.

antero-posteriorly and 9 mm. laterally, it is somewhat conical in shape, the optic nerve forming the apex of the cone. The cornea is reduced to a minute disc, it could be recognised previous to excision by its transparency. The sclerotic is thickened. The lens and vitreous are absent.

No. 17.—The lateral half of a shrunken puckered globe. It was removed from a man, aged 65, who had had the sight destroyed in it by inflammation 42 years previously, while he was in India; an operation had been performed on it, but no sight was regained. Very little corneal tissue is left, what is, is opaque. The sclerotic is thickened, and puckered beneath the insertion of each rectus muscle. The lens and vitreous are absent. What remains of the iris is adherent to the posterior surface of the cornea. The retina is detached, remaining adherent only at the optic disc and ora serrata; it is shrunken into a thick cord which passes through the centre of the globe. On the inner surface of the choroid is a large cup of bone.

No. 18.—The lateral half of the much shrunken eye of a boy, aged 9 years. The sight of it was destroyed during purulent ophthalmia in infancy. It is roughly diamond-shaped; the iris is in contact with the cornea, there being no anterior chamber. The sclerotic is much thickened. The lens and vitreous are absent. The retina, much crumpled, is displaced forwards; it is seen as a greyish-green mass behind the iris. The anterior portion of the choroid and the posterior part of ciliary body are detached from the sclerotic, the suprachoroidal lymph space being considerably enlarged. On the inner surface of the choroid at the posterior part is a nodule of bone.

No. 19.—The lateral half of the right eye of a girl, aged 1 year. Four days after birth she had diphtheritic ophthalmia, the ocular and palpebral conjunctiva being covered with a thick greyish membrane which would not peel off. Extensive ulceration and perforation of the cornea ensued. Occupying the position of the cornea is a dense mass of fibrous tissue thicker above than below, it is lined on its inner surface by a network of uveal pigment. The lens and its capsule are absent. The anterior hyaloid of the vitreous comes forwards and is attached

to the cornea. There are several rucks in the retina just behind the ora serrata. The uveal pigment is absent from the surface of the choroid in places, it has probably become detached in mounting the specimen.

No. 20.—A ring section from the centre of the left eye of a boy, aged 3. The sight of it was destroyed during purulent ophthalmia in infancy. The central portions of the cornea are replaced by a thick, dense, prominent mass of fibrous tissue, upon the posterior surface of which the uveal pigment of the iris is spread out. A small portion of the extreme periphery of the normal cornea has been left; with the posterior surface of this the iris is in contact, the angle of the anterior chamber being closed. The whole globe is much enlarged and there are several patches of atrophy in the choroid from stretching. The optic nerve, which is not shown in the specimen, was cupped. The lens is very small, there is a markedly prominent pyramidal opacity at its anterior pole; between the apex of this and the back of the pseudo-cornea some pigmented tissue passes. The fibres of the suspensory ligament can be seen passing horizontally inwards from the ciliary processes to the sides of the lens.

No. 21.—The lateral half of the right eye of a woman, aged 38. The sight of it was destroyed by purulent ophthalmia in infancy. The globe is increased in size, especially in its antero-posterior diameter. The cornea is much enlarged, its curve is the same as that of the sclerotic; above it is much thinned, below there is a thickened patch in it. The iris, much atrophied and stretched out, is intimately adherent to the whole posterior surface of the cornea. A shrunken nodule of lens matter is left, which has calcareous deposit in it and is adherent to the thickened part of the cornea; from this calcareous nodule grey bands pass backwards to the ora serrata, being all that remains of the vitreous. Both retina and choroid are much atrophied, the former is in position. There has been considerable disturbance of the uveal pigment layer, some of it has grown forwards into the substance of the retina. The optic nerve is deeply cupped.

No. 22.—The lateral half of the left eye of a girl, aged $4\frac{1}{2}$. The sight of it was destroyed by purulent ophthalmia during

infancy; the tension at the time of excision was increased. The whole globe is much enlarged; antero-posteriorly it measures 30 mm., and vertically 26 mm. The cornea is considerably larger than normal, it is opaque and thinned; in its centre there is a nodule projecting above the rest of its surface, this is the position at which perforation occurred; the whole of its inner surface is lined by stretched and much atrophied iris tissue. The lens is *in situ*; it is very much flattened from before backwards and has a grey opacity at its anterior pole. The fibres of the suspensory ligament pass straight out from its sides to the elongated ciliary processes. The retina is in position. There are some patches of atrophy in the choroid from stretching. The vitreous is shrunken and detached posteriorly. The optic disc does not show in the specimen, it was found to be cupped.

No. 23.—The lateral half of the left eye of a man, aged 20. The sight of it had been destroyed by inflammation when he was 5 years old. He had had no pain in it until a few weeks previous to excision. The globe is somewhat shrunken and misshapen; there is a pucker in the sclerotic beneath the insertion of each rectus muscle. The lower part of the cornea is thickened and opaque, the iris is here adherent to it. A large space is left between the posterior surface of the iris and the lens; which latter is shrunken and has a calcareous patch in it. The vitreous is shrunken and fibrous, and the retina detached and puckered. There is a wide separation of the ciliary body and anterior portion of the choroid from the sclerotic. On the inner surface of the choroid is a thick cup of bone and on the inner surface of the lower part of this, between it and the detached retina, is some yellow caseous looking material with cholesterine crystals in it.

No. 24.—The lateral half of the left eye of a boy, aged 2. The sight of it was destroyed from purulent ophthalmia at the age of 4 months. The tension at the time of excision was increased. A thick mass of opaque fibrous tissue, lined by the uveal pigment layer of the iris, occupies the position of the cornea. The lens is round and, when the eye was first opened, lay in contact with the uveal pigment on the back of the

pseudo-cornea. At its anterior pole is a small white opacity, which microscopically is seen to be situated on the inner surface of the hyaline capsule. The vitreous is shrunken and the retina *in situ*.

No. 25.—The inner half of the left eye of a boy, aged 15. It became inflamed three weeks previous to excision, and nearly the whole cornea sloughed away. The iris, with a thick stratum of organising granulation tissue on its surface, protrudes through the perforation. The granulation tissue has become united with the narrow ring of cornea which was left. The lens is pushed forwards, remaining in contact with the posterior surface of the protuberant iris; it is opaque and much altered in shape, its posterior surface being concave. The vitreous, when the eye was first opened, was of good consistency and the retina in position.

No. 26.—The lateral half of the left eye of a woman, aged 25, which first became inflamed 10 months previous to excision. The whole cornea is much enlarged and staphylomatous, a portion of it more so than the rest; there is a general mottled opacity of it, and some pigmentation of the central more prominent part, where the iris is intimately adherent to its posterior surface. Elsewhere the iris is in contact with the cornea, much stretched and atrophied. The lens is in its normal position, a large space being left between its anterior surface and the iris. At the anterior pole of the lens is a small, white, slightly raised opacity. The retina is *in situ*.

No. 27.—The two lateral halves of a left eye mounted in one cell. It was removed from a woman, aged 21, and the sight of it had been destroyed by purulent ophthalmia in infancy. In the ciliary region, extending from the margin of the cornea backwards as far as the ora serrata, at the upper part of the globe is a large localised staphyloma. The sclerotic is here very thin and the ciliary body much atrophied, it being reduced to nothing but a network of uveal pigment. The whole cornea is opaque and somewhat thickened, it has the atrophied iris adherent to its posterior surface. The lens is absent. A large fold of retina is prolonged forwards from the region of the ora

serrata and overlies the lower part of the ciliary body in the inner half of the globe. One piece of this fold of retina comes as far forward as the centre of the cornea, to which it is attached. Elsewhere the retina is *in situ;* there are numerous fine dots of pigmentation in it. The vitreous is much shrunken and detached. The optic disc is deeply cupped and excavated.

No. 28.—The lateral half of the left eye of a boy, aged 12. A month previous to excision he had purulent ophthalmia and a perforating ulcer of the cornea. An extensive excavation is now seen occupying more than half its lower part; this, in the recent state, was quite clear, except in the centre, where perforation has occurred and where the iris is adherent. The lens is in position and apparently healthy. When the eye was first opened the vitreous was of good consistency and the retina *in situ.*

No. 29.—The lower half of the left eye of a woman, aged 76. About a fortnight previous to excision she had ulceration of the cornea and hypopyon, which were treated with the actual cautery and paracentesis. The ulcer ultimately perforated. The specimen shows considerable excavation and thinning of a large area of the cornea and a perforation about its centre; through the perforation a large portion of the lens, surrounded by its capsule, is protruding. At the margin of the excavated surface there is some yellow infiltration of the cornea; the iris is in contact with it posteriorly, there being no anterior chamber. Except for the hernia of the anterior and outer part of the lens through the perforation in the cornea, it is not much displaced; there is no break in the continuity of its capsule. The sclerotic and choroid in the equatorial region on the outer side are thin and staphylomatous. Between the choroid and sclerotic posteriorly, and the ciliary body and sclerotic on the inner side are blood clots.

No. 30.—The lateral half of the right eye of a man, aged 20. Nearly the whole of its cornea was destroyed by ulceration during an attack of gonorrhœal ophthalmia, which commenced a month previous to excision. The iris, much thickened, is seen protruding through the perforation that was left. The pupil

is closed by an inflammatory membrane, and the cornea at the margins of the perforation is united with the thickened iris. The lens is *in situ*, a large space exists between it and the posterior surface of the iris; at its anterior pole is a small, flat, white opacity. The retina has numerous rucks in it; it is doubtful if these were present previous to excision.

No. 31.—About the fourth part of an eye which has been opened by an antero-posterior vertical section. It was removed from a child, aged 4; the sight of it had been destroyed by purulent ophthalmia in infancy. The antero-posterior diameter of the globe is much increased, it measures 29 mm. The cornea is opaque and very staphylomatous. The iris is adherent throughout to the posterior surface of the cornea: in the central parts it is much atrophied, the pigment being spread out in the form of a thin network; at the periphery it is much thicker, the pigment there being very dense. The sole remnant of the lens and its capsule is a small, triangular, greyish, fibrous-looking mass adherent to the back of the iris; the fibres of the suspensory ligament can be seen passing backwards from this. A fold of retinal tissue is prolonged forwards from the region of the ora serrata, it overlies and partly conceals the ciliary processes; the fibres of the suspensory ligament are attached to it. Elsewhere the retina is *in situ*.

No. 32.—The lateral half of the right eye of a boy, aged 15. The sight of it was destroyed by purulent ophthalmia in infancy. The tension at the time of excision was increased. The centre of the cornea is densely opaque, the iris is adherent to its posterior surface throughout. An extensive fold of retina, which is now grey and opaque, is prolonged forwards from the region of the ora serrata overlying and concealing the ciliary body. The indentations of the ora serrata are much exaggerated. In the other half of the globe, fibres of the suspensory ligament were seen passing from the teeth of the ora serrata to a small grey nodule attached to the back of the cornea, which was all that remained of the lens and its capsule. Except for this fold in the region of the ora serrata, the retina is in position. There is some disturbance of the uveal pigment layer at the anterior part of the choroid.

No. 33.—About two-thirds of the anterior half of the right eye of a man, aged 35. The sight of it had been destroyed in childhood, and it seemed to be giving rise to symptoms of sympathetic irritation in the left. The upper part of the cornea is staphylomatous, thin, and opaque; the iris is in contact with, or adherent to, the whole of its posterior surface. The lens is

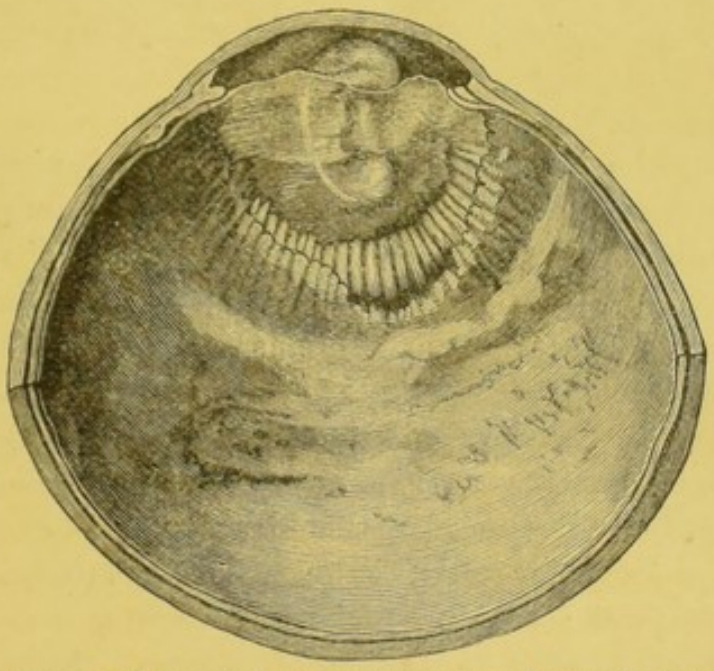

FIG. 7.—Specimen 33, showing the retina drawn forwards from the region of the ora serrata over the ciliary processes by the adhesion of a shrunken lens capsule to a staphylomatous cornea.

much shrunken and forms a flattened, nodulated mass attached to the back of the cornea, the fibres of the suspensory ligament can be seen passing from its sides to the much elongated ciliary processes. These latter are partly concealed by a fold of retina which is prolonged forwards from the normal position of the ora serrata (Fig. 7). The indentations of the ora serrata are much increased in size. There is some atrophy and disturbance of the uveal pigment at the anterior part of the choroid.

No. 34.—The outer half of the left eye of a girl, aged 18, the sight of which was destroyed by purulent ophthalmia in infancy. The globe is enlarged, there is considerable bulging and thinning of its tunics posteriorly on the outer side of the optic nerve, and also a staphyloma at the sclero-corneal margin above. In the centre of the cornea is a dense white leucoma.

The whole of the posterior surface of the cornea and that of the staphylomatous part at its margin is lined by much atrophied iris tissue, which is intimately adherent to its posterior surface. The only remains of the lens and its capsule is a circular, grey patch attached to the back of the iris : from the sides of this the fibres of the suspensory ligament are seen to radiate to a fold of retina which is drawn forwards from the region of the ora serrata and overlies the ciliary body. Elsewhere the retina is *in situ*.

No. 35.—The lateral half of the left eye of a boy, aged 6, the sight of which was probably destroyed by purulent ophthalmia in infancy. Its tension at the time of excision was +3. The cornea is small, much flattened, and leucomatous; it possesses much the same curvature as the sclerotic. Adherent throughout to its posterior surface is the iris, also a nodule of grey tissue, the sole remains of the lens and its capsule. Passing from the sides of this grey nodule are seen the fibres of the suspensory ligament of the lens; some of them are attached to a fold of retinal tissue which has become drawn forwards from the region of the ora serrata, overlying and completely concealing the ciliary processes. Elsewhere the retina is *in situ*. The optic disc is deeply cupped.

No. 36.—The two lateral halves of the right eye of a woman, aged 30, mounted in one cell. The sight of it was destroyed during purulent ophthalmia in infancy. There is a dense, white opacity in the centre of the cornea, where it is of about its normal thickness, laterally it is thin and staphylomatous. The width of the globe in the ciliary region is considerably increased. The whole of the posterior surface of the cornea is lined by much atrophied iris tissue, which is intimately adherent to it. A small grey nodule attached to the centre of it is all that remains of the lens and its capsule, fibres of the suspensory ligament are seen to pass off from it. A fold of retina is drawn forwards from the region of the ora serrata and partly overlies the ciliary processes, elsewhere it is in position. There is extensive atrophy of the choroid and pigmentation of the retina, in the form of dots and branching irregular patches. The optic disc is deeply cupped.

No. 37.—The two lateral halves of the shrunken right eye of a girl, aged 10. They are mounted in one cell. The sight of it was destroyed by purulent ophthalmia in infancy. The globe is roughly diamond-shaped, it measures only 12 mm. antero-posteriorly and 11 mm. vertically. No cornea is left; the sclerotic is considerably thickened. The lens is absent, some irregularly pigmented tissue fills the interior of the globe; the separate parts of the uveal tract and retina cannot be clearly distinguished.

No. 38.—The lateral half of the left eye of a child, aged 3. The sight of it was destroyed by purulent ophthalmia during infancy. The whole globe is much enlarged, it measures 29·5 mm. antero-posteriorly and 23·5 mm. vertically. The cornea is considerably increased in size, and thinned, atrophied iris tissue is intimately adherent to the whole of its posterior surface. In its centre there is a fold of pigment which projects backwards and from which passes a band of grey membrane to the anterior capsule of the lens. The lens appears shrunken and flattened, probably its nucleus has escaped. The ciliary area is increased in width and the fibres of the suspensory ligament are much stretched. The vitreous is detached from the ora serrata up to the optic disc, at which points it remains attached. The retina is *in situ*. The optic disc is cupped.

No. 39.—The two lateral halves of the left eye of a child, aged 1½ years. The sight was destroyed by purulent ophthalmia, commencing when he was three days old. Antero-posteriorly the globe measures 32 mm. and vertically 25 mm. The cornea is staphylomatous, there is a thick mass of cicatricial tissue nearly in the centre of it which projects above the rest of its surface. The iris, much atrophied, is stretched out on the posterior surface of the cornea, being adherent in the region of the cicatricial tissue. A small remnant only of the lens is present which has a tag of adhesion to the back of the cornea, from its sides the fibres of the suspensory ligament are seen to radiate. The vitreous is very shrunken. The retina is *in situ*, some of its pigment epithelium has become separated in preparing the specimen. The choroid has large areas of atrophy in it, and the optic disc is deeply cupped.

Subseries (B).—*Following or in course of some Acute Febrile Disease.*

Inflammation of the eye in connection with one of the acute febrile diseases may start primarily in the cornea or in one of its internal tunics. Ulceration of the cornea may be occasioned in several different ways. In all forms of severe illness in which the patient lies for days unconscious, with the lids imperfectly closed, the cornea is liable to become abnormally dry and finally to break down and ulcerate.

Children after an attack of measles or scarlet fever are very liable to phlyctenular ophthalmia, in which, if treatment is neglected, severe ulceration of the cornea occurs. They may also in the enfeebled condition resulting from an attack of fever become affected with a rapidly-progressing form of keratitis and ulceration, which is called kerato-malacia; this seems to be due to marked lowering of the nutrition of the cornea.

The form of keratitis which follows an attack of small-pox is due not to the formation of a pock on the eye, but to the occurrence of an abscess in the cornea. It appears usually after the pocks on the skin have passed away, often during convalescence. It is metastatic in origin. Abscesses of the cornea occur in connection with other acute specific fevers besides small-pox.

The changes produced in eyes as the result of ulceration following one of the acute specific fevers, are similar to those which have been described in the previous section as following on ulceration the result of ophthalmia. In the same way, if the whole cornea becomes destroyed the iris protrudes, granulation tissue growing in it, which subsequently develops into fibrous tissue and forms a staphylomatous pseudo-cornea (Nos. 7, 9, 12, and 14. Fig. 8); or, if the ulceration has been less extensive, complete adhesion of the pupillary margin of the iris to the cornea

may occur, and the normal cornea become expanded (Nos. 1, 8, and 13). When a large escape of the contents of the globe has occurred it becomes shrunken and puckered (Nos. 4, 10, and 11). The choroid often becomes atrophied (Nos. 1 and 3), and bone or colloid nodules (Nos. 5, 10, and 13) may develop on its inner surface. The retina is frequently detached (Nos. 5, 6, and 15).

Inflammation of the eye in connection with an acute febrile disease, which starts primarily in either the uveal tract or retina, may be embolic in origin or due to the direct extension of the inflammation of the eye from surrounding parts; as from the meninges along the optic nerve in cases of meningitis, or possibly along the ocular vessels in cases of orbital cellulitis. In many of the cases it is difficult to say in which of the above ways the eye inflammation originated. In some the inflammation is infinitely more severe than in others; in some the inflammatory products degenerate and break down into pus, which, if the eyes are left sufficiently long, points, and ultimately escapes through a perforation, which occurs from within outwards (No. 16). In these severer cases also, the orbital tissues become much infiltrated and adherent to the sclerotic (Nos. 16, 17, and 18). In the milder cases the inflammatory products are of a more plastic character, and, instead of breaking down, tend to organise into fibrous tissue, the contraction of which leads to considerable displacement and alteration in the relation of the parts within the eye. Eyes in which these changes have occurred often present many symptoms similar to those of *glioma retinæ*, and hence are spoken of clinically as cases of *pseudo-glioma*.

The inflammatory products which have been thrown out into the vitreous sometimes unite it completely or in part to the inner surface of the retina; when organisation and contraction occur the retina becomes separated from the choroid and often much puckered (Nos. 19, 20, 21, 22, 23, 25, and 27). Sometimes portions of the retina which

did not become united to the vitreous get ballooned out and look very like cysts in it, for which they might be mistaken (Nos. 22 and 23).

If the inflammatory exudation, besides being thrown out into the vitreous, passes forwards into the circumlental space and adheres to the posterior surface of the iris at its periphery, then on its organisation and contraction the root of the iris becomes retracted and the anterior chamber deepened at its periphery (No. 22, 23, and 25). In such cases also there is usually some shallowing of the anterior chamber centrally, from the protrusion forwards of the lens by the contracting band of fibrous tissue behind it (Nos. 23 and 25). The fibrous tissue which forms in the vitreous in these cases, and which stretches across the ciliary region, is often spoken of as a cyclitic membrane (Nos. 19, 20, 22, 23, 25, and 27); its contraction may lead to separation of the ciliary body and anterior portion of the choroid from the sclerotic, and enlargement of the loose lymphatic tissue between them. Intimate adhesion usually exists between a cyclitic membrane and the posterior capsule of the lens. Contraction of the former leads to puckering of the latter, and in this way a small protrusion of the lens at the posterior pole may be produced (No. 25). Other alterations in the lens are also frequently found, its nutrient fluid is cut off by the changes in the ciliary body, it consequently degenerates, becomes cataractous and shrinks; thickenings occur on the inner surface of its capsule, which may be the seat of calcareous deposit (Nos. 22 and 27).

In many cases the inflammation is confined to retina and ciliary body, the choroid or iris not being involved. Should the latter be affected, adhesions form between it and the anterior capsule of the lens. Such an adhesion may involve the whole length of the iris (total posterior synechiæ) or only its pupillary border. If the margin of the pupil becomes completely adherent fluids are unable to pass through it, they then accumulate behind the iris

and bow it forwards, producing the condition known as *iris bombé* (Nos. 22 and 26).

In those eyes in which the retina has become detached, either a thin fluid or a gelatinous substance is found filling the space left between it and the choroid. In most of the specimens this gelatinous substance has been removed. It is probably a highly albuminous fluid which exuded from the choroidal vessels and coagulated. In this gelatinous substance the pigment epithelial cells which line the inner surface of the choroid frequently undergo proliferation, giving rise to a whitish fawn-coloured substance. Sometimes the cells undergo fatty degeneration, and cholesterine crystals are formed. Little hard masses are occasionally found adherent to the inner surface of the choroid, produced from proliferated and degenerate pigment epithelial cells (No. 21).

No. 1.—The front half of the right eye of a man, aged 29. The sight of it was lost after small-pox; no further details or dates are known. The equatorial diameter of the eye is considerably increased. The cornea in the recent state was opaque and irregularly staphylomatous. The ciliary area is increased in size, and the suspensory ligament on one side has given way, allowing the lens to be displaced to the opposite. The part of the ciliary body left exposed by this displacement of the lens, is covered with a rather thick layer of opaque, grey, inflammatory tissue. The iris, so far as can be seen, is free from any adhesion to the cornea. The retina in the recent state was found detached, but the choroid was in apposition with the sclerotic; the former has partly been removed and the latter, which in places is much thinned, has on one side become displaced.

No. 2.—The front half of an eye which has been divided into two pieces: these are mounted in separate cells. It was removed from a woman, aged 25. Nothing is known of the history except that it was lost through small-pox. The centre of the cornea is considerably thickened; connecting its posterior surface with the anterior capsule of the lens is a small white band of tissue, and the lens capsule is drawn forwards by this

adhesion. There is a delicate adhesion between the iris and the cornea on one side of this white band. The lens, now opaque, lies loose in the cell.

No. 3.—The lateral half of the left eye of a woman, aged 20. It became inflamed during an attack of small-pox when she was seven years old. The whole cornea is opaque, densely so in the centre; it is thickened and more prominent than usual. The whole of the anterior surface of the iris is adherent to the cornea; a thin tag of white membrane is seen to pass from the margin of the pupil to its centre. The lens is in position, a large space being left between it and the back of the iris; at its anterior pole is a small flattened white opacity. The retina is detached for a short distance both above and below. The optic disc is slightly cupped.

No. 4.—The lateral half of a very shrunken eye. It was removed from a woman, aged 30. The sight of it was destroyed during an attack of small-pox when she was three years old. A small opaque remnant of cornea only is left. The sclerotic, which is much thickened and very puckered, has a deep depression in it beneath the insertion of each rectus muscle. The lens is absent; there is some deeply pigmented tissue in the anterior part of the globe, but the individual structures in its interior are so altered they cannot be differentiated.

No. 5.—The two lateral halves of a right eye, mounted in one cell. It was removed from a woman, aged 45. It first became affected 25 years previously during an attack of small-pox. Since then it had twice been operated on, and had frequently been inflamed and painful; lately symptoms of sympathetic irritation had developed in her other eye. The cornea is much flattened; down and in there is a white opacity with calcareous deposit in it. There is no anterior chamber, and the iris is adherent to the cornea. A small quantity of lens substance only is left in the capsule, which is also adherent to the cornea at the seat of the opacity. There is an umbrella-shaped detachment of the retina; the uveal pigment layer is atrophied, the choroidal blood-vessels showing plainly through. On the

inner surface of the choroid around the optic disc is a thick plate of bone.

No. 6.—The lateral half of the right eye of a woman, aged 66. The sight of it was destroyed 55 years previously while she was recovering from an attack of small-pox. Recently it had become painful, and the tension was increased. The cornea appears clear. There is no anterior chamber, the iris being pushed forwards into close contact with the cornea. The pupillary margin of the iris was adherent to the lens, but the latter, which is completely calacareous, has become somewhat displaced backwards in mounting the specimen. The retina is detached below from the optic disc up to the ora serrata; above it is detached for a short distance anteriorly, but adherent to the choroid posteriorly.

No. 7.—The lateral half of the right eye of a girl, aged 7. It became affected during an attack of measles about six months previous to excision. The tension was increased at the time of excision. The mass of fibrous tissue which has replaced the

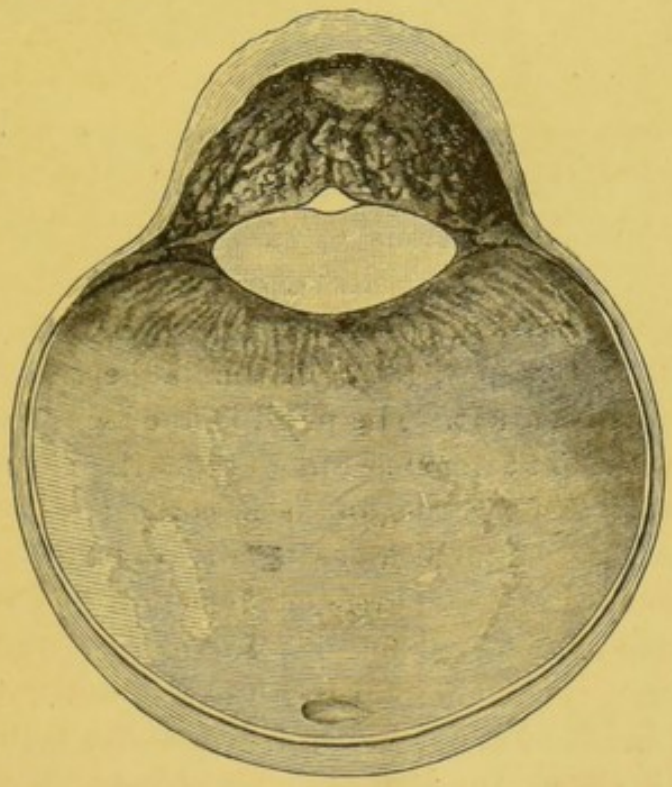

Fig. 8.—Specimen 7, showing the thick mass of fibrous tissue which has replaced the normal cornea, lined by a network of the uveal pigment of the iris; also a pyramidal-shaped anterior polar cataract.

cornea is densely opaque and staphylomatous. It is lined throughout by a network of the uveal pigment of the iris, its thickness is about twice that of the normal cornea. The lens is *in situ*, a large space being left between it and the uveal pigment on the back of the cornea; at its anterior pole is a raised white opacity (Fig. 8). The vitreous is rather thin in consistency. The retina is in position, and the optic disc cupped.

No. 8.—The lateral half of the right eye of a girl, aged 2. Eight months previous to excision she had an attack of measles, which was followed by ulceration of both corneæ. There is a considerable staphyloma of the cornea; a large extent of it has evidently been destroyed by ulceration and been replaced by scar tissue, on the inner surface of which iris tissue, much atrophied, is seen to be spread out in the form of a network. Elsewhere the iris is in apposition with the back of the cornea, and a large space is left between the iris and lens. The lens is in position; it has a grey, pyramidal, raised opacity at its anterior pole. The vitreous is shrunken and detached posteriorly. In mounting the specimen some of the uveal pigment has become separated from the inner surface of the choroid. The retina is *in situ*, and the optic disc is cupped.

No. 9.—The lateral half of the right eye of an infant, aged 18 months. It had become inflamed during an attack of measles, two weeks previous to excision. The whole cornea, except a small portion at its extreme periphery, has been destroyed by ulceration. Through the perforation thickened iris tissue is protruding; it has become adherent to the rim of cornea that has been left. The pupil is filled with an inflammatory membrane. The lens is absent, and the vitreous, opaque and yellow, comes forwards, and is in contact with the back of the thickened iris. The vitreous is adherent to the retina, and in its contraction and displacement forwards has detached the latter from the choroid. There is also some separation of the anterior portion of the choroid from the sclerotic. Most of the uveal pigment has become separated from the inner surface of the choroid in the preparation of the specimen.

No. 10.—The two lateral halves of an eye, mounted in

separate cells, of a patient, aged 26. It was lost after scarlet fever, but there is no record of the date of the illness, or other particulars. The globe is considerably shrunken, but of normal shape, antero-posteriorly it measures 18·5 mm. and vertically 19·5 mm. The cornea looks normal, but is somewhat diminished in diameter and thickness. The lens has been removed from the specimen; there is no record of its condition. The pupil is small and irregular, the iris was probably adherent to the lens capsule. The vitreous is shrunken and fibrous, and in its contraction has drawn forwards the retina from the choroid and the optic disc. On the inner surface of the choroid is a layer of opaque fibrous tissue, with bony deposit in it in places; bands pass between it and the outer surface of the retina.

No. 11.—The lateral halves of the anterior part of an eye of a boy, aged 4. The sight of it was destroyed after an attack of scarlet fever, but nothing further is known concerning it. The globe is much shrunken and quite filled with tough, firm, whitish, fibrous tissue, in one part of which some pigment can be seen, probably that of the ciliary body. The only part that can be definitely recognised as belonging to a normal eye is the sclerotic. The cornea cannot be identified.

No. 12.—The two lateral halves of an eye, mounted in one cell. It was removed from a boy, aged $3\frac{1}{2}$, and became inflamed during an attack of scarlet fever eight weeks previous to excision. The whole cornea has been destroyed by ulceration, and a fungating mass, composed partly of thickened iris tissue, is protruding anteriorly. The lens is absent. The choroid and retina cannot be differentiated, the whole interior of the globe being filled with a suppurating mass. The sclerotic is thickened.

No. 13.—The two lateral halves of the left eye, mounted in one cell. It was removed from a girl, aged 12. Ten years previously the sight of it had been destroyed, after an attack of what was called "gastric fever." The whole globe is enlarged. The greater part of the cornea has probably been destroyed by ulceration. The fibrous tissue which has replaced it varies in

thickness in different parts. The whole of its posterior surface is lined by the much atrophied and spaced out uveal pigment of the iris. The lens occupies its normal position, but is much shrunken and opaque; a large space is left between it and the back of the iris. The choroid and retina are *in situ*, and appear healthy.

No. 14.—The lateral half of the left eye of a man, aged 40. Nine months previous to excision he had typhoid fever; while he was laid up with this, he says he had an attack of erysipelas of the face which caused sloughing of the lid and ulceration of the cornea. He was delirious at the time. The whole cornea is opaque and staphylomatous; it is thicker in the centre than at the sides, but is mostly thinner than normal. The posterior surface of the cornea is lined throughout by the atrophied iris, little but its uveal pigment layer remaining. The lens is *in situ*. The vitreous is somewhat shrunken and detached from the ora serrata up to the optic disc. The retina was in position when the eye was first opened, but is now slightly displaced.

No. 15.—The inner half of the left eye of a man, aged 32. The sight of it was destroyed 20 years previous to excision during an attack of typhoid or typhus fever, the patient was not sure which. The globe is shrunken, but of good shape; there is a central leucoma of the cornea to which the iris is adherent. The lens is of a dense white colour and calcareous throughout. The vitreous is much shrunken, fibrous, and adherent to the retina, which latter is completely detached from the ora serrata up to the optic disc. Scattered over the whole of the inner surface of the choroid are numerous little granules like grains of pepper. Microscopically these are found to be hyaline bodies amongst the pigment epithelium; some, near the posterior part, are green in colour and have calcareous deposit in them.

No. 16.—The lower half of the left eye of a woman, aged 42. Twelve days previous to its removal she had an attack of influenza; on the fourth day of the attack the eye, which previously was perfectly good, became severely inflamed, and rapidly got worse. The day before the enucleation a gathering appeared about her

left thumb-nail, which broke and discharged matter. The globe is much altered in shape; there are two perforations in it, one posteriorly, made during enucleation, and one externally, at about the seat of insertion of the external rectus muscle: through this latter some of the contents of the globe has escaped, and some yellow and infiltrated tissue is prolapsing. The cornea appears healthy. The lens is absent. The choroid is thickened; here and there there are large yellow masses in it. The orbital tissues are very adherent to the outer surface of the sclerotic.

No. 17.—Portions of the front and back halves of the left eye of a woman, aged 50. About three weeks previous to its excision she suffered with an attack of frontal headache, pains in the back, and depression, like ordinary influenza (of which there was much about at the time). There were no complications except congestion at the base of one lung. Temperature was not raised. Six days after the attack slight pain was noticed in the left eye, then the sight became dim and the lids and conjunctiva began to swell, but there was no discharge. The swelling increased and the eyeball became much proptosed and almost completely fixed. There was no cardiac or renal disease, no arthritis, and no discharge from the ears. A few days previous to excision the pain became very severe. The anterior chamber was very deep, a yellowish-white reflex was seen through the pupil, and she was unable to distinguish light from dark. The orbital tissues around the posterior half of the globe are considerably thickened and intimately adherent to the sclerotic. Both choroid and retina are much thickened, the latter can hardly be distinguished from the yellow mass of suppuration in the vitreous. The anterior chamber is deep and is filled with a slightly blood-stained coagulated mass. The ciliary body and anterior portion of the choroid are somewhat separated from the sclerotic by distension of the lymphatic tissue between them. The vitreous immediately behind the lens is much infiltrated and yellow.

No. 18.—The two halves of one eye, divided by an antero-posterior vertical section, and the lateral half of its fellow eye, mounted in three separate cells. The two former are labelled (*a*)

and (*b*) and the latter (*c*). The eyes were removed from a patient who died of pyæmia and had suppurative panophthalmitis. The changes are best displayed in (*a*) and (*b*). There is very marked thickening of the sclerotic and of the orbital tissue, which are intimately adherent to it. The cornea in (*c*) has probably sloughed quite away. In (*b*) is seen a deep ditch-like ulcer near the corneal margin, which has partly given way, allowing the iris to protrude. Everywhere the cornea is yellow and opaque. The choroid is irregularly detached from the sclerotic in front of the equator: it is much thickened, and of a yellowish colour. The epithelial pigment lining it is recognisable only at and in front of the ora serrata. The retina is thickened and detached except at the optic disc and ora serrata. The vitreous is a mass of pus; part of it has been removed. The lens is not exposed by the section in (*a*) and (*b*); probably it escaped from (*c*) when the cornea gave way.

No. 19.—The lateral half of the left eye of a child, aged $1\frac{1}{2}$. It was excised because it was thought to contain a gliomatous growth, a white reflex being seen behind the lens. The mother had been married four years, and had had one miscarriage and one stillborn child before the birth of the patient. There is no further history. The globe is small; the cornea is clear and appears normal, as also do the iris and lens.

The vitreous is shrunken, infiltrated, and opaque. The retina is thickened, folded, and detached from the optic disc up to the ora serrata.

No. 20.—The two lateral halves of an eye, mounted in one cell. One-half was hardened in spirit, and the other was kept in pure glycerine for several years. The eye was removed from a child, and before excision it was thought to contain a tumour; no further history is known concerning it. The cornea, anterior chamber and iris seem normal. The lens is now opaque. The retina is detached from the choroid and from the optic disc. It is much shrunken and puckered, and forms, together with shrunken and fibrous vitreous, an opaque mass behind the lens. The choroid appears healthy.

No. 21.—A ring section of the left eye of a child, aged 3.

Two months previous to excision the mother first noticed a bright reflex in it. No history could be obtained of any illness having preceded the eye affection. It was excised on the possibility that it contained a glioma of the retina. The anterior chamber is exceedingly shallow. The lens in the recent state was much pushed forwards; it has now become somewhat displaced backwards. The vitreous is much shrunken. The retina is detached from the ora serrata up to the optic disc. Projecting from the inner surface of the choroid near the optic disc are some little brown nodules about the size of hemp seeds; they microscopically seem to have been produced by proliferation and degeneration of the pigment epithelial cells.

(Recorded in R.L.O.H. Reports, vol. xiii, p. 384.)

No. 22.—The lateral half of the left eye of a girl, aged 12. It was stated to have been bad since "brain fever" two years previous to excision. The anterior chamber is of very unequal depth on the two sides. The pupillary margin of the iris is adherent to the lens capsule, and on one side it is bowed forwards almost into contact with the cornea; while on the other the root of the iris is much retracted by the contraction of fibrous tissue which is adherent to it. The lens is small and opaque; just within its capsule is a line of denser white opacity. The vitreous is much shrunken and fibrous. The retina is detached from the ora serrata up to the optic disc; it is much puckered and folded, and is intimately adherent to the shrunken vitreous; some of the folds in it have become ballooned out with fluid, so as to almost fill the space originally left between the detached retina and choroid.

No. 23.—The lateral half of the right eye of a girl, aged 17 months. Two months previous to excision the mother noticed that the child did not seem well: she was restless at night and sick; afterwards a peculiar appearance was noticed in the eye, and it was found to be blind. The cornea appears normal. The anterior chamber is shallow in the centre and deepened at the periphery, due to advance in the position of the lens and retraction of the root of the iris. The root of the iris and the ciliary body are both drawn backwards and in-

wards by the contraction and formation of fibrous tissue in the vitreous. The retina is detached from the optic disc up to the ora serrata. The anterior portion, which is adherent to the shrunken vitreous, is much puckered. On one side a fold of the detached retina is ballooned out.

No. 24.—The outer half of the right eye of an infant, aged 1 year and 10 months. When 14 months old she had several fits, and six days previous to excision was taken acutely ill with sickness, shivering, and retraction of head. The inflammation in the eye commenced two days later. At the time of excision a white reflex was seen from behind the lens, which was taken to be due to a gliomatous growth of the retina. Subsequently her ears were examined, and perforation of the right tympanic membrane was discovered, together with an abscess in the tympanum. The child died six weeks after excision, and the *post-mortem* examination showed extensive basal meningitis. The cornea, iris, and lens appear healthy: in the recent state there was a patch of yellow lymph on the centre of the anterior capsule, which filled the pupil, previous to its being dilated with atropine; this has been removed from the specimen. There is extensive yellow infiltration of the vitreous, which is most marked at the periphery, the central parts being clear. When the eye was first opened the vitreous was everywhere in contact with the retina; in mounting the specimen it has become somewhat detached posteriorly. The retina and choroid are *in situ*.

(Recorded in R.L.O.H. Reports, vol. xiii, p. 387.)

No. 25.—The lateral half of the left eye of an infant, aged 10 months. Three months previous to excision he had a discharge from his right ear, and a month later a rash on the skin of his arms, legs, and buttocks. He had never had any fits or other illness. For two weeks his mother had noticed something wrong with the eye, and, on examination, a white reflex was seen from behind the lens. The eye was excised on the possibility of its containing a gliomatous tumour of the retina. The anterior chamber in the centre is exceedingly shallow, the lens and the pupillary margin of the iris being almost in contact with the back of the cornea; at its periphery it is deeper, due to

retraction of the root of the iris. The lens has a small rounded knob projecting from it at its posterior pole. The vitreous is much shrunken and fibrous; it has a patch of dense yellow infiltration in it. The retina is detached from the choroid everywhere right up to the ora serrata: its anterior part where it is adherent to the shrunken vitreous is much puckered.

(Recorded and figured in R.L.O.H. Reports, vol. xiii, p. 391.)

No. 26.—The lateral half of the right eye of a boy, aged 6. Three months previous to its removal he had an acute illness which lasted for five weeks. During this time his eye became inflamed, and his knee joints were affected. When first seen, a month before excision, the pupil was occluded and the iris *bombé*. An iridectomy was performed. At the time of excision the tension was −3, and he had no perception of light. The iris is in contact with the back of the cornea, and its pupillary margin is adherent to the anterior capsule of the lens. The vitreous is very shrunken, forming a yellowish-grey membrane stretching across the ciliary region behind the lens. The retina is *in situ*: it is much swollen around the optic disc. Between the shrunken vitreous and the retina is a grey substance of a gelatinous consistency.

No. 27.—The lateral half of the left eye of a girl, aged 3. Six months previous to its excision she had a severe illness, which commenced with a fit and unconsciousness. Her left knee became swollen, and during the first fortnight of her illness the eye became affected. She subsequently had a rash all over her. The globe is considerably shrunken. The sclerotic is thickened. There is a shallow anterior chamber at the periphery; hardly any in the centre. The central portions of the lens were fluid, and have escaped; its capsule is thickened, densely white, and has some calcareous deposit in it. The vitreous is exceedingly shrunken and fibrous; it has a dense yellow patch in it about the centre. The retina is completely detached from the choroid; it is drawn forwards and much puckered. A tag of retina is still attached to the optic disc, but this is not continuous with the main mass anteriorly.

Subseries (C.)—*Tubercular.*

Tubercle when it occurs in the eye commences in some portion of the uveal tract, either iris (Nos. 1 and 5), ciliary body or choroid (Nos. 3, 4, 6, and 7), but any of its parts may become involved. Thus tubercle of the iris not uncommonly invades the cornea, and may lead to its perforation (No. 1), and tubercle of the choroid may extend to the retina (No. 4), sclerotic, or optic nerve (No. 3), complete giant-cell systems being found in these structures.

Tubercle of the eye affects it in either one of two ways:—(1) In the form of small, scattered, miliary nodules, which are seen either as grey or pale yellow circular patches in either iris or choroid (No. 6), and which are generally secondary to tubercle in other parts of the body. (2) As aggregate masses (Nos. 1, 2, 3, 4, 5, and 7. See Fig. 9), a form not so common as the scattered nodules, but better illustrated in this collection, because eyes so affected more often have to be excised. When a large mass of tubercle occurs in the choroid, the symptoms it presents may very closely simulate those presented by glioma of the retina (Nos. 3 and 4). Posterior synechiæ are more often seen in connection with tubercle than with glioma, but their absence does not exclude tubercle, and their presence does not exclude glioma. On section of a mass of tubercular tissue, areas of degeneration can frequently be seen in it due to caseation (Nos. 1, 2, and 3).

No. 1.—The lateral half of the right eye of a child, aged 5. It first became inflamed about two months previous to excision. There was no family history of consumption in the mother's family, but a possible history in the father's. The anterior chamber is very deep, and there is a mass of yellow lymph in it. The iris and ciliary body are enormously thickened by large masses of new growth, which are in contact with the cornea at its periphery. At the lower part the new growth has

invaded the cornea, and has nearly perforated it. The vitreous is shrunken, opaque, and detached posteriorly. The retina is *in situ:* it and the choroid appear healthy. Microscopically the new growth is seen to present the typical histological appearances of tubercle.

No. 2.—Half a rabbit's eye opened by an antero-posterior section; it had been inoculated with tubercle. The upper part of the iris is seen to be involved in a mass of grey-coloured new growth, which has invaded and perforated the cornea. There is a collection of lymph in the lower part of the anterior chamber. The other parts of the eye appear healthy.

No. 3.—The lateral half of the right eye of a boy, aged 2. It was said to have been bad about 10 weeks previous to excision. The globe is much enlarged, measuring 22 mm. antero-posteriorly and 20 mm. vertically. The sclerotic bulges posteriorly, and is of a grey colour. The lens is misshapen, being rounder than normal. The whole of the posterior part of the globe is filled with a greyish-yellow flocculent mass. No pigment layer separates it from the sclerotic, which latter is thickened. In front of the greyish-yellow mass is seen the detached and crumbled retina, only separated from the back of the lens by the remains of the shrunken and fibrous vitreous. There is some separation of the ciliary body and sclerotic anteriorly. Microscopically the greyish-yellow mass presents the typical appearances of tubercle; there are areas in it of caseous degeneration.

No. 4.—The lateral half of the right eye of a boy, aged $3\frac{1}{2}$. It was said to have had "a skin" on it since an attack of measles a year previous to excision. During the last three weeks it had been inflamed. At the time of excision the eyeball was prominent; it was deeply injected; there were posterior synechiæ; the lens was opaque, and the tension was +1. The anterior chamber is deep, and filled with a gelatinous substance. On one side its angle is closed by the apposition of the root of the iris and the periphery of the cornea. The lens is

much flattened from before backwards, and of a brown colour, due to the Müller's fluid. The retina is detached from the optic disc up to the ora serrata; in front it appears to be in contact with the back of the lens. Behind it is much thickened and of a yellowish-grey colour, that coming from the two sides of the eye appearing to be in apposition. Between the retina and choroid is a quantity of gelatinous substance which is streaked with yellow. The choroid posteriorly is thickened. Microscopically, numerous typical giant-cell systems of tubercle are seen in the thickened choroid and in the posterior part of the retina.

No. 5.—The lateral half of the left eye of a child, aged 2, who had growths on the iris of varying size, which had increased greatly during the four weeks preceding excision. The glands along her sternomastoid muscles were enlarged, and she had recently had hooping cough, from which she had not quite recovered. The whole iris is much thickened; three

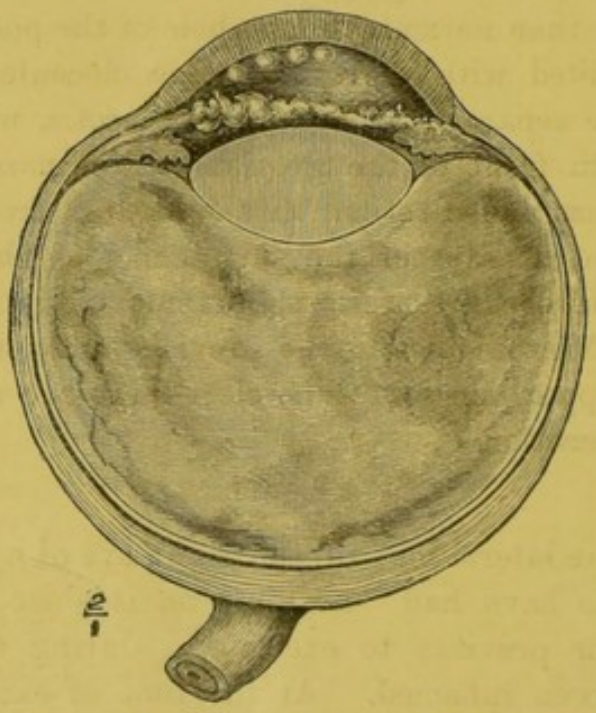

FIG. 9.—Specimen 5, showing the thickening of iris with tubercular growth and nodules of tubercle on the posterior surface of the cornea.

yellow nodules about the size of pins' heads are seen in it at the point of section; they protrude from its anterior surface into

the anterior chamber. On the back of the cornea, at the lower part, four smaller yellow nodules are seen. Microscopical examination shows these several nodules to be made up of typical tubercular giant-cell systems. The other parts of the eye appear healthy.

No. 6.—Portions of the sclerotic and choroid of three separate eyes mounted in one cell. They were taken from the eyes of three different patients, all of whom died of tubercular meningitis. The retina has been removed from all three pieces; to two the optic nerve is still attached. In each specimen several small circular grey patches are seen: they are slightly raised, the largest of them is not as big as a pin's head, and the smallest are about half that size.

No. 7.—The lateral half of the right eye of a woman, aged 56. She first came under observation six months previous to excision; she then had a cataract in it. Four months later it became inflamed and painful, and the tension became increased. After a week's treatment with eserine these symptoms were not relieved, so a large iridectomy was done, and the cataract extracted. The inflammation continued; a quantity of opaque cortical matter filled the pupil, and the wound began to bulge. A month after the extraction the left eye became inflamed, and its tension increased. The extraction scar is seen as a yellowish line near the upper corneal margin. The upper part of the iris is absent; the lower part, together with a large quantity of lens matter which has been left, is pushed forwards into contact with the back of the cornea. The whole of the choroid, iris, and ciliary body are thickened by a greyish-coloured new growth. The thickening of the choroid is most posteriorly around the optic nerve. Microscopically the new growth is seen to consist of numerous giant-cell systems. The retina is much folded and detached from the ora serrata up to the optic disc. There is some filamentous material between the detached retina and choroid.

Subseries (D).—*Syphilitic. Acquired and Inherited.*

The eye may be affected during any stage in the course of an attack of syphilis. Cases have been met with in which a hard chancre has formed on the ocular conjunctiva ; it is necessarily an exceedingly rare occurrence, and there is no specimen of such a condition in this collection. Iritis may occur as early as the second month after the appearance of a chancre : it is more usual for it to come on about the sixth month. The inflammation in the iris may be diffuse, or characterised by the formation of greyish nodules of various sizes, none usually larger than a pin's head (Nos. 5 and 6). These nodules are generally found located at the pupillary or ciliary margin of the iris, the intermediate zone being free from them. They become absorbed and do not break down into pus, leaving sometimes a depression in the iris tissue where they were situated. In the later stages of syphilis, after the first year, gummata may form in the iris ; they are larger than the nodules above described and often involve other structures as well. In the course of an iritis adhesions usually form between the iris and the lens capsule (No. 5). If there has been much effusion into the anterior chamber an adhesion may also form between the iris and back of the cornea at its periphery ; some softening of the walls of the globe may then occur in this position, causing it to yield before the intraocular tension, and a staphyloma at the sclero-corneal margin will be produced (No. 7). The inflammation in syphilis may be limited to the iris, ciliary body or choroid, or all these structures may be implicated. In syphilitic choroiditis there are usually numerous, scattered, separate patches of inflammation, some of which may run into one another and become confluent. When the inflammation subsides patches of atrophy are left in the choroid, through which the white of the sclerotic shows (Nos. 1, 2, 3, 8, and 9).

In most cases of choroiditis the retina becomes involved.

The two tunics become united, the uveal pigment layer between them being much disturbed; it is usually absent in the centre of the patches and heaped up at the margins (Nos. 3, 8, and 9). The pigment epithelium proliferates and grows into the substance of the retina, giving rise to pigmentation of it; sometimes it gets into the sheath of the blood-vessels and follows their course for a short distance; in this way the star-shaped and branching patches are produced (Nos. 1 and 4). In most cases of choroido-retinitis there is some effusion of inflammatory products into the vitreous, giving rise to opacities in it. Effusion also occurs into the vitreous in the course of a cyclitis, which may develop into fibrous tissue on the inner surface of the ciliary body (Nos. 1 and 3). In a cyclitis inflammatory products become mixed with the newly-secreted aqueous humour. These, on being carried forwards into the anterior chamber, are deposited on the posterior surface of the cornea and give rise to punctate opacities.

In inherited syphilis the uveal tract is liable to an inflammation similar in character to that which occurs in the acquired form. The same circular patches of atrophy are left in the choroid with the heaping up of the uveal pigment at their margins (Nos. 11, 12, 13, and 15).

The most common affection of the eye to meet with in connection with inherited syphilis is a parenchymatous keratitis, an affection which but rarely occurs in the acquired form of the disease. It is frequently, but not always, associated with iritis, and there may be severe iritis with little or no keratitis. The keratitis is characterised by the effusion of a number of small round cells into the substance of the cornea, which gives rise to an opacity. These do not break down into pus, but are absorbed after the cornea has become vascularised; and when the blood has ceased to circulate through the newly formed vessels the cornea may entirely regain its transparency. Sometimes, however, the absorption of the inflammatory products is not complete; they then develop into fibrous tissue, a

permanent opacity being left (Nos. 11 and 12). The cornea, during an attack of interstitial keratitis, is softened, and in severe cases is liable to expand before the intra-ocular pressure and become staphylomatous (Nos. 11, 12, and 15).

The position and extent of the opacity in a case of interstitial keratitis, and the amount of vascularisation which occurs are very variable. As a rule the cornea never ulcerates during an attack; there is, however, one rare class of cases in which ulceration does occasionally occur. In these the whole cornea becomes vascular, and presents the appearance of a ripe cherry, except for one spot in the centre, which is infiltrated and yellow; this patch may break down and ulcerate, sometimes perforating (No. 14).

No. 1.—The two halves of a right eye, opened by an equatorial section and mounted in separate cells. It was removed from a person aged 46; the vision of it had been lost suddenly 12 years previously. Besides other signs of syphilis there were those of choroiditis preceding the present state of the eye. The choroid is extensively atrophied, especially posteriorly, where the white colour of the sclerotic shows very plainly through it. The pigment epithelium on the inner surface of the choroid is much disturbed, being almost entirely absent in some parts; in others it is collected into dots, streaks, and variously-branched figures of different sizes, some of which are in the substance of the atrophied retina. In the interior of the eye, in the region of the ora serrata, for about two-thirds of its circumference, is a crescentic band of fibrous-looking tissue. Its convex outer border merges with the thickened opaque retina, its concave inner one, which is thin and sharp, projects towards the hyaloid fossa. The cornea, sclerotic, and iris appear healthy. The lens is shrunken and calcareous, and dislocated into the anterior chamber.

No. 2.—One lateral half of the front part of an eye. It was removed from a man aged 28. The diseased state of the organ

is said to be due to secondary syphilis; no further history is known. The iris is in contact with the cornea, and the pupil is very irregular from the presence of adhesions to the lens capsule. The ciliary area is much increased in size by atrophy of the ciliary processes. Behind the ora serrata the sclerotic and choroid are very much thinned; these thinned parts bulge outwards, and form a staphyloma of oblong shape, the long axis of which is parallel with the circumference of the cornea. The thinning of the tunics has occurred in patches which in places have run together; where the atrophy has advanced most the choroid is barely recognisable. The lens is opaque and probably was so in the recent state. It is also displaced laterally, but this has probably occurred since the removal of the eye.

No. 3.—The lateral half of the front part of an eye affected with syphilitic choroiditis and cyclitis. No further history is known concerning it. In the choroid, near the ora serrata, may be seen a number of minute dark rings formed by slight heaping up of the pigment epithelium. Each ring encloses a light-coloured dot from which the epithelium is absent. (These changes may be well seen with a magnifying power of 20 or 30 diameters.) From the ora serrata there passes inwards, across the hyaloid fossa, a fibrous-looking membrane having in some parts considerable thickness. The lens has probably been removed. The other parts of the eye look normal.

No. 4.—One-half of the hinder part of an eye which had suffered from repeated attacks of syphilitic iritis. No further history known concerning it. The retina is in apposition with the choroid; it is opaque over an area about $\frac{1}{4}$ inch wide which has the optic disc for its centre, but elsewhere is transparent and only slightly opalescent. The transparent part is covered by a close network of rather wide black lines and dots, which, when magnified, are seen to have very much the same arrangement as the retinal capillaries. The choroid shows no signs of disease, either to the naked eye or when magnified 75 diameters.

No. 5.—The front half of an eye from which the cornea and

sclerotic have been removed. It was excised from a man aged 56, having been blind for 18 years from detachment of the retina; the last two months it had become inflamed and painful. At the time of excision the tension was increased and the iris was *bombé*. Since the eyeball was opened the iris has fallen back into contact with the lens; there are adhesions between its pupillary border and the anterior capsule. In the substance of the iris, at its pupillary margin and at its extreme periphery, are seen several nodules, all smaller than a pin's head, some of them well defined. These nodules are confined to the parts mentioned, none of them being situated in the central portions of the iris. On magnifying, grey lines are seen passing across the pupil; in the recent state these contained blood.

No. 6.—The front half of an eye from which the cornea and sclerotic have been removed. It was excised from a woman aged 47. Two and a half months previously an iridectomy had been performed on it, the tension at that time being +2, the iris *bombé* and the pupil closed. There is no note as to the cause of the iritis. The whole of the coloboma is seen to be filled with a yellow inflammatory membrane, and the lower part of the iris is stretched and drawn upwards. In the substance of the iris, chiefly at its ciliary border, and in the ciliary body, are numerous, small yellow nodules, the largest about the size of a grain of rape seed and the smallest only just visible to the naked eye.

No. 7.—The inner half of the right eye of a woman, aged 38. Six months previous to its excision she suffered from a rash on the skin, sore throat, and loss of hair; three months later iritis set in in both eyes. Between the upper sclero-corneal margin and the commencement of the ciliary body there is a large staphyloma of the sclerotic, the whole of the inner surface of which is lined by stretched and atrophied iris. The pupil is oval in shape and much displaced upwards; there is some adhesion at its lower part to the anterior capsule of the lens. The whole of the pupillary margin of the iris is preserved in the specimen. The lens is in position, and apparently healthy.

The vitreous is shrunken and detached posteriorly. The retina, when the eye was first opened, was *in situ*.

No. 8.—The posterior part of an eye opened somewhat behind the equator. The only history concerning it is that the diseased condition was the result of syphilis. The retina is transparent and *in situ*. Near the cut edge of the specimen is a large group of spots and patches of atrophied choroid. The smallest of these are only just visible to the naked eye; the largest isolated spots are about 1 mm. in diameter; all the separate spots are round, or nearly so. Some of the larger ones have run together, and an irregularly shaped and unevenly pigmented patch of atrophy of large size is the result; part of this large patch has been removed in the anterior half of the eye.

No. 9.—Part of the front half and the whole of the posterior half of an eye, mounted in separate cells. It was removed on account of perforation of the cornea, escape of the lens and vitreous, and detachment of retina. Previously there had been several attacks of syphilitic iritis, but no further details are known. The eye is considerably shrunken, and the front half puckered. The cornea is small, and the iris and retina are adherent to it at the seat of perforation. The latter is detached from the optic disc up to the ora serrata, and is much folded. On the inner surface of the choroid, at the equator, and behind it, are numerous small black dots of various shapes, some round, and some oval, others like a dumb-bell, or branched and knotted. Magnified 30—75 diameters they are seen to be distinctly raised, and are probably "colloid" in nature. The epithelium between these bodies is normal in parts, but there are numerous spots and patches from which it is absent. The choroid shows no patches of atrophy, and there is no pigmentation of the retina.

No. 10.—The two lateral halves of the right eye of a woman, aged 31. Fifteen years before its removal she had an attack of iritis in it. The lens became opaque, and was extracted three weeks before excision, being followed by the escape of a large quantity of watery vitreous. The history of syphilis was indefinite. The cornea is flattened; the greater part of the lens

and a large piece of the iris are absent. In the portion of the globe situated between the ora serrata and the equator there are extensive changes in the retina and choroid. There is considerable heaping up of the uveal pigment, and growth of it into the substance of the retina. There are circular patches of atrophy in the choroid, with rings of pigmentation around them. The pigment is chiefly distributed in circular patches, but in places the patches have run together and formed large areas. The posterior parts of the choroid and retina appear healthy.

No. 11.—The front half of the eye of a lad, aged 18, who was the subject of congenital syphilis; there is no further history known concerning it. The cornea is opaque and irregularly enlarged; the iris is in close apposition with it throughout, and very much thinned. The pupil is central, small, and irregular. A large space is left between the back of the iris and the lens, which is in its normal position. In the anterior portion of the choroid there is considerable atrophy, and heaping up of the uveal pigment on its inner surface. The patches are, when isolated, small and round; where numerous, they have more or less coalesced.

No. 12.—The lateral half of the left eye of a man, aged 28. He was the subject of congenital syphilis. Nine years previous to excision the eye became affected with well-marked keratoiritis. The tension of the eye became increased, and the cornea gradually enlarged. The antero-posterior diameter of the globe measures 32·5 mm., and the vertical 23 mm. The cornea is opaque, thinner, and larger than normal; it has numerous bleb-like patches on its surface, which microscopically are seen to be composed of loose, œdematous fibrous tissue, immediately beneath the epithelium. Nearly the whole of the anterior surface of the iris is adherent to the periphery of the cornea, only its pupillary margin remaining free. The ciliary area is much widened. In mounting the specimen, the lens has slightly fallen forwards, some of the uveal pigment has become separated from the inner surface of the choroid, and the retina has become partly detached. In the anterior portion of the choroid, at and in front of the equator of the globe, there are numerous circular patches of atrophy and of heaping up of the uveal

pigment; in places these patches are isolated; in others they have run together and formed larger ones.

No. 13.—The lateral half of the left eye of a woman, aged 20, who had the typical physiognomy and teeth of congenital syphilis. Six months previous to excision the eye became inflamed, and she had interstitial keratitis in it. Three months later the sight of it was destroyed by a wound with a piece of wire. The globe is shrunken and flattened antero-posteriorly. The sclerotic is thickened, and the cornea small and opaque. The iris is in contact with the cornea; the lens is absent. The vitreous is fibrous and much shrunken; it forms a grey layer behind the iris, to which the puckered and detached retina is adherent. The inner surface of the choroid presents a very mottled appearance, which is seen microscopically to be due to disturbance of the uveal pigment layer, from the presence of numerous colloid nodules on the inner surface of the elastic lamina. In the neighbourhood of the optic disc several circular grey patches are seen in the choroid.

No. 14.—The front part of the lateral half of the eye of a girl, aged 11. She had the typical physiognomy of inherited syphilis, and scars at the angles of her mouth; her teeth, however, were regular and well-formed. When she first came to the hospital, a year and ten months previous to excision, both corneæ were hazy and infiltrated and at the margins there were very fine networks of blood-vessels; these gradually encroached on all sides towards the centre of the corneæ. Then the centre of each cornea became ulcerated, that of the right perforating. At the time of excision the tension of the right eye was +2. The cornea is prominent, opaque, and towards the centre much thickened. The iris on one side is adherent to the cornea in its whole length. On the opposite side its root is in contact with it for some distance. The lens has become somewhat displaced in mounting the specimen.

(Recorded in R.L.O.H. Reports, vol. xi, p. 339.)

No. 15.—The anterior half of the right eye of a woman, aged 25; the cornea has been cut away. She had the typical notched and screwdriver-shaped teeth of inherited

syphilis, and a suggestive physiognomy. She was also deaf, and had had kerato-iritis in her left eye. There is general thinning of the sclerotic at the margin of the cornea, and considerable prominence of it on the inner side. The iris was much atrophied, and lined the inner surface of the cornea. The circumlental space is considerably increased in size, especially on the inner side, and the fibres of the suspensory ligament of the lens are much stretched. In the non-plicated portion of the ciliary body there is a large oval patch of atrophy, which allows the white of the sclerotic to be seen through, and about which there is considerable disturbance of pigment. In the portion of choroid immediately posterior to the ora serrata, are numerous small circular patches of atrophy, with rings of pigment around them.

Subseries (E).—*Sympathetic. Exciting and Sympathising Eyes.*

An eye is said to suffer from sympathetic inflammation when an inflammation originating in the fellow eye has passed over to it. The inflammation in what is called the exciting eye may be slight or severe; it is always of a sero-plastic and not a suppurative type, and it is characterised by the diffusion of nodules of round cells throughout the uveal tract. Microscopically, thickening of the choroid or iris can generally be seen (Nos. 1, 2, 4, and 8). It always follows on some perforation of the globe, most often a wound inflicted accidentally (Nos. 1 and 2), though occasionally after operations for glaucoma (No. 8) or extraction of cataract (No. 7). An eye with an ulcer of the cornea which has perforated may sometimes excite sympathetic ophthalmitis (No. 6), and also one containing a sarcoma of the choroid which has become inflamed and in which the cornea has become perforated (No. 5). No well authenticated case has been recorded in which inflammation of the fellow eye has been excited by a sarcoma of the choroid in which the globe was not perforated. Wounds with an entanglement of

the iris (Nos. 1, 2, and 7), or involving the ciliary body, seem especially prone to give rise to sympathetic mischief.

The attack of inflammation in the sympathising eye commences generally from one to two months after the receipt of injury (Nos. 1, 2, 3, 6, and 8). It may, however, occur as early as three weeks after, or several years may elapse (No. 7), during which time the exciting eye may remain quite quiet; usually in such a case a history of a fresh attack of irritation in it can be obtained, preceding by some weeks the inflammation in the sympathiser. The inflammation in the sympathising eye, like that in the exciting one, is of a sero-plastic type and is characterised by the diffusion of nodules of round cells throughout the uveal tract. These nodules can sometimes be seen by the naked eye as little grey or yellow patches (Nos. 9 and 13). There is also frequently some retinitis, and often very early in an attack the optic disc is seen to be swollen (Nos. 10 and 12). Another very early symptom is the presence of punctate opacities on the posterior surface of the lower part of the cornea, due to deposition on it of inflammatory cells contained in the aqueous humour and derived probably from the secreting area of the ciliary body. The amount of inflammatory exudation in a case of sympathetic ophthalmitis varies considerably, it may be so little that macroscopically scarcely any changes are visible in the globe (No. 14). On the other hand, the vitreous may become extensively infiltrated (No. 10), and a large quantity of lymph accumulate in the anterior chamber (No. 12). Inflammatory exudation of a very plastic character frequently unites the posterior surface of the iris in the whole of its length to the anterior capsule of the lens (Nos. 12 and 13), so that it becomes impossible to dilate the pupil with atropine, and very difficult to remove any of the iris by an iridectomy.

No. 1.—The lower half of the right eye of a man, aged 28.

Six weeks previous to excision he had a wound of the cornea, and a prolapse of the iris, which was snipped off the next day. A month later there was ciliary injection, increase of tension and pain, and an iridectomy was performed upwards. Five weeks after the injury to the right eye, ciliary injection and keratitis punctata were noted in the left. There is a vertical scar in the cornea about 2 mm. distant from its outer margin. Below it extends up to, but not beyond, the sclero-corneal margin. The cornea in the neighbourhood of it is slightly thickened. A portion of the iris from the outer side has been removed, but not right up to the ciliary body, a large portion of the root remaining, the cut end of which is attached to the corneal scar. There is very slight adhesion of the iris to the lens capsule. On the back of the cornea and anterior capsule of the lens is a thin layer of lymph. The choroid is much thickened posteriorly, the thickening gradually diminishing from the optic disc forwards. The retina in the neighbourhood of the disc also appears somewhat swollen. When the eye was first opened the retina was *in situ*, and the vitreous was of good consistency and not detached. In mounting the specimen the parts have become displaced.

No. 2.—The upper half of the right eye of a boy, aged 10. Nine weeks previous to excision he was cutting a piece of string with a knife which slipped up into his eye. The fellow eye became affected with iritis eight weeks after the accident. The globe is shrunken and the sclerotic misshapen. A retracted scar passes nearly vertically right across the centre of the cornea. The iris on one side is absent, on the other it is adherent to a mass of cicatricial tissue, which passes from the scar in the cornea to a membrane stretching across the ciliary region. The lens is absent. The membrane stretching across the ciliary region is fibrous tissue, which has developed in the vitreous, and which, by its contraction, has somewhat separated the ciliary body from the sclerotic. The retina is detached from the choroid up to the ora serrata. The choroid is thickened.

No. 3.—Portions of the much shrunken right eye of a man, aged 71. About eight months previous to its excision the sight

failed in it, and an operation was performed on it at another hospital. It became quite blind soon after the operation and began to shrink. The sight of his left eye commenced to fail a month after the operation on the right. At the time of the excision of the right there were spots of keratitis punctata and posterior synechiæ in the left. The globe, besides being shrunken, is much flattened antero-posteriorly. The cornea is small, opaque, and flat. The iris is adherent to its posterior surface, there being no anterior chamber. The lens is absent. The interior of the globe is filled by a tough, semi-translucent, greyish material, in which traces of choroid can be made out by its pigment. Some retina can be seen extending forwards from the region of the optic disc.

No. 4.—The lateral half of the left eye of a man, aged 62. Five and a half years previous to excision it was struck by the handle of a rake, after which the sight began to fail. Eighteen months later he was noted to have in his left eye a cataract, defective projection, and tension +1. Six months before excision the left eye was operated on at another hospital. The patient states that his right eye was inflamed and painful at that time, and has continued so since. On examination it was found to have considerable ciliary injection and iritis. The globe is somewhat shrunken, and there is a pucker in the sclerotic beneath the superior rectus muscle. In the lower and outer part of the cornea is a depressed scar, with considerable greyish-yellow opacity around it. The lower part of the iris and the lens are absent. The upper part of the iris is much thickened. Behind the iris, and adherent to the posterior surface of the cornea in the region of the scar, is a mass of opaque greyish-yellow tissue, probably shrunken and infiltrated vitreous. The retina is detached from the ora serrata up to the optic disc; between it and the choroid are large blood clots. The choroid is much thickened, especially anteriorly.

No. 5.—The lateral half of the right eye of a man, aged 50. The sight of the eye began to fail without pain four years previous to excision, in three months it had almost completely gone. A week before excision "something burst in the eye and water ran out." The pain then became very severe, and he

noticed for the first time that the left eye was becoming dim. In it ciliary congestion and posterior synechiæ were found, and, subsequent to excision of the right, keratitis punctata appeared, the aqueous became muddy and the vitreous hazy. A dark irregularly pigmented solid tumour fills the posterior part of the globe; it is somewhat mushroom-shaped, with a broad base of attachment to the posterior part of the sclerotic external to the optic disc. It is pale in the centre, becoming darker at the edges. The cornea is thickened in an irregular manner and flattened; there was a central perforation of it, this is not shown in the specimen. The iris is adherent to the cornea and atrophied. The lens is absent. Between the iris and the front surface of the tumour is a space 3 mm. in breadth, filled with old blood clots. The retina and vitreous are not visible. The choroid is detached anteriorly, and distinctly thickened. It is continuous with and involved by the tumour. The optic nerve appears not to be implicated by the growth.

(Recorded in R.L.O.H. Reports, vol. xi, p. 43.)

No. 6.—The lateral half of the left eye of a woman, aged 60. Three months previous to excision it first became inflamed and painful, and, a few days later, "burst and bled"; since then there has been no sight in it. Two months later it again became painful, and a week before excision her right eye became tender and the sight of it got dull. On examination of the right, deep ciliary injection and many posterior synechiæ were found. The cornea is somewhat bulged forwards, it is opaque, and in its centre is a perforating ulcer through which the iris is protruding. The anterior chamber is quite obliterated, the iris being everywhere in contact with the back of the cornea. The lens is displaced, its lower part being tilted forwards, and adherent to the cornea. It is irregular in shape, having a protuberance projecting from its lower and posterior part. The vitreous is shrunken and detached posteriorly. The retina and choroid are *in situ*.

No. 7.—The lateral half of the right eye of a man, aged 63. Ten years previous to excision it was operated on for cataract. He had never been able to see with it since; it gradually shrank. For the last three or four years his left eye had been

irritable, on and off, and for 15 months it had been severely inflamed. The pupil of the left eye was irregular. There were circular dotted opacities on the posterior surface of the cornea, and numerous floating opacities in the vitreous. The globe is much shrunken and flattened antero-posteriorly; there is a deep pucker in the sclerotic beneath the insertion of each rectus muscle. The cornea is small, and its curvature flattened out. The lens is absent, its capsule is attached to the extraction cicatrix at the upper margin of the cornea. There is a coloboma of the iris upwards, the cut end being incarcerated in the corneal cicatrix. The vitreous is shrunken. The retina in the recent state was *in situ*, but has now become partially detached.

No. 8.—The lateral half of the left eye of a woman, aged 63. Six weeks previous to excision, an iridectomy was performed on it for glaucoma; the tension returned and a week before excision she noticed the sight of her right eye becoming dim. On examination there were found to be posterior synechiæ, dots of pigment on the anterior capsule of the lens and dots of keratitis punctata on the lower half of the cornea. The iridectomy incision is seen at the sclero-corneal margin, the iris appears to have been removed well up to its periphery. The lens is tilted forwards at its upper part, and when first opened was seen to be adherent to the iridectomy scar: it has now become slightly detached. Microscopically, a break is seen in the lens capsule opposite the scar, and some proliferation of the epithelium lining it in that position has occurred, and breaking down of the lens fibres into hyaline globules. Patches of inflammatory round cells are scattered through the iris, ciliary body, and choroid right up to the margin of the optic disc. The vitreous is much shrunken and detached posteriorly; there are the remains of an old hæmorrhage in it at the lower part. The retina is *in situ*.

No. 9.—The lateral half of the left eye of a man, aged 58. A year and a half previous to its excision he had his right eye injured with a bough; after which the sight in it failed, and it became staphylomatous. The right eye was excised 9 months previous to the left, the latter having become affected with iritis and keratitis punctata six weeks before. The tension in

it became increased, and the sight gradually failed until it became quite blind. The cornea is much flattened and thickened; it has several very fine folds on its anterior surface. Behind the cornea the structures are so altered and matted together by inflammatory material, that the iris, ciliary body, lens, and shrunken vitreous cannot be differentiated. The retina is detached everywhere, from the choroid right up to the ora serrata. The choroid is seen to be much thickened by small, yellow nodules in it.

No. 10.—The lateral half of the right eye of a woman, aged 74. A year previous to its excision she had a cataract extracted from her left eye; a month after the extraction she had a blow on it, and it became very painful. Two months after the extraction irido-cyclitis and keratitis punctata were noted in the right; the tension of it became increased, and the sight was completely destroyed. The cornea is flattened out, so that it has assumed much the same curvature as the sclerotic. The iris is much thickened by inflammatory products, and appears to be in contact throughout with the back of the cornea. The ciliary body is thickened. Surrounding the lens and infiltrating the vitreous, which is shrunken and detached, is some yellow, inflammatory exudation. Microscopically the lens capsule is seen to have been perforated, and the lens substance partially invaded with round cells. The lower border of the nucleus of the lens is tilted forwards. Between the shrunken vitreous and the retina is some coagulated albuminous fluid. The retina posteriorly is much thickened.

No. 11.—The lateral half of the left eye of a woman, aged 67. Five years and four months previous to excision she had had a cataract extracted from her right eye; the operation was followed by a moderate amount of iritis and by increased tension, which lasted in a slight degree until a year later, when an iridectomy was done downwards. Two months before excision, *i.e.*, four years and two months after the iridectomy, the left eye became severely inflamed, and at the time of the excision the tension in it was +3, and the lens completely opaque. The anterior chamber is of good depth; its angle is widely open; the pupil is small, and the iris appears of about its normal

thickness. The ciliary processes are swollen. The lens shows considerable cortical degeneration. The retina, when the eye was first opened, was *in situ*. Microscopically there is seen to be considerable round cell accumulation about the spaces of Fontana and canal of Schlemm, also much round cell infiltration of the ciliary body between the pigment and muscle fibre.

No. 12.—The lateral half of the left eye of a woman, aged 68. A year previous to its excision she had a cataract extracted from the right, and the left became inflamed soon afterwards. The tension of it at the time of excision was +2. There is a mass of organised lymph in the lower part of the anterior chamber, the angle of which is closed by the apposition of the root of the iris to the posterior surface of the cornea. There is adhesion of the iris to the anterior capsule of the lens. The lens shows considerable degeneration in its cortical layers. The vitreous is much shrunken and detached posteriorly. The retina, when the eye was first opened, was *in situ*; it is now somewhat rucked. The optic disc is slightly swollen.

No. 13.—The lateral half of the left eye of a woman, aged 66. Ten months previous to excision she had a cataract extracted from her right eye, and, two months later, the operation of needling was performed on the same eye. Between three and four weeks after the needling, iritis commenced in the left. In spite of the use of atropine to it the pupil remained contracted, and the tension of it became increased. An iridectomy was performed upwards; the coloboma became closed with lymph, and the tension and pain recurred. The iris is considerably thickened, its anterior surface is uneven and nodulated. The whole of its posterior surface is intimately adherent to the anterior capsule of the lens, away from which the lens itself has become somewhat displaced in mounting the specimen. The coloboma cannot be traced, the pupil is filled with an inflammatory membrane. A spongy effusion filled the anterior chamber, which has been removed; its angle is very narrow, but not quite blocked by the root of the iris. The ciliary processes are slightly swollen. The vitreous is detached from the retina, but remains adherent at the optic disc. The retina and choroid were *in situ* when the eye was first opened; in the latter several small, scattered, yellow patches can be seen.

Series III.—Glaucoma.

The term glaucoma was originally applied to a disease in which the pupil, instead of having its normal blackness, presented a greenish reflex. It has now come to signify a condition of the eyeball in which there is increased hardness of it. This increased hardness of the globe is spoken of as primary or secondary, according as it is obviously caused by some previous disease or not.

The results of increased tension differ considerably, according to the age at which it occurs. It has therefore been thought advisable to divide the specimens of glaucomatous eyes into those from adults and those from children, each of which classes has its two subdivisions of primary and secondary glaucoma.

Subseries (A).—*Primary Glaucoma in Adults.*

The specimens which are contained in this series are all eyes which have been removed after the tension had been established for some time, because they were blind and painful. It is difficult in such specimens to be sure whether the changes which are found preceded the increase of tension or succeeded it; whether they were the cause of the glaucoma, or caused by it. In many of the specimens the lens is larger than normal, or it is relatively larger than other parts of the eye (Nos. 1, 2, 8, 10, 11, and 14). Such a disproportion would tend to narrow the space between it and the ciliary processes. In most of the specimens this space is widely open, on account of the atrophy of the ciliary body which ensued after the tension had been established for some time. In two (Nos. 2 and 11), however, the ciliary processes are in contact with the sides of the lens, and possibly in the other specimens there was a stage preceding the atrophy in which the ciliary processes were swollen and in contact with it.

Contact of the ciliary processes with the sides of the lens would tend to impede the passage of fluid from the

vitreous chamber into the aqueous chamber, and glaucoma is obviously due to an accumulation of fluid in the vitreous chamber, for the anterior chamber is shallowed. This shallowing of the anterior chamber and the narrowing of its angle, due to the apposition of the root of the iris and the periphery of the cornea (Nos. 8, 9, 10, 11, and 12), is probably brought about by the accumulation of fluid in the vitreous, forcing forward the lens and ciliary processes. The narrowing of the angle of the chamber leads to obstruction to the exit of the aqueous humour through the spaces of Fontana into the canal of Schlemm.

The changes in primary glaucoma are, in the first place, non-inflammatory; later some iritis, cyclitis, or choroiditis may occur. Posterior synechiæ may form (No. 1), or some exudation of leucocytes occurs about the root of the iris, which is in contact with the cornea; so that the two, which are at first only in apposition, ultimately become absolutely adherent. Pressure of the root of the iris against the posterior surface of the cornea causes it to become much flattened in that position, and an abrupt bend is formed in it where it ceases to be in contact (Nos. 13, 14, 15, and 17). When the pressure is very great, the blood-vessels of the iris become restricted, and it atrophies, the pupil becoming permanently enlarged (Nos. 7, 8, 10, 11, and 17). If the atrophy occurs more in one segment of the iris than in the rest of it, the pupil is displaced to that side, becoming eccentric (Nos. 5, 6, and 17). The atrophy of the iris affects more its stroma than the pigment epithelium on its posterior surface; the consequence is that this latter becomes drawn round the pupillary margin on to the anterior surface of the iris: a condition which is spoken of as ectropion of the uveal pigment (Nos. 7, 10, 15, and 17). When the tension of an eye is increased, its walls become stretched, and a previously healthy adult eye becomes somewhat square in shape, due to slight bulging between the insertions of the four recti muscles. If, however, some part of the walls of the globe have been previously weak-

ened by inflammation, that part becomes staphylomatous (Nos. 4 and 5). Sometimes when there has been inflammation about the adherent root of the iris, a staphyloma will form at the margin of the cornea in front of the ciliary body; it is spoken of as *intercalary* (Nos. 1, 6, and 7. Fig. 10).

The seat of entrance of the optic nerve is a weak point in the walls of the eye, and the lamina cribrosa early becomes depressed backwards. This depression backwards of the lamina cribrosa, together with atrophy of the nerve fibres, causes cupping of the optic disc (No. 18).

At first the lamina cribrosa is only depressed backwards, later it is expanded laterally as well, so that an excavation occurs beneath the sclerotic at the margins of the cup.

When the ciliary body has become much atrophied, the secretion of fluids from it which supply nutriment to the vitreous and lens becomes interfered with, the former consequently shrinks and becomes detached from the retina (Nos. 1, 6, 7, 10, and 12), and the latter becomes cataractous, its fibres undergoing degenerative changes (Nos. 2, 5, and 12); sometimes a peculiar band, which microscopically is found to be composed of hyaline globules, forms right across the nucleus of the lens (No. 8).

Commonly, when the tension of an eye is increased, the cornea becomes hazy, the haze being due to an œdema of its epithelium and anterior layers from an interference with the lymph streams in it. Besides being hazy it becomes partially anæsthetic. The œdematous condition allows of the surface epithelium being readily rubbed off, and the anæsthesia increases the likelihood of such slight injuries occurring. Abrasions thus formed may become infected, ulceration, with or without hypopyon, ensuing (Nos. 12 and 16).

No. 1.—The two lateral halves of the right eye of a woman, aged 52, mounted in separate cells. Two years before excision

she had an acute attack of glaucoma in it, which was followed by several others, ending in total blindness. The tension at the time of excision was +1, the anterior chamber was shallow, and the lens opaque. At the upper and anterior part of the globe there is considerable bulging and thinning of its tunics. This bulging is greatest between the margin of the cornea and the commencement of the ciliary body, but the upper part of the ciliary body is also involved. Lining the inner surface of a large portion of the staphylomatous sclerotic is the extremely atrophied root of the iris. The lens is probably displaced backwards from the position which it occupied in the recent state, and the anterior chamber deepened; its angle is closed for a considerable distance by the apposition of the periphery of the iris with the posterior surface of the cornea. The pupillary border of the iris appears adherent to the lens capsule. The vitreous is much shrunken; it is detached posteriorly, and opaque. The choroid is considerably atrophied at the equator, and the optic disc is deeply cupped and excavated.

No. 2.—The anterior and posterior halves of the left eye of a woman, aged 57; they are mounted in separate cells. It had been blind for six months previous to excision from chronic glaucoma. The anterior chamber is shallow. The pupil is oval and semi-dilated. The lens looks large; its edge is in contact with the ciliary processes; it is now semi-opaque. The optic disc is deeply cupped, but this is difficult to appreciate now on account of the transparency of the retina and the emptiness of its vessels; when magnified, the sharp edge of the cup is well seen.

No. 3.—The posterior half of an eye which had been lost by glaucoma; no further history is known. The optic disc is deeply cupped; on magnifying, the sclerotic ring is well seen. There are extensive changes in the choroid and pigment epithelium near the disc; there are several round patches in which the latter is absent, and around some of these it is heaped up. Nearer the equator the atrophy is more diffused; general pallor of the choroid, with irregular pigment accumulation, being the naked-eye condition.

No. 4.—The lower half of the left eye of a woman, aged 41;

it was blind from glaucoma, and had become painful during the last two or three months. The tension at the time of excision was +3. There is a considerable staphyloma at the equator of the globe on the inner side. The antero-posterior diameter measures 26 mm. and the lateral 32 mm. All the tunics of the globe in the region of the staphyloma are much thinned; the uveal pigment in places is absent; while here and there it is heaped up in the form of irregular patches and streaks. The choroid is detached for a short distance on the outer side of the globe, but this has probably been produced by manipulation of the specimen since removal. The vitreous is much shrunken and detached everywhere posteriorly, except at the optic disc, to which it retains a narrow tag of adhesion. The optic disc is deeply cupped, and the angle of the anterior chamber is narrowed by the apposition of the root of the iris to the posterior surface of the cornea.

No. 5.—The lateral half of the right eye of a man, aged 54. He stated that 20 years previously it was stung by a fly, and that since then it had been blind; recently it had become painful. At the time of excision the tension was +2, and he had no p.l. The globe is considerably altered in shape by a large equatorial staphyloma at the upper part. There are blood-clots in the anterior chamber and in the circumlental space. The pupil is somewhat eccentric, and the root of the iris is firmly adherent to the periphery of the cornea. The lens is nearly spherical in shape; its cortical layers are opaque and soft; its central part of normal density, and nearly clear. The choroid is atrophied, extremely so in the region of the staphyloma. There is considerable disturbance of the pigment epithelial layer; some branching patches of pigmentation are seen in the substance of the retina, which is in its normal position. The optic disc is deeply cupped.

No. 6.—The lateral half of the right eye of a man, aged 46. The sight failed slowly in it, without any pain or inflammation, five years previous to excision. During the last six months it had become painful. There is a large staphyloma at the anterior and lower part of the globe, between the margin of the cornea and the commencement of the ciliary body (intercalary staphyl-

oma). The whole of the inner surface of the staphylomatous part is lined by atrophied iris tissue. The root of the iris above is in contact with the periphery of the cornea, and the angle of the anterior chamber is blocked in its entire circumference. The pupil is very large and eccentric; there is some ectropion of the uveal pigment at its margin. The ciliary processes are atrophied. The lens is in its normal position. The vitreous is much shrunken and detached posteriorly. The retina is *in situ*. Some of the pigment epithelium has become separated from the choroid in the preparation of the specimen. The optic disc was deeply cupped, but it is not shown in the specimen.

No. 7.—The lateral half of an eye, the sight of which was destroyed by glaucoma; no further history is known. There is a staphylomatous condition of the sclerotic at the margin of the cornea (intercalary), the bulging being more marked above and below than at the sides (Fig. 10). The whole of the inner surface of the staphylomatous part is lined by atrophied iris tissue, the angle of the anterior chamber being closed in its entire circumference. The ciliary body is not involved. The pupil is widely dilated, and there is a slight ectropion of the uveal pigment at

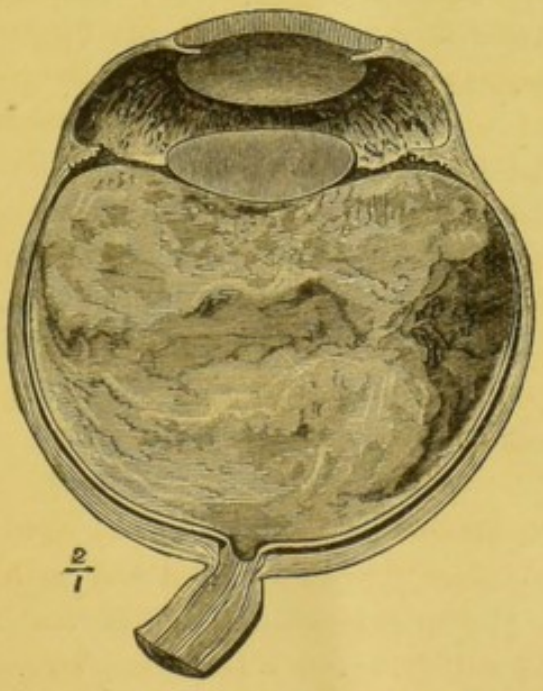

FIG. 10.—Specimen No. 7, showing staphyloma of the sclerotic at the margin of the cornea in front of the ciliary body (intercalary).

its margin. There is a large space between the lens and iris, also between the margin of the lens and the ciliary processes: these latter are directed almost straight inwards at right angles to the sclerotic. The vitreous is shrunken and detached posteriorly; there is some coagulated albuminous substance between it and the retina, which is *in situ*. The optic disc is cupped.

No. 8.—The lateral half of the right eye of a woman, aged 66. Five months previous to excision it suddenly became painful and the sight got very dim; the pain continued very severe for six weeks, at the end of which time she was unable to tell light from dark with it. The tension at the time of excision was +1. The pupil is dilated. The anterior chamber is shallow, on one side its angle is closed by apposition of the root of the iris to the cornea; on the other, it has become partially opened up in the mounting of the specimen. The lens is opaque throughout; passing through the centre of it, right across the nucleus, but ending a little short of the periphery on each side, is seen a sharply defined grey band which microscopically is found to be composed of numerous, closely packed, small, round globules. There is a considerable space between the margin of the lens and the ciliary processes. The vitreous is somewhat thin in consistency. The retina, when the eye was first opened, was in position, it has now become slightly detached. The optic disc is slightly cupped.

No. 9.—The lateral half of the left eye of a man, aged 51. The sight of it commenced to fail two years previous to excision; for 12 months it had been quite blind, and for the last three months painful. At the time of excision T. was +2. The root of the iris is in contact with the periphery of the cornea, narrowing the angle of the anterior chamber. The pupil is oval, its long axis being directed horizontally; there is slight ectropion of the uveal pigment at its margin. The lens in mounting the specimen has become displaced a little backwards; there is a good space between its margin and the ciliary processes. The vitreous is of good consistency, in the recent state it was in position. The retina is *in situ*. The optic disc is deeply cupped and excavated.

No. 10.—The lateral half of the left eye of a man, aged 66.

It had been blind for two years, as the result of chronic glaucoma. The tension at the time of excision was +3. The root of the iris is in contact with the periphery of the cornea and blocks the angle of the anterior chamber. There is slight ectropion of the uveal pigment at the pupillary margin. The vitreous is much shrunken and detached posteriorly. The retina is *in situ*. There are some small patches of atrophy and disturbance of uveal pigment in the anterior part of the choroid. The optic disc is deeply cupped and excavated.

No. 11.—The lateral half of the right eye of a man, aged 70. The sight of it had been failing for 10 years, and it had been quite blind for five years. Nine weeks before excision it became acutely inflamed and painful. The tension at the time of excision was +2. The anterior chamber is shallow, its angle is closed by the apposition of the root of the iris to the periphery of the cornea. The pupil is dilated. The lens is *in situ* and apparently healthy, the ciliary processes are in contact with the sides of it. The retina is in position and the optic disc deeply cupped.

No. 12.—The lateral half of the left eye of a man, aged 47. The sight of it commenced to fail four years previous to excision: it had been quite blind and painful on and off for one year. Its tension at the time of excision was increased, and the lens was cataractous. The whole cornea is hazy, in its centre the opacity is denser and there is a small shallow ulcer. The anterior chamber is deep, probably the iris and lens have become somewhat displaced backwards since the eye was opened. The root of the iris is adherent to the back of the cornea, completely blocking the angle of the chamber. The nucleus of the lens is sharply defined from the cortex and of a somewhat lighter colour. The vitreous is shrunken, it retains its adhesion to the optic disc, but is detached elsewhere from the retina right up to the ora serrata, it is also detached antero-laterally from the suspensory ligament. The retina is *in situ*. The optic disc is deeply cupped and excavated.

No. 13.—The front half of an eye from which the sclerotic and cornea have been peeled off and half the iris cut away. It was

removed from a woman, aged 59 ; 10 months previous to excision she had an acute attack of glaucoma in it, and the sight was completely destroyed. The root of the iris, where it was in contact with the periphery of the cornea, is seen to be much flattened, and where it ceased to be in contact there is an abrupt bend. The ciliary processes, fibres of the suspensory ligament, and margin of the lens are shown : the former are not in contact with the latter.

No. 14.—The front half of an eye prepared in the same way as No. 13, and showing much the same points. It was removed from a man, aged 62. The sight of it was destroyed by chronic glaucoma of some three or four years' standing. The lens is larger and the circumlental space narrower than in Specimen 13.

No. 15.—The front half of an eye prepared in the same way as the last two specimens. In addition to the points mentioned in them, it shows a black line at the margin of the pupil, due to ectropion of the uveal pigment. This eye was removed from a man, aged 49. The sight had been failing in it gradually for four years, and it had been quite blind for one year; three weeks previous to excision he had a subacute attack of glaucoma in it.

No. 16.—A ring section from the right eye of a woman, aged 44. It had been affected with chronic glaucoma for several years. For some weeks previous to excision it had been irritable and inflamed. There is a small patch of yellow infiltration of the cornea in the lower part and slight excavation of the surface overlying it. The angle of the anterior chamber is closed by an adhesion of the root of the iris to the posterior surface of the cornea. There is a large collection of yellow lymph in front of the iris in the lower part of the chamber. The lens is in position. The retina has become slightly detached in the preparation of the specimen; there are a few dotted patches of hæmorrhage in it. The optic disc is deeply cupped.

No. 17.—The two halves of a left eye opened by an equatorial section. From the front half the cornea and sclerotic have

been peeled off. It was removed from a man aged 69 : he had been subject to occasional attacks of dimness of sight for three or four years. The eye had been quite blind for four months, and a short time before excision had become painful and inflamed. The tension at the time of excision was +1. The position where the root of the iris was in apposition with the cornea is well shown, the iris being there flattened and having an abrupt bend where it ceased to be in contact with it. The pupil is semi-dilated and eccentric ; the iris on one side being broader than on the other. On the side on which the iris is narrowest, its uveal pigment turns round the pupillary border on to its anterior surface. In the posterior half of the globe, scattered throughout the retina, are numerous hæmorrhages of very various sizes, some as small as pins' points, some flame-shaped. They have now a brownish hue. The optic disc is deeply cupped and excavated.

No. 18 (*a*), (*b*), and (*c*).—The posterior part of three eyes excised on account of absolute glaucoma, showing cupping of the optic nerve.

Subseries (B).—*Secondary Glaucoma in Adults.*

Increase in the tension of the eye may occur as the result of injuries of various nature, and of diseases differing widely in their character. It may occur in an eye in which there has been no external lesion, but in which, as the result of a blow, the lens has become displaced either backwards or forwards. If displaced completely forwards into the anterior chamber (Nos. 1 and 2), or so that one edge of it protrudes through the pupil (No. 4), the normal circulation of fluids through the pupil may become obstructed ; they will then accumulate behind the iris, forcing it forwards against the sides and back of the lens and back of the cornea and be unable to escape from the eye.

When the lens becomes displaced backwards (No. 5) or laterally (No. 3) and increased tension results, it is probably due to the relative alteration in position which has taken place between the lens and the vitreous body,

directly forcing forwards the root of the iris into contact with the cornea, so closing the angle of the anterior chamber; for in these cases the angle is always found closed.

A broad anterior synechia of the iris (Nos. 6 and 7), lens capsule (No. 8), or vitreous is liable to produce increased tension, whether the adhesion be the result of a wound or of a perforating ulcer of the cornea. It does so by advancing the position of the iris, so that it is brought into contact with the periphery of the cornea in the region of the spaces of Fontana, obstructing the exit of the aqueous humour from the eye. If the iris be in part (Nos. 9 and 10) or entirely absent (No. 8), the anterior of the ciliary processes may be drawn forwards into contact with the periphery of the cornea and produce an obstruction in the same way (Nos. 8, 9, 10). One of the commonest of all forms of secondary glaucoma is that due to adherent leucoma (Nos. 6 and 7). The glaucoma, which comes on after extraction of cataract, is generally due, as has been mentioned in the section on eyes lost after operations, to a synechia of the lens capsule to the extraction scar (Nos. 9 and 10).

A form of secondary glaucoma which is commonly met with in practice, but of which there is no specimen in this collection, is that which results from the swelling of a lens in its capsule after it has been wounded, as in the operation of discission. In such a case the swelling of the lens directly pushes forwards the iris, bringing its root into apposition with the periphery of the cornea; it also tends to narrow the circumlental space. When extensive hæmorrhage occurs from the choroid into the subretinal space of an eye which has a detachment of retina, the blood is unable to permeate the retinal tissue, and consequently as it goes on accumulating it forces the retina forwards together with the shrunken vitreous, lens, and iris, thus producing a shallowing of the anterior chamber and an increase of tension (No. 12).

A sarcoma of the choroid probably gives rise to glaucoma in somewhat the same way. In its growth it obstructs the passage of blood through the choroidal veins, which causes an exudation of serum from them and detachment of the retina (No. 14). Space is at first made for this serum and for the new growth by the forcing of fluid out of the vitreous. When the vitreous has become quite shrunken, so that none of its fluid element is left, then it, together with the lens, iris, and detached retina, are all forced forwards, the anterior chamber shallowed and glaucoma established.

Inflammation of the uveal tract is sometimes accompanied by increased tension, which is not always brought about in the same way. In an inflammation of the iris, the whole of its pupillary border may become adherent to the capsule of the lens, so that the passage of fluids forwards through the pupil is arrested; being unable to permeate the iris itself, they bow it forwards, accumulating between it and the lens (No. 13). The stoppage of the passage of fluids through the pupil prevents their escape from the eye, and hence gives rise to increase of tension.

Sometimes in an iritis, not only the pupillary border, but the whole length of the iris, becomes adherent to the lens capsule, a condition known as total posterior synechia. The passage of fluids forwards in such an eye is also arrested, but, owing to the adhesion, they are unable to accumulate between the iris and lens, and therefore collect in the vitreous. The iris and lens together become forced forwards, the anterior chamber shallowed, and glaucoma established.

In a serous inflammation involving the secreting area of the ciliary body the tension of the eye frequently becomes increased, though the anterior chamber is deeper than normal and the angle widely open. An excess of highly albuminous fluid containing formed elements such as leucocytes and cells, which have desquamated from the surface of the ciliary glands, is thrown into the eye. The

albuminous character of it renders it less capable of filtration through the spaces of Fontana than the normal aqueous, and the cells it contains collect in the meshes of the ligamentum pectinatum and block up the lymph channels. Some of them also became deposited in little patches on the back of the lower part of the cornea, and give rise to what is often termed, though incorrectly, *keratitis punctata* (No. 15). There are, then, in these cases three factors which tend to give rise to increased tension: the excess of fluid thrown into the eye, the albuminous character of it, and the accumulation of cells in the lymph spaces at the angle of the anterior chamber.

In many cases of primary glaucoma, if the tension has persisted for some time, changes will occur in the walls of the retinal vessels, which render them more brittle than normal, and hæmorrhages occur into the substance of the retina. Sometimes, however, the retinal hæmorrhages are seen to precede the onset of the increased tension, and the glaucoma may be said to be secondary to them (Nos. 16 and 17). The probability is that there is some unknown factor which causes both the increased tension and the hæmorrhages, and that the cases are really analogous to those of primary glaucoma.

No. 1.—The lateral half of the right eye of a woman, aged 39. She had had a cataract forming in it for about three years; six months previous to excision she had a blow on it from a fist, and during the last six weeks it had become inflamed and painful. The tension at the time of excision was + 2. The lens, which is calcareous and opaque, is displaced into the anterior chamber. The iris has fallen somewhat back since the eye was first opened; it is in contact at its periphery with the cornea, and where it ceases to be in contact with the cornea it is in apposition with the back of the lens. The vitreous is shrunken and the retina detached.

No. 2.—The lateral half of the right eye of a man, aged 54. There was no history of any injury to it; the sight had been

failing for about 12 months, and it had been quite blind for four weeks. The tension at the time of excision was increased. The lens, which had a central opacity, is dislocated forwards, and lies in the lower part of the anterior chamber; it and the iris have become a little displaced backwards in mounting the specimen. The root of the iris is in contact with the periphery of the cornea; where the iris ceases to be in contact with the cornea it embraces the sides and back of the lens. The vitreous is of good consistency. The retina is *in situ*. The optic disc is not cupped.

No. 3.—The lateral half of the right eye of a man, aged 40. About two months previous to excision he received a blow on it from a knot in a chain. The tension at the time of excision was + 2, and he had no p.l. There is some bulging of the tunics of the globe in the equatorial region. The lens is displaced forwards and a little downwards; it is in contact with the back of the cornea, its anterior surface projecting through the much dilated pupil. The iris is pushed forwards into contact with the cornea, the angle of the anterior chamber being closed. The vitreous is detached posteriorly and passes forwards between the upper margin of the lens and the ciliary body. The retina is *in situ* and the optic disc deeply cupped.

No. 4.—The lateral half of the left eye of a woman, aged 60. Eight or nine years previous to excision she had a blow on it from a fist; since that time the sight in it had been defective and she had had attacks of pain in it on and off. Seven months previous to excision the sight went completely. The tension was increased. The lens is displaced forwards, its upper half protruding through the pupil and lying in contact with the back of the cornea. A portion of the upper part of the iris is behind the lens. The whole of the lower part of the iris and the periphery of the upper part are in contact with the back of the cornea. The lens is opaque, the nucleus being of a denser grey colour than the cortex. The vitreous is much shrunken. The retina is detached from the ora serrata up to the optic disc; protruding from the outer surface of it posteriorly is a partially-collapsed cyst. The optic disc is deeply cupped.

No. 5.—The lower half of the left eye of a man, aged 63.

Thirty years previous to excision he had a blow on it from a bone, there was great pain at the time, but the sight completely recovered. During the last six years he had noticed failure of sight, which had gradually progressed to blindness. For a week he had had severe pain in it. The tension at the time of the excision was increased. The root of the iris is in contact with the periphery of the cornea, blocking the angle of the anterior chamber. The lens is displaced downwards, backwards, and slightly inwards, so that its upper edge is directed backwards It remains adherent at the lower and inner part, and before mounting moved backwards and forwards with the slightest movement as though on a hinge. It is opaque, and appears to have a fluid cortex and solid nucleus. The vitreous is shrunken and almost fluid in consistency. The retina and choroid in the recent state were *in situ*.

No. 6.—The lateral half of the left eye of a man, aged 51. A month previous to excision he got an abrasion of the cornea; ulceration ensued, and an hypopyon formed. The base of the ulcer was cut across, and the hypopyon evacuated. Adhesion of the iris took place to the cornea, and at the time of excision the tension was +2. A somewhat bulging leucoma is seen in the centre of the cornea, to the posterior surface of which there is a broad adhesion of the iris; the whole of the rest of the iris is in contact with the back of the cornea, there being no anterior chamber. A large space is left between the posterior surface of the iris and the lens, at the anterior pole of which there is a small, white, flat opacity. The vitreous is shrunken, and detached posteriorly. The retina is *in situ*. The optic disc is not cupped.

No. 7.—A ring section of the left eye of a man, aged 42. Four weeks previous to excision it was struck by a piece of stone; ulceration and perforation of the cornea ensued. At the time of excision, tension was +2. There is a dense, somewhat bulging, central leucoma of the cornea, to which the whole of the pupillary margin of the iris is adherent. The whole of the remainder of the iris is in contact with the back of the cornea, so that the anterior chamber is completely abolished. A large space is left between the back of the iris and the anterior

surface of the lens. The retina is *in situ*. The optic disc is slightly cupped.

No. 8.—The lateral half of the right eye of a man, aged 57. Eight and a half months previous to excision it was wounded by a piece of a punching press. The tension at the time of excision was increased. There is an irregular scar near the centre of the cornea which has a broad adhesion of the capsule of the lens to it. The lens is opaque; part of it has escaped or become absorbed, and what is left has become somewhat displaced backwards in mounting the specimen. The whole iris has gone, the ciliary processes are drawn forwards, and microscopically the most anterior of them are seen to be in contact with the back of the cornea, and to block up the filtration area. The vitreous is shrunken, and detached from the retina and the optic disc. The retina is *in situ*, and the optic disc is deeply cupped.

No. 9.—The inner half of the right eye of a man, aged 51. Four years previous to excision a cataract was extracted from it, with iridectomy. Subsequently the tension became increased. Two years after the extraction an opaque membrane in it was needled, but no improvement of vision occurred; the optic disc was then seen to be cupped. The line of the extraction incision is situated some distance internal to the sclero-corneal margin. The lens capsule comes forwards, and is adherent to it. A good deal of cortical lens substance has been left in the periphery of the capsule. Above, the iris has been removed very nearly, but not quite up to its periphery; what has been left is found microscopically to be sufficient to block the filtration area in the region of the coloboma. Elsewhere the angle of the anterior chamber is closed by the apposition of the root of the iris to the periphery of the cornea. The vitreous is shrunken and detached posteriorly. The retina is *in situ*, and the optic disc is deeply cupped.

No. 10.—The lateral half of the right eye of a woman, aged 20. She had microcornea, and two years previous to excision a cataract was extracted from it. After this the tension became increased, and the sight was completely destroyed. The extraction cicatrix is very corneal, and the lens capsule is drawn

forwards and adherent to it. A small amount of cortical lens matter is left in the periphery of the capsule. A portion of the iris has been removed above, but not up to its extreme periphery; what is left is in contact with the back of the cornea, as also is the root of the iris elsewhere. The cornea is small, and has an opaque ring passing round it near its margin. The retina is *in situ*, and the optic disc deeply cupped.

No. 11.—The lateral half of the left eye of a man, aged 62. He had had ulceration of the cornea for three weeks. An hypopyon formed, and the tension became increased. The pus was evacuated from the anterior chamber, but it reaccumulated, and the tension returned. There is extensive ulceration and yellow infiltration of the cornea. The centre is much thinned. The anterior chamber is nearly filled with pus and blood clot. The iris tissue is much swollen, and the ciliary processes appear in contact with the sides of the lens. The vitreous is of good consistency. The retina is *in situ;* it has a few patches of hæmorrhage in it. The optic disc is slightly swollen.

No. 12.—The lateral half of the right eye of a man, aged 20. The sight of it had always been defective; he had never been able to read with it. Three weeks before excision it became acutely painful, the sight failed completely, and the tension became increased. A paracentesis was performed, but no permanent relief of tension was obtained. The globe is somewhat enlarged, antero-posteriorly it measures 29·5 mm., and vertically 26·5 mm. The angle of the anterior chamber is closed by the apposition of the root of the iris to the posterior surface of the cornea. The lens is in position; there is a wide space between it and the ciliary processes. The vitreous is much shrunken, and the retina detached from the optic disc and choroid right up to the ora serrata. The space between the choroid and retina is completely filled by recent blood clots.

No. 13.—The lateral half of the left eye of a man, aged 68. He stated that eight months previously he had had it operated on four times at another hospital for the maturation of cataract. After the last operation the eye had become inflamed and painful. The tension at the time of the excision was +2, and

the eye quite blind. The cornea is rather more prominent than normal. The whole pupillary border of the iris is intimately adherent to the anterior capsule of the lens. The rest of the iris, from its pupillary border up to the ciliary body, is bowed forwards, so as to be in contact for a considerable distance with the periphery of the cornea. There is a larger extent of iris in contact with the cornea on one side (the lower) than on the other (the upper). Where the iris ceases to be in contact with the cornea below, it passes almost vertically backwards to the lens capsule. The lens is large, its cortex opaque, grey, and degenerated; what appears to be the nucleus is displaced forwards. The vitreous is shrunken and detached from the retina and optic disc posteriorly. The retina is *in situ*, and the optic disc deeply cupped and excavated.

No. 14.—The lateral half of the left eye of a man, aged 48. He stated that the sight of it became dim about 10 weeks before excision, and that it became quite blind in about a week. For 10 days it had been very painful, and the tension at the time of excision was +2. Springing from the upper and posterior part of the choroid, by a base which extends from the margin of the optic disc to a position on a level with the insertion of the superior rectus muscle, is an irregular pigmented growth which fills about two-thirds of the interior of the globe. There is a constriction about the middle of it. Anteriorly its summit is in contact with the back of the lens, and it extends somewhat beyond the middle line of the globe. The angle of the anterior chamber is closed by the contact of the root of the iris with the cornea. The vitreous is very much shrunken, the retina from the two sides of the globe being almost in contact. The retina is detached everywhere from the choroid, but is in contact with the summit of the growth.

No. 15.—The lateral half of the left eye of a woman, aged 50. Three months previous to excision it was pricked by a pin, which perforated the cornea and wounded the lens. An anterior synechia formed at the seat of puncture, which was afterwards divided. A fortnight before removal the tension was found to be increased. There was considerable general injection, and on the back of the cornea there were small punctate dots. A small

scar can be seen in the upper part of the cornea. The anterior chamber is deep, and its angle is open. On the back of the cornea at the lower part are several small yellow nodules, which are found microscopically to be composed of masses of small round cells and a few large epithelial-like cells containing pigment granules. The lens is opaque, its antero-posterior diameter is enlarged; its sides are not in contact with the ciliary processes. The vitreous is detached posteriorly from the retina.

No. 16.—The outer half of the right eye of a woman, aged 66. The sight commenced to fail in it eight months previous to excision; the failure commenced with chromatopsia and progressed gradually to blindness. The tension at the time of excision was +2. The angle of the anterior chamber is closed on one side for a short distance by the apposition of the root of the iris to the cornea, on the other it is open; there is, however, here a bend near the root of the iris which renders it probable that it was closed in the recent state, and became opened up in the manipulation of the specimen. The ciliary processes are almost in contact with the sides of the lens. The retina is *in situ*, but thickened; scattered throughout it are numerous, variously-shaped hæmorrhages; these are situated mostly around the optic disc and yellow spot. The optic disc is only slightly cupped.

No. 17.—The lateral half of the right eye of a man, aged 47. Two and a half months previous to excision the sight of it became misty; he was seen a week later, the vision was then reduced to $\frac{3}{60}$, T. was +1, there was ciliary injection, haze of the cornea, and a hæmorrhage on the front of the iris. Two paracenteses were performed, but the tension continued to be increased and the eye became quite blind. There is some bulging of the tunics of the globe at the equator, beneath the insertions of the superior and inferior rectus muscles; there is also a tendency to intercalary staphyloma. The angle of the anterior chamber is considerably restricted by adhesion of the root of the iris to the periphery of the cornea. The pupil is semi-dilated and displaced slightly inwards; there is some ectropion of the uveal pigment of the iris at its upper margin.

There is a large space between the posterior surface of the iris and the lens. The circumlental space is also enlarged. There are some hæmorrhages in the anterior and lower part of the vitreous. The sclerotic at the equator above is very thin. The retina is much thickened, and there are numerous large irregular-shaped hæmorrhages in it. The optic disc is deeply cupped.

Subseries (C).—*Primary and Secondary Glaucoma in Children.*

Glaucoma occurring in childhood may be divided, as that in the adult, into two classes, primary and secondary.

The primary form is always congenital, and the conditions which give rise to it have not yet been definitely determined. It seems, however, probable that it is due to some defect of development in the filtration area at the angle of the anterior chamber. In some cases it appears that the canal of Schlemm is altogether absent (No. 2).* In others, that the iris does not become separated from the back of the cornea up to its extreme periphery, and that a congenital adhesion in this position prevents the exit of fluids from the eye. If such be the case, then the primary glaucoma of children would differ from the primary glaucoma of adults, in that the original obstruction was situated at the angle of the anterior chamber and not at the circumlental space. Possibly this would account for the fact that in the former the anterior chamber is deep and in the latter it is shallow.

The sclerotic and cornea in the child's eye are much more elastic than they are in the adult, hence, when the tension in the former becomes increased, the whole globe expands and all the tunics become stretched and thinned (Nos. 1, 2, 3, 4, and 5). The diameter of the cornea is considerably increased and its curvature altered, it assuming a more globular shape. The ciliary area increases in width, so that through the fibres of the suspensory ligament there is a considerable drag on the side of the lens, which

+ On this point see Duer & Schlegtendal Five cases of Congenital Hydrophthalmos v. Graefe's Archives XXXV 2b 2. p 88 & Ophth. Review Vol VIII p 339.

flattens it antero-posteriorly and elongates it laterally (No. 3). Occasionally the fibres of the suspensory ligament give way and it may become displaced. Operation in these cases is very seldom followed by any beneficial result. Judging by the specimens contained in this collection it would seem that, in an iridectomy, the iris is not generally removed up to its extreme periphery, but that a large portion of the root is left adherent to the back of the cornea. (Nos. 1, 4, and 5.) As the globe enlarges the vitreous does not increase in size, the hyaloid becomes detached from the inner surface of the retina, serous fluid filling the space between them (Nos. 1, 4, and 5). The retina sometimes becomes secondarily detached (No. 2).

By far the most common cause of secondary glaucoma in childhood is an adhesion of the iris to the cornea, either as the result of a wound (No. 8) or perforating ulcer of it (Nos. 6 and 7). When the whole of the pupillary margin of the iris becomes adherent to the cornea the passage of the aqueous humour through the pupil is arrested; it then accumulates behind the iris, between it and the lens, pressing the whole of the front of the iris into contact with the back of the cornea and completely abolishing the anterior chamber, the tension becoming increased (Nos. 6 and 8). Secondary glaucoma also comes on in children from adhesion of the lens capsule to the cornea (No. 7), as the result of iritis and exclusion of the pupil (No. 9), or from the growth of a gliomatous tumour in the retina (No. 10). In all forms of secondary glaucoma in childhood, as in primary glaucoma, the sclerotic and cornea give before the increased tension and become expanded and thinned.

No. 1.—The outer half of the left eye of a girl, aged 11. Her eyes had always been unusually large. When $2\frac{1}{2}$ years old she came to the hospital with the left lens, which was transparent, dislocated into the anterior chamber; an attempt was made to remove it, some vitreous escaped, and an iridectomy

was done upwards. At the age of 7, the lens of her right eye also became dislocated into the anterior chamber, and was removed. A sister of the patient is said to be blind from a similar condition of the eyes. The tension of the left eye at the time of excision was increased. The whole globe is much enlarged, antero-posteriorly it measures 30 mm., vertically 24·5 mm. The cornea is increased in size and is globular in shape; its transverse diameter measures 15 mm. At its upper margin, in the region of the extraction cicatrix, there is a lobulated cystoid condition. The whole of the inner surface of this portion is lined by atrophied iris tissue. The upper part of the iris has been removed, but not nearly up to its extreme periphery. The lower part of the iris is much stretched and elongated. Microscopically some tags of adhesion are seen to pass between its root and the posterior surface of the cornea, just internal to the commencement of the ligamentum pectinatum. The ciliary body and choroid are atrophied; in the latter are seen some white patches with disturbance of the pigment epithelium about them. The retina is *in situ*. The optic disc is not shown in the specimen; it was deeply cupped. The lens is absent.

No. 2.—The lateral half of the right eye of a boy, aged 6. He was born prematurely at the seventh month, and his eyes at the time of birth were noticed to be unusually large. No change had occurred in the left, but something yellow had appeared in the right; during the last two months it had become painful. The right had no perception of light. The whole globe is much enlarged; it measures 28·5 mm. antero-posteriorly, and 25·5 mm. vertically. The cornea has its normal curve much flattened out; it measures 12 mm. across. The sclerotic, especially anteriorly, is much thinned. The iris is shrunken, it is pushed forwards, and the whole of its anterior surface is in contact with the periphery of the cornea. Between the cornea and lens is a quantity of brownish, flocculent substance. The lens is grey and small; there is a large space between it and the ciliary processes. The retina is detached from the margin of the optic disc up to the ora serrata; protruding from its outer surface are several large, thin-walled cysts. There are blood clots between the retina and choroid. Microscopically no canal of Schlemm can be seen.

No. 3.—The lateral half of the left eye of a boy, aged 4. His mother stated that it commenced to enlarge when he was four months old, after he had received a blow on it, and that five days previous to excision he had received another blow. The whole globe is enlarged; antero-posteriorly it measures 28 mm., vertically 26·5 mm. The diameter of the cornea is 14·5 mm. The anterior chamber is very deep, and there are blood clots in it. The lens is considerably flattened from before backwards. The vitreous is of good consistency. The retina is *in situ*, and the optic disc deeply cupped.

No. 4.—The lateral half of the left eye of a man, aged 19. When a year old he had an iridectomy performed on it for "hydrophthalmos." He was never able to see more than to count fingers with it. Lately it had become painful. The tension at the time of excision was increased. The whole globe is much increased in size; antero-posteriorly it measures 33 mm., and vertically 26 mm. The cornea is enlarged, measuring 13 mm. across; on its anterior surface is seen a large collapsed bleb. A portion of the iris above is absent, but it has not been removed up to its extreme periphery; the part left is intimately adherent to the back of the cornea. Microscopical examination shows that the angle of the anterior chamber below is somewhat restricted. The pupil is drawn up, and the upper margin of the lens is displaced forwards and upwards. Between the upper margin of the lens and the ciliary processes is some grey fibrous tissue. All three tunics of the eye are much thinned. The choroid is so stretched and atrophied in some places that the white of the sclerotic shows through. The vitreous is shrunken, detached, and thin in consistency. The optic disc is deeply cupped.

No. 5.—The lateral half of the right eye of a woman, aged 33. She stated that she had never had good sight, and that her eyes were always large. Her left was removed when she was four years old. The right got gradually worse, and was operated on when she was seven; after this the sight went completely. Lately the eye had become painful. The whole globe is much enlarged; antero-posteriorly it measures 30 mm., and vertically 27·5 mm. The diameter of the cornea is 19 mm.

Both sclerotic and cornea are much thinned. The iris above has been partially removed, but not nearly up to its extreme periphery; the portion left is intimately adherent to the back of the cornea. The angle of the anterior chamber below is also closed by the root of the iris. The ciliary body is much flattened. The lens is shrunken and displaced upwards; it is adherent to the iridectomy scar. The retina is *in situ*, and the optic disc is deeply cupped and excavated.

No. 6.—The lateral half of the left eye of a boy, aged 7. The sight of it had been destroyed by inflammation some years previous to excision. The tension at the time of excision was increased. The whole globe is much enlarged; its antero-posterior diameter measures 30·5 mm., and its vertical 24 mm. The cornea is much expanded, thinned, and staphylomatous. There is a mottled opacity of the whole of it, and a dense white leucoma a little below its centre. The whole posterior surface of the cornea is lined by the very much atrophied iris tissue, the anterior chamber being completely abolished. A large space exists between the back of the iris and the lens, which latter is *in situ*. The ciliary processes are elongated, and pass directly inwards, almost at right angles to the sclerotic. The vitreous is shrunken and detached posteriorly. All three tunics, sclerotic, choroid, and retina, are thinned. Some of the pigment epithelium has become separated from the choroid in the process of mounting, and the choroid has become slightly detached from the sclerotic. The optic disc is deeply cupped.

No. 7.—The lateral half of the left eye of a girl, aged 12. About six years previous to excision she had a perforating ulcer of the cornea, which resulted in an adherent leucoma and a cataractous condition of the lens. An iridectomy was performed, and some of the lens removed by a curette evacuation. The lens capsule remained adherent to the centre of the cornea, the tension became increased, and the whole globe enlarged. The cornea is much larger than normal, and there is an opacity in its centre where the capsule of the lens is attached. Part of the iris from the lower part of the specimen has been removed, but not nearly up to its extreme periphery. The root of the iris is everywhere in contact with the periphery of the cornea,

and in places much atrophied. The greater part of the lens has gone, but some of its cortex still remains in the capsule. The vitreous is shrunken and detached posteriorly. The retina, choroid, and sclerotic are all stretched and thinned. The optic disc is deeply cupped.

No. 8.—The lateral half of the right eye of a man, aged 21. When he was four years old it was cut with a knife. The tension at the time of excision was increased; antero-posteriorly the globe measures 29·5 mm., and vertically 25·5 mm. The cornea is much enlarged; there is a thick band of cicatricial tissue in the centre of it, laterally it is much thinned. The iris is atrophied; it is spread out in the form of a network over the posterior surface of the cornea, to which it is intimately adherent. Also adherent to the back of the cornea, about its centre, is a small remnant of lens, from which the fibres of the suspensory ligament are seen to radiate. The vitreous is shrunken, and detached posteriorly. The choroid has considerably large areas of atrophy in it. The retina is *in situ*, and the optic disc deeply cupped and excavated.

No. 9.—The lateral half of the left eye of a man, aged 22. He had good sight until he was 5 years old, then inflammation commenced in it. Three and a half years before excision the pupil was found to be excluded, and the iris *bombé*; an iridectomy was then performed. At the time of excision the tension was +2, and the vision reduced to hand movement. The patient presented no signs of inherited syphilis, either in his physiognomy or teeth. He was one of a family of 13, three of whom, born before the patient, had died in infancy; none of the others had had any eye trouble. The globe measures 29 mm. antero-posteriorly, and 26 mm. vertically. The cornea is much enlarged, its diameter being 14 mm. At its upper margin is seen the scar of the iridectomy incision. The upper border of the lens is tilted forwards, and adherent to it. The pupillary margin of the iris was attached to the lens capsule in the recent state, but in mounting has become somewhat separated. The lower part of the iris, between its pupillary margin and the ciliary body, is bowed forwards, and its root is in contact with the periphery of the cornea. The vitreous is shrunken and

detached posteriorly. The choroid has small scattered patches of atrophy in it. The retina is *in situ*. The optic disc is very deeply cupped and excavated.

No. 10.—The lateral half of the right eye of a boy, aged 2. His left eye was blind and shrunken (? from glioma) and he had also a malignant growth over the parietal bone. He died soon after the removal of the right eye. The whole globe is enlarged, the cornea and sclerotic much stretched. The curvature of the cornea is considerably flattened out. Posteriorly there is a mass of extra-ocular growth. The interior of the eye is filled with new growth of a mottled, yellowish-grey colour. The iris and lens cannot be seen; an irregular pigmented line near the centre of the growth indicates probably the position into which the choroid has become displaced.

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