

and slightly salient, thus encroaching upon and narrowing the area of the clear cornea. I have several times seen this affection in those who had recently recovered from a severe and protracted attack of gonorrhœa, and thus perhaps representing the analogue of the much-disputed gonorrhœal rheumatism. Here, as elsewhere, there is, of course, always a danger that the inflammation may extend itself to the neighboring tissue, and its early origin and destructive features may thus be concealed in the signs and symptoms of the participating parts. Resolution of these foci of inflammation usually occasions a localized resorption and thinning of the sclera, which shows itself by a bluish area, that may subsequently become the seat of a staphylocomatous projection.

Gummy infiltration into the stroma of the tissue merely differs from the episcleral in its locality.

The following case<sup>1</sup> is quoted entire, as it presents so complete an example of the way in which gummy formations of the scleral tissue arise, progress, and terminate, both clinically and microscopically:

The patient was a well-developed woman of thirty years of age, and at the time of the attack was apparently in perfect health, and without the slightest signs of a syphilitic cachexia. Five years before, she had had a chancre, for which she had been treated in the regular way. The primary lesion was followed by the usual secondary, and these in their turn by the so-called tertiary symptoms.

Three years after inoculation, and two years before the present trouble, the patient suffered from an attack of iritis in both eyes, and they had remained "weak" ever since.

The present attack was ushered in by similar symptoms, and the belief on the part of her attending physician was that the patient was suffering from a second attack of iritis. The trouble was, however, entirely confined to the left eye. The injection of this eye gradually increased for about a week or ten days, unaccompanied, however, by much pain or loss of vision. The patient was, however, shortly after awakened at night by a sudden and very violent attack of pain, with a very rapid loss of sight, which in a day or two resulted in total blindness. Becoming alarmed, the patient presented herself at the Eye and Ear Infirmary, where I saw her for the first time, about two weeks after the beginning of the attack.

The right eye at this time appeared to be perfectly normal in every respect. The left was very much injected, and the conjunctiva, besides being very much inflamed, seemed, in conjunction with the subconjunctival tissue, to be thickened and œdematous, especially to the outer side of the eye. The anterior chamber was filled by a yellowish exudation, so that the iris was concealed from view. The cornea was, however, free from any ulcerative process, and the epithelial layer was intact. There was no perception of light.

As the patient was suffering violent pain in and around the eye,

<sup>1</sup> E. G. Loring and H. C. Eno, Trans. Amer. Ophth. Soc., 1874, p. 174.

and as she would not permit the eye to be removed without the consent of her friends, it was decided to do a free paracentesis. This was done with a Graefe's knife, a free incision being made in the lower margin of the cornea. The anterior chamber was thoroughly evacuated. This was followed by a great relief of pain.

The wound, however, gradually closed, and with its closure the pain returned, and the exudation began to reappear in the anterior chamber. The other eye (the right), which up to that time had shown no trace of any trouble, began now to be somewhat sensitive to light, and to show other symptoms which seemed to be of a sympathetic nature. Enucleation was therefore performed, and the eye given to Dr. Eno, whose description of the examination will be found below.

The enucleation of the left was followed by an amelioration of the condition of the right eye, so far as the dread of light was concerned; but four days after the operation a small circumscribed elevation began to make itself apparent in the line of the insertion of the rectus externus, but somewhat closer to the cornea. This had the appearance of a circumscribed elevation of the subconjunctival tissue, the conjunctiva proper being but slightly injected just over it. This injection of the conjunctiva proper gradually increased, following the line of the rectus externus muscle, till, within two or three days, it had spread out in a fan or cone-like shape, the base of which was toward the external canthus, and the apex, sharply defined, towards the cornea.

At this time a serous exudation underneath the conjunctiva began to make its appearance, being limited to the external and lower part of the eye. The injection of the eyeball gradually extended round the cornea, above and below, till it had included the whole eye. Still, the region over and around the tendon of the externus was the seat of the most marked symptoms of the trouble, and from the serous exudation it was supposed that something was interfering with the circulation of both the superficial and deeper parts of this portion of the eye. At this time a grayish, spongy exudation began to be apparent over that part of the iris opposite the insertion of the externus rectus. This extended itself pretty rapidly in a circuit round the upper portion of the iris, so that on the day after it had been first noticed the exudation had extended over about two-thirds of the entire membrane, leaving the outer and lower parts unaffected. This exudation had a very peculiar appearance, looking more like mould of a grayish-yellow color than anything I can compare it to. It projected over the edge of the iris into the pupillary space; and vision, which had hitherto remained good, now sank rapidly, so that the patient could barely count fingers at four feet. On the following day this semi-transparent exudation had extended all around the iris and was occupying the greater part of the anterior chamber. Through it the iris could be dimly seen, of a dull velvety hue. Vision was so bad that the fingers could be barely counted at a foot and a half. The pupil was contracted, though not markedly so, and

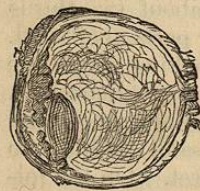
there were no adhesions to the lens, as was afterwards shown by the free dilatation of the pupil under atropine. Specific treatment had from the first been pushed vigorously without apparently checking the progress of the disease, and great fears were entertained that the eye would follow in the same course as its fellow.

On the following day, however, the exudation began to be absorbed, and disappeared so rapidly that within thirty-six hours after its commencement the anterior chamber was entirely free from it. Vision immediately rose and the eye made a steady and rapid recovery.

The left eye was placed in Müller's fluid immediately after enucleation. The eyeball appeared normal in size and shape, with the exception of a very considerable thickening of the episcleral tissue at the outer side of the cornea, and over the insertion of the rectus externus. The cornea was opaque, and there was a large cicatrix, the result of the previous opening, in the lower portion of it. At the end of two weeks the eye was removed from Müller's fluid, and opened by a section passing nearly through its horizontal meridian. The antero-posterior diameter of the eye measured 26 mm., the transverse diameter 25 mm. As seen in this section, the episcleral tumor above mentioned is about  $1\frac{1}{2}$  mm., in thickness, and extends back nearly to the equator of the eyeball, inclosing in its substance the tendon of the rectus externus. The anterior chamber is filled with a mass of yellow exudation completely blocking up the pupil. The iris and ciliary body are enormously increased in size, but especially at the outer portion of the eye corresponding to the external swelling; here the iris measures  $1\frac{1}{2}$  mm., and the ciliary body 3-4 mm. in thickness; here also the substance of the iris and ciliary body seems to be continuous with the mass of exudation in the anterior chamber, the ligamentum pectinatum iridis being broken through. The ciliary tumor is of quite firm consistence and yellowish in color. It extends backwards to the region of the ora serrata, where it gradually is lost in the choroid, which appears to be but slightly increased in thickness.

The lens is transparent and normal in appearance, but pushed over to the nasal side by the swelling of the ciliary body on the opposite side of the eye. The vitreous is cloudy. The retina and choroid are in place. The sclera is normal in appearance, and may be seen as a white band separating the intra- from the extra-ocular tumor. (Fig. 132.)

FIG. 132.

Section of eyeball.  
Natural size.

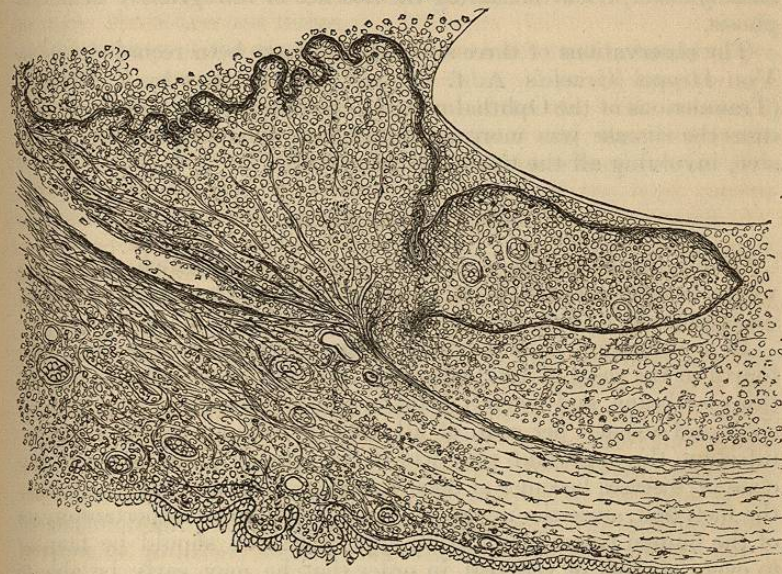
Microscopic examination shows that the episcleral tumor is due to an infiltration of the episcleral tissue, with a multitude of round cells. The cells are distributed between the fibres of the connective tissue, and the bloodvessels of this region are enlarged and engorged.

At the limbus a collection of cells is so disposed as to separate the lam. elast. ant. with the superjacent epithelium from the corneal tissue for a considerable distance. The rest

of the cornea presents the appearance of moderate keratitis. The anterior chamber is filled with a mass composed of round cells and coagulated fibrin. The outer layers of the sclera are invaded by the cell-growth, and throughout its whole thickness collections of round cells may be seen lying between the bundles of fibrous tissue.

Thin meridional sections were made through the centre of the ciliary tumor, and the iris and ciliary body were found to be infiltrated with a great quantity of the same small round cells as exist in the episcleral tumor. (Fig. 133.)

FIG. 133.



Section through ciliary region, showing ciliary tumor and episcleral tumor, etc.

In that portion of the ciliary body near the sclera, the cells are distributed between the bundles of muscular fibres; and as we pass towards the inner surface of the ciliary body, they become more numerous, separating the muscular bundles more and more widely, until, at the inner margin, we can distinguish only a mass of cells thickly packed together and traversed by an occasional capillary vessel. These cells are identical in appearance with the so-called exudation, or lymphoid cells, being about the size of a white blood-corpusele and containing a granular nucleus. In no portion of the tumor do they present the appearances of granular or fatty degeneration.

In the iris the cells are very abundant, and in those portions most affected it is scarcely possible to recognize any element of normal iris tissue, except the pigment. The inner and under surface of the ciliary body and iris are also thickly covered with masses of round cells. The vitreous is filled with round cells and coagulated fibrin.

The retina and choroid of the posterior portion of the eye were examined, but presented no unusual appearance beyond those of an inflammatory condition.

In view of the clinical history and pathological appearances of this case it must be regarded as one not merely of irido-cyclitis syphilitica, but also of syphilitic gumma of the ciliary body and iris. For, though the lesions do not differ essentially in kind from those of a simple inflammatory origin, still their intensity and circumscribed character, together with the formation of a distinct tumor, justify the name *gumma*, notwithstanding the absence of retrogressive metamorphosis.

The observations of three similar cases have been recorded, one by Von Hippel (Graefe's A. f. O., viii, p. 288), two by F. Delafield (Transactions of the Ophthalmological Society, 1871); but in all these cases the disease was more advanced and the changes more extensive, involving all the tissues of the eyeball.

#### SYPHILITIC IRITIS.

Of all the affections of the eye there is none which, taken as a whole, is more serious in its immediate effects, or more disastrous in its subsequent results, than iritis.

It is estimated, from carefully prepared statistics, that over one-fourth of the cases of total blindness proceed from inflammation of this membrane, and when it is taken into consideration that between sixty and seventy per cent. of all cases of iritis are due to syphilitic infection, the important rôle which the specific virus plays in this class of diseases becomes at once manifest, and strongly emphasizes the fact, that, since the integrity of one of the most important organs of the human frame is involved, syphilitic iritis should be familiar to every student of venereal, in order that he may early be able to recognize and treat it.

Let me premise by saying that we have no certain means of distinguishing syphilitic iritis from that dependent upon injury, rheumatism, or other causes; although there are certain symptoms, presently to be described, which, when observed, render the former origin probable. Moreover, the majority of cases of iritis are doubtless due to syphilitic taint, so that the existence of this disease should always excite suspicion, and lead the surgeon to make a thorough examination of the present condition and past history of the patient.

In accordance with the teachings of pathological anatomy, modern ophthalmologists have divided inflammation of the iris in general into three classes.

- (1) Simple or plastic iritis.
- (2) Serous iritis.
- (3) Parenchymatous or suppurative iritis.

<sup>1</sup> My friend, Dr. Henry D. Noyes, of the Infirmary, informs me that, according to statistics collected and reported in his lectures by Prof. Graefe, about sixty per cent. of all cases of iritis occur in persons affected with syphilis. See also Wecker, *Etudes ophthal.*, tome i., p. 394.

It is to this last division that the so-called syphilitic iritis as a rule belongs; still, as the disease may, and often does, assume either of the above forms, a short description of each will be given, omitting the more minute details, which are chiefly of interest to the ophthalmologist, and which are apt to confuse the mind of one who has not made a special study of the eye.

*Simple or Plastic Iritis.*—This form is characterized by congestion of the membrane, but differs from simple hyperæmia of the iris by the production of an exudation either from the pupillary border, surface, or stroma, of the iris, and in some cases by an increase in the elements of the connective tissue.

This variety of the disease may assume a very mild character, presenting but a very moderate degree of subconjunctival injection, and accompanied with but little discoloration of the iris, pain, or dread of light. Indeed, it may happen that the entire trouble escapes detection till the use of atropine brings to light the existence of one or more adhesions of the iris to the anterior capsule of the lens, producing under dilatation the characteristic irregularity of the pupil.

More frequently, however, there is injection of the conjunctival and sclerotic vessels, giving the eye a red appearance. But unnatural redness is observed in simple conjunctivitis; and how shall the two be distinguished? In the first place, by depressing the lower lid, and, at the same time, telling the patient to look upwards, whereby the inferior palpebral fold will be exposed. In most cases of conjunctivitis, the greatest amount of injection will be found remote from the cornea; while in iritis the contrary is the case; the redness is almost entirely confined to a circle around the cornea, called the "sclerotic zone," and the more distant portions of the white of the eye remain clear. If the eye has been congested by the injudicious application of poultices, alum, curds, etc., this difference will be less or not at all apparent. Again, observe the character of the injection: some of the conjunctival vessels are distended, and may be recognized by their brick-red color, large size, tortuous course (chiefly over the recti muscles), and their mobility, if the conjunctiva, by means of slight pressure with the finger external to the lid be made to slide over the sclerotica; but beneath these brick-red vessels a second layer is discovered on close examination, composed of others radiating from the margin of the cornea, much finer than the preceding, straight, and of a pinkish hue, and which are seen to remain stationary through the meshes of the sliding network of conjunctival vessels. It is these vessels which constitute the sclerotic zone, met with not only in iritis, but in other internal inflammations of the eye.

Next observe the condition of the iris and pupil, and compare them with those of the opposite and sound eye. The affected iris is seen to have lost its natural brilliancy; its minute texture is less apparent; its surface covered over with a thin layer of fibrin; and its color changed. In persons with blue eyes it assumes a yellowish-

green hue; in others, the change is less marked but may generally be detected. Close the two eyes with the thumb of each hand, the fingers resting for support upon the temples, and alternately open one and then the other; and the iris of the affected eye will be found to be sluggish in its motions or quite immovable.

At an early stage of the disease, the pupil assumes a dull appearance, and is less clear and bright than in the normal condition, owing sometimes to a slight turbidity in the aqueous, and sometimes to a delicate film of exudation from the margin of the iris over the anterior capsule. I have, moreover, sometimes thought that the capsule itself or the underlying epithelial cell layer become implicated, though of this, so far, I have had no anatomical proof. The pupil may also become irregular in shape. This irregularity of outline, due to adhesions between its margin and the capsule of the lens, or to exudation into its substance, becomes more marked as the disease progresses, and is especially evident if the pupil be dilated by belladonna or atropine, when its margin is found to be scalloped, owing to its being attached at some points and drawn out in others. In some cases the adhesions become continuous around the whole circumference, and the capsule of the lens is covered with a layer of lymph which completely blocks up the pupil.

*Serous Iritis.*—This is distinguished from the simple variety by the fact that the exudation is of a serous, instead of a plastic nature, and is due to a hypersecretion of slightly turbid aqueous humor, which produces, as a rule, an increase in the intraocular tension.

On this account the anterior chamber becomes deepened, and the pupil, instead of being contracted, moderately dilated, sometimes markedly so. This is probably due to direct pressure by the contents of the globe upon the nerves of the iris.

The circumcorneal injection is here much less than in the plastic form, or it may be entirely wanting. Besides the aqueous humor becoming slightly cloudy, the entire posterior surface of the cornea appears oftentimes as if covered with a delicate film, and minute punctated opacities make their appearance upon the internal lining membrane (membrane of Descemet). These spots owe their existence, at least in the beginning of the disease, to the precipitation upon the membrane of minute particles, which are held in suspension in the troubled aqueous humor, and which often disappear when the anterior chamber is evacuated by paracentesis corneae. Later in the disease, however, they assume a somewhat larger size, and are then permanent, being due to a morbid change in the epithelium of the membrane itself.

Sometimes these punctated spots are either entirely absent or are so slight as to escape any but a most careful examination. In this case the predominant symptoms, viz., slight discoloration, and dilatation of the iris, and trifling cloudiness of the aqueous humor, are very easily overlooked by an inattentive observer, and the disease is allowed to progress until it extends itself to the ciliary body and cho-

roid, gradually involving the deeper structures, and the eye falls step, by step, into a state of low chronic glaucoma.

In this form of iritis it seldom happens that there are any adhesions of the iris to the capsule of the lens.

I have been particular in giving the principal symptoms of this peculiar form of iritis, both on account of its insidious nature, which renders it so liable to escape detection, and from the fact that it has been alleged to be oftentimes the product of hereditary syphilis.

*Parenchymatous or Suppurative Iritis.*—This form of iritis is characterized by a deep-seated inflammation, affecting the stroma of the iris, and giving rise to a considerable swelling of the membrane, and causing an increase in its cellular tissue elements. Owing to this fact the surface of the iris becomes elevated in different parts, and vessels, sometimes of considerable size, from arrest in their circulation, make their appearance on the surface of the membrane. These elevations are almost entirely composed of cellular tissue, and usually contain a number of vessels of new formation.

It is in this form of iritis that we meet most frequently with extensive adhesions between the margin of the pupil and the lens, together with a complete loss of contractility of the iris, and when these adhesions once take place they are far more obstinate in resisting the effect of atropine than those of simple idiopathic iritis. Here, too, the production of pus in the anterior chamber is much more rapid and abundant.

The so-called syphilitic iritis of various authors is, strictly speaking, only a variety of parenchymatous iritis, its distinguishing characteristic being that the inflammatory action is more circumscribed, confining itself usually to one part of the iris, while the neighboring portions preserve, for a considerable time, at least, a nearly perfectly normal condition. In the same way it is less apt to propagate itself to the deeper-lying membranes. It is here that we find those peculiar brownish or yellowish elevations upon the surface of the iris, which generally, though not always, occur on its inner ring, near the margin of the pupil.

These "tubercles" or "condylomata," as they are called, gradually increase in size, and sometimes become organized and covered with a network of small vessels. They vary exceedingly in their dimensions, sometimes acquiring a growth sufficient to occupy the quarter or even one-half or more of the entire iris, and, if then situated near the external border of the membrane, may cause projection of the cornea or sclerotic.

It has been demonstrated by Colberg<sup>1</sup> that the composition of "tubercles" is identical with that of gummy tumors, as described by Virchow.<sup>2</sup>

The presence of these tubercles affords a very strong probability, if not an absolute certainty, of syphilitic taint. Of sixty cases of

<sup>1</sup> Archiv für Ophth., t. viii., p. 288.

<sup>2</sup> Archiv für path. Anat., No. 15, p. 265.