

absorbed at birth. He believes this filament is present in most eyes.

The last subdivision of DeBeck's classification of cases more nearly resembles mine, with the exception that these cases do not contain vessels.

He says that in almost all cases of persistent canal, it is found in both eyes, while in the ordinary forms of persistent artery, the remnant occurs in but one eye in more than 5/6 of the cases.

The case here presented is of inter-

est, as the accompanying illustration shows because of:

(1) The unusual caliber of the Canal of Cloquet and its opaqueness thruout its entire length.

(2) The persistence of the hyaloid artery, carrying blood, within the canal.

(3) The clear distinction of the adventitious vessels on the surface of the canal.

(4) The reduction of vision to light perception.

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CLINICAL OBSERVATIONS ON THE CORNEA.

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With improved illumination, the corneal microscope permits exact observations of the changes in the anterior segment of the eye, which throw light on the nature and progress of such changes. Deposits on the posterior surface of the cornea, keratoconus, copper embedded in the cornea without irritation, corneal changes in electric ophthalmia and herpes are here described.

PRECIPITATES ON THE POSTERIOR SURFACE OF THE CORNEA.

The phenomenon of what are apparently minute droplets deposited on the posterior surface of the cornea is an early sign of iridocyclitis, and may be the only evidence of the incipency of pathology. In certain cases of ocular pathology, not as yet definitely classified, similar droplets have been identified by Vogt as being edematous endothelial cells, and this observation has been later confirmed by Staehli. Aside from these "droplets" and probably individual cells, some pigmented, and pigment granules, the latter likely an evidence of senile depigmentation of the uvea, we find the larger cell conglomerations, the so-called mutton tallow spots on the posterior surface of the cornea in iridocyclitis.

The configuration assumed by these deposits, as seen in focal illumination,

by means of the ophthalmoscope, is well known. As to their genesis, there may be some doubt. However, the theory advanced by Fuchs, that they are in all likelihood leucocytes, which have united to form smooth, round masses within the aqueous, has thus far not been successfully disproven by observation of the living eye with the microscope. Koeppe has claimed that if this form of origin be true, such "balls" must be found elsewhere on the iris or free within the aqueous. While he does not deny having seen similar masses, he feels inclined to believe that such as are seen on the posterior corneal surface are due to a successive apposition of individual cells and small cell masses.

Observation of many cases under high power leaves little doubt in my mind that they are deposited as one mass, and do not grow larger.

The following factors point to this, in agreement with Fuchs. The cell masses at the time of precipitation are apparently quite soft in consistency, for they spread out, are flat and regular in outline. This latter factor alone would exclude an accretionary development.

These masses of leucocytes, with apparently so much affinity for one another when forming within the aqueous, seemingly lose this cohesive desire when attached to the cornea, for tho we may observe enormous numbers develop in a very short time, yet these mutton tallow spots never seem to be even in part superimposed. They are individual, do not increase in size, tho a new group may make a very sudden appearance at any time in the process of the disease.

Newer observations pertaining to the (in all probability) senile process of depigmentation within the anterior chamber, may give food for thought as to the distribution of pigment in the deposits on the posterior corneal surface. It is a matter of frequent observation, that fresh exudates on the anterior lens capsule are almost immediately covered by a chocolate like pigment coating. These fresh exudative masses, when impregnated by pigment cells, seem to stimulate the latter into very active proliferation. I have seen large areas of exudate fully covered by new pigment over night. The impregnation may be by direct contact with the retinal pigment of the iris, or as likely by pigment free within the aqueous,—thus accounting for the pigmentation of isolated masses in the center of the pupillary area. It may be of interest to mention in this connection, that I have observed similar pigmented masses attached to the *posterior lens capsule* in cases of cyclitis.

The mutton tallow spots on the back of the cornea would, by their coloration in the majority of cases, present an absence of contact with pigment cells of any kind, unless their physical character were at times such as to exclude successful pigmentation. Some, however, are sparsely pigmented, especially in their centers, leading one to believe that this thicker center of the exudative mass may give a somewhat

stunted nourishment to a few pigment cells after impregnation in situ, or they may, according to Fuchs, bring their pigment with them from their uveal origin.

In other cases, all deposits on the posterior corneal surface are covered by pigment, even on the attached surface. These masses may have been impregnated while in transit thru an aqueous containing free pigment cells.

In long quiescent cases of iridocyclitis, small star shaped masses, if on the posterior corneal surface, without a doubt represent old deposits to a great extent absorbed, in fact they may be permanent evidences of a former exudative process. These stars must not be confounded with similar, more uniform, pigmented three or four tailed pupillary membrane remnants, found so very frequently and often in great masses on the anterior lens capsule in normal eyes. It is well known that these acquire their pigment after birth. In this connection, it is of interest to know that I have found that these "stars" participate in the process of senile depigmentation; for if found in older individuals, they as a rule present a grayish appearance, a *prima facie* evidence of senile pigment absorption.

I have also observed pigmented masses, regularly deposited and round, on the posterior cornea in an old case of specific iridocyclitis, connected by a regular network of fibrin, individual strands between all deposits. At the time of observation, this network was not free within the aqueous, as is seen at times. I had opportunity to show this case to Prof. Gallemaerts of the University of Brussels, the first European authority on microscopy of the living eye to visit our country. We agreed that the picture presented could only be explained by accepting it as an evidence of "crystallization" in the process of absorption.

KERATOCONUS.

During the past two years, I have had an opportunity of studying seven cases of keratoconus under slit lamp illumination with the binocular microscope.

Two of these cases were fairly well

advanced, and showed the typical opacification and the most often vertical striping in the middle and deep corneal parenchyma. In both cases the normal nerve fibers were decidedly thickened.

The eye most advanced in this particular pathologic condition presented a rupture of Descemet's membrane.

The other cases presented keratoconus in its incipency. One eye, tho the process was advanced to a point where it was possible to discern the conus macroscopically, when seen from the side, failed to show microscopic changes. In the four eyes of two other incipient cases, the most pronounced early change was the keratoconus ring of Fleischer, a curved line of pigment granules, supposedly of hematogenous origin, deposited in the basal epithelium. This line is similar in nature to the pigment line often found in corneal cicatrices, at times in normal corneae. This was first described by Staehli, who now believes that the coloration of the epithelium may have an extraocular origin, possibly from impurities in the lacrimal fluid.

COPPER IMBEDDED WITHIN THE CORNEAL STROMA.

A fifteen year old boy was injured as the result of a Fourth of July explosion. One eye was enucleated. The other has only the perception of light. This eye shows at least twenty-five particles of copper deeply imbedded within the cornea, all of which are metallicaally clean. Some were as large as one millimeter in diameter, thin and with their flat surfaces parallel to the surface of the cornea, for this reason having failed to penetrate. They all seemed to be retained without irritation of the surrounding stroma, and there was no ciliary injection one year after injury.

Several opacities, continuous thru the cornea, gave evidence of the perforation of other particles. A larger piece of copper was seen at the bottom of the anterior chamber. This had a piece of transparent lens capsule attached to it, the copper evidently having been freed from its original location in the lens capsule by a needling done for the traumatic cataract.

CORNEAL CHANGES IN ELECTRIC OPHTHALMIA.

In a patient whose eyes were exposed to a flash of a shortcircuit, high tension current, the cornea after twenty-four hours presented dew like changes of the epithelium, and many very minute epithelial cell erosions, which latter faintly stained with fluorescein.

The striking peculiarity of this case was the sharp demarkation of the involved corneal zone. Crescentic areas including about the lower one-fourth of both corneas, which no doubt at the time of the "flash" were covered by the lower eyelids, failed to show a pathologic condition. There were no visible retinal changes, both eyes presented a slight ciliary and conjunctival injection. The so-called photophobia, so often described in similar cases, was temporarily removed in this case by an instillation of cocain, proving that this symptom was in reality not retinal, but due to a mild irritation of the traumatized corneal epithelium.

HERPES OF THE CORNEA.

A case of typical skin eruption, along the supraorbital and supratrochlear nerves, identified a coexisting keratitis on the same side as being of the same etiology, in this way giving an opportunity of observing a corneal lesion, without the question of diagnosis.

Macroscopically the cornea presented a fairly circumscribed, round area of grayish infiltration, involving about one-fifth of the cornea in an upper nasal zone. There was ciliary injection, epiphora, and a moderate amount of pain. Repeated inspection, over a period of several weeks, showed no change. Deep vascularization, such as is so characteristic in specific parenchymatous keratitis, did not develop. The surface epithelium was stippled over this area and stained faintly in minute spots, showing epithelial cell erosions. Dew like changes of the epithelium were visible over the area involved, and extended somewhat into the more normal cornea. This remained stationary, therefore, a part of the lesion and not an evidence of progression. There were two elevated "humps" on the surface of the

cornea, presenting not a fluid accumulation as might be expected, but what must have been localized zones of edema of the corneal stroma, judging by their appearance, size, and behavior over a prolonged period of time. Over the back of the lesion, Descemet's membrane was thrown into broad folds. The endothelium covering the lesion was studded with at least fifty pigment cells or granules. This peculiarity has proven an endothelial change sufficient to allow of the adhesion

of these granules posterior to the involved zone. Pigment granules were sparsely present on the back of the uninvolved corneal area, also in the other eye, thus proving that while they attached themselves in greater numbers on the pathologically changed endothelium, their presence in the aqueous had no relation to the corneal process, but was an evidence of senile *depigmentation* of the uvea of both eyes, coexisting in this individual.

TWO CASES OF RETINITIS PROLIFERANS OF SYPHILITIC AND DIABETIC ORIGIN.

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Although the two patients were examined repeatedly for a long time, large hemorrhages were never observed on the retina or in the vitreous. Therefore they are excluded as factors of the new formations. Read before the Rhode Island Ophthalmological and Otological Society, February, 1922.

CASE 1. S. S., Armenian, 29 years of age, well nourished, strongly built, was seen the first time in July, 1913. In September, 1912, he contracted syphilis; four months later his eyes became affected and were treated at

anterior capsule. Could not count fingers at any distance.

Right eye. External appearance normal, pupil dilatable with atropin, lens clear, vitreous transparent, optic disc entirely concealed by a large white membrane of an irregular rhomboidal shape. Two opposite angles were directed vertically and the other two horizontally. The one on the temporal side of the fundus deviated slightly upward, while the other, on the lower part, just a little outward. Numerous new formed fine blood vessels were seen on the surface, and one hemorrhagic spot. The retinal blood vessels were underneath the new formation, and were seen emerging at its boundary on the retina. The surface, with the numerous capillaries, protruded into the cavity of the vitreous, and became clear by direct ophthalmoscopic examination with +10 D.

The patient went to Philadelphia and other cities, remained in different hospitals for observation, was the subject of study and lectures, and returned here the following year, in 1914, totally blind. The vitreous grew gradually opaque, the fundus more and more indistinct, until all the interior of the eye became uniformly white.

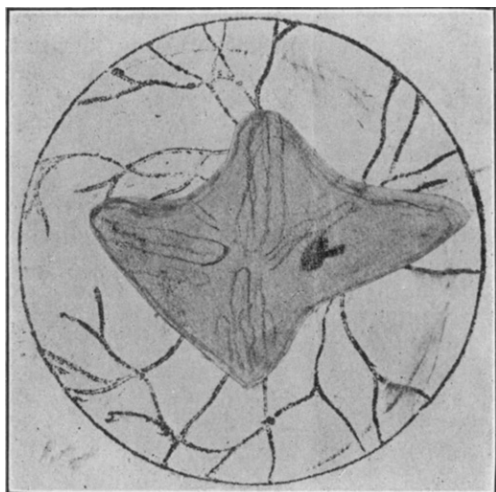


Fig. 1. Retinitis proliferans of syphilitic origin. (Case 1).

the Massachusetts Eye and Ear Infirmary with injections, mercury, etc. Repeated examinations revealed the following eye conditions: Left eye. Pupil irregular, small, not dilatable, with deposits of pigment and exudates on the