DR. VERHOEFF (closing): In the paper I did not discuss the question of which is preferable in the treatment of tumors, *x*-rays or radium. I think it is pretty well established that the actions of *x*-rays and radium are exactly the same. Radium has the advantage only when the tumor is relatively inaccessible, for instance, when it is in the orbit. In this case I do not believe radium would have been nearly as successful. Radium as generally used requires very long exposures, while the *x*-ray treatment required only about five minutes each time. If you get the dosage right, the *x*-ray will achieve the same result as radium. Of course, there is a certain fascination about radium, and I think a great many are inclined to overlook the fact that the *x*-ray will do just as well.

COATS' DISEASE OF THE RETINA. REPORT OF TWO CASES.

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The two cases represent two types of massive exudation into the retina: (1) With extensive vascular changes; (2) without extensive vascular changes. A brief review of the etiology and treatment of the disease is given.

CASE 1.—Leonard L., aged ten years, came to the clinic at the Post-Graduate Hospital September 18, 1920. Father and mother living and in good health. Family history negative. The first knowledge of any trouble was when the school physician reported the right eye defective in December, 1919. The right eye diverged and the patient was advised to have it straightened. The eye has never pained or been inflamed. The patient has had measles, whooping-cough, scarlet fever, and has had swollen glands removed from the neck. At the present time he is in perfect health, excepting the eye trouble. V.R.E., 4/200 eccentric; L.E., 20/30 with + .75 cyl. ax. 75° = 20/20.

Ophthalmoscope: The left eye is normal. In the right fundus there is a large mass of white exudate, yellowish in some spots, under the retina, extending from the temporal half of the optic disc, upon which it encroaches, to the extreme periphery of the temporal half of the fundus. The highest point of this mass measures plus 8.00 D. about 1½ disc-widths to the temporal side of the disc. There are numerous hemorrhages on the surface of the mass near the macula, especially to the temporal side; some of the vessels are dilated into a fusiform shape, as described by Coats in certain cases.

There are numerous cholesterin crystals scattered throughout the mass, especially frequent at the lower and upper margins of the exudate. There are also several round pigment spots in the mass, from 1 to 3 mm. in diameter. (As seen by the ophthalmoscope.) The exudate is about 3 disc-widths wide at its broadest part near the macula. There are no light-streaks on the retinal vessels which run over the mass. One of the unusual features in this case is that one of the retinal vessels is veiled over a short distance in the lower portion of the mass. The vitreous and anterior portions of the eye are clear. The pupils are normal in size and reaction.

The von Pirquet test was positive; this was confirmed a week later by a subcutaneous injection of 1 mgm. of O. T., which was followed by a marked reaction—local, focal, and general. The arm was swollen and red, the vision more clouded, and a decided rise in temperature occurred. The patient was placed on therapeutic doses of O. T., beginning with a 2 minim O. T. (H. K. Mulford) Vial No. 1 (1/1000 mgm.), and gradually increased 2 minims a dose, at week intervals, until 14 minims of Vial No. 1 (7/1000 mgm.) was reached, when the patient had a severe local and general reaction, pains in the stomach, legs, and back, great *malaise*, temperature 101° F. The arm was sore and swollen, but no focal reaction, either subjective or objective, was manifested.

The injections were discontinued for a few weeks and then begun again with a 1/1000 mgm. O. T., and gradually increased as before, until the dose (April 9, 1921) had reached 16 minims of Vial No. 2 (8/100 mgm.) without reactions of any kind. However, on April 9, 16, and 23, the Schick test was given the patient by his school physician, and imme-

diately following this Schick test the eye became slightly red, numerous retinal hemorrhages occurred, the retinal exudate was increased, and the temperature rose to 102° F. Needless to say, all T.B. injections were discontinued. The patient, who had gained eight pounds under the tuberculin treatment, lost three pounds following the Schick tests.

After an interval of three weeks, when the temperature was again normal, the eye white and the retinal hemorrhages absorbing, the O. T. injections were again resumed, beginning with 1/1000 mgm., and this has been carried up gradually to 10 minims (5/1000 mgm.) without reactions. The patient has regained the three pounds lost following the Schick test and is feeling well.

An examination of the fundus (June 10, one month after the first Schick injection) shows the mass of exudate subsiding, the retinal hemorrhages almost cleared, and the eye quiet. Figure 1.

CASE 2.—Molly K., aged nineteen years. First seen September 29, 1920, when her temperature by mouth was 99.2° F. In the last few days the patient noticed that she cannot see well. Family history negative and the patient seemingly in perfect health.

Ophthalmoscopic appearance of the left eye is entirely normal, as are also the cornea, iris, and ciliary body. Right eye: In the temporal half of the fundus the retina is elevated by a whitish, yellowish mass, plus 2.00 D. at the highest point. This mass extends from near the optic disc to the extreme periphery of the fundus, as far as can be seen with the ophthalmoscope. It is about 3 disc-widths at its broadest point, near the macula, which area is affected.

The retinal blood-vessels are normal, except perhaps for almost complete disappearance of the light-streak on the vessels that run on the mass. There are no hemorrhages or cholesterin crystals. Eccentric vision to the temporal side. A large central oval scotoma corresponds to the mass of exudation under the retina. (Fig. 2.)

This patient did not return to the clinic, but we trust she came under other care and will be reported. She gave an assumed name (Molly Kron) and a false address, as we found out when we tried to follow up the case. Wassermann was negative.

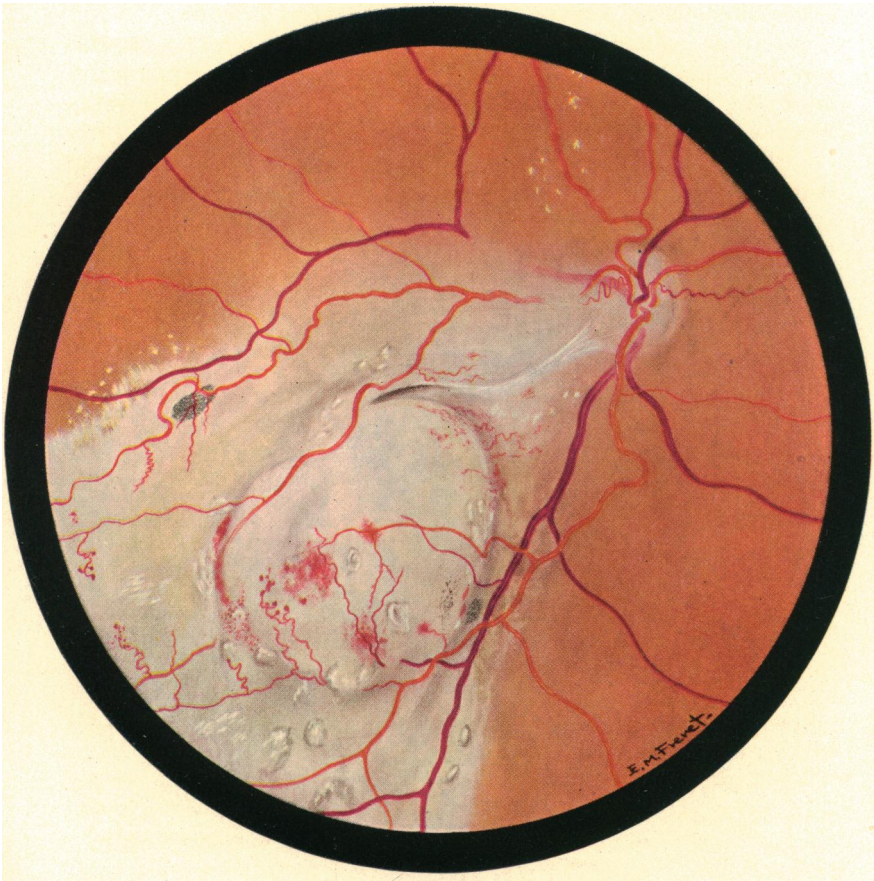

Fig. 1.

There is one feature in each of these cases that heretofore has not been noted, as far as I can find out from the literature, that is, the absence of the light-streak on the retinal vessels over the massive exudate, or, if present, the streak is but very faintly to be seen and then only where the exudate

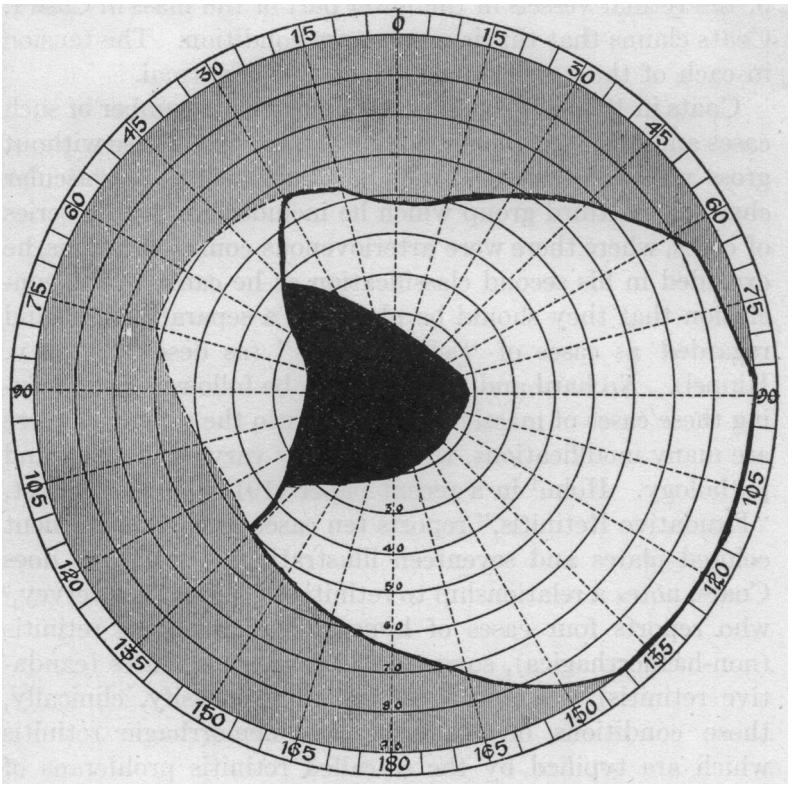

Fig. 2.

is shallow. This corresponds to cases of ordinary marked detachment of the retina where no light-streak is seen upon the retinal vessels; and incidentally it goes to confirm the theory that the light-streak produced on the retinal vessels is due to refraction, and not to the reflection of light, a point

that both Loring and myself contended for many years and in which I confirmed the experiments of Loring by vivisection in deciding that refraction and not reflection was the cause of the light-streak as seen upon the retinal vessels.

Another feature unusual in these cases was veiling of one of the retinal vessels in the lower part of the mass in Case 1. Coats claims that this is a very rare condition. The tension in each of these cases here observed was normal.

Coats in 1909 and again in 1911 reported a number of such cases and classified them into two groups: (1) Those without gross vascular changes; and (2) those with gross vascular changes. A third group which he included in his first series of cases, where there were arteriovenous communications, he excluded in his second classification as he came to the conclusion that they should be placed in a separate group and regarded as cases of "angiomatosis" (as described by v. Hippel). No hard and fast rules can be followed in classifying these cases of massive exudation into the retina, as there are many modifications, with probably varying etiology and pathology. Holm[1] in a recent paper (1917) on the subject, "Exudative Retinitis," reports ten cases, with two excellent colored plates and seventeen illustrations. Holm, as does Coats, notes a relationship to retinitis circinata, and Jervey,[2] who reports four cases of hyperplastic exudative retinitis (non-hæmorrhagica), suggests that with these cases (exudative retinitis) it would seem proper to classify, clinically, those conditions of exudative, non-hemorrhagic retinitis which are typified by the so-called retinitis proliferans of non-hemorrhagic origin, and the hyperplastic retinitis of syphilitic and traumatic origin which are not of hemorrhagic formation. Holm cites the investigations of Goldzier and Fuchs on retinitis circinata, as early as 1893, and also notes the papers of v. Hippel, 1905; Coats, 1909 and 1911, and Leber's paper of 1915, the last-named author citing 61 cases from the literature up to that date, 1915.

Etiology.—In most cases, as pointed out by Coats and others, the cause is quite obscure. The family and personal history, as a rule, throw but little light on the subject. Syphilis has been excluded in most cases. Tuberculosis is undoubtedly at the bottom of some cases. The pathologic reports, except for showing that the retina is chiefly affected and that the choroid is not affected, or only in the slightest degree, have not materially aided in clearing up the etiology.

Hajano[3] reports the history of a case occurring in a child of two years of age. In this a glioma was suspected and the eye removed. From the pathologic report he considered that the primary lesion was an arteriosclerosis, even in a child of so tender age.

E. von Hippel[4] referred to a patient forty-nine years of age in which the choroid was involved. In this case the tuberculin and Wassermann tests were negative. The eye came to section, and the presence of recent round-cell infiltration showed that the process was distinctly inflammatory and not due solely to the organization of retinal hemorrhages.

The consensus of opinion, however, is that the disease is a degenerative process and not inflammatory. Holm, in his excellent paper, quoted above, states that the etiology and pathogenesis are quite unknown. Coats claims that it is due to subretinal hemorrhages, while Leber maintains it is a degenerative process affecting the retina and pigment cells, with serofibrous exudation. Coats' idea was that it was a local vascular disease, but to what the hemorrhages were due was in doubt.

Pathologic reports of such cases are extremely rare. Dr. L. W. Crigler, of New York, has been fortunate enough to secure the eye in one case for microscopic examination because of secondary glaucoma. His case differed materially from those described by Coats in that there was very slight deposition of connective tissue beneath the retina, with a progressive atrophy of its inner layers. A coagulum filled

the space between the retina and the choroid, in which there were deposits of cholesterin and clouds of "ghost cells." In every other respect the case presented the identical changes described by Coats, classified under Group 2.

Treatment: As the etiology is usually doubtful, the treatment is more or less empirical and unsatisfactory.

The first case here presented had a negative history, and the physical examination revealed nothing abnormal, no clinical symptoms outside of the eye being manifested. He reacted sharply to the diagnostic tuberculin tests, however, both the von Pirquet and the subcutaneous, also to the therapeutic doses of tuberculin. The patient is still under tuberculin treatment, gaining weight, and the eye has steadily gained, as shown by the steady shrinkage of the mass of exudation and the absorption of the hemorrhages; except at the time of the Schick test, which latter caused an acute exacerbation of the trouble.

Differential Diagnosis.—Such cases may be confused with tubercle of the choroid or with pseudoglioma; however, I think myself that careful study of the case, with diagnostic tuberculin tests, that tuberculosis of the choroid should be differentiated. Although, it is possible, in a conglomerate tubercle of the choroid, to be mistaken in the diagnosis.

Pseudoglioma: Here there is a history of exanthemata, and, furthermore, there are always masses of exudation *into the vitreous*, together with mild inflammation of the anterior portion of the eye, usually a circumcorneal flush, which would easily distinguish it from the massive exudate under the retina. In the milder cases of this trouble, Coats' disease, the patients may go for years without any active trouble whatsoever, conditions becoming quiescent. On the other hand, in those cases with vascular changes, retinitis proliferans may supervene, with detachment of the retina, and not infrequently there is a secondary glaucoma and iritis, which may necessitate the removal of the eye.

REFERENCES.

1. Klin. M. f. Augenh., v, 1917, p. 319, et seq.
2. Amer. Jour. Ophth., February, 1919, 127.
3. Cited in Amer. Encyclopedia of Ophthalmology, 11354.
4. Cited in Amer. Encyclopedia of Ophthalmology, xv, 11354.

DISCUSSION.

DR. WILLIAM ZENTMAYER, Philadelphia: Just one point in reference to the differential diagnosis. In cases I have seen, and most of those reported in literature, the presence of cholesterin in Coats' disease is of value in differential diagnosis.

DR. DAVIS (closing): In extenuation I would say that I did not attempt to put in all the literature. I simply reported two cases, and I supposed we were all familiar with the literature of these cases. I recited incidentally Dr. Crigler's case in New York because the eye had come to section.

LIPÆMIA RETINALIS.

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The following history is placed on record for two reasons, first, because there are but few authentic cases of lipæmia retinalis in recorded literature, and second, because a complete metabolic study was made which I believe has not been done before.*

The first case of lipæmia retinalis was reported by Heyl before this Society in 1880, under the title of "Intra-ocular Lipæmia." Reports then followed by Hale White, 1903; Fraser, 1903; Reis, 1903; Turney and Dudgeon, 1906; Heine, 1906; Hertel, 1909; Köllner, 1912; Darling, 1912; Foster Moore, 1915 (two cases); Cohen, 1921; and the present report. Lipemia, as has been pointed out by others, occurs in

* This was written before Martin Cohen's report of a case of lipæmia retinalis with hypotony.