vision. It is also remarkable that both of these cases recovered at a fairly late date.

DR. J. W. JERVEY, Greenville, S. C.: I would like to add to the record of Dr. Gradle a very interesting report of a case seen by me three weeks ago. A woman, aged sixty years, appeared, complaining that her vision had been almost completely lost ten days previously, due to a bilateral obstruction of the central retinal artery. Whether one eye had been lost before the other I do not know, but her vision was merely light perception. She was a cardiorenal case, with a systolic blood-pressure of 250, and I returned the patient to the internist referring her to me with a very gloomy prognosis. I am glad to hear what has been said about the effects of paracentesis. I wonder how long after the onset of the obstruction that treatment is valuable.

THE PHOTOGRAPHIC DIAGNOSIS OF SOME PUNCTATE RETINAL CONDITIONS

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Since Waren Tay, in 1874, described certain white dots in the fundus at the yellow spot region, many reports of somewhat similar conditions have appeared. The descriptions are confusing and the titles misleading. By using the Gullstrand ophthalmoscope the depth of individual lesions may be appreciated. With stereophotographs we are able to show diseases and study the particular level of involvement.

Seven cases were cited by Tay in some clinical notes published in Mr. Hutchinson's article. Small white spots were the dominant feature of each, and his descriptions are so clear and the observations so accurate that we quote the ophthalmoscopic description of two cases:

"In the fundus of each eye there were a number of small spots, some glistening white, but the majority of a faint white color.

They all seemed on a level posterior to the retinal vessels; they were of irregular size and shape, and were chiefly situated above and below the disc. In the right eye they were fewer in number and distinct from another; there were none visible at the periphery, nor at the yellow spot. In the left eye they were much more numerous and were fused together, showing a tendency to form patches above and below the disc; there were a few at the yellow spot, and some faint ones in the periphery. There was a slight central opacity at the posterior pole of the lens.

"A number of very small white spots were found to be scattered widely over the central part of the fundus, being especially numerous in the yellow-spot region. Near the yellow spot in the right eye they had become partly confluent and formed a large white patch. The spots varied much in the clearness of shade, some being of a glistening white, others of various somewhat duller white tints; they also differed in size to some extent and were not all circular; the duller colored ones were especially noted to have somewhat ill-defined borders. Many of them were distinctly behind the retinal vessels and none were proved to be in front. These near to the yellow spot were, as a rule, of a brighter white than those elsewhere. There was not the slightest pigmentation of any of the white dots. In each eye the optic disc was perhaps slightly pale and hazy, but these appearances may have been due to the incipient general haze of the lenses which was observed on oblique illumination. At the extreme lower part of the periphery in each eye were several round patches of old choroidal diseases; atrophic choroid with some pigment accumulation."

Following this epic-making presentation no contribution was placed on record until 1883, when Gunn recorded four cases. The following description is typical:

"In the right eye there are very minute, yellowish white, shining dots in the retina for some distance around the disc, especially to the nasal side and below; in distribution these dots are remarkably equidistant from one another, and are situated anteriorly to the largest retinal blood-vessels, each being less than one-fifth of the diameter of a large vessel; the outline of the disc is rather indistinct, the large veins full and somewhat tortuous. The left eye shows a similar condition, but the disc outline is more blurred than in the right. This appearance is most easily seen when the light is thrown

somewhat obliquely on the part of the retina to be examined; the dots will then be seen to stand out well near the border of the image of the flame."

Special attention is drawn to his statement that these spots were "situated anteriorly to the largest retinal blood-vessels."

In the following year Nettleship, in presenting a case which he described as "Central Senile Guttate Choroiditis," said:

"At the region of the yellow spot in each eye are numerous dots of choroidal disease. They are very small, uniformly scattered, yellowish-white, and free from pigment accumulation. The smallest of all are round, but the larger ones are often rather irregular, as if formed by the confluence of two minute ones. The dots look as if caused by deposit rather than atrophy, the boundary of each dot being rather softened, not sharply defined. The disc and retinal vessels show no marked change."

In a second case-history recorded under the same heading he found:

"A number of small, perfectly circular, pale grayish-yellow spots are thickly congregated at the yellow-spot region, and more thinly scattered all around that part, reaching on the nasal side as far as the disc; in these outlying parts the spots are usually grouped in small patches, or in linear series as if following the course of some large vessel or nerve in the choroid. Some of the spots are more defined than others, but none are sharply cut; the most defined ones are surrounded by a shaded gray ring, such as might be produced if the pigment epithelium were pushed aside by a slightly prominent nodule; there is nothing suggesting proliferation of the pigment epithelium. The small retinal trunks which feed the lower half of the yellow-spot region are larger and more tortuous than usual, and it is just in this part that the spots of disease are thickest; indeed, the upper half of the yellow spot is nearly free, and its retinal vessels are so small that the artist has not shown them. Disc perhaps rather pale; retinal vessels normal. No choroidal disease elsewhere. The other eye showed changes exactly similar in kind and very nearly as abundant."

In 1887, when Nettleship presented several cases under the title, "Cases of Permanent Partial Night Blindness," the ophthalmoscopic appearances were somewhat similar to those described in his other communication.

In the interval between the Tay communication and the last Nettleship report Kuhnt described the disease to which the name retinitis punctata albescens is applied. This he observed for the first time in a young girl who had contracted fields and whose vision was reduced to one-sixth. Ophthalmoscopically there were minute white spots in the inner retinal layers which could be seen only in the erect image. On two other occasions he had seen a similar fundus appearance.

In 1882 Mooren reported a case-history in which there were hundreds of blurred spots, like reflecting light flecks. The retina and choroid looked as though they were covered by a sheet through which small holes were punched, allowing the sclera to be seen through the openings. The walls of the vessels were not obscured, for all the specks were between the vessels. The field of vision was unchanged.

Treacher Collins, in 1888, referred to colloid degenerations of the pigment epithelium.

In 1897 Griffith reported a case of so-called retinitis punctata albescens, which appears in our present discussion, for his short report without illustrations stated:

> "R.V. 6/36; L.V. 6/36, not materially improved by glasses. The fundi are similar in appearance. The disc is pale and has a somewhat waxy hue; the margin gradually shades off into the color of the rest of the fundus. Vessels slightly constricted. There is a general mottled condition of the whole fundus, but especially around the disc and macular region there is a ring area covered with discrete yellow spots resembling Tay's choroiditis."

Beard, in 1914, described what he termed "an oil spray effect." The original description is so lucid and beautifully worded that readers are referred to it.

Some textbooks have failed to follow the author's descriptions of these conditions, and in the minds of many observers there is seemingly a question as to just what constitutes the individual lesion.

We are confronted with the problem of correlating the different portrayals with the conditions found and recorded on the photographic plate. By a series of pictures, some of which have been taken from "Photographs of the Fundus Oculi," an attempt is made to show that the so-called colloid degenerations are, clinically at least, seen in such a variety of ways and placed in such changing groups that it is questionable whether all may not properly be classified as variations of the same manifestation. We cannot bring forward any pathologic proof, but stereophotographs and clinical observations assume a great rôle in the diagnosis of some fundus pictures.

We are not unmindful of the facts that glistening bodies must be either clear subretinal fluid or colloid collected in such a way that an unusual amount of light is reflected from its surface, or that we have whiter spots with softer outlines, or that large, white elevated plaques may be concentrically arranged either to the inner or outer side of the macula or even completely encircle the yellow-spot region, and finally that there may be an almost complete absence of macular involvement. The illustrations included in this demonstration are examples of these various types.

Comment has been made on the Gunn dot. We believe that all minute spots placed in front of the retinal vessels are exudates. Even when hyaline points seem to lie anterior to the retinal vessel, it is either because the vessel has been pushed aside or a shadow from the deposit gives the impression of overlying the blood-stream, or by the reflection of light from the colloid body. The minute detail can be accurately understood only by stereo study. Sometimes it

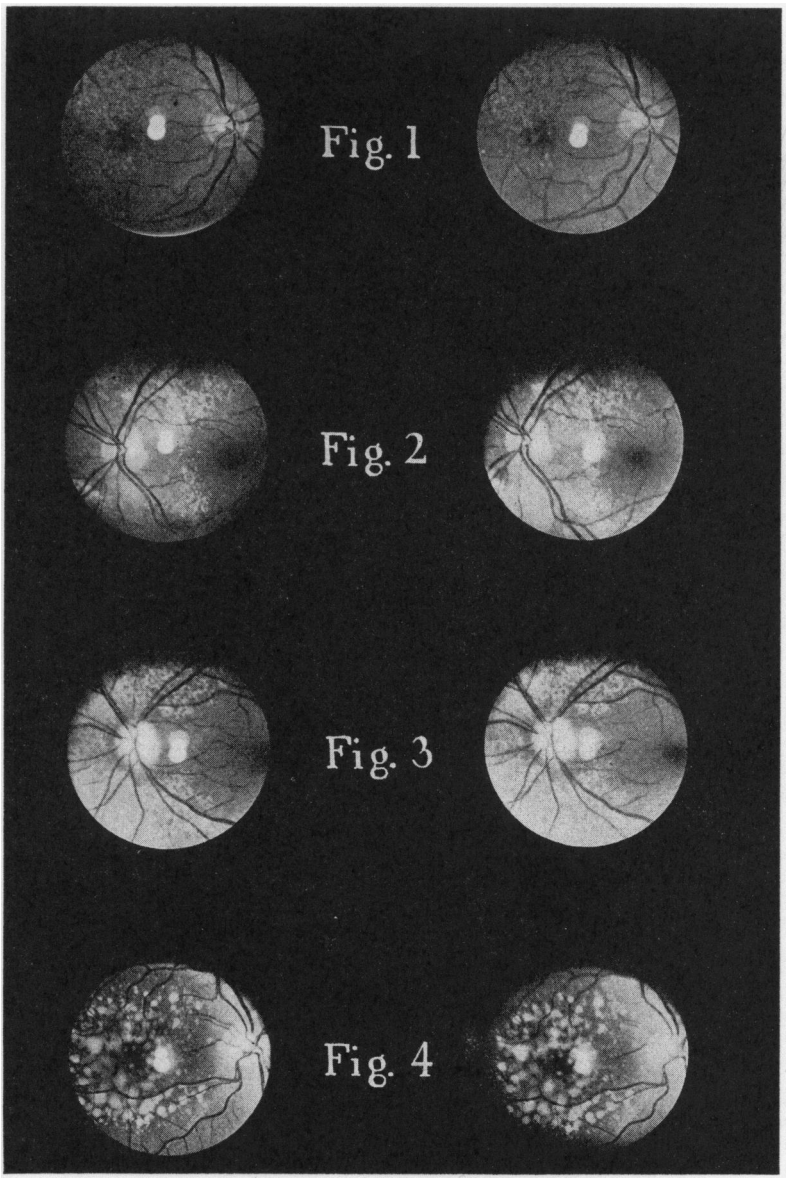
Fig. 1
Fig. 2
Fig. 3
Fig. 4

seems that two or more deposits are superimposed to build up the spot and it is in this way that larger, broader, and thicker masses are made. These appearances can be verified in any of the grosser forms of this degeneration. With the photographs it is needless to state the size of the individual lesion, since it is so clearly depicted that relative measurements are unnecessary.

After examining these so-called degenerations, we should consider exudates and hemorrhages, but this, with the exception of diabetic exudates, will be done in another paper.

An exudate often has an indefinite outline, is usually whiter in color, and most frequently associated with other evidence

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Fig. 1.—Male, aged seventy-two years. V. = 10/200, with +0.25 sph. ⊃ +1.00 cyl. ax. 75° = 20/70. Much of his visual reduction is the result of an adult nuclear cataract. The rounded disc is clearly defined by a scleral ring. The veins are large, the arteries of normal size. A fan-shaped area occupying the upper outer part of the posterior pole consists of massed drusen. The individual bright yellowish spot is small and distinct. When two or more are superimposed, they seem gray, but this is only because of poor focus and retinal depth. All the deposits are beneath the retinal vessels.

Fig. 2.—Female, aged sixty-two years. V. = 20/40, with = 0.50 sph. ⊃ +2.25 cyl. ax. 115° = 20/15(?). A very extensive layer of whitish yellow deposits lies beneath the retinal vessels. In places the dots coalesce, in other regions they are single and easily distinguished as pin-points. The macular area is clear. The nasal side is somewhat involved, but the two greatest areas lie above and below the zone between the disc and fovea.

Fig. 3.—Male, aged seventy years. Operated upon for simple glaucoma several years ago. V. = 20/70, with +1.50 sph. ⊃ +1.00 cyl. ax. 150° = 20/30. The disc shows an almost complete undermining excavation, which is partially concealed by the opacification of the overlying vitreous. The entire nasal half of the fundus is covered by a speckled white layer of colloid bodies. The macular region is clear. The constriction of the vessels is the result of a glaucoma, and not this drusen layer.

Fig. 4.—Male, aged fifty-one years. V. = 20/100, with +1.50 sph. ⊃ +0.75 cyl. ax. 105° = 20/30. A great mass of yellow white deposits completely encircles the macular area. These range in size from minute white points to spots one-quarter the size of the disc in diameter. This aggregation which is beneath the retinal vessels forms an uneven, cobblestone-like surface with deepest depressions between the largest spots. The smaller vessels are attenuated over some of the individual white islands. The lesions are confined to the perimacular zone in the right eye, but a few fine dots are near the nasal side of the left disc. The process is more extensive in the left eye and the largest masses are grouped to the temporal side of the yellow-spot region.

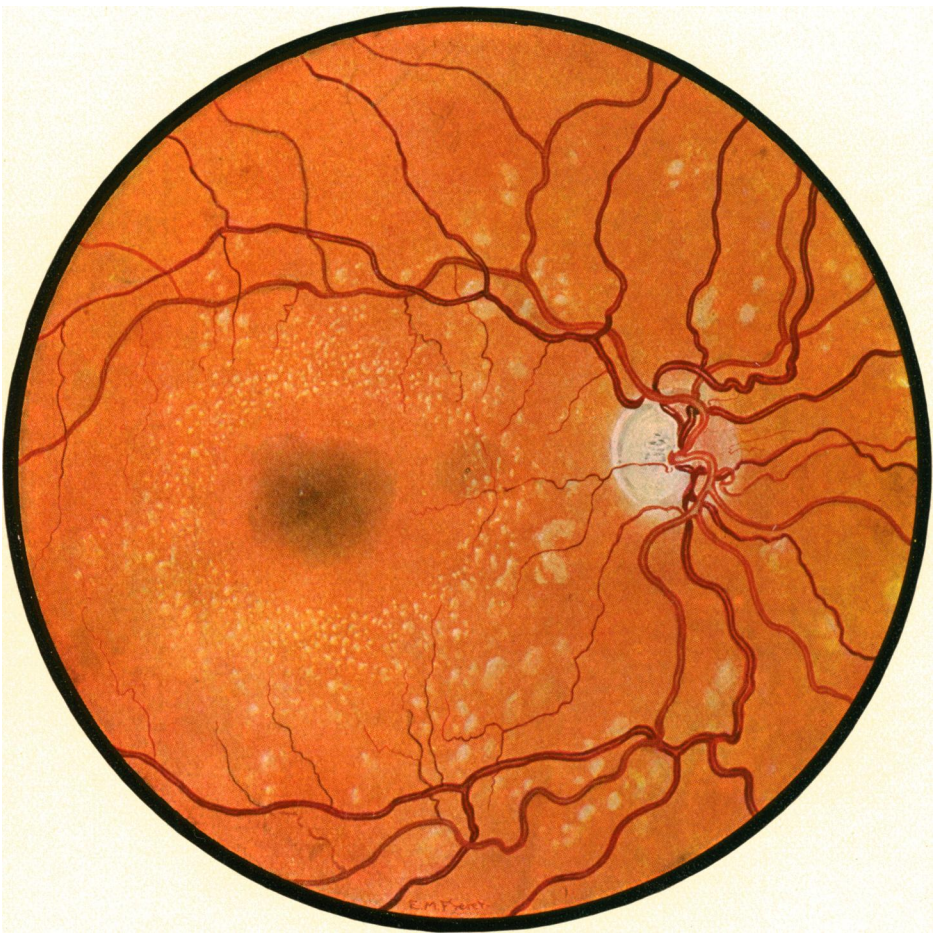
of pathologic changes. A distinctive type is that which is found in diabetes, where the white or bright yellow, sharply delineated spots are sufficiently descriptive to warrant the presumable diagnosis of this malady. These spots may be combined with hemorrhages and vascular changes, associated with arteriosclerosis, hyperpiesis, or nephritis.

SUMMARY

A variety of minute yellowish white bodies have been described by several authors. These deposits have been placed in various positions of the fundus, and points of differential diagnosis have been based on their location. The size of the single spot has been overstressed. The relation of the colloid bodies to function has at times been exaggerated because of the undue importance placed on the spot rather than on the co-existing pathologic changes. Some difficulty remains in the correlation of the minute yellowish dots with the broad, thick, white plaques, but spots that are present in gross retinal disease must be grouped in their proper classes. New diseases must not be named for the deposits, but for the underlying pathologic process. Exudates can be differentiated from deposits.

CONCLUSION

The deposits so well described by Tay remain clinical entities. The shining dots of Gunn have not been verified in front of the retinal vessels. The association of hyaline deposits with other diseases has not been sufficiently emphasized. Only by stereo-examination or by stereophotographs is it possible in the mooted cases to definitely decide the location of the lesion. A deposit may be so thick that it comes up to the blood-vessel wall, or it may be so far back of the vessel that we can see beneath the anterior layers of the retina.



Illustrating Dr. Knapp's paper on retinal degeneration in macular region without cerebral symptoms.

A border of minute spots may surround zones of deposits which increase in size toward the fovea. Pigmentation of these deposits has not been observed, but what appears to be pigment seems in reality to be the contrasting underlying layer.

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RETINAL DEGENERATION IN MACULAR REGION WITHOUT CEREBRAL SYMPTOMS

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The types of retinal degeneration in the macular region are based on differences in the ophthalmoscopic picture, and also on the presence or absence of associated mental involvement. The following six cases are reported as examples of the macular type of maculocerebral degeneration (Oatman), or of progressive family degeneration in the macular region without psychic disturbance (Stargardt):

CASE 1.—W. F., male, aged eleven years, was seen March 24, 1915, stating that his sight had been failing for one year; no consanguinity, no familial history, and no hemeralopia. Previous illnesses were meningitis(?), measles, mumps, and cyclic albuminuria. He