An opportunity presented itself in September and October, 1958, to observe African patients with chorio-retinitis in Kano, Nigeria. Although it was not possible to carry out detailed studies on these patients, blood sera were taken and tested for antibodies to *Toxoplasma*, a protozoan parasite. The results of these tests are of interest.

Wolf, Cowen, and Paige (1938) established toxoplasmosis as a human disease. Severe encephalomyelitis and bilateral chorio-retinitis were found in the patient whom they describe. The ocular pathology of toxoplasmosis was described by Wilder (1925). Jacobs, Fair, and Bickerton (1954) isolated and cultured *Toxoplasma* from the eye. Our knowledge of ocular toxoplasmosis was summarized in the XIV Jackson Memorial Lecture by Hogan (1958).

Antibody to *Toxoplasma* can be demonstrated in the serum of an affected individual with the methylene blue dye method as described by Sabin and Feldman (1948). Up to the present time the reaction has proved to be a specific one. In the absence of other known causes of chorio-retinitis, the finding of a high titre in the serum by this test suggests that ocular toxoplasmosis may be present.

Feldman and Miller (1956) tested ten human populations in a serological study of toxoplasmosis. The methylene blue dye test was used and only titres of 1:16 or above were considered positive. There were no positive sera in the Eskimo population. Various city populations in the United States showed from 17 to 35 per cent. positive sera for toxoplasmosis. The sera from the Tahiti population were positive in 68 per cent.

**Method of Study**

All of the patients were seen in the clinics of the Sudan Interior Mission Eye Hospital in Kano, Nigeria. The patients were of the Negro race and lived for the
most part in Northern Nigeria. The blood specimens were taken under sterile conditions. 3 ml. serum, to which 1 drop of 3 per cent. merthiolate aqueous solution had been added as a preservative, were removed into a small sterile glass container in each case. All the specimens were kept under refrigeration and at the end of the 2-month period were sent by commercial air transportation, with refrigeration where this was possible, directly to the Francis I. Proctor Foundation in San Francisco for serological studies.

The standard dye test procedure as outlined by Sabin and Feldman (1948) was done. Titres below 1:16 were not investigated.

**Results**

Chorio-retinitis was found in seventeen patients. Thirteen members of this group showed active chorio-retinitis and four showed inactive chorio-retinitis. Blood sera were also taken from 77 other patients who had conditions such as glaucoma, trachoma, cataracts, and refractive errors with no evident chorio-retinitis. One patient with acute iritis was not included in the above two groups. The Table shows the patients with active and inactive chorio-retinitis and the dye test titres of the sera.

**TABLE**

**DYE TEST TITRES IN SEVENTEEN PATIENTS WITH CHORIO-RETINITIS**

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age (yrs)</th>
<th>Dye Test Titres</th>
<th>Degree of Chorio-retinitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>Negative</td>
<td>Active</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
<td>Negative</td>
<td>Active</td>
</tr>
<tr>
<td>3</td>
<td>21</td>
<td>1:64</td>
<td>Inactive</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>1:64</td>
<td>Active</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
<td>1:64</td>
<td>Active</td>
</tr>
<tr>
<td>6</td>
<td>20</td>
<td>1:64</td>
<td>Active</td>
</tr>
<tr>
<td>7</td>
<td>27</td>
<td>1:64</td>
<td>Active</td>
</tr>
<tr>
<td>8</td>
<td>58</td>
<td>1:256</td>
<td>Inactive</td>
</tr>
<tr>
<td>9</td>
<td>29</td>
<td>1:256</td>
<td>Active</td>
</tr>
<tr>
<td>10</td>
<td>22</td>
<td>1:256</td>
<td>Inactive</td>
</tr>
<tr>
<td>11</td>
<td>17</td>
<td>1:256</td>
<td>Active</td>
</tr>
<tr>
<td>12</td>
<td>70</td>
<td>1:256</td>
<td>Active</td>
</tr>
<tr>
<td>13</td>
<td>49</td>
<td>1:256</td>
<td>Active</td>
</tr>
<tr>
<td>14</td>
<td>17</td>
<td>1:1024</td>
<td>Active</td>
</tr>
<tr>
<td>15</td>
<td>36</td>
<td>1:1024</td>
<td>Active</td>
</tr>
<tr>
<td>16</td>
<td>23</td>
<td>1:1024</td>
<td>Active</td>
</tr>
<tr>
<td>17</td>
<td>39</td>
<td>1:4096</td>
<td>Active</td>
</tr>
</tbody>
</table>

The relationship between these cases and the dye test titres is given in Fig. 1 (opposite).

The relationship between the cases showing no evident chorio-retinitis and their dye test titres is shown in Fig. 2 (opposite).
Comment

In this small group of cases of active and inactive chorio-retinitis, 88 per cent. showed positive methylene blue dye tests for toxoplasmosis at a dilution of 1:16 or above. 37 per cent. of a somewhat larger group of cases showing no evident chorio-retinitis had positive serum dye test reactions at a titre of
540 HERMAN A. IVERSON, M. DOUGLAS HURSH, AND ANN LEWIS

1:16 or above. Hogan (1958) found a positive dye test at a titre 1:16 or above in 35 per cent. of his series of patients with uveitis and a 25 per cent. incidence in a miscellaneous group of patients without uveitis. One patient with acute iridocyclitis showed a dye test titre of 1:256 and he was not included in either of the two groups presented in this study.

Definite conclusions cannot be drawn from this study. It will be of interest, however, to see if future work in this field will give added support to the possibility that toxoplasmosis is a cause of chorio-retinitis in Northern Nigeria.

**Summary**

Patients with chorio-retinitis from Northern Nigeria frequently show accompanying high blood serum titres for toxoplasmosis with the methylene blue dye test.

Appreciation is expressed to Dr. Michael J. Hogan for his advice and cooperation in this study.

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CHORIO-RETINITIS IN PATIENTS WITH SEROLOGICAL STUDIES ON TOXOPLASMOSIS

Herman A. Iverson, M. Douglas Hursh and Ann Lewis

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