damage to living protoplasm, give much force to the contention that the connective tissue overgrowth in these cases of hepatic cirrhosis is secondary to changes in the chemical constitution of the liver cell. A further feature of interest is the fact that in two of the dogs the liver cells contained little fat at the time of autopsy. Finally, it may be mentioned that although a considerable loss in weight was observed in the dogs during the period of repeated narcotization, this loss was subsequently recovered in spite of the persistent cirrhotic changes.

These observations open the question whether the fatty and parenchymatous degenerations of the liver, which in some cases follow narcosis by chloroform in the human subject, may not occasionally pass on to interstitial cirrhosis — a single narcosis in man being sufficient to induce the primary damage to the protoplasm of the liver cell.

7 (99). **"Color sense in different races of mankind": R. S. WOODWORTH.**

The evolution of the color sense is very imperfectly understood. Scarcely any direct evidence is at hand regarding the color sense of animals, though some indirect evidence that various classes distinguish colors is afforded by the facts of protective and attractive coloration.[1] We do know from human experience, that there exists a form of color vision (red-green blindness) which is less complete than the usual human type, and as it appears not to be pathologic, it may be a reversion. In the absence of subhuman data, it is of some value to ascertain whether those races of mankind which seem to represent the more primitive stages in human development are especially subject to color-blindness. The results of various authors go to show that other races are perhaps even less subject to it than the white race. Some previously untested races were examined by the author in association with Mr. Frank G. Bruner, under the Anthropological Department of the St. Louis Exposition. Of 252 adult male Filipinos (including Christians and Moros), 14 were red-green blind, or 5.6 per cent.; of 75 males of the "wild tribes" of the Philippines (Igorots, Tinguianes and Bagobos), 2 were red-green blind, or 2.7 per cent.; of

[1] See Grant Allen: The Color Sense, Its Origin and Development, 1879. W. A. Nagel: Der Farbensinn der Tiere; Wiesbaden, J. F. Bergmann, 1901.

13 male Negritos, none was color blind. Special interest attaches to the Negritos, as they probably represent a more primitive type of man than has previously been tested in this way; and though the individuals examined were too few in number to enable the author to establish the percentage of color-blindness among them, the absence of color-blindness from the 13 males tested (as well as from the women) shows certainly that color-blindness is not universal among them, and very likely no more prevalent than among more developed races. On the whole a negative conclusion is warranted as to the suggestion that the color sense has developed, within human history, from anything approaching red-green blindness.

Quite a different hypothesis has been advanced by certain anthropologists from a study of the color names of primitive languages. While all languages have names for red, and most of them also for yellow, comparatively few have definite names for green, blue, or violet. Even in European languages, the names of these latter colors seem to be a rather recent acquisition. The suggestion is that color vision was first developed for the red end of the spectrum, the rest remaining colorless at first, and only gradually taking on the appearance of green and blue, and that this development has occurred during human history. In testing the natives of Torres Straits, who have no name of their own for blue, Rivers obtained a certain amount of evidence in favor of this view, in that these people were somewhat less sensitive to faint tints of blue than Europeans, though rather more sensitive to red. As the Filipinos also have no native words for green, blue and violet, the authors tested them as to their power of discriminating these colors. The test employed called for the matching of dark shades of several colors with pale tints of the same. Colored papers were used; the tints were spread out in spectral order, and each dark shade was to be matched with the tint with which it agreed in color. The authors found that the Filipinos, and indeed all other races examined, were inferior to whites in this test; but it was impossible to detect any special deficiency for the greens, blues and violets. These colors were relatively as well matched as the reds, and better than the yellows. Nor was there any tendency, except among the Igorots, to confuse blue, green or violet with neutral gray.

The Negritos did better than many more advanced races. The results obtained by the author are thus opposed to the view that the color sense has developed within human history from a more primitive type, in which only the red end of the spectrum appeared as colored.

8 (100). **"The practical concentration of diphtheria antitoxin": R. B. GIBSON.**

The methods which have been proposed for the purification or concentration of antitoxins are, for the most part, peculiar and tedious ways by which the whole or a portion of the globulins are separated from serum or milk. Evaporation and freezing have been tried, but the general use of such methods has not been continued. Pick states that by the isolation of his soluble or high ammonium sulfate fraction, it is possible to concentrate the protective properties several times. Though superficially the most applicable, Pick's method is open to certain objections. Considerable quantities of antitoxin may be carried down with the nonprotective fraction on one-third saturation of the serum with ammonium sulfate. Such a concentration is also not practicable.

An artificial concentration can best be effected, for the present at least, by preliminary isolation of the antitoxin globulins; on this procedure is based the plan of the following method which has proved fairly successful.

The serum is precipitated with an equal volume of saturated ammonium sulfate solution and, after reprecipitation, is extracted with a solution of saturated commercial sodium chlorid. The antitoxic globulin is easily dissolved in the chlorid solution. The nonsoluble globulin settles to the bottom on standing. After filtering, the NaCl solution of the antitoxic globulin is precipitated by the addition of a half volume of saturated ammonium sulfate solution, or better still, with acetic acid in the usual way. The filtered precipitate is pressed as dry as possible with paper and dialyzed in parchment a few hours. Its solution is then neutralized and dialyzed again in running water. After two or three days' dialysis of the neutralized solution of the protein precipitate, sterilization is accomplished by double filtration through a Berkefeld filter. Before filtration, sufficient sodium chlorid is added to make its proportion equal to