

proves conclusively that the defect is not due to a diminution of a hypothetical red sensation, because all the rays coming through the blue-green glass are supposed to affect the red sensation, and yet we have been able to correct the erroneous match by the subtraction of red light."

Now the question of a longer or shorter spectrum with otherwise absolutely normal vision is one which can be dealt with equally easily by all theories. To show the power of the Young-Helmholtz theory, I shall take the most extreme case possible, that in which the peculiarity amounts to dichromasy. Let the pink and violet colours be represented by  $x_1R + y_1G + z_1B$  and  $x_2R + y_2G + z_2B$  respectively, in the usual trichromatic notation; and let the colour abstracted by the blue-green glass be  $a_1R + b_1G + c_1B$  in the case of the pink, and  $a_2R + b_2G + c_2B$  in the case of the violet. So the colours seen by the normal eye are  $(x_1 - a_1)R + (y_1 - b_1)G + (z_1 - c_1)B$  and  $(x_2 - a_2)R + (y_2 - b_2)G + (z_2 - c_2)B$  respectively. If these appear to be identical, we have  $x_1 - x_2 = a_1 - a_2$ ,  $y_1 - y_2 = b_1 - b_2$ ,  $z_1 - z_2 = c_1 - c_2$ . These are the relations which must subsist amongst the unifiable colours and the colours absorbed by the unifying medium. Now let the dichromasy correspond to the condition  $\xi R + \eta G + \zeta B = 0$ . The pink and violet are then expressible as  $(x_1 - z_1 \xi / \zeta)R + (y_1 - z_1 \eta / \zeta)G$  and  $(x_2 - z_2 \xi / \zeta)R + (y_2 - z_2 \eta / \zeta)G$  respectively. These being identical, we have  $(x_1 - x_2) : (y_1 - y_2) : (z_1 - z_2) = \xi : \eta : \zeta$ , which are the conditions for Dr. Edrige-Green's case. The trichromatic theory, so far from being helpless, as he asserts, not merely accounts generally for the phenomenon, but tells quantitatively as well as qualitatively what is happening. W. PEDDIE.

#### Distribution of Megalithic Monuments.

MR. O. G. S. CRAWFORD, in NATURE of May 5, p. 602, criticises what he terms my "speculations" concerning the distribution of megalithic monuments in England and Wales. I am sorry that apparently he did not trouble to read the paper, and to see exactly what I had to say on the matter. My aim was to urge that there is a connexion, in England and Wales, between the distribution of megaliths and certain geological formations, the Granite in Devon and Cornwall, the Chalk in Dorset and Wilts, the Lias in Gloucester and Oxford, and so forth. In this I found that I had been anticipated in part by Mr. Crawford himself. Where we differ, of course, is in the interpretation of the evidence.

An examination of the paper will show Mr. Crawford that I am well aware of the difficulties involved in the theory that the builders of megalithic monuments were attracted to this country by the stores of gold, copper, lead, and so forth, that it contained, and that I discussed the very points to which he directs attention. It must never be forgotten, however, that megaliths are found in all parts of the world, and that possibly the explanation of the presence of these monuments in one country may serve to explain their presence elsewhere. All I have done is to put forward the theory, based on evidence from all parts of the world, that the megalithic civilisation of western Europe was derived from a metal-using civilisation in the Ancient East.

The attention of all who are interested in the matter is being directed to the excellent work now being done by Mr. Crawford at Southampton, and we are all eagerly expecting the publication of the fresh distribution maps of megalithic monuments that Mr. Crawford promises us. But, admirable as such work is, the final solution of the problems presented by these monuments may, after all, come

from a wide survey of facts derived from all parts of the world, and not necessarily from detailed work in a limited part of the field. W. J. PERRY.

The University, Manchester.

#### The Concentration of Hæmoglobin in Blood Corpuscles.

I HAVE very little doubt that Dr. Gorter is right in suspecting that the method which is commonly used for determining the volume of the red blood corpuscles by centrifugalisation is not trustworthy (NATURE, June 23, p. 845). Whether the red corpuscles are biconcave discs or hollowed cones, or indeed, whatever their shape may be, they cannot be packed together without leaving spaces between them unless they are deformed: and if they are deformed there is every reason to be suspicious about their water content remaining unaltered.

The usual method is to centrifuge the blood until the volume of the cells ceases to become smaller, the apparatus generally making 3000 to 5000 revolutions a minute with a disc of something less than a foot. It is easy to convince oneself that the final result depends on just how the process is carried out, for it is different if the blood is first gently centrifuged, say at about 2000 revolutions, and then exposed to the full speed, from what it is if the high speed is used from the beginning. So dependent is the figure obtained on the precise details of the method that, if real comparisons between different bloods is required, it seems to be essential that they must be in the centrifuge simultaneously.

The method seems never to have been examined critically. What is wanted is a comparison between it and the results calculated from the concentrations in whole blood and in plasma of some substance present in plasma and not in red corpuscles, which can be estimated with a high degree of accuracy. Without some control of this kind the method must, for absolute values at any rate, remain under suspicion.

A. E. BOYCOTT.

Medical School,  
University College Hospital, W.C.

#### Effect of Plant Extracts on Blood Sugar.

OUR studies in connexion with insulin led us to the conception that carbohydrate metabolism is performed by an oxidising ferment mechanism. This theoretical conception induced us to test vegetable material, known to contain oxidases and peroxidases, for oxidising substances having an insulin-like action. In December 1922 we injected 5 c.c. of juice from a new potato intravenously into a 1500 gm. rabbit and noted a fall of blood sugar in one hour from 0.17 to 0.13 per cent. Since then we have found that sterile pieces of raw potato, and juice expressed from these, introduced into a glucose solution, after incubation for twenty-four hours at 37° C., caused this to lose from 26 to 36 mg. of glucose per 100 c.c. These results were published in the *Jour. Amer. Med. Assoc.*, June 2, together with results indicating a diminished glycolytic power of blood from diabetics.

Winter and Smith published a note in the *Journ. Physiol.* 57, 40 (Nos. 3 and 4), 1922, which reached the United States in April last, and in NATURE of March 10, p. 327, stating that they had obtained an insulin-like substance from yeast.

Collip, in NATURE of April 28, p. 571, states that he, working independently, found an insulin-like substance in various vegetables, in yeast, and in clams. Collip's studies on insulin are of inestimable