spinal centres upon the higher ones. We know that after elimination by cutting or simply by cooling of the higher (that is to say, upper) centres, for some time at least, the lower centres may be paralysed. So, if the brain and upper centres are nearer to the anode (descending current), their anelectrotonic elimination has a paralysing effect, while their catelectrotonic excitation with an ascending current produced convulsions.

The explanation of Scheminzky's observations, therefore, needs no 'functional polarity', the existence of which is directly contradicted and refuted by the reversal demonstrated in our experiments.

H. WINTERSTEIN.
A. SEDEFCIYAN.

Physiological Institute,
University of Istanbul.
Dec. 1.

Changes in the Red Blood Cells in Chronic Infections

THE anæmias of chronic infection have not been elucidated in spite of the frequency of their occurrence. An investigation was undertaken to study the changes in the red cells in these conditions.

The following results were obtained. The red cell count is usually reduced to only a small extent. The hæmoglobin reduction is relatively greater.

In a few cases a high colour index anæmia exists. In most the colour index is either normal or reduced. Analysis of the detailed characters of the red cells shows that there is a marked tendency to increase in the erythrocyte volume and diameter. The thickness of the cells, on the other hand, tends to remain within normal limits, the cells therefore being flat. Associated with this the red cells are resistant to hypotonic saline hæmolysis, and target cells are seen in blood smears in increased numbers.

The individual red cell has been shown to be hypochromic.

The absence of features suggesting excessive hæmolysis of the red cells is confirmed.

The bone marrow function appears to be reduced in respect of erythropoietic function.

The anæmia of chronic infection is therefore dimorphic, that is, there is evidence of two factors at work, one causing hypochromia and another causing increase in the volume and diameter of the cells. The macrocytosis can be related to the defective liver function demonstrated in these cases. The hypochromia is due to defective utilization of iron by the depressed bone marrow.

The level of the anæmia shows a remarkable tendency to be fixed in chronic infections. This has been attributed to the setting of the bone marrow at a new low level by the products of inflammation absorbed from the infected area.

By analogy with cases of non-hæmolytic jaundice studied at the same time, it is suggested that some of the features of the red cells in the anæmias of chronic infections are due to disturbance of the normal effect of the spleen on circulating red blood cells. The anæmia of chronic infection, therefore, may be interpreted as a toxic dimorphic dyshæmopoietic anæmia with hyposplenism.

LIONEL BERK.

Department of Clinical Medicine,
University of Cape Town.
Dec. 7.

A Crystalline Serum Muco-Protein with High Choline-Esterase Activity

IN a recent communication under the above title, we mentioned that "it appears to be an undecided question whether choline-esterases from different tissues, such as blood and brain, are identical"[1]. This cautious statement has caused Mendel, Rudney and Strelitz to say[2] that "it has definitely been established that choline-esterases from different tissues are not identical", and that they have "conclusively demonstrated" the existence of two distinct choline-esterases.

While we were aware of the work of Mendel, Rudney and Strelitz, and agree that their claims may well be correct, we felt that in the present state of knowledge of this enzyme (enzymes) it seems premature to speak of them as having been "definitely established". We might recall that no electrophoretic or closer elementary analysis has yet been reported. Moreover, kinetic studies like, for example, those of Northrop on pepsin, and a study on an eventual shift of the *p*H-optimum in presence of different ions, appear to be necessary before such definite conclusions can be drawn. Recollections of the analysis of well-known problems like the high rennin activity of crystalline pepsin, linked with elementary analysis of both rennin and pepsin preparations, the diaphorase activity of xanthine oxidase, the identity of xanthine oxidase with aldehyde oxidase, etc., make us hesitate to claim so much as Mendel *et al.*

Mendel, Rudney and Strelitz raise another point in their communication which, however, has little or no connexion with the question of the identity of the choline-esterases of brain and serum. They reported earlier the isolation of an extremely active preparation (non-crystalline) of serum choline-esterase, while we reported a less active preparation (crystalline) from the same source. Although, as can be seen from our title, we never claimed to have obtained crystalline serum choline-esterase, they argue that in comparison with their product our preparation is grossly impure. Here again we are inclined to see things more from the point of view of the many established facts which are known from enzyme studies. Crystalline enzymes, even those regarded as pure, are often less active than non-crystalline preparations (for example, Sumner's crystalline catalase and Agner's preparation); for loss of activity is often due to a more efficient removal of certain essential activators. The classical work of Sumner *et al.* showed how the presence of different ions (acetate, citrate and phosphate), as well as different substrate concentrations, were capable of shifting the *p*H-optimum of crystalline urease considerably, so that one and the same enzyme preparation, under slightly different conditions, but at the same *p*H and substrate concentration, showed a difference of activity as great as 70 per cent or more. At *p*H 7·5, for example, crystalline urease is at its optimal activity using phosphate buffers; whereas with acetate buffers its activity is down to approximately 15 per cent.

It seems premature, as Mendel *et al.* have attempted, to calculate how much "inert material" our crystalline preparation contains. All the more, because none of the essential characteristics of the preparations of Mendel *et al.* or ourselves (for example, *p*H-optimum influence of different ions, etc.) was available to make a calculation of this sort possible. These characteristics, as shown by the example of crystalline urease,