as a route of infection. But it seems very unlikely that a similar process could be of nutritional significance.

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[1] Payne, J. M., Sansom, B. F., Garner, R. J., Thomson, A. R., and Miles, B. J., *Nature*, **188**, 586 (1960).

We are grateful to Prof. R. B. Fisher for his comments but must point out that no claim was made that "similar processes may be of nutritional significance". We presume the sentence under question is: "We suggest that the use of radioactive particles of this kind may prove to be a sensitive method for the study of various problems of infectious disease and possibly also in work on nutrition and nutritional allergy"; but this can scarcely be taken as implying that the absorption of particles is of nutritional significance.

It seemed to us that the demonstration of particulate absorption, however small, might be of interest to those working on the absorption of relatively insoluble elements required in only trace amounts. In this connexion it may be of interest to record that we are endeavouring to determine the relative uptake of particles of different sizes. Experiments of this kind, attempting to measure the 'porosity' of the alimentary canal, may well find some application in work on nutrition although we are mainly interested in the pathogenesis of infectious disease.

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HÆMATOLOGY

Antigenicity of A_2 Hæmoglobin

The heterogeneity of adult human hæmoglobin is a well-established fact[1–3]. The present work was designed to determine if the slow electrophoretic fraction A_2 has antigenic specificity and if this fraction can be detected immunologically in cord blood and in the presence of hæmoglobin S and C. Previously described[4] techniques were used for the preparation and the agar-gel electrophoresis of the hæmolysates. Following electrophoresis the agar gel was cut into sections containing the hæmoglobin fractions to be tested for antigenicity. These sections were then frozen, thawed and filtered through fritted Büchner funnels of medium porosity. The short duration (90 min.) and the use of large glass plates as the base of the agar gel made it possible to obtain quantities of eluates sufficient for immunization of rabbits. Eluates of the following fractions were used for this purpose: the main component (A_1) of normal blood and of blood from a patient with thalassæmia minor; the respective A_2 fraction and the non-hæmoglobin fraction which we have previously[4] designated 'unidentified component 1' and which probably is identical with Derrien's X_1 fraction[2]. In addition the most cathodic part of the fœtal hæmoglobin from cord blood (Fig. 1*b*, area between brackets) was eluted from agar gel because of the possibility that this part contains A_2 hæmoglobin. Each eluate containing approximately 3 mgm. of protein was combined with an equal volume of Freund's adjuvant and injected into adult male albino rabbits on three or four different sites.

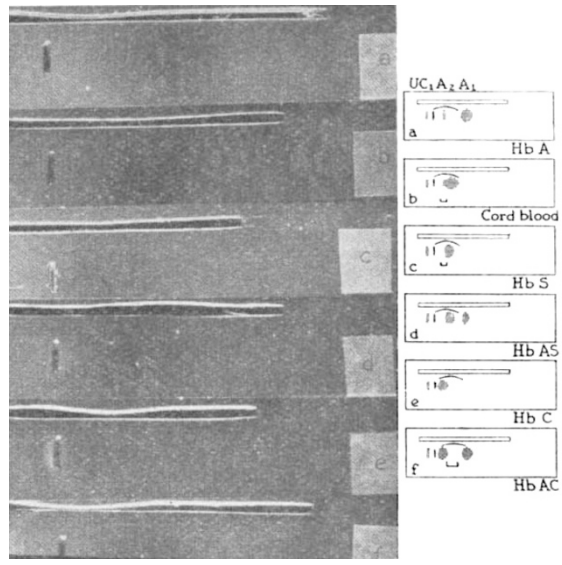

Fig. 1. Immuno-electrophoretic precipitin reaction of A_1-antiserum and hæmolysates. The brackets in *b*, *c*, *f* indicate the areas which were isolated and eluted for immunological studies

Twenty-one days following the injection blood was obtained from the ear artery and this procedure was repeated at weekly intervals. Serum from these samples was tested for antibody content by applying the Ouchterlony agar-gel diffusion technique as modified in this Laboratory[5] and immuno-electrophoresis in agar gel on microscope slides. As test antigens the following material was used: (*a*) agar-gel eluate of the A_1, A_2 and unidentified component 1 fractions of normal and thalassæmic hæmoglobin; (*b*) whole hæmolysates of normal adult and cord blood and of blood from patients with thalassæmia minor, sickle cell anæmia, sickle cell thalassæmia, A–S and A–C hæmoglobin; (*c*) eluates of sections of electrophoretograms of fœtal, S, and A–C hæmoglobin which correspond to the location of the A_2 fraction (Fig. 1*b*, *c*, *f*, areas between brackets).

Antibody to A_2 hæmoglobin appeared three weeks after a single injection of the A_2 fraction. This antibody reacted with hæmolysates of normal adult and fœtal hæmoglobin, hæmoglobin S, A–S, A–C (Fig. 1) and S thalassæmia. The precipitation line was always in a position opposite to a place on the electrophoretogram corresponding to the A_2 fraction. On Ouchterlony plates all hæmolysates reacted with the antiserum, but when eluates of the isolated fractions were used as test antigens, only A_2, the slowest section of S hæmoglobin, and the eluate of the interspace of A and C reacted, which are the areas corresponding to the location of the A_2 component. Antisera to the slowest section of fœtal hæmoglobin reacted in the same manner as the antiserum to A_2 from thalassæmic and normal blood, suggesting immunological identity of these fractions.

Antibody to A_1 and to unidentified component was demonstrated only following one or two booster injections. A_1 was only weakly, but the unidentified component 1 was strongly, antigenic (Fig. 2). Anti-unidentified component 1 serum cross-reacted slightly with A_2 but not with A_1. A clearly defined precipita-