Preliminary Notes

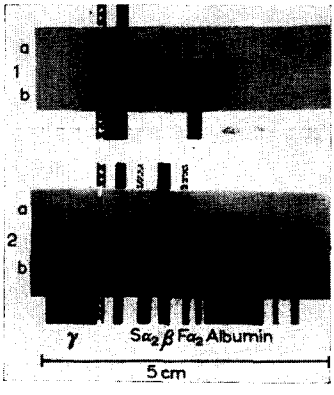
Zone electrophoresis of serum β-globulins on starch gel

Although a resolution of the β-globulin fraction of human serum into two or more components by means of paper electrophoresis has been obtained by a few workers[1,2,3], the majority have failed to obtain a definite separation of sub-fractions with this technique. SMITHIES[4] in a preliminary communication has reported that, with starch gel as the medium for electrophoresis, fractionation of the β-globulin could be effected. The author has confirmed this and has been able to show that one of these sub-fractions is a lipoprotein.

Electrophoresis on starch gel was carried out essentially according to the method of SMITHIES[5], and paper electrophoresis as described by FLYNN AND DE MAYO[6]. In order to render lipoprotein components visible the serum was pre-stained with Sudan Black[7].

The β-globulin fraction of pre-stained serum was first isolated by electrophoresis on paper and was then subjected to electrophoresis on starch gel. At the conclusion of the run, on staining one half with Naphthalene Black (Fig. 2a), four bands (two major and two minor) were obtained, of which one corresponded to the band stained with Sudan Black (Fig. 1a).

The major band corresponding to the Sudan Black band lay between the point of insertion and the band named "Sa_2" by SMITHIES[5], and although the components in this area are reported by him to be derived from γ-globulin, some β-lipoprotein is obviously present. The second major band corresponded with the "β" band (nomenclature of SMITHIES[5]) of whole serum. The two minor bands occupied the same position as the stronger bands which appear on electrophoresis of whole serum (Fig. 2b) and which SMITHIES[5] has reported to be α_2-globulin. Since the α_2 and β-globulin bands on paper are fairly close it is possible that the two minor bands were derived from traces of α_2 present in the β-globulin.



Figs. 1 and 2. Starch gel showing position of: Fig. 1. Lipoproteins (Sudan Black): (a) From β-globulins isolated on paper; (b) From whole serum. Fig. 2. Proteins (Naphthalene Black): (a) From β-globulins isolated on paper; (b) From whole serum. The filter paper method of sample insertion was used; the position of sample is indicated by cross-hatching.

It seems likely that the resolution of more than one β-globulin component obtained with electrophoresis on starch gel is due to differences in the molecular dimensions of the components (mol.wt.: β-globulin = 90,000–150,000 and β-lipoprotein = 1,300,000[8]). The possibility of the effect being due to differential adsorption or to the presence of borate ions must also be considered.

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HELEN JEANETTE SILBERMAN*

Department of Biochemistry, Royal Perth Hospital, Perth, W.A. (Australia)

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* Present address: Department of Biochemistry, University of Melbourne, Australia.