## PHYSIOLOGY

### A Serum Protein present in Pregnant Women

Smithies[1] has briefly mentioned a protein band which he found in the starch-gel electrophoretograms of sera from about 10 per cent of women who were either in late pregnancy or had recently delivered. In the work reported here, a much higher frequency has been found for what is probably the same protein band. In some runs in a borate gel at $p\mathrm{H} = 8{\cdot}5$, under essentially the same conditions as described by Smithies[2], the protein of the investigation reported here migrated at a rate slightly slower than the first haptoglobin band of Hp 2–2 sera to which hæmoglobin had been added (Fig. 1). In other runs, the two were not separated. Accordingly, the typings for presence and absence of the band in Hp 2–2 sera are not included in the data given here although it was undoubtedly present in the majority of such sera.

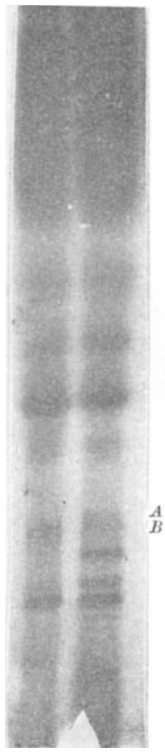


Fig. 1. Anode at the top of photograph. Starch-gel electrophoresis of two sera from pregnant women at 4–5 V/cm for 14 h in borate buffer (0·0092 M sodium hydroxide, 0·023 M boric acid $p\mathrm{H} = 8{\cdot}5$) and staining with amido black 10*B*. (1) Haptoglobin type 1–1 ; (2) haptoglobin type 2–2 ; (*A*) first haptoglobin band of Hp 2–2 ; (*B*) pregnancy protein

The sera of 226 pregnant European women were examined and of these 141 were Hp 1–1, Hp 2–1 and Hp 0. The period of pregnancy has been divided into four seventy-day intervals and the frequency of occurrence of the band in each is shown in Table 1.

When the frequencies in the first and second intervals were pooled, $\chi^2$ for heterogeneity was non-significant ($\chi^2_1 = 4{\cdot}767$, $0{\cdot}10 > P > 0{\cdot}05$).

Great variation in the concentration of the protein in different sera as judged by the intensity of staining with amido black 10*B* (Gurr) was observed. It is possible that more sensitive methods would detect it in sera from all pregnant women. In a group of 107 control sera from female blood donors 75 were Hp 2–1 or Hp 1–1 and one of these possessed a very faint band. The remainder did not possess a perceptible band.

Table 1. Frequency of the Occurrence of a Specific Serum Protein at Intervals of Pregnancy

| Presence (+) or absence (—) | Interval of pregnancy (1) 0–70* | (2) 71–140 | (3) 141–210 | (4) 211 to end of pregnancy | Total individuals | % frequency |
|---|---|---|---|---|---|---|
| + | 2 | 37 | 43 | 42 | 124 | 86 |
| — | 2 | 7 | 2 | 6 | 17 | 14 |
| Total | 4 | 44 | 45 | 48 | 141 | 100 |

* Days

The band was observed in three other individuals : (1) an Australian Aboriginal woman known to be pregnant, (2) a New Guinea native woman of adult age, for whom no information about pregnancy was available, (3) a European man whose carcinoma of the prostate was being treated with dienœstrol (50 mg twice a day).

Hirschfeld and Söderberg[3], using immunoelectrophoretic methods, have detected proteins in sera from pregnant women which were not present in control sera. It is possible that the protein reported here is identical with one of these proteins. It also seems likely that this protein is analogous to that found by Heim[4] and Beaton *et al.*[5], using starch-gel electrophoresis, in the serum of neonatal, tumorous and pregnant rats. Darcy[6] has demonstrated by immunological methods increased concentrations of a normal serum protein in the same classes of rats, and Heim[5] suggested that this protein and the one he detected by starch-gel electrophoresis are identical. The presence of the one and increased concentrations of the other appear to be concomitant with tissue growth and lactation in the rat.

The results presented here, however, do not exclude the possibility that the human protein is induced by increased levels of œstrogen ; it has been demonstrated that the administration of œstrogen can induce the formation of specific proteins in the liver of the chicken embryo[7].

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### Action of Prostaglandin $E_1$ on Tissues which respond to Bradykinin

Prostaglandin $E_1$ (9-keto, 11α, 15, dihydroxy-prost-13-enoic acid, $PGE_1$) was the first of several prostaglandins to be isolated by Bergström *et al.*[1,2]. It is a member of a chemically new group of vasodilator substances. Other naturally occurring vasodilators such as bradykinin, acetylcholine and histamine have effects on several types of tissue in addition to smooth muscle. For example, bradykinin increases capillary permeability, produces pain on application to a blister base and releases adrenaline from the adrenal medulla[3,4]. The actions of $PGE_1$ on these and other biological preparations have been investigated using bradykinin as a standard for comparison. The results are summarized in Table 1.

The vasodilator activity of $PGE_1$ was confirmed on the flow of blood in the hind-limb of a cat. Like bradykinin, it increased capillary permeability as shown by intradermal injection into guinea pigs pre-treated with Pont-