and 100 μc. of carrier-free sodium iodide-131 in 2 ml. of distilled water was injected subcutaneously in the right axilla. One hour later the animal was anæsthetized with 'Nembutal' and ether, a midline abdominal incision was made, the uterus opened and the fœtuses exposed and individually bled from the umbilical cord or from the heart. Maternal blood was collected by heart puncture before and after the removal of the fœtuses. Both maternal and fœtal blood was collected in heparinized centrifuge tubes. Either 0·5- or 1-ml. samples of plasma were diluted with distilled water to a volume of 10 ml. in 12-ml. glass containers and the radioactivity counted in a Geiger–Müller multiple counter[1].

Of the ten guinea pigs studied so far, all of which were between forty and sixty days pregnant, the iodine-131 concentration in the fœtal plasma was 1·5–5 times higher than the iodine-131 concentration in the maternal blood. Because the concentration of iodine-131 in the maternal blood, as indicated by heart puncture samples before and after removal of fœtuses (a 15-min. interval), was on a rising, steady or early falling curve, the ratio found of iodine-131 in fœtal plasma to that in maternal plasma reflects a true high plasma concentration of inorganic iodide in the fœtal blood.

The iodine-131 in the fœtal blood was not precipitable by protein precipitants, and when the fœtal plasma was allowed to come to equilibrium with its maternal plasma across a semi-permeable collodion membrane, the iodine-131 concentration was found to be equal in both. The results, together with the further findings that the ratio of iodine-131 in fœtal plasma to that in maternal plasma was reversed in two guinea pigs given 100 mgm. of sodium thiocyanate, indicate that there is a transport mechanism for iodide in the guinea pig placenta comparable to that in the thyroid gland, salivary glands and gastric mucosa.

It was possible to demonstrate the same high ratio of iodine-131 in fœtal plasma to that in maternal plasma in three pregnant rabbits, all of which had a steady level of iodine-131 in the plasma at the time of removal of the fœtuses; but the existence of a similar ratio could not be demonstrated in rats.

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Urinary Excretion of a Substance after a Single Dose

THE method of Stern[1] for representing experimental data seems to be useful. However, the equation of Haigh and Reiss[2] has good theoretical justification, and it seemed worth while to see whether there was any simple relation between the two formulæ. Stern derives the equation

$$x \log 2 = Q \log \frac{t}{t_0} \qquad (1)$$

to represent the data where Q and t_0 are constants and x is the cumulative excretion as a function t. Haigh and Reiss's equation is

$$x = x_{\text{max.}} \{1 - \exp(-\lambda t)\} \qquad (2)$$

where $x_{\text{max.}}$ and λ are constants. Plotting Haigh and Reiss's equation in the manner of Stern gives an effective straight line over the range $t = 0{\cdot}2/\lambda$ to $t = 4/\lambda$, and this curve then has a discontinuity and becomes the horizontal straight line $x = x_{\text{max.}}$ for greater times. This straight line yields values of $Q = a\, x_{\text{max.}}$ and $t_0 = b/\lambda$; tentative values of the constants a and b are $a = 0{\cdot}25$ and $b = 0{\cdot}1$. For values less than $0{\cdot}2/\lambda$, the curve tends to the straight line $x = 0$ as t tends to zero. This behaviour is more satisfactory than the straight line of Stern, as the latter will yield negative excretions for the period immediately after the injection. Thus it appears that in fact Stern's method is merely a convenient way of plotting a Haigh–Reiss formula.

In the case of Stern's curves (C and D), there appears to be some evidence for a discontinuity of the type predicted by a Haigh and Reiss formula, except that the second straight line is not horizontal but instead has a smaller slope than the first line. Our own experiments with inulin give curves of the same type as D, and in this case a study was also made of the plasma concentration, C_1, which could be represented by an equation

$$C = C_1 \exp(-\lambda_1 t) + C_2 \exp(-\lambda_2 t) \qquad (3)$$

where C_1, C_2, λ_1 and λ_2 are constants. Assuming simple glomerular filtration, equation (3) would yield a double Haigh–Reiss formula of the form

$$x = x_1 \{1 - \exp(-\lambda_1 t)\} + x_2 \{1 - \exp(-\lambda_2 t)\} \qquad (4)$$

where x_1 and x_2 are constants. Such a formula when plotted in the manner of Stern yields a curve of type D, and it is possible to evaluate the four constants x_1, x_2, λ_1, λ_2, from an analysis of the curve.

In the case of inulin, equation (3) is a mathematical representation of the combined effect of passage of inulin into (and out of) the interstitial fluid and glomerular filtration. Thus the constants in equations (3) and (4) are related to physiological factors in the case of inulin, and probably in the cases studied by Stern.

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I AM grateful to Hough, Barnard and Bassir for suggesting that my equation may be considered as an approximation, over a limited range of t, to that described by Haigh and Reiss. This explanation may provide some logical justification for what was an empirical finding.

Fig. 1 shows a graphical representation of the Haigh and Reiss equation (solid curve), plotted on a log time-scale, together with the limits over which Hough *et al.* suggest a line of the form of my equation may be considered as a good approximation (marked G). Their suggestion that $x = x_{\text{max.}}$ for large values