Kruse,[4] in a study of oxygen exclusion by various oils, ascribed the greater efficiency of the heavier oil to its higher viscosity. In the present study, the introduction of cotton or blotting paper reduces convection currents to a minimum without the high viscosity associated with heavy oils. The rate of passage of carbon dioxide through the heavy oil is then greater than through paraffine oil, whereas when convection is permitted the paraffine oil carries the greater quantity. When high viscosity and absence of convection currents are associated, as in the case of vaseline and solid paraffine, the rate of transportation of carbon dioxide becomes negligible.

The substances used to close the tubes were less than 1 mm. thick except where otherwise noted. The tubes were kept in an atmosphere of carbon dioxide for 14 days, and those substances which allowed no carbon dioxide to pass in that time may be considered impervious under any ordinary conditions. Rubber, as noted by many previous observers, is quite worthless against carbon dioxide, as even a rubber stopper 1.5 cm. thick allowed appreciable amounts to pass.

4412

Antitryptic Titre in Pregnancy and in Hyperthyroidism.

LOUIS B. FLEXNER, JOSEPH BERKSON, HYMAN WINTERS AND IRVING WOLMAN. (Introduced by Raymond Pearl.)

From the Department of Obstetrics and the Institute for Biological Research of the Johns Hopkins University.

Since it is known that the normal blood serum contains substances which inhibit the action of enzymes, and that the titre of such substances varies, there is ground for supposing that this property of the blood plays some physiological rôle. Specifically it might be conjectured that it affects catabolism and that in conditions where changes in metabolism are an outstanding feature correlated changes in antienzyme titre would be found, and that these might have etiological import. Indeed, fragmentary observations of changes occurring in pathological conditions have been made.[1, 2, 3]

With this thought in mind we investigated two conditions in which metabolic changes were prominent: (1) pregnancy, (2) toxic hyper-

[4] Kruse, T. K., *J. Phar. and Exp. Ther.*, 1926, xxvii, 243.

[1] Meyer, K., *Berl. klin. Wchnschr.*, 1909, xlvi, 1064.

[2] Gräfenberg, E., *München. med. Wchnschr.*, 1909, lvi, 702.

[3] Thaler, H., *Wien. klin. Wchnschr.*, 1909, xxii, 850.

thyroidism. The method used follows Northrop and Hussey.[4] 5 cc. of a 1% solution of commercial pancreatin were mixed with 0.5 cc. of serum to be tested; 0.5 cc. of the mixture was then added to 10 cc. of a 3% solution of commercial gelatin in an Ostwald viscosimeter and the viscosity changes noted at 35° C. Two of us have shown elsewhere[5] that under these conditions the viscosity changes may be represented as a logarithmic function and that the exponential rate is linearly related to enzymatic activity. Accordingly the exponential rate of viscosity change was obtained for each serum examined and compared with one or more normal sera observed at the same time. As a measure of the antitryptic titre we use the difference between the rate obtained for the experimental serum, and that obtained for the normal serum which was run in the same bath, and this expressed as a percentage of the control rate, a plus sign indicating an experimental serum the titre of which is greater and a negative one which is less than the normal control.

A preliminary examination of 10 normal sera taken at different times of the day indicated a comparative stability of the measure of antitryptic titre. A mean value of 20.2 was obtained in this series and a standard deviation of 2.1 yielding therefore a coefficient of variation of 10.4%. The determinations comprising this series are independent of the control normals which were set severally against the runs made with the experimental sera.

The results for the pregnancy series follow: 159 separate determinations were made. All but 10 of these showed an antitryptic titre greater than normal. Expressing the time in the pregnant period when the serum was obtained as weeks prior to delivery, the mean time for the 149 cases showing a plus titre was 8.9, the standard deviation 8.42. For this same group the mean antitryptic titre was plus 34.95% ±0.92, the standard deviation 16.61% ±0.65 and the coefficient of variation 47.5%. From this we may say that about two-thirds of such cases fall within plus 18% and plus 52% in the measure of titre used. Graphically (Fig. 1) we show the mean titre at various times in the period of pregnancy for 119 of the 159 cases in which the time of delivery was obtainable. It would appear from this that there is a progressive rise of titre from conception until about 6 lunar months before delivery, after which there is a decrease. The small number of cases involved, particularly for the early months, makes the evidence that a cyclic change in titre occurs during pregnancy only suggestive, but that there is a rise

[4] Northrop, J. H., and Hussey, R. G., *J. Gen. Physiol.*, 1922-23, v, 353.

[5] Berkson, J., and Flexner, L. B., *J. Gen. Physiol.*, 1928, xi, 441.

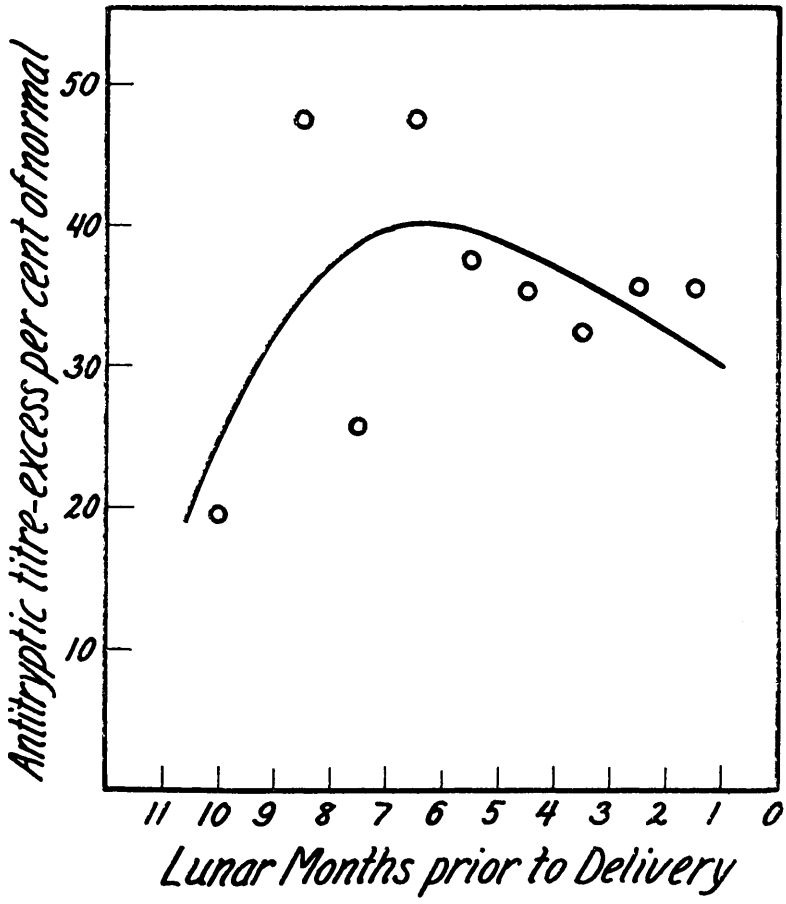

FIG. 1.

from conception to a point well above normal seems conclusively established. Whether this fact can be utilized for the diagnosis of pregnancy is yet to be determined.

The Antitryptic Titre in Hyperthyroidism. Twenty-five sera of patients diagnosed definitely as suffering from hyperthyroidism and all showing increased basal metabolic rates were examined in the same way as those in the pregnant series described above. All showed an antitryptic titre above the normal. The mean value was $+32.0\% \pm 2.8\%$, the standard deviation $20.5\% \pm 2.0\%$, the coefficient of variation 64.0%. This may be interpreted as indicating that about two-thirds of such cases as those examined have a titre between plus 12% and plus 52%.

Twelve of these cases are identical with ones in the series reported

by Nicholls and Perlzweig[6] and for which they reported decreased total and unchanged unsaturated fats. This militates against the conclusion of Jobling and Peterson[7] that the antitryptic substances of the blood serum are identified in the unsaturated fatty acids.

4413

Impairment of the Birth Mechanism Due to Hormones from the Anterior Hypophysis.*

HERBERT M. EVANS AND MIRIAM E. SIMPSON.

From the Department of Anatomy, University of California.

It has been shown in this laboratory[1] that the administration of the hypophyseal growth hormone (alkaline extracts of bovine hypophysis) during the last week of pregnancy in some way injures the birth mechanism. Treatment is stopped on day 21. There is then a characteristic prolongation of pregnancy of from 2 to 3 days, with final birth of dead or living foetuses. There are also instances of complete failure even to give birth to dead foetuses and of the consequent resorption of the latter. The effect has been shown to be due in all probability to changes which the treatment provokes in the ovaries of the pregnant animal, more especially to the formation of fresh lutein tissue there.[2]

Now another hormone of the anterior hypophysis, one of the outstanding characteristics of which is the production of precocious maturity in young female rodents, strangely enough, in addition to its marked stimulation of the follicular apparatus also causes the luteinization of follicle walls, a point strongly emphasized by Zondek and Aschheim.[3] It might be expected, therefore, that whatever effects from growth hormone treatment are due to the creation of fresh lutein tissue in the ovary would also be encountered in the treatment of animals with this second hormone from the anterior hypophysis.

We propose to show that this is the case as regards interference

[6] Nicholls, E. G., and Perlzweig, W. A., *J. Clin. Inv.*, 1928, v, 181.

[7] Jobling, J. W., and Peterson, W., *J. Exp. Med.*, 1914, xix, 459.

* Aided by a grant from the Committee for Research in Problems of Sex of the National Research Council.

[1] Teel, H. M., *Am. J. Physiol.*, 1926, lxxix, 170.

[2] Dispensa, J. G., M.A. Thesis, University of California, May, 1928 (unpublished).

[3] Zondek, B., and Aschheim, S., *Deutsche med. Wchschr.*, Feb. 19, 1926; *Ztschr. f. Geburts. u. Gynäk.*, 1926, xc, 372, 387.