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Hysterectomy at Parturition and Ovarian Function in the Monkey (*M. mulatta*).

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Whether the endometrium responds only as an end organ, or whether it affects or modifies the hypophyseal-ovarian relationship remains an open question. While much clinical evidence points to an active rôle, the experiments of Burford and Diddle[1] on hysterectomy in immature and adult monkeys tend to show that the operation in no way modified ovarian physiology as demonstrated by signs of continued ovulation, changes in the sex skin and vagina, and by attainment of puberty.

We have attempted to obtain evidence on this question by observing the course of recovery of ovarian activity following parturition in normal monkeys and in monkeys deprived of their uteri at the time of parturition. During the latter part of pregnancy, and at term, the ovary of the macaque is apparently functionally quiescent. The ovaries become translucent in appearance and are elongated or spindle-shaped. There is an absolute reduction in their size and weight. Corpora lutea, large and medium follicles are absent and macroscopically the ovary presents a picture of regression and suppression. It was felt that the process by which such a gonad is again brought to full cyclical activity might be peculiarly susceptible to the absence of the uterine endometrium, if the latter is implicated in any important way in this process.

Experimental. Five normal pregnant monkeys were delivered at term and their babies were immediately separated from the mothers. Two of the animals on the 4th and 6th postpartum day, respectively, were subjected to a supravaginal hysterectomy whereby all but an insignificant amount of the cervical mucosa was removed.

As a measure of ovarian function we determined thrice weekly the percentage sedimentation in the vaginal lavage, according to the technic of Hartman.[2] Desquamation and menstrual cycles in the 3 control animals and desquamation cycles in the 2 experimental

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1 Burford and Diddle, *Surg., Gynec. and Obst.*, 1936, **62**, 701.

2 Hartman, Carl G., *Contrib. to Embryol.*, Carnegie Institution of Washington, 1932, Vol. 23, p. 1.

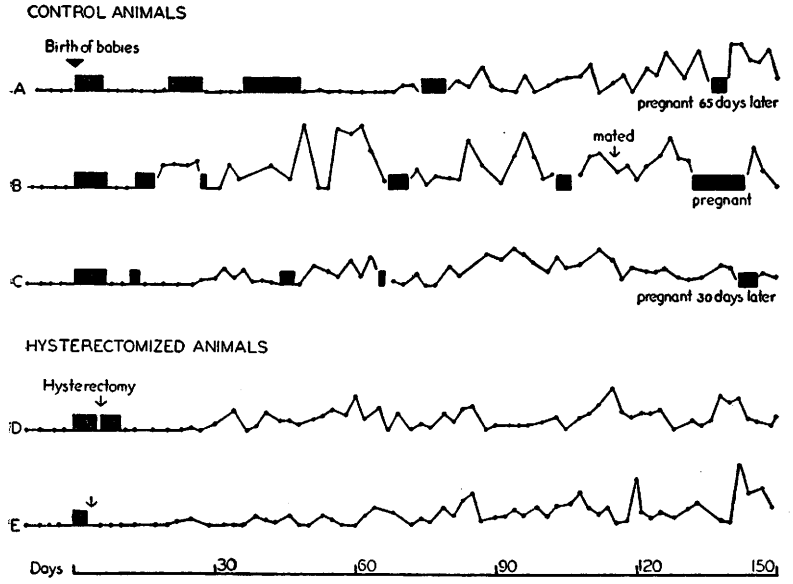

FIG. 1.

Curves showing vaginal desquamation in 5 monkeys followed for 150 days after parturition. Two of the animals were hysterectomized on the 6th and 4th days after delivery. The solid areas represent vaginal bleeding. In animal B the last bleeding shown is the placental sign indicating a positive mating at the 115th day.

animals are shown in Fig. 1. In the normal animals (A, B, and C), the first signs of desquamation were observed at 70, 19, and 27 days, respectively, after parturition; corresponding maximum sedimentation values were 50, 65, and 40%. In monkey A there occurred uterine bleeding at intervals following the lochial discharge which was associated with the persistence of a gestational type of vaginal epithelium. First menstrual bleeding occurred 75 days after delivery and an appreciable sediment reappeared in the lavage at this time. In monkey B a cycle of relatively normal length was established early, suggesting that the animal might be mated, and pregnancy immediately ensued. In the animals D and E from which the uterus had been removed there was, of course, no menstruation, but they resumed vaginal desquamation at 30 and 20 days, respectively, after parturition and showed maximum sedimentation values of 45% and 60%. The sedimentation curves for the 5 animals are, in fact, virtually indistinguishable. The 3 controls were mated and became pregnant at 215, 105, and 180 days respectively, after the birth of their last babies. Thus, their desquamation curves may be accepted as typical records of normal, cyclic animals capable of reproduction and the curves for the ex-

perimental animals were not shown to deviate from them to any degree.

Conclusion. Supravaginal hysterectomy in the macaque at the time of parturition causes no deviation from the normal pattern in the resumption of ovarian activity as demonstrated by the study of vaginal desquamation.

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Detoxication of Borneol by Glucuronic Acid in Humans.

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In previous studies[1] we had investigated the extent of detoxication of phenylacetic acid and benzoic acid in the form of glucuronides, using the photoelectric colorimetric method of Maughan, Evelyn and Browne.[2] We were attracted to the study of the detoxication of borneol for the reason that the high percentage of detoxication by glucuronic acid of this substance reported in the literature enhanced the possibility of using it to study pathological cases. In this paper we deal with a detailed study of normal cases.

Quick[3] reporting 2 cases in which 2 g of borneol was ingested by human subjects, stated that 81% was excreted as the glucuronide within 10 hours after ingestion; while on giving the subject 3.5 g of borneol, 69% was thus excreted within 6 hours. Pryde and Williams[4] extended these experiments to 24 human cases and measured the excretion of glucuronides for some stated period between 6-12 hours after the ingestion of 2 g of borneol. These authors found that the maximum excretion was around 80%, and that this limit is reached in the normal human being within 10-12 hours. It

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1 Wagreich, H., Kamin, H., and Harrow, B., PROC. SOC. EXP. BIOL. AND MED., 1940, **43**, 468; Wagreich, H., Abrams, A., and Harrow, B., *Ibid.*, 1940, **45**, 46.

2 Maughan, G. B., Evelyn, K. A., and Browne, J. S. L., *J. Biol. Chem.*, 1938, **126**, 567.

3 Quick, A. J., *J. Biol. Chem.*, 1928, **80**, 535.

4 Pryde, J., and Williams, R. T., *Biochem. J.*, 1936, **30**, 799.