the structure of large atretic follicles may be obtained after continued intravenous injection of pregnancy urine, but no structures which are clearly corpora lutea have as yet been obtained with this substance, although luteinization in the rat is a pronounced result after prolonged subcutaneous intraperitoneal or intravascular injections.

In the female monkey the only well recognized phenomena which occurs after treatment of normal intact animals with pregnancy urine extracts is this uterine bleeding. The ovaries, although they show no morphological change as yet recognizable, are essential in this mechanism for bleeding, as no results were obtained in an ovariectomized animal even after 30 days of treatment. In no case has the endometrium shown the degree of development which is obtained by means of oestrin, or after stimulation with the water soluble pyridine extract of anterior pituitary. Bleeding in every case studied has occurred from an interval type endometrium, with poor glandular development and with relatively little tissue destruction.

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Prevention of Experimental Uterine Bleeding in Macacus Monkey by Corpus Luteum Extract (Progestin).*

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Since uterine bleeding was shown to follow cessation of follicular treatment, the many observations on experimental menstruation in the monkey have not given adequate consideration to the rôle of the corpus luteum. Experiments were designed to study this question. Adult or subadult animals, all beyond the first menstruation (3700 to 5150 gm. B.W.) were injected with the follicle stimulating water soluble fraction of sheep pituitaries (Pyridine method of Fevold, Hisaw and Leonard) for 10 to 14 days. Coincident with the last 4 of these injections oestrin (Theelin) was also given in large doses (100 R.U. per diem)**. The uterus at the end of the treatment

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**The Theelin and dried sheep pituitary glands were kindly supplied by Parke Davis & Co., through the courtesy of Dr. O. P. Kamm.

was large, firm and of a deep red color. It is known that the animal will bleed within 6 days of the cessation of this treatment. Bilateral ovariectomy was also performed, which alone will be followed by uterine bleeding. On this day of ovariectomy, treatment was begun with Progestin (method of Corner and Allen), giving generally 70 gm. equivalent of fresh sow corpora daily***. *Bleeding has never occurred during the course of treatment with progestin,* and has been prevented, in various animals for from 10 to 28 days after the double stimulus to bleeding afforded by bilateral ovariectomy and cessation of oestrin treatment. The preparation has one R.U. of oestrin per 19 gm. equivalent which is quite inadequate to prevent uterine bleeding.

A typical animal (My89, wt. 4.4 K.) was given 15 days of aqueous solution of anterior pituitary (dry gland equivalent of 17 gm.). During the last 4 days of this period 100 R.U. oestrin (Theelin, P. D. & Co.) was administered daily. On operation the ovaries were large (1.172 gm.) and contained numerous cystic follicles, no corpora. Both ovaries were removed. The uterus was firm and measured 18 x 14.7 mm. Progestin (70 gm. fresh gland equivalent daily) was continued for 28 days. Bleeding began on the sixth day following the last injection of progestin.

A typical progestational endometrium is obtained by the 10th day of treatment, similar to that previously obtained by Hisaw, Meyer, and Fevold[1]. The bleeding which follows the breakdown of the progestational endometrium is more profuse and of a different quality than interval type bleeding.

In the monkey and human, uterine bleeding occurs in the absence of ovulation and of corpora lutea. The impression obtained over an extended period of observation with experimental induction of uterine bleeding following cessation of injections of oestrin (theelin, amniotin) and a luteinizing preparation of the anterior pituitary (P. D. & Co.) or during the course of injections of pregnancy urine extract, is that the type and quality of bleeding is not the same as after cessation of progestin treatment. Description of the tissues and of blood extravasation from the endometrium will be published later. Provisionally, we are applying the term menstrual bleeding only to that type of uterine hemorrhage which follows the degeneration and sloughing of a prepared progestational endometrium.

***The fresh corpora lutea were supplied by the Wilson Laboratories, through the courtesy of Dr. David Klein.

[1] Hisaw, F. L., Meyer, K. K., and Fevold, H. L., PROC. SOC. EXP. BIOL. AND MED., 1930, **27**, 400.

Uterine bleeding from the interval endometrium with proportionately less tissue loss, and the passing of red cells through the epithelium by diapedesis may not be a homologous process.

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The Question of Synthesis of the Antirachitic Vitamin by the Cod.

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Ever since the recognition of the antirachitic factor, the question has been raised as to whether cod fish synthesize this factor or whether the marked potency of their liver oil is due to antirachitic vitamin taken in with the food. Investigations have been few and inconclusive. Wejdling[1] has drawn attention to the fact that diatoms, which may form a part of the diet of the cod, contain the antirachitic vitamin. On the other hand, Bills[2] has demonstrated that caplin, which are consumed in enormous quantity by the Newfoundland cod, are not rich in the D factor, and suggested that some of the vitamin may be formed by synthesis within the fish.

Some years ago we carried out experiments designed to ascertain whether the livers of cod fish which were fed large amounts of non-activated ergosterol by mouth contained exceptional amounts of the antirachitic factor. Cod fish were given, by means of a pipette, 5 feedings of 10 mg. each of ergosterol suspended in cottonseed oil. The fish were kept in tanks in New York Bay and feedings were given at 2-day intervals, the last one being given about 36 hours before the fish were killed. The result may be summarized by the statement that the livers of the fish which received the ergosterol were found, on biological assay, to contain the antirachitic vitamin in no greater amount than the control fish which were kept under similar conditions, but which had not been given ergosterol. Two series of experiments were carried out with the same result.

Last December this subject was approached from a somewhat different point of view. Instead of giving ergosterol by mouth, it was injected intramuscularly. Three injections were given of 1 mg. dissolved in 5 cc. of corn oil; there was an interval of 2 days be-

[1] Wejdling, K., *Acta paed.*, 1928, **7**, Suppl. II, 259.

[2] Bills, C. E., *J. Biol. Chem.*, 1927, **72**, 751.