tuating with various conditions. If the structure is relatively inelastic, then its shortening must result if twisted into a helicoid; if more or less elastic, a lengthening may occur.

The helicoid twist described cannot be deprived of significance by classing it as an artifact or an abnormal state; if it is due to the reagents employed, the involved structures must have contained compounds different from those found in the non-twisted homologous structures and this means a different functional state. Abnormality on analysis simply means that a normal process has been increased or decreased beyond a certain level, for in no abnormal process is there ever the creation of a new function, there is merely the exaggeration in a positive or negative direction of capacities active or dormant in the cell.

2985

The time of ovulation in the menstrual cycle of the monkey, Macacus rhesus.*

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Available data for placing the time of ovulation in the sexual cycle of primates is meager in comparison to that for other mammals. Much of the evidence consists of the finding of early *corpora lutea* in the ovaries. Since in most cases it has not been possible to correlate the condition of the ovum discharged or its position in the tube with the stage of development of the corresponding *corpus luteum,* this evidence is incomplete.

Recently Corner[1] recovered an ovum from the tube of a monkey on the 14th day of the cycle. This was the first unfertilized tubal ovum of a primate to be recovered after being freed from the ovary. A degenerating ovum was also removed from the uterus on the 17th day of the cycle. In six other animals, all

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[1] Corner, George W., *Carnegie Inst. Cont. to Emb.*, 1923, xv, 73.

of which had menstruated within two weeks of the time of killing, no signs were found in the ovaries of recent or impending ovulation.

In the course of some experimental work upon injections of the ovarian follicular hormone into monkeys, operations have been performed at several intervals of the menstrual cycle. In the ovaries removed from a monkey on the first day of menstruation, there was no visible indication of either a large follicle or early *corpus luteum.*

A second monkey was operated on the 16th day of the cycle. One ovary was large and opalescent, although no individual large follicles could be seen from the surface. Some clear liquor was aspirated by means of a capillary pipette, but no ovum could be found. As this ovary was not removed, there was no way of determining whether the follicle was in a normal condition. A third monkey, operated on the 14th day, showed no signs visible on the surface of the ovaries of either a large follicle or recently formed *corpus luteum.* However, these two monkeys were young, having just attained sexual maturity.

A fourth monkey was operated on the 14th day after the appearance of the previous menses. A rupture point was visible on the surface of one ovary through which a hernia of luteal tissue protruded. The ampulla of the tube was distended to a semi-translucent state. The tube was removed, a hypodermic needle inserted into the uterine end and an ovum washed into a watch glass. On examination in warm Ringer's solution it was found to be completely surrounded by several layers of follicular cells. This may be interpreted as evidence of a very recent ovulation.

An operation was performed on a fifth monkey on the 10th day of the cycle. Conditions very similar to those in the fourth monkey were found, and a second unfertilized tubal ovum was recovered. These two ova are therefore the second and third unfertilized primate ova to be recovered from the uterine tubes after ovulation.

These ova were measured in warm Ringer's solution and fixed for further study in sections. A correlation of the degree of development of the corresponding *corpora lutea* is planned in the near future.

These results add two new instances to the relation of ovulation to the menstrual cycle in *Macacus rhesus.* One coincides with Corner's case of the 14th day, but the other shortens the period

at which ovulation may occur to the tenth day. On the basis of the recovery of these three unfertilized tubal ova, the time of ovulation in the menstrual cycle may be placed between the tenth and fourteenth days.

2986

The ovarian follicular hormone: a study of variation in pig, cow and human ovaries.

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It is now possible to measure quite accurately the amount of follicular hormone present in the ovaries of the larger mammals. The unit of measurement is the least amount of lipoid extract required to produce a definite physiological reaction in the spayed adult rat. This reaction to the injected hormone proves a good physiologic unit of measurement because it has a fairly sharp end point which may be determined accurately without sacrificing the test animal. It has been fully described and illustrated in earlier papers.[1] Briefly stated, the test consists of the induction of enough growth in the genital tract to cause the formation of a cornified layer in the vaginal epithelium. This growth requires about 48 hours and amounts to a complete replacement of the epithelial wall of the vagina. A positive test is indicated when cornified cells replace the leucocytes typical of the vaginal smear of the spayed control animal.

Material from pigs accurately timed with regard to its position in the 21 day oestrous cycle was collected by Dr. F. F. McKenzie, Department of Animal Husbandry, University of Missouri, in the course of his studies on reproduction.[2] The first ovary ex-

[1] (a) Allen, Edgar, and Doisy, E. A., *J. Am. Med. Assn.*, 1923, lxxxi, 819. (b) Allen, Edgar, Doisy, E. A., Francis, B. F., Robertson, L. L., Colgate, C. E., Johnston, C. G., Kountz, W. B., and Gibson, H. V., *Am. J. Anat.*, 1924, xxxiv, 133. (c) Doisy, E. A., Rolls, J. C., Allen, Edgar, and Johnston, C. G., *J. Biol. Chem.*, 1924, lxi, 711. (d) Allen, Edgar, and Doisy, E. A., *Am. J. Physiol.*, 1924, lxix, 577.

[2] McKenzie, Fred F., *Anat. Rec.*, 1924, xxvii, 185.