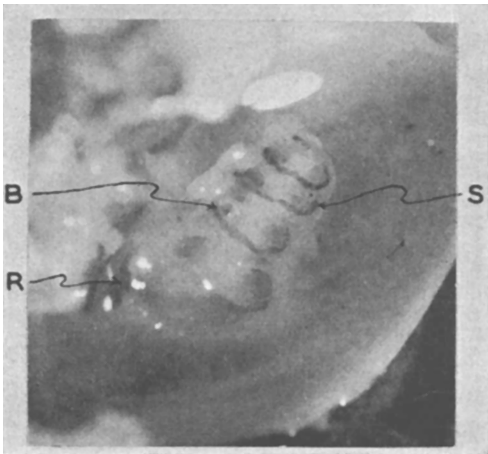

FIG. 5.
The bone of the cochlea has been dissected off under saline solution, leaving the membranous labyrinth nearly intact. The pigmented stria vascularis (S) is clearly visible in Turns 2, 3, and 4. A bubble (B) is still present in scala vestibuli of Turn 2. A larger bubble escaped during the dissection. The round window (R) is at the lower left. In the first turn the stria vascularis, spiral ligament and basilar membrane have been removed, exposing the spiral lamina. White spots are reflections from the surface of the saline solution. Treatment: DC; 100 microamperes for 1 minute.

dissolved gases.

We have noticed incidentally two anatomical features of the guinea pig's cochlea that may be of importance to electrophysiologists, as follows:

1. In the first turn the spiral ligament is separated from the scala tympani by a thin spiral shelf of bone. This shelf appears like a deposit of bone in the surface layers of the dense, non-vascular tissue that covers the tympanic half of the spiral ligament. A hole drilled into the spiral ligament behind this shelf is likely to bring an electrode into more direct contact with scala media than with scala tympani.

2. Within the modiolus a bony partition separates the channel that contains the spiral ganglion from the hollow central core that contains the cochlear nerve. Nerve fibers and blood vessels penetrate this partition freely but the holes are so small that it forms an effective barrier against any micro-electrode that may be thrust outward from the cranial cavity through the internal auditory meatus.

Summary. Direct, alternating and radiofrequency currents of 40 microamperes or more were passed between silver wire electrodes introduced in various positions within the guinea pig's cochlea. Irreversible depressions of electrical responses, both microphonic and action potentials were produced. Microscopic examination showed that two important mechanisms were a) necrosis due to heating and b) formation of bubbles by electrolysis or by heating. Reversible physiological effects can also be produced by weaker DC polarization.

Two details of the bony anatomy that may be of electrophysiological significance are described.

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Effects of Progesterone upon Ovulation in the Rhesus Monkey.* (18230)

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The hormonal control of ovulation in the primate is not very well understood, and it is extremely difficult to obtain ovulation consistently in the monkey by experimental means. There are a few authentic cases reported where ovulation has been produced experimentally with gonadotrophins(1-5).

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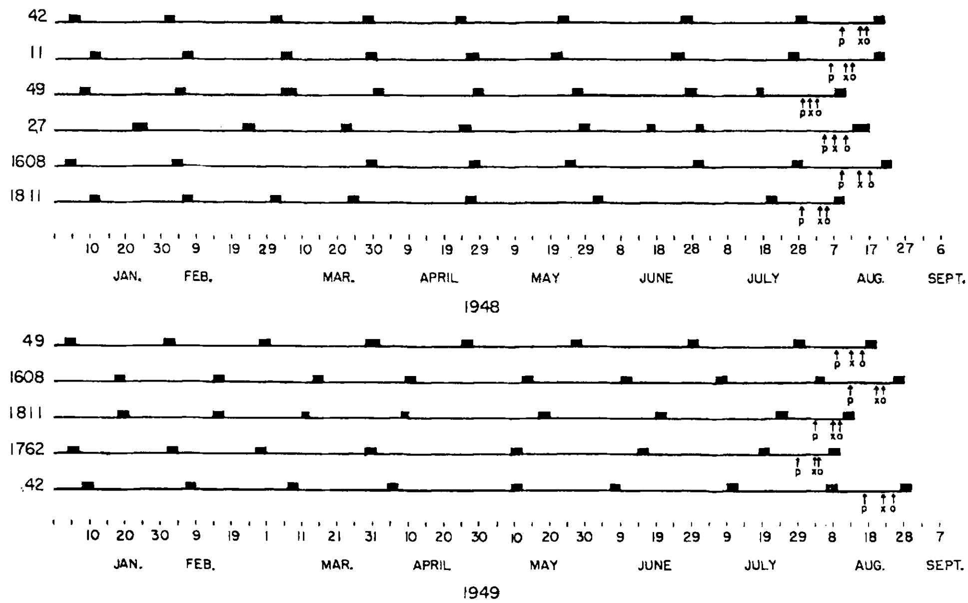

FIG. 1.

The menstrual cycles for each monkey used in the experiments are plotted from January 1 to the end of the experiments. The black blocks represent the periods of bleeding, P the time progesterone injections were begun, X the time injections were stopped, and 0 the time laparotomy was performed.

However, it seems probable that most attempts have resulted in failure. From the published work and personal experimentation it seems quite evident that ovulation is due to a relatively sensitive balance of gonadotrophic hormones which is somewhat difficult to reproduce by experimental means. The fact that progesterone plays such a definite rôle in the mechanism of ovulation in the rat(6), and fowl(7), together with the increasing evidence that in mammals progesterone is always produced in the maturing follicle before ovulation, suggests that this hormone might play some rôle in the mechanism of ovulation in the primate. In most colonies the female monkey runs anovulatory cycles during the summer months, which makes this animal the most favorable primate for experimentation on ovulation. It is the purpose of this paper to report the effects of exogenous progesterone administered during the middle trimester of the menstrual cycle during the summer anovulatory period.

Material and methods. The menstrual cycles of the normal female monkeys in our colony were followed routinely. Each of 6 adult female monkeys received 0.5 mg of progesterone daily for 3 to 6 days beginning on the 10th to 14th day of the menstrual cycle during August of 1948. The day that the injections were begun depended somewhat on the average length of the cycles, which are plotted in Fig. 1. The progesterone was dissolved in sesame oil so that the injected dose was contained in 0.2 cc of oil. The month of August was chosen as the period when there would be the least chance of ovulation or of the presence of a former corpus luteum that could be confused with a recently formed one. Each animal was laparotomized 2 to 3 days after the last injection of progesterone, and both ovaries were carefully examined for the stage of development and possible ovulation. The experiment was repeated in August of 1949 with the modification that the progesterone injections were started on the 10th

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TABLE I. Effect of Exogenous Progesterone Upon Ovulation in the Monkey. Each animal received 0.5 mg daily.

Animal No.	Day of cycle started	Days treated	Laparotomy: Day of cycle	Laparotomy: Day after last inj.	Ovulation	Remarks
		A. During anovulatory summer period of 1948				
42	13	6	21	2	—	Preovulatory follicle
11	12	5	19	2	—	Extensive adhesions
49	12	3	17	2	—	Preovulatory follicle
27	12	4	18	2	—	Large follicle
1608	14	5	22	3	+	Corpus luteum well formed
1811	10	5	17	2	—	Two large follicles
		B. During anovulatory summer period of 1949				
49	11	5	18	2	—	No large follicles
1608	10	6	19	3	+	4 day corpus luteum
1811	11	5	18	2	+	2 day " "
1762	11	5	17	1	+	Just ovulated
42	11	5	19	3	—	No large follicles

or 11th day of the cycle and were all continued for 5 to 6 days, with the idea that this would tend to insure the presence of the progesterone at the right stage in the growth of the follicle. Some of the newly formed corpora lutea were excised from the ovary, fixed in Bouin's fluid, imbedded in paraffin, sectioned at 7 μ and stained with Harris' hematoxylin and triosin.

Results. For the most part a single follicle develops in the ovaries of the monkeys in this colony and proceeds to approximately the preovulatory stage, but ovulation does not occur during the summer anovulatory period of June to September. There are, nevertheless, cases where more than one follicle enlarges or where no enlarged follicle can be found. The enlarged follicle gradually undergoes atresia and the menses appear at approximately the same time as if ovulation had occurred. It will be seen from Fig. 1 that there may be a somewhat greater variation in the length of the menstrual cycle during this period.

The results of the experiments are summarized in Table I. Ovulation was not readily induced in the experiment performed during the summer of 1948. It occurred in only one of the 6 monkeys tested. One other animal had such extensive adhesions around the ovaries that it was impossible to determine their development. Two others had what were diagnosed grossly as normal preovulatory follicles. Another had a single follicle which had the pale appearance often seen in cystic follicles, and the sixth animal had 2 large follicles corresponding to preovulatory follicles in size and appearance.

In repeating the experiment during the summer of 1949, 4 of the monkeys used in 1948 and one additional monkey were tested. Under the experimental regime in effect during this period 3 of the animals ovulated (Table I). The other two animals did not have preovulatory follicles. The age of the corpora lutea found in animals No. 1608 and No. 1811 was determined on the basis of the histological descriptions of Corner, Hartman and Bartelmez(8).

In both experiments menstruation followed regularly 3 to 8 days after the last injection of progesterone whether ovulation had occurred or not (Fig. 1). There appeared to be very little correlation between the number of days of treatment and the length of the period before bleeding. However, in the second experiment, where all of the animals were injected the longer period of time (5 to 6 days), the average interval was only 4 days, as compared to 5.5 days for the other group.

Discussion. It is realized that some variation exists among colonies as to whether ovulation occurs normally during the summer months. In our colony, however, the author

8. Corner, G. W., Hartman, C. G., and Bartelmez, G. W., *Carnegie Inst. Wash. Pub.* 204, Contrib. to Embryol., 1945, v31, 117.

has seen no spontaneous ovulation between June and September, although he has performed at least 50 laparotomies during these months. This fact agrees with the published findings of Hartman(9). While the results reported here are presented with the full realization that they are not conclusive, the author feels that they do compare very favorably with the better results of experimentation on ovulation in the monkey by other means. The single ovulation in the summer of 1948 might possibly be considered a chance occurrence. However, it is felt that the number of ovulations in 1949 were too frequent to be due to chance.

Accepting the above results to mean that progesterone produces ovulation in the monkey during the anovulatory summer period, provided a follicle of sufficient size is present, the monkey can be added to such other species as the rat(6) and the chicken(7), in which progesterone causes ovulation. It is also probable that the ovulation is the result of the release of LH from the hypophysis intermediated by the progesterone(10,11). This interpretation fits very well with the finding that progesterone is produced by the preovulatory follicle in all mammals in which it has been tested. The presence of progesterone has also been detected in the blood of the monkey(12) and of women(13) before ovulation.

It is interesting that the next bleeding seemed to occur in relation to the last injection of progesterone and not to the presence or absence of a corpus luteum. The apparent lack of correlation between the length of progesterone treatment and the number of days before menstruation(14) is probably not significant since the material was not adequately controlled for this factor.

Summary. Ovulation occurred in 4 of 11 adult female monkeys which had received 0.5 mg of progesterone daily for 3 to 6 days beginning on the 10th to the 14th day of the menstrual cycle during the anovulatory summer period. Menstruation began from 3 to 8 days after the cessation of the progesterone treatment whether ovulation occurred or not.

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Free Glutamic Acid Content of Viridans Streptococci and Some Trained Resistant Strains.* (18231)

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Gale(1) and Taylor(2) have determined the internal glutamic acid content of many different species of bacteria. Gale(3) has shown that sulfathiazole interferes with the condensation of glutamic acid into bacterial protein. Since the assimilation from the medium into the cell was not blocked, it might be expected that glutamic acid would accumulate in the cell in the presence of sulfathiazole. Gale found this to be true. He also reported(4) that resistance to sulfa-

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1. Gale, E. F., *J. Gen. Microbiol.*, 1947, v1, 53.

2. Taylor, S. E., *J. Gen. Microbiol.*, 1947, v1, 86.

3. Gale, E. F., *J. Gen. Microbiol.*, 1947, v1, 327.