TABLE I.
Effect of 2% Pectin on Growth of *Esch. coli* in Heart Infusion Broth.

| | pH | Original Count per cc. | Count after 24 hr. per cc. | Count after 48 hr. per cc. | After 48 hr. % Increase | After 48 hr. % Decrease |
|---|---|---|---|---|---|---|
| Pectin | 5.0 | 185,000 | 375 | 0 | | 100 |
| Control | 5.0 | 251,000 | 287,000,000 | 935,000,000 | 372,410 | |
| Pectin | 5.2 | 147,000 | 3,700 | 69 | | 99.9 |
| Control | 5.2 | 37,000 | 725,000,000 | 1,337,000,000 | 3,613,414 | |
| Pectin | 5.4 | 71,000 | 500 | 43 | | 99.9 |
| Control | 5.4 | 78,000 | 31,000,000 | 75,000,000 | 96,053 | |
| Pectin | 5.5 | 90,000 | 4,967 | 1 | | 99.9 |
| Control | 5.5 | 323,000 | 513,333,000 | 2,030,000,000 | 625,287 | |
| Pectin | 6.0 | 97,000 | 311,000 | 390,000,000 | 401,962 | |
| Control | 6.0 | 250,000 | 677,000,000 | 1,103,000,000 | 441,100 | |
| Pectin | 6.5 | 171,000 | 310,000,000 | 720,000,000 | 420,952 | |
| Control | 6.5 | 167,000 | 525,000,000 | 1,117,000,000 | 668,763 | |
| Pectin | 7.0 | 144,000 | 286,000,000 | 315,000,000 | 218,650 | |
| Control | 7.0 | 129,000 | 506,000,000 | 745,000,000 | 577,420 | |

ulative tissue. In cultural studies, it was found that as the wounds healed there was a marked decrease or complete disappearance of streptococci and a more gradual diminution of staphylococci. It is possible that the action of pectin on bacteria is one of the factors in the clinical success of this treatment.

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## Effects of Progesterone on the Female Genital Tract after Castration Atrophy.*

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The effects of oestrin-free progestin on the atrophic endometria of 2 castrated monkeys were described by one of us.[1] These animals had been castrated for 37 days and were given 4 RbU of oestrin-free corpus luteum extract daily for 10 days. The endometria of both monkeys showed unquestionable premenstrual development. Although these preparations did not produce cornification of the vaginas of castrated rats it could not be stated with certainty that they were entirely free of oestrin and that the observed effects were due only to the action of progestin. We wish here to present results of similar experiments using synthetic progesterone.†

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1 Hisaw, F. L., *Am. J. Obst. and Gyn.*, 1935, **29**, 638.

† The synthetic progesterone was furnished by the Schering Corporation.

A young adult monkey that had been castrated for 242 days was given 4 mg. of progesterone daily for 18 days, a vaginal biopsy was taken on the eighth day, a thread was placed through the uterus on the eleventh day and the animal was killed on the nineteenth. Nucleated epithelial cells appeared in the vaginal smear and were present in considerable numbers by the eighth day, after which they gradually decreased and were almost absent at the conclusion of the experiment. The face showed coloration by the seventh day and the pale sexual skin developed and maintained a deep red color. The uterus, at laparotomy on the eleventh day, measured 11 by 9 mm. at its greatest diameters and at autopsy 17 by 13.5 mm.

This treatment produced a fully developed premenstrual endometrium and epithelial proliferations[1] characteristic of an implantation site. The cervical glands showed active secretion though the epithelial cells in most places were not as tall as those seen following injections of oestrin. The vaginal mucosa, though thin, showed some stimulation both at the time of biopsy on the eighth day and at autopsy.

Experiments similar to those described for monkeys were also carried out on castrated rabbits. A rabbit that had been castrated one year was given 6 RbU of oestrin-free progestin distributed equally over 5 days and killed on the sixth. Another, 8 weeks after castration received one RbU of progesterone daily for 7 days and was killed on the eighth. Two rabbits, 12 days after castration, were given 0.25 and 1.0 mg. of progesterone daily for 7 days and killed on the eighth. The uteri of all these animals showed growth, mitoses and progestational modification of the endometrium. A +++ to ++++ reaction was obtained in all these rabbits except the one receiving ¼ mg. progesterone daily which showed about +.

The effects of synthetic progesterone were tested on 4 adult female rats, 2 of which had been castrated for 150 days and 2 for 168 days. One of each pair was hysterectomized just previous to the beginning of the experiment for the purpose of determining whether or not the uterus had an influence on possible vaginal changes. The effects on the vagina were followed by vaginal smears and biopsies. Each animal was given 1.0 mg. of progesterone daily for 6 days and killed on the seventh. This treatment produced changes in both the uterus and the vagina. The uteri of the experimental animals were slightly larger than those of the castrated controls and the uterine and glandular epithelium showed an increase in thickness and occasional mitotic figures. A few nucleated epithelial cells usually appeared in the vaginal smears of both

the hysterectomized and castrated animals by the fourth or fifth day of treatment and biopsies and examination at autopsy showed a slight though definite thickening of the vaginal mucosa associated with some mitotic activity and scattered glycogen granules.

Although synthetic progesterone was used in most of these experiments, the results suggest the presence of an oestrogenic substance. An attempt to check this possibility was made by collecting the urine before and during the treatment with progesterone and analyzing it for oestrin. The urine of 2 monkeys and 3 rabbits that were given from 0.25 to 2.0 mg. of progesterone daily was extracted‡ and tested on ovariectomized rats. In no instance were we able to obtain an effect on the vaginal mucosa.

It seems quite probable that these effects are due to the direct action of relatively large doses of progesterone. It has been found previously that one RbU of progestin distributed over 5 days has little or no effect on the uterus of the rabbit after complete castration atrophy,[2] while Lloyd[3] has found that 0.5 mg. progesterone daily for 3 days stimulates mitotic activity. It is also of interest to note that certain of the androgens produce progestational proliferation of the endometrium of rabbits[4] and growth of the mammary glands of rats[5] thus displaying the physiological properties of both progesterone and oestrin. These observations show that these chemically related hormones are adapted for producing their specific effects when present in small amounts yet they have, to a smaller degree, certain physiological characteristics in common which can be demonstrated under favorable circumstances by increasing the dosage.

‡ These urines were extracted by Dr. Pincus and associates by methods developed in their laboratory.

[2] Hisaw, F. L., and Leonard, S. L., *Am. J. Physiol.*, 1930, **92**, 574.

[3] Lloyd, C. W., PROC. SOC. EXP. BIOL. AND MED., 1937, **36**, 190.

[4] Klein, M., and Parkes, A. S., *Proc. Roy. Soc.*, 1937, **121**, 574.

[5] Selye, H., McEuen, C. S., and Collip, J. B., PROC. SOC. EXP. BIOL. AND MED., 1936, **34**, 201.