15 mg. %) produced in a nephrectomized animal. Therefore it appears that the physiological changes which occur as a result of nephrectomy interfere with the mobilization of calcium into the blood.

9001 C

Further Evidence on Hormonal Basis of "Heat" Behavior.*

JOSEPHINE BALL. (Introduced by Carl G. Hartman.)

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In an exploratory experiment it was found that doses of 10 to 100 R.U. of estrin (Progynon-B Schering)† failed to have the slightest effect on the behavior of 3 hypophysectomized female rats, although similar amounts consistently brought castrated females into heat. This suggested that estrin produced heat behavior by way of the pituitary and led to a series of experiments which, while somewhat inconclusive, are, nevertheless, of interest because they seem to show that progestin is not the immediate heat behavior hormone in the rat as Dempsey, Hertz and Young[1] believe is the case in the guinea pig.

The same 7 castrated female rats were used in each experiment. The method of measuring varying degrees of sexual excitability has been described elsewhere.[2]

Injection of gonadotropic hormone (Prephysin Chappell)† in doses of 0.04 to 0.80 cc. had no effect, nor did luteinizing hormone† in doses ranging from 5 mg. given in a single injection up to 60 mg. given in 5 increasing doses over a 3-day period. However, 6 mg. of LH raised the sexual excitability of 2 unoperated females that happened to be spontaneously in a condition like that described as "constant estrus" by Witschi and Pfeiffer.[3] The latent period for

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1 Dempsey, E. W., Hertz, R., and Young, W. C., *Am. J. Physiol.*, 1936, **116**, 201.

2 Ball, J., *Comp. Psychol. Monogr.*, in press.

3 Witschi, E., and Pfeiffer, C. A., *Anat. Rec.*, 1935, **64**, 85.

this reaction was about 4 hours, suggesting a much more direct action than that of estrin which has a latent period of 24 to 48 hours.

These experiments pointed to the need of estrin as a preparatory agent for LH, although some doubt was thrown on such a requirement by the fact that high degrees of heat behavior were exhibited without any cornified cells in the smears of unoperated rats receiving 0.05 cc. Prephysin Chappel daily over long periods of time. Ten such heat periods were observed in 4 rats, indicating that if estrin is essential, subliminal amounts suffice.

An experiment was accordingly arranged which was designed to imitate the behavior picture shown by the "constant estrus" animals treated with LH by keeping castrated females at a low level of receptivity by means of low daily doses of estrin and then injecting LH into these animals in addition to this uniform estrin dosage. Daily doses of 1 to 10 R.U. of estrin were found to keep the animals at the desired low degrees of receptivity, although, interestingly, not always producing cornified smears. LH was then administered in doses varying from 10 mg. in 1 injection to 60 mg. given in 5 injections at hourly intervals. Following the LH injections heat behavior was elicited with slighter stimulation in 11 out of 15 cases. In one case (10 mg.) there was definitely no effect. The other 3 cases (40 and 50 mg.) were doubtful.

These results pointed to a definite effect of LH on estrinized castrated rats. But the behavior so produced was not perfectly typical heat behavior. There is no question about the fact that most of the reactions typical of estrin were more easily elicited. Ear vibration, continuous tense crouching and ready lordosis appeared upon slighter stimulation than before the LH had been injected. But there was almost no darting about the cage after the first quick run to a corner. Moreover, turning of the activity drums in which the animals lived was usually somewhat less after LH injections also, whereas it is well known that the typical heat period is characterized by more rather than less general activity. The animals were also more sensitive to pain, objecting violently to the prick of the hypodermic needle which at other times they gave no sign of feeling. This hypersensitivity and decreased general activity suggest a possible toxic effect of some other ingredient in the extract. However, 3 of the 7 animals showed the same immotility in sex tests when they were later brought to the same degrees of sexual excitability with estrin alone. Apparently the fact that they had been castrated for 7 months at the time of this experiment may have been responsible for some of the immotility but not all of it.

While the animals were still on the daily estrin regime, progestin

was tried to see if it would increase the effect of the estrin. Each rat was injected 2 or 3 times with Proluton Schering, in amounts varying from 0.01 to 0.10 I.U., either in a single injection or in 4 injections given in one afternoon. In no case was there either increase or decrease in the estrin-maintained behavior level. The highest dose used is one-half the effective dose for the guinea pig,[1] an animal about 3 times the size of the rat.

Obviously the experiments with LH will have to be repeated with variations to determine whether it produces a truly specific effect on sex behavior. The failure to obtain any effect from progestin in the rat is, perhaps, open to the criticism that this species may be relatively insensitive to this hormone as regards behavior. Nevertheless, the observations reported bring the endocrinology of heat behavior in the rat, so far as it is known, into line with what it is reasonable to expect from the physiology and time relations of the ovarian and behavioral events occurring at estrus.

9002 C

An Attempt to Induce Nephrotoxins and Experimental Glomerulonephritis by Injections of Homologous Renal Tissue.

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The rôle of allergy and nephrotoxins in the production of glomerulonephritis has been studied extensively by many investigators. The results of these studies may be found in excellent reviews of the literature by Pearce,[1] Leiter,[2] Masugi,[3] and Fishberg.[4] Recently Masugi has shown that if the blood serum of ducks that have received repeated injections of rabbit kidney be injected intravenously into rabbits, a glomerulonephritis results. Schwentker and Rivers[5] have demonstrated, further, that by autolyzing rabbit brain it is possible to render it antigenic to rabbits so that its repeated in-

[1] Pearce, R. M., *Arch. Int. Med.*, 1910, **5**, 113.

[2] Leiter, L., *Arch. Int. Med.*, 1924, **33**, 611.

[3] Masugi, M., *Ziegler's Beitr.*, 1934, **92**, 429.

[4] Fishberg, A. M., *Hypertension and Nephritis*, Philadelphia, Lea and Febiger, Ed. 3, 1934.

[5] Schwentker, F. F., and Rivers, T. M., *J. Exp. Med.*, 1934, **60**, 559.