TABLE I.
Comparison of Normal and Infarcted Heart Muscle.

Duration Min.	Loss in Infarcted Muscle % Creatine	Glycogen	Gain in Water Content in Infarcted Muscle
18	0	56	0.0
20	4	22	0.66
30	2	21	1.60
120	5	52	2.10
200	2	25	0.54
315	38	87	3.98
340	43	76	3.08
420	32	65	2.55
450	20	19	4.14
690	52	70	3.38
720	40	83	2.70

content as compared with the normal muscle (Table I). The drop seemed to have reached its maximum in 5 hours. Edema detectable by a drop in total solids apparently began to appear in the infarcted anoxic muscle within a half hour and likewise reached its maximum in 5 hours. The creatine loss was slight up to 5 hours, after which diffusion from the damaged muscle was considerable, and increased slowly.

8071 C

Reactions of Ant. Pituitaries of Male Rats to Administration of Ant. Pituitary-Like Substance and to Oestrin.*

J. M. WOLFE AND DORIS PHELPS.

From the Departments of Anatomy and Gynecology, Vanderbilt University School of Medicine, Nashville, Tennessee.

Recent studies[1] indicated that injections of massive amounts of oestrin into normal female rats induced weight and morphologic reactions in the anterior pituitary similar to those obtained by the injection of the anterior pituitary-like substance of pregnancy urine. Both of these substances induced a marked weight increase in the gland, a marked loss of granules from the basophiles and a less evident loss of granules from the eosinophiles (in A.P.L. rats whose ovaries contained active corpora lutea). Furthermore, it has been found that administration of the A. P. L. factor has no action on

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[1] Wolfe, J. M., PROC. SOC. EXP. BIOL. AND MED., 1935, **32**, 1192.

the anterior hypophysis of the castrated rat[2, 3] but that oestrin is capable of direct action on the anterior lobe of the castrated rat.[4] The experiments described below were carried out in order to compare the reaction of normal male rat pituitaries to administration of these 2 factors.

Fourteen adult male rats received daily injections of 25 rat units of an extract of pregnancy urine† for 10 days. Another group of 10 rats received daily injections of 200 rat units of oestrin‡ for 10 days. A third group of 30 normal mature male rats served as controls. At autopsy, body, pituitary, testes and prostate and seminal vesicle weights were secured. Serial sections of all glands were cut, 5 representative sections from each series were studied and cell counts made. Quantitative results are presented in Table I.

Administration of the A. P. L. substance to male rats did not increase the weight of the pituitary gland over that found in the controls (Table I). This was in contrast to previous findings in female rats. Confirming the findings of Severinghaus[2] the anterior pituitaries of the injected male rats exhibited a marked loss of granules from practically all the basophiles although a few granular basophiles were present (Table I). We have previously reported that a few typical castration cells were found in the anterior lobes of normal male rats. These were also found in the control males used in this series. Whether such cells are found in the anterior lobes of male rats generally or whether this condition is characteristic only of our colony is unknown at present. In the male rats receiving the A. P. L. substance, an occasional castration cell was observed. They were never abundant enough, however, to be presented in terms of percentage. There were no significant changes in the eosinophiles or the chromophobes. Table I shows that these cells were found at practically the same level in the A. P. L. injected and the control rats. In all sections studied, the total number of mitoses were counted and are expressed in Table I as the mean number per section. Mitoses were of equal number in the male rats receiving A. P. L. and in the controls (Table I). Cell counts were made on every fifth field of the sections studied. Our quantitative data indicate that the average number of cells counted per section in the control and the

2 Severinghaus, A. E., *Anat. Rec.*, 1934, **60**, 43.

3 Wolfe, J. M., PROC. SOC. EXP. BIOL. AND MED., 1934, **32**, 184.

4 Wolfe, J. M., PROC. SOC. EXP. BIOL. AND MED., 1935, **32**, 1189.

† This extract, Follutein, was furnished by E. R. Squibb and Sons through the courtesy of Dr. J. J. Durrett.

‡ Progynon-B, furnished by the Schering Corp., was used.

TABLE I.

Frequency-Distribution Table Giving Percentage-Frequencies of the Various Cells and Their Means (M) in Percentage. The Mean Pituitary Weights of the Various Groups and the Mean Number of Cells and Mitoses Counted per Section in the Various Groups Are Given.

Level of Cells, %	Frequency—Distribution			Mean Level of Cell Types		
	Control	A.P.L.	Oestrin	Control	A.P.L.	Oestrin
Eosinophiles						
15 — 19.9	—	—	1			
20 — 24.9	—	—	—	M — 48.5	M — 47.1	M — 31.5
25 — 29.9	—	—	3	Cells counted per section—610	Cells counted per section—592	Cells counted per section—473
30 — 34.9	—	—	3			
35 — 39.9	—	—	1			
40 — 44.9	8	4	1			
45 — 49.9	7	6	1			
50 — 54.9	11	4	—			
55 — 59.9	4	—	—			
Basophile—Gran.						
0 — 1.9	1	14	10			
2 — 3.9	6	—	—	M — 5.4	M — 1.0	Practically
4 — 5.9	11	—	—	Cells counted per section—68	Cells counted per section—12	none
6 — 7.9	10	—	—			
8 — 9.9	2	—	—			
10 — 11.9	—	—	—			
Basophile—Non-gran.						
0 — 1.9	29	—	6			
2 — 3.9	1	5	3	M — 1.1	M — 4.5	M — 2.0
4 — 5.9	—	5	1	Cells counted per section—14	Cells counted per section—57	Cells counted per section—30
6 — 7.9	—	4	—			
8 — 9.9	—	—	—			
Chromophobe						
30 — 34.9	1	—	—			
35 — 39.9	5	—	—	M — 45.2	M — 47.4	M — 66.5
40 — 44.9	10	3	—	Cells counted per section—564	Cells counted per section—598	Cells counted per section—997
45 — 49.9	5	7	1			
50 — 54.9	9	4	1			
55 — 59.9	—	—	—			
60 — 64.9	—	—	1			
65 — 69.9	—	—	4			
70 — 74.9	—	—	2			
75 — 79.9	—	—	—			
80 — 84.9	—	—	1			
Mean Pituitary Weight	7.6 mg.	6.8 mg.	14.6 mg.			
Mitoses per section	5.0	5.0	46.9			
Mean number of total cells counted per section				1255	1259	1500

injected rats was practically the same (Table I). This would probably indicate that A. P. L. administration did not bring about an increase in the total number of cells in the gland.

Subcutaneous injections of oestrin for a period of 10 days induced a marked but variable weight increase in the pituitary; a finding previously reported by Hohlweg[5] and Halpern and

[5] Hohlweg, W., *Klin. Woch.*, 1934, **13**, 92.

[6] Halpern, S. R., and D'Amour, F. E., PROC. SOC. EXP. BIOL. AND MED., 1934, **32**, 108.

D'Amour.[6] The mean was 14.6 mg., the range from 9 to 22 mg. The mean weight of the pituitaries of the controls was 7.6 mg. (Table I).

The anterior lobes of all rats receiving oestrin exhibited a marked loss of granules from the basophiles, furthermore the number of these cells counted per section was reduced. Certain less conspicuous changes were found in the eosinophiles and the chromophobes, the extent of which was associated with the degree to which the pituitary was increased in weight. Thus in 2 glands which weighed only 9 mg. the relative level of the eosinophiles was normal and they presented only slight granular loss. In the heavier glands many of the eosinophiles showed loss of granular material and their relative percentage was reduced. Eosinophiles showing loss of granules were often swollen and the remaining granules took a pale stain with orange G. The negative image of the Golgi apparatus was often enlarged. The above morphologic and quantitative changes became progressively more marked in the heavier pituitaries and in one gland which weighed 22 mg. the relative percentage of eosinophiles was reduced to 17.1%. Our quantitative data indicate that the number of eosinophiles counted in these enlarged pituitaries was reduced below normal but not to the degree to which the relative percentage was reduced (Table I). In the rats receiving oestrin the relative percentages and the number of the chromophobes counted were definitely increased (Table I). This increase was more or less proportional to the degree to which the pituitary was increased in weight and indirectly to the extent to which the granular cells were reduced in percentage. Many of the chromophobes were greatly enlarged and presented a fragmentary light blue cytoplasm. Others were smaller and had a denser blue cytoplasm. In both, the negative image of the Golgi apparatus was often hypertrophied.

In the rats receiving oestrin the number of mitoses found was greatly increased (Table I). Mitoses were most abundant in the chromophobes but were also found in the eosinophiles. In general mitoses were most abundant in those glands which were most increased in weight and presented the most marked histologic changes. The total number of cells counted per section was also increased (Table I).

These studies are of considerable interest in that they demonstrate that injection of oestrin induces a reaction in the anterior lobes of mature male rats similar to that induced by both oestrin and the A. P. L. factor in the normal mature female rat, *i. e.*, hypertrophy of the gland, marked loss of granules from the basophiles and less

significant loss of granules from the eosinophiles. On the other hand A. P. L. injection (the same amount as the females received) in the normal male rat induced loss of granules only from the basophiles.

8072 C

Effect of Feeding Desiccated Thymus upon Growth.

EATON M. MACKAY AND RICHARD H. BARNES.

From the Scripps Metabolic Clinic, La Jolla, California.

There are numerous studies in the literature concerning the effect of thymus gland feeding upon growth. Liddo[1] found that it had a harmful effect on all rats but was less harmful when fed with carbohydrates. As with many such studies the question of the completeness of the diets clouds the results and there is always the question of whether such effects are produced only by the thymus or may also result from feeding other animal tissues. This question has been examined.

Four rats were removed from each of 4 albino rat litters 30 days old. The 4 from one litter were females and the remainder males. One from each litter was placed upon each of 4 diets. The control diet was composed of cornstarch 41, commercial casein 20, dried brewer's yeast 10, Osborne and Mendel salt mixture 4, lard 15 and cod liver oil 10. One group was fed a mixture of 90% control diet plus 10% desiccated beef thymus (all of the desiccated material was prepared by The Wilson Laboratories, Chicago) and as additional controls groups were fed a mixture of 90% control diet plus 10% of desiccated beef liver and plus desiccated beef kidney, both very nuclear tissues.

The relative influence of the addition to the diet of desiccated thymus, kidney and liver may be seen in Fig. 1 and we have confirmed this in other experiments. Both the kidney and liver material had essentially the same slightly deleterious influence on growth (see initial body weight and body length at death in Table I), while the desiccated thymus depressed the growth curve considerably more. The poor growth of the thymus-fed rats was in spite of a higher actual food intake than any of the other groups. The average food intake per rat per day for the control group was 9.0 gm., the liver

[1]Liddo, S., *Boll. Soc. ital. Biol. sper.*, 1933, **8**, 267.