oratory we have succeeded in raising animals to maturity and in keeping their offspring in apparent health by replacing the lard in Diet 11 by soybean oil. The protective factor must therefore pass to the fetus, because in its absence, the offspring are born with advanced muscular lesions.

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Effects of Synthetic Androsterone on Accessory Reproductive Organs of the Male Ground Squirrel.*

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Accessory organs of immature, non-rutting adult and castrated male ground squirrels (Citellus tridecemlineatus) have been shown to respond greatly to injections of male hormone prepared from bull testes and human male urine.[1] Synthetic androsterone,‡ reported to stimulate male accessories in castrated birds and mammals,[2-6] was administered to annual-breeding male ground squirrels in order to determine its effects on accessory reproductive organs during the season when testis hormone is released in minimal quantities, if at all, by gonads in normal males of this species.

The low state of reproductive organs in 25 normal males was evaluated by the following methods without the actual removal of tissues, in order to evade possible compensatory hypertrophy: (1) inspection of scrotal skin for pigmentation, (2) manual palpation of bulbar gland, (3) examination of epididymis and ductus deferens at exploratory laparotomy, and (4) measurement of the testis

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1 Wells, L. J., *Anat. Rec.*, 1934, **60** (Suppl.), 53; 1935, **62**, 409.

‡ Prepared from cholesterol. Kindly furnished by Drs. Ruzicka and C. C. Haskell and the CIBA Company.

2 Ruzicka, L., and Tschopp, E., *Schweiz. Med. Woch. Schr.*, 1934, **64**, 1118.

3 Callow, R. K., and Parkes, A. S., *Bioch. J.*, 1935, **29**, 1414.

4 Callow, R. K., and Deansely, R., *Bioch. J.*, 1935, **29**, 1424.

5 Korenchevsky, V., and Dennison, M., *Bioch. J.*, 1935, **29**, 1720.

6 Tschopp, E., *Klin. Woch.*, 1935, **14**, 1064.

through a peritoneal incision. Testis size, as an index of the hormonal condition of accessories, owes its reliability to the fact that the writer has considered gross and histological data (concerning testis and 6 accessory reproductive organs) for more than 250 normal males of this species killed at various stages of the sexual cycle since 1931.

Sixteen of these 25 animals were treated with androsterone, (dissolved in olive oil) while 9 were sacrificed as operated uninjected controls. Thirteen immature and 3 adult males were given from 0.5 mg. to 1.5 mg. of androsterone daily for periods ranging from 20 to 31 days, and were autopsied one day after the last injection. Sacrifice of experimental and control animals occurred during the interval from August 18th to November 6th; 84 other normal males killed between these dates since 1931 served as additional controls. Seminal vesicles, prostate gland, Cowper's glands and

TABLE I.
Gross Fresh-Weight of Accessory Organs.

		Treatment				Fresh weight in mg.			
Age	No.	Mg. daily	days	Date killed	Body wt. in gm.	Seminal vesicles	Prostate gland	Cowper's glands	Bulbar gland
Young									
	1040	0.5	20	8-18	110	6.8	3.8	6.2	30.0
	1041	0.5	20	8-18	97	11.8	4.0	8.4	32.2
	1042	1.0	20	8-18	120	8.6	3.2	8.2	41.4
	1043	1.0	20	8-18	100	13.6	4.0	8.8	23.4
	1044	1.5	20	8-18	138	11.8	4.0	16.2	35.2
	1045	1.5	20	8-18	90	16.4	6.2	20.2	44.0
	1046	Control		8-18	135	7.4	3.4	6.0	25.2
	1047	"		8-18	124	8.2	3.9	8.4	25.6
	1061	0.5	29	8-27	117	8.0	4.0	6.8	27.8
	1062	0.5	29	8-27	110	6.6	4.0	7.2	25.4
	1063	1.0	29	8-27	118	18.2	6.2	17.6	58.4
	1064	1.0	29	8-27	146	11.4	4.8	17.0	40.6
	1065	1.5	29	8-27	134	6.0	4.2	9.2	25.8
	1066	1.5	29	8-27	156	14.0	6.6	17.0	53.8
	1067	Control		8-27	100	7.0	4.0	8.2	31.8
	1068	"		8-27	157	9.0	4.2	6.0	25.8
	1082	1.5	31	11-6	190	10.0	4.6	19.1	37.0
	1081	Control		11-6	198	6.2	3.6	4.6	30.0
Adult									
	1022	0.5	29	8-27	164	35.0	22.2	35.8	177.4
	1023	1.5	29	8-27	222	52.8	30.0	69.6	194.2
	1020	Control		8-27	212	36.0	20.2	46.0	220.2
	1021	"		8-27	170	38.4	14.8	33.4	159.0
	1060	"		8-26	168	34.0	18.8	29.2	133.0
	1077	1.5	31	11-6	208	31.5	19.5	40.5	160.0
	1083	Control		11-6	250	21.0	12.6	25.6	172.8

bulbar gland of each animal were weighed while fresh; all of the above organs, together with epididymis and ductus deferens, were then fixed in Bouin's solution, sectioned at 6 micra and stained with Ehrlich's hematoxylin and eosin.

Gross weights of treated accessory organs ranged from values approximately equaling those for untreated glands to values twice as great as those for control organs (see table). In general, gross weights were largest following the higher doses and smallest after the lower doses. Stimulation was more noticeable in young males (small body-weight) than in adults.

Histological studies revealed unmistakable signs of stimulation of the epithelium of each accessory organ of treated males; however, the degree of stimulation was not great in any case. The epithelia of seminal vesicle, prostate gland, Cowper's gland, bulbar gland, epididymis and ductus deferens were measured with an ocular micrometer, and the average of 5 measurements for each organ from each of the 25 animals was recorded. Average measurements of epithelial height indicated that the magnitude of histological stimulation, in treated males, was approximately parallel to that of gross stimulation shown in the table. Other histological criteria, such as increased organization of the epithelium and increased granulation of epithelial cytoplasm, offered convincing evidence that androsterone treatments stimulated all accessory organs in each case (even though the stimulation was relatively slight).

Effects of synthetic androsterone on accessory organs in this species may be compared with effects of male hormone prepared from bull testes and male urine.[1] Quantitative comparisons can have no more than suggestive merit, since injected doses of these different substances were not identical in terms of capon units. However, the two following comparisons may be noted: (1) weight of accessory organs in males receiving male urine extract, in daily doses of 6 capon units for 30 days, was approximately the same as that in animals treated daily with 1.0 mg. to 1.5 mg. synthetic androsterone for a similar period; (2) daily injection of 6 capon units of bull testis extract, for a 29-day period, stimulated accessory organs much more than treatments with either male urine extract or synthetic androsterone for a similar period.

Lack of marked response of accessories in the ground squirrel to synthetic androsterone may be due possibly to the fact that the hormone was given in insufficient amounts; nevertheless, 1.5 mg. synthetic androsterone daily for 29 to 31 days proved effective in

stimulating the precocious formation of spermatozoa in both immature and non-rutting adult ground squirrels (4 cases).[7]

The value of the present study lies principally in the fact that synthetic androsterone proved capable of stimulating seminal vesicles, prostate gland, Cowper's glands, bulbar gland, epididymis and ductus deferens in a mammal other than those previously studied.

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An Experimental Study of Cardiopericardial Adhesions.*

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The generally accepted conclusion that pericardial adhesions play a fundamental rôle in the production of cardiac hypertrophy has been widely taught and approved.[1] Doubt was cast upon this established point of view by the many experimental operations on the heart and pericardium carried out during the past 12 years by Beck[2] and his associates. An additional reason for the study of this subject lies in the fact that the myocardium can be given a new blood supply through tissues grafted upon the heart. The Beck operation[3] involves myocardial adhesions and the rôle of adhesions needs critical study if coronary sclerosis is to be treated by this new surgical principle.

Twenty-six dogs were divided into 2 groups. In one group the pericardium alone was attached to the dome of either diaphragm.

[7] Wells, L. J., and Moore, C. R., *Anat. Rec.*, 1936 (in press).

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[1] Karsner, Howard T., *Human Pathology*, 4th ed., J. B. Lippincott Co.; Krumbhaar, E. B., Pericardial disease, in *Nelson Loose-Leaf Living Medicine*, vol. IV, p. 525; White, Paul Dudley, *Heart Disease*, Macmillan Co., 1931, p. 516.

[2] Beck, C. S., *Surg. Gynec. and Obst.*, 1935, **61**, 407; *Arch. Surg.*, 1929, **18**, 1659; *J. A. M. A.*, 1935, **104**, 714; Beck, C. S., and Griswold, R. A., *Arch. Surg.*, 1930, **21**, 1064.

[3] Beck, C. S., *Ann. Surg.*, 1935, **102**, 801; Beck, C. S., and Tichy, V. L., *Am. Heart J.*, 1935, **10**, 849; Moritz, A. R., and Beck, C. S., *Am. Heart J.*, 1935, **10**, 874.