

glands of 9 of 10 adrenalectomized rats showed more development than was found in 6 controls. In some cases, the end buds showed no enlargement, but the increased number of short lateral branches surpassed that of any mammary gland seen in these experiments.

Discussion. In some respects, these findings agree with those of Butcher¹ but differ in that they were obtained in normally fed rats. If the animals failed to gain appreciably in weight, the mammary glands did not show the specific effects of adrenalectomy. Neither did the areas of the glands from adrenalectomized rats exceed those of the controls, in contrast to the results of Butcher.¹ Estrogen stimulation superimposed on that of adrenalectomy seemed to emphasize the effect of the latter. The variation in results obtained might well be attributed to variable amounts of

functioning accessory cortical tissue known to be present. In one experimental group, in which NaCl was not given, only 2 of 5 animals showed increased lateral buds and these two gained appreciably in weight. No explanation of these mammary changes can be made at this time.

Summary. Adrenalectomy in normal or castrated immature male rats resulted in an increased number of lateral buds on the duct system of the mammary tree and in some cases increased end bud growth, particularly when body growth was not markedly inhibited. Estrogen treatment in adrenalectomized rats caused dilatation of these stimulated lateral buds or else further increased their number above that of the injected unoperated controls.

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Effect of Adrenocorticotrophic Hormone on the Insulin Content of the Rat's Pancreas.*

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In the course of investigations concerning various metabolic effects of purified anterior pituitary hormones, both lactogenic and adrenocorticotrophic hormone (ACTH) were found to increase the insulin content of the rat's pancreas.¹ The lactogenic hormone used in those studies was essentially pure while the ACTH was admittedly impure, its main contaminant being the lactogenic hormone (10 to 30%). The opinion was therefore expressed that the action of the ACTH fractions on the

pancreas might be due to their contamination with lactogenic hormone, rather than representing a function of the former hormone. Since that time purified ACTH has become available² and it has been possible to reinvestigate this problem using ACTH preparations containing less than one percent of lactogenic hormone.³

Hypophysectomized rats received the hormone preparations for 2 weeks, starting on the day following operation. The injections were given once daily, intraperitoneally; 3 injections of one-half the usual daily dose were distributed over the last 24 hours preceding autopsy, during which time all animals

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¹ Fraenkel-Conrat, H., Herring, V. V., Simpson, M. E., and Evans, H. M., *Am. J. Physiol.*, 1942, **135**, 404.

² Li, C. H., Simpson, M. E., and Evans, H. M., *Science*, 1942, **96**, 450.

³ We wish to thank Dr. C. H. Li for kindly placing at our disposal the highly purified ACTH here employed.

TABLE I.
Effect of Pituitary Hormones on Insulin Content of the Rat's Pancreas.*

Hormone administered	Pancreatic insulin, units/100 g rat		
	Individual Expts.	Average	S _D †
Adrenocorticotropic	0.90, 0.69, 0.53, 0.75, 0.63	0.70	0.064
Lactogenic	0.90, 0.58, 0.51, 0.66, 0.86	0.70	0.096
Adrenocorticotropic plus Lactogenic	0.60, 1.00, 0.93, 0.94, 0.55	0.80	0.078
None (controls)	0.50, 0.44, 0.51, 0.53, 0.50	0.50	

* Two-month-old hypophysectomized male rats (4 to 9 per group), receiving injections for 14 days once daily from the day following operation. Daily dose per rat, given in one intraperitoneal injection: 5.0, 4.0, 3.0, 3.0, 2.5 mg ACTH and/or 2.0, 2.0, 1.5, 1.5, 1.25 mg lactogenic hormone, respectively in the five experiments listed. During a 24-hour fast preceding autopsy, one-half the daily dose was administered three times.

† S_D is the standard error of the difference between means, according to:

$$S_n = \sqrt{\frac{\sum x_1^2 + \sum x_2^2 \times (N_1 + N_2)}{(N_1 - 1) + (N_2 - 1) \times N_1 N_2}}$$

were fasted. The determination of the insulin extractable from the pooled pancreas of each group of rats was carried out as in previous reports.^{1,3}

As indicated by Table I, the insulin content of the pancreas of the rats receiving ACTH (2.5 to 5 mg daily) was found consistently higher than that of the controls, the average increase being 40%. These increases were similar in magnitude to those produced by half the dose of lactogenic hormone, concurrently administered to similar rats. The increases were not as great as those previously observed after administration of a crude ACTH preparation, believed to be rich in lactogenic hormone. The possibility of a synergism between these two hormones offered itself as an explanation for this discrepancy. Groups receiving a mixture of the two hormones were therefore also included in the above experiments. No consistent synergistic

or additive action was evident in these experiments, although the highest pancreatic insulin levels observed during this study occurred in 3 groups receiving the double treatment. Statistical analysis indicated that the differences between all series of rats receiving ACTH and the controls were significant. The increases in pancreatic insulin in the groups receiving lactogenic hormone alone (at half the dose) were significant.§

Summary. Treatment with purified adrenocorticotropic hormone for 14 days has been found to increase the insulin content of the pancreas of hypophysectomized rats. The previously observed action of the lactogenic hormone has been confirmed.

§ The fact that the present series of control groups showed lower pancreatic insulin levels than had been observed in preceding years¹ may be noted, although it cannot yet be explained. It may possibly be a consequence of the use of animals which had survived several severe insulin shocks in the breeding colony. The consistency in the insulin level of the pancreas of the present control groups is remarkable.

³ Fraenkel-Conrat, H., Herring, V. V., Simpson, M. E., and Evans, H. M., *Proc. Soc. Exp. Biol. and Med.*, 1941, **48**, 333.