stage and continued during a period of over seven weeks. Embryos so radiated appear to develop normally, and limb growth and differentiation takes place in an apparently typical manner. However, if at any time during the course of the experiment a limb is amputated, it will not be regenerated; at the same time the unharmed limb on the opposite side of the embryo will continue normal development.

By means of x-radiation, regeneration can be as effectively prevented in late stages of limb development as in early stages. If an embryo, the fore limb of which is well developed into upper arm, fore arm and hand, be given daily dosages of x-rays no portion of the limb will be regenerated after amputation. This failure to regenerate under the influence of x-radiation occurs, moreover, regardless of the level at which the limb is amputated. The wound at the point of amputation heals as quickly as in normal unradiated controls, and there is a slight amount of growth at the cut end. However, there is no regeneration of the lost part such as takes place rapidly in unradiated embryos. The effect of x-radiation in preventing regeneration, therefore, appears to bear no relation to the age of the embryo, the stage of limb development, or the level at which the limb is amputated.

One of the significant results of this investigation is that x-radiation affords a method of studying experimentally the differentiation process in regeneration as compared with differentiation in normal embryonic development. It would appear that the differentiation during regeneration is in some important respect unlike the differentiation during normal development; the former is prohibited by a dosage of x-radiation that has no externally visible effect on the latter. Histological studies of non-regenerating limbs of Amblystoma embryos compared with normally regenerating limbs are now in progress.

The source of radiation for these experiments was a Coolidge medium focus tube. The factors governing the dosage of radiation were as follows: 65 kilovolts, 7 milliamperes, distance from target to embryo 25 cm., exposure from 3 to 5 minutes.

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EFFECTS ON THE GONADS OF CORTICO-ADRENAL EXTRACT[1]

AN apparent interrelationship between the adrenal cortex and the sex glands has frequently been noted by clinicians.[2,3] The fact that both tissues arise from a common mesodermal origin, and that hypertrophy of the adrenal cortex occurs in pregnancy and in sexual precocity, has strengthened this view. No adequate experimental evidence in confirmation of the hypothesis appears, however, to have been brought forward.

In an attempt to secure data relative to this possible interrelationship, immature albino rats were injected intraperitoneally with cortico-adrenal extract prepared in this laboratory according to the method of Swingle and Pfiffner.[4] This extract has been shown to contain the cortical hormone in sufficient amount to maintain adrenalectomized cats in good health for considerable periods of time, and to revive animals showing marked symptoms of adrenal insufficiency.[5] Litter mates which were used as controls were injected with corresponding amounts of normal saline solution. All animals used were of Wistar stock. They were fed on a standard meal diet.

Following one and two-week periods of treatment, the animals were killed and the gonads fixed in Bouin's solution. Identical methods of fixation, clearing and staining were employed in order that the observations might be in every way comparable. The results of the treatment are summarized in the accompanying table.

When histological preparations of the gonads were compared in all animals from the 25-day stage onward, it was observed that maturation of the experimental gonad, considerably beyond that seen in controls of the same age, had taken place. In the female this was evidenced by a greater amount of fluid within the follicles, and by increased follicular diameter. In the male, the difference was not so striking. The tubules of the experimental animals presented a more closely packed appearance, and a reduction and increased differentiation in the cells of the germinal epithelium was apparent. The general appearance was quite similar to that seen in young rats, following the injection of macerated pituitary gland.[6] The cortico-adrenal extract used, it should be mentioned, was in all cases sterile and protein free, and contained approximately 1 in 4,000,000 parts of adrenalin.

In several cases marked uterine enlargement was produced by cortico-adrenal extract injection. The

[1] Reported in brief at the meeting of the Federation of American Societies for Experimental Biology, Montreal, April 11, 1931.

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Number of animals used	Age (days)	Daily dosage	Equivalent in fresh glandular substance (grams)	Duration of period of injection	Results in experimental animals*
4	18	¼ cc	7.5	1 wk. (2)	Negative
				2 wks. (2)	"
4	20	2 cc	60.0	1 wk. (2)	"
				2 wks. (2)	"
4	25	½ cc	15.0	1 wk. (2)	"
				2 wks. (2)	"
4	32	¼ cc	7.5	1 wk. (2)	"
				2 wks. (2)	Corpora lutea present.
4	33	4 cc	120.0	1 wk. (4)	Corpora lutea present.
4	35	1 cc	30.0	1 wk. (4)	Spermatogenesis. Corpora lutea.
2	42	1 cc	30.0	1 wk. (2)	Spermatogenesis. Corpora lutea.

* Corpora lutea were present in none of the control animals. At the 42-day stage, however, a small percentage of the tubules of the controls contained a few spermatozoa.

pituitary gland also showed considerable hypertrophy in some of the youngest animals examined.

It is concluded that extracts of the adrenal cortex, which contain according to recent observations the hormone of the cortical tissues, produce precocious sexual maturity in the albino rat. The effect is most pronounced and first produced in the female.

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ANTIUREASE[1]

ANTIENZYMES, such as antirennin, antipepsin, antitrypsin, anticatalase, antiemulsin, antiamylase and others, have been described in enzyme literature, but there always has been considerable doubt of their existence. In some cases, as with anticatalase, the substance is nothing more than an inhibitor occurring naturally in animal tissues. The production of antipepsin by injecting pepsin into animals is very improbable since pepsin is rapidly destroyed at the pH of the blood.

We believed that crystalline urease would be especially suitable for the production of an antiurease in animals for the following reasons: It is extraordinarily active; it is stabilized by blood serum and it poisons animals even in small doses by converting the animal's urea to ammonium carbonate.

Urease, recrystallized from 30 per cent. alcohol and of the highest obtainable activity, was injected into young rabbits of from 2 to 2½ kilograms in weight. When given by ear vein as little as 0.3 mg caused convulsions after a few minutes and death after 1 or 2 hours. When the urease was injected intraperitoneally the rabbit was usually found dead in 10 to 12 hours. Subcutaneous injection caused death within 36 to 48 hours. It has been possible to immunize rabbits by starting with subcutaneous, or intraperitoneal injections of 0.02 to 0.04 mg and increasing the dose gradually. The amount of urease has been increased as high as 4 or 5 mg of crystalline urease at a single injection without causing any loss in weight and any visible symptoms other than slight swellings at the sites of injection. Serum from these immunized rabbits, when incubated with crystalline urease, greatly inhibits the ability of the urease to hydrolyze urea. Even as little as 0.015 cc of the immune serum has an unmistakable effect. When normal rabbits are given protective doses of immune serum intraperitoneally, they have been shown to be unaffected by twice the lethal dose of crystalline urease.

Since antiurease can be determined easily by chemical means and, unlike toxin-antitoxin, is independent of animal experimentation for its demonstration and estimation, we expect this work to lead eventually to a more complete understanding of the phenomena of immunological reactions.

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