deficiency. The adrenals of the normal guinea pig when cross sectioned and covered with 0.04% of silver nitrate became deeply stained due to the reducing action of the hexuronic acid as Szent-Gyorgyi[5] first demonstrated. It was found that the adrenals of the scorbutic animals, in marked contrast, caused no reduction and remained unstained. This seems to indicate a complete depletion of the hexuronic acid in the terminal stages of scurvy. The relationship of vitamin C to the cortical hormone is not known, but it is interesting to note that in acute cortical deficiency, a marked capillary permeability is observed,[6] while in scurvy there is presumably also an alteration in the permeability of the capillaries resulting in diffuse hemorrhages.

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Relation of X-rays to Lymphomatosis.*

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Five transmissible strains of lymphomatosis were studied. Two strains can be successfully transmitted to any stocks of mice, 3 to related mice only. Mice of stocks yielding from 50 to 100% success upon inoculation with malignant lymphocytes will be designated as susceptible, mice of a stock to which lymphomatosis could not be transmitted will be designated as resistant.

A single exposure of mice to X-rays will increase the susceptibility of the animals to transmissible lymphomatosis. The smallest quantity of X-rays that made resistant mice susceptible to lymphomatosis was about 30 r-units but this amount was effective in only 2 of 13 irradiated mice. The success of inoculations is greater after exposure to larger quantities of X-rays and is about 100% after exposure to sublethal doses (400 to 600 r). The duration of susceptibility is likewise proportional to the quantity of irradiation.

[5] Szent-Gyorgyi, A., *Biochem. J.*, 1928, **22**, 1387.

[6] Swingle, W. W., Pfiffner, J. J., Vars, H. M., Bott, P. A., Parkins, W. M., *Science*, 1933, **77**, 64.

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About one-third of the mice exposed to sublethal doses of X-rays remained susceptible for 2 or 3 months, but more than one-half of them regained resistance in from 1 to 2 months after irradiation.

A single exposure to sublethal doses of X-rays almost completely destroys the leucocytes of the blood and blood-forming organs but it does not prevent the progressive growth of malignant lymphocytes introduced before such an irradiation into the circulation of healthy mice. The inoculated mice often die of lymphomatosis before there is regeneration of the blood-forming organs that were injured by X-rays. Table I summarizes the results of 3 experiments made with one transmissible strain of lymphomatosis (Rg 10) on the effect of irradiation before and after inoculation.

TABLE I.

Mice	Moderately susceptible stock			Resistant stock		
	No. mice injected	Successful Injections No.	%	No. mice injected	Successful Injections No.	%
Non-irradiated	18	5	27.8	13	0	0
Irradiated						
before inoculation	10	8	80.0	14	12	85.7
after inoculation	16	8	50.0	18	3	16.7

Irradiation after inoculation increased the percentage of successful inoculations of mice of a resistant stock from 0 to 16.7% and of mice of a moderately susceptible stock from 27.8 to 50%. Inoculation was even more successful with mice both of a resistant and of a moderately susceptible stock (80 to 85%) when the animals were irradiated before injection.

The results of these experiments suggest that many resistant animals inactivated the malignant lymphocytes that were introduced into their circulation during the interval that elapsed between inoculation and irradiation (2 to 2½ hours).

Irradiation of mice after inoculation prolongs the duration of illness. The average length of life of 11 mice irradiated after injection was 15.8 days, that of 13 mice irradiated before injection was 11.9 days.

Similar experiments were performed with a strain (A 35) which can be successfully transmitted to almost any non-irradiated mice. In 2 experiments with this strain the average length of life after injection of 10 non-irradiated mice was 9.4 days, of 12 mice irradiated before injection 9.4 days, of 18 mice irradiated from 2½ to 24 hours after injection 13 days. Similar results were obtained in experiments made with 2 other transmissible strains.

Prolongation of the duration of illness is probably due to a

direct effect of the X-rays on the malignant lymphocytes and may be explained by assuming that some malignant lymphocytes are destroyed by irradiation, the length of life varying inversely with the dose. In most of our experiments irradiation of mice after inoculation of stock susceptible to lymphomatosis did not decrease the number of successful inoculations. In a small number of experiments a decrease of successful inoculations occurred and since the number of successful inoculations is proportional to the quantity of injected cells, it may be assumed that X-rays have destroyed some malignant lymphocytes.

The results of these experiments indicate that X-rays lower the resistance of mice to malignant lymphocytes and suggest that X-rays diminish the number of inoculated leucemic cells but seldom if ever destroy all the cells that have been introduced.

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A Secondary Bio-Electric Effect of Potassium.

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The usually large bio-electric effect of potassium salts is often ascribed to the high mobility of K^+ ion in the protoplasmic surface It sometimes appears to be more complex, however, involving the mobility effect as an initial stage, with a secondary effect due to the deeper penetration of potassium. The two steps are often fused into an almost continuous curve in *Nitella,* but are more clearly distinguished in the closely related *Chara coronata.* In the cells of this plant the initial effects of KCl and NaCl are almost identical. The P. D. across[1] the protoplasm (100 to 150 mv. outside positive) is quickly reduced 40 or 50 mv. when tap water is replaced by 0.01 M NaCl or KCl, and then remains at this level for some time. During this time the polarization response remains about as quick and as large as in tap water, so that the effective resistance is high (*e. g.,* 250,000 ohms) to small direct currents passing in either direction across the protoplasm. If an outward current be increased beyond the threshold of stimulation, or if an action current occurs spontaneously, the P. D. quickly falls to about zero. The polariza-

[1] For technique see earlier papers in the *J. Gen. Physiol.*