materials, then treated with perchloric acid(3) to dissociate nucleic acids from protein. The soluble portion of the resulting product showed an absorption spectrum very similar to that of the nucleic acids.

The carbohydrate moiety of the nucleic acid was measured by the diphenylamine reaction(4), the orcinol reaction(5), and the carbazole reaction(6). The results indicated clearly the presence of carbohydrate of the desoxypentose type, with only a trace of pentose.

The ash content of these tactoids is quite high, usually about 25% of the dry weight. Besides the alkali metals, the only cation present in appreciable concentration is aluminum. Although it has been definitely established that the aluminum rises directly from the intestine (possibly partly from the diet) and is not a procedural contaminant, its significance in the formation of the tactoid is unknown.

Summary. A nucleoprotein-rich fraction has been obtained from alkaline blends of intestinal mucosa by placing the blend in the cold with or without adjustment of the pH to 11. After several days (or weeks, if the pH is not previously adjusted), a 2-phase liquid system becomes evident. The heavier, viscous, continually contracting phase, designated here as the tactoid, generally has a composition of approximately 50% nucleoprotein, 25% fat, and 25% ash. The nucleic acid is almost entirely of the desoxypentose type. The ash contains appreciable amounts of aluminum, the significance of which in the formation of the tactoid is unknown.

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Effect of Whole-Body X-Radiation on Rat Intestine and Intestinal Nucleoprotein (19313)

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In the preceding paper, a method was described for the isolation from intestinal mucosa of a tactoid fraction which has been identified as approximately 50% nucleoprotein. The present paper describes biochemical changes in this fraction after the animals receive a lethal dose of X-rays to the whole body.

Experimental. Since, as described in the preceding paper, the process of tactoid formation is a continuing one, for quantitative measurements it is necessary to prepare the intestine solutions, draw aliquots for analysis, etc., at some regular, though arbitrary, time. To achieve this aim, all intestines of a given experiment were quickly frozen in dry ice and acetone after cleaning. All were then thawed, blended with N/10 NaOH, filtered, and placed in the cold room as nearly simultaneously as possible. When tactoid formation appeared adequate, a control sample and its corresponding sample from X-rayed animals were centrifuged in the same centrifuge load. Animals used were Maguran male rats weighing 220-290 g. X-radiation administered was 800 r to the whole body. Controls and X-rayed animals were fasted 24 or 48 hours after the irradiation and then were sacrificed.

Results. Table I indicates that 24 hours after whole body X-radiation, the weight of intestine has decreased significantly, the rela-

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TABLE I. Effect of Whole Body X-Radiation on Some Properties of Rat Intestine.

	Control	X-Rayed
Wt of 3 intestines, g	22.2 ± 1.2	20.1 ± .7 (t = 2.96)
Relative viscosity of alkaline sol. of intestines	2.69 ± .17	2.02 ± .21 (t = 4.78)
Protein content of alkaline sol. of intestines (mg/ml)	5.51 ± .68	6.81 ± .98 (t = 2.13)
% of total alkaline sol. appearing as tactoid	9.3 ± 4.3	1.8 ± .7 (t = 3.36)

Data presented are mean, average deviation from the mean, and Student's t value. Each datum represents the average of six pools of three rats each.

TABLE II. Effect of Whole Body Irradiation on Components of Rat Intestine and Intestine Tactoid Fraction.

	In tactoid, 24 hr			In whole homogenate, 48 hr		
	Control	X-Rayed		Control	X-Rayed	
Dry wt	9.02 ±2.47	3.87 ±.38	(t=3.30)	22.11 ±1.14	18.03 ±1.12	(t= 3.78)
Total N				1.70 ± .06	1.21 ± .10	(t= 6.27)
Total phosphorus	.097± .027	.040±.003	(t=3.34)	.226± .007	.144± .002	(t=10.02)
Ash	.57 ± .19	.26 ±.07	(t=2.87)			
Protein	.54 ± .33	.10 ±.02	(t=2.59)			
Fat	.96 ± .36	.66 ±.18	(t=1.49)			
Polysaccharide	.134± .052	.106±.063	(t= .56)	.356± .153	.371± .085	(t= .12)

Data are expressed as g of component per 100 g fresh intestine. Each datum represents average of 4 pools of 3 rats each.

tive viscosity of alkaline solutions of intestine has greatly decreased, and the percentage of the total alkaline solution which separates as tactoid has significantly decreased. At the same time, an apparent increase in protein content is not statistically significant.

Table II presents the effect of whole body X-radiation on certain components of the tactoid prepared from animals sacrificed 24 hours after irradiation and on these same components of the whole alkaline solution prepared from the intestines of animals sacrificed 48 hours after irradiation. It will be observed that the irradiation caused significant decreases in dry weight, total nitrogen, total phosphorus, and ash, a dubiously significant decrease in protein and no significant change in fat or polysaccharide (alcohol-precipitable carbohydrate) content.

In a separate experiment, the total phosphorus of the tactoids was fractionated, and it was found that the greatest part of the loss of phosphorus was derived from the nucleic acid fraction. These data are, of course, consonant with the concept that one effect of whole body X-radiation is the degradation of nucleic acid. In the intestine, notoriously radiosensitive, this is strikingly visible chemically, as has previously been shown by Ely and Ross(1), using ultraviolet measurements.

Summary. After 800 r of whole body irradiation to rats, a nucleoprotein-rich fraction of the intestine is diminished in amount and also in its content of total phosphorus, total nitrogen, dry weight, and ash. The greatest loss of phosphorus is derived from the nucleic acid fraction. In addition, the weight of the intestine, as well as the viscosity of its alkaline solutions, is significantly decreased after whole body irradiation. These data are interpreted as substantiation of the idea that one effect of whole body irradiation is the degradation of nucleic acid.

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