lesions with extensive keratinization. This suggests that the penetrating power of the drugs is slight.

It is known that totally unrelated compounds have actions similar to colchicine. Ludford (*3*) mentions auramine, urethane, and sodium cacodylate as producing the same effects as colchicine on injection. Podophyllin, by local application, is now shown to have the same results as colchicine.

Detailed descriptions of our clinical and pathological studies will be reported.

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X-Ray-induced Depolymerization of Thymonucleohistone and of Sodium Thymonucleate[1]

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It is well known that X-rays greatly increase mutation rates and produce chromosome breaks and aberrations, but the mechanism by which these effects are brought about is not well understood. It is assumed that excitations or ionizations produced by the X-ray quanta cause molecular disturbances or rearrangements which ultimately lead to visible chromonemal breaks or gene mutations (*2, 5*). Practically nothing is known about the very complex chain of events connecting the initial activation with the end result. It appeared that an investigation of the effects of X-rays on isolated chromosomal constituents might yield pertinent information. A study was therefore begun of the effects of X-rays on the physical properties of two important nuclear components: thymonucleohistone and the sodium salt of thymonucleic acid.

The nucleohistone used was prepared from calf thymus by the method of Mirsky and Pollister (*4*). Sodium thymonucleate was separated from the nucleohistone by saturation with sodium chloride as described by Bang (*1*) and Hammarsten (*3*). Both substances have characteristically high relative viscosities and show intense birefringence of flow. These properties serve as indexes of molecular asymmetry.

Solutions of 0.2 per cent sodium thymonucleate in water and 0.4 per cent thymonucleohistone in 1 M NaCl were irradiated. Viscosities were measured in the Ostwald type of capillary viscometer immersed in a water bath at 30 ± .05° C. Viscosities relative to the solvent for control (unrayed) samples and for rayed samples up to dosages of 120,000 r are given in Table 1. The data are presented graphically in Fig. 1.

TABLE 1
RELATIONSHIP OF X-RAY DOSAGE TO RELATIVE VISCOSITIES OF SOLUTIONS OF THYMONUCLEOHISTONE AND SODIUM THYMONUCLEATE

Dosage (r)	Relative viscosity	
	Nucleohistone	Sodium thymonucleate
0	3.47	3.97
7,500	3.27	3.50
15,000	3.10	3.13
30,000	2.72	2.26
45,000	2.54	1.99
60,000	2.21	1.61
90,000	1.79	1.25
120,000	1.74	1.15

Plotted on a semilogarithmic scale, these values give approximately straight-line curves for both nucleate and nucleohistone. However, the considerable differences in slope indicate that equal dosages cause a greater drop in viscosity of the nucleate than of the thymonucleohistone solution.

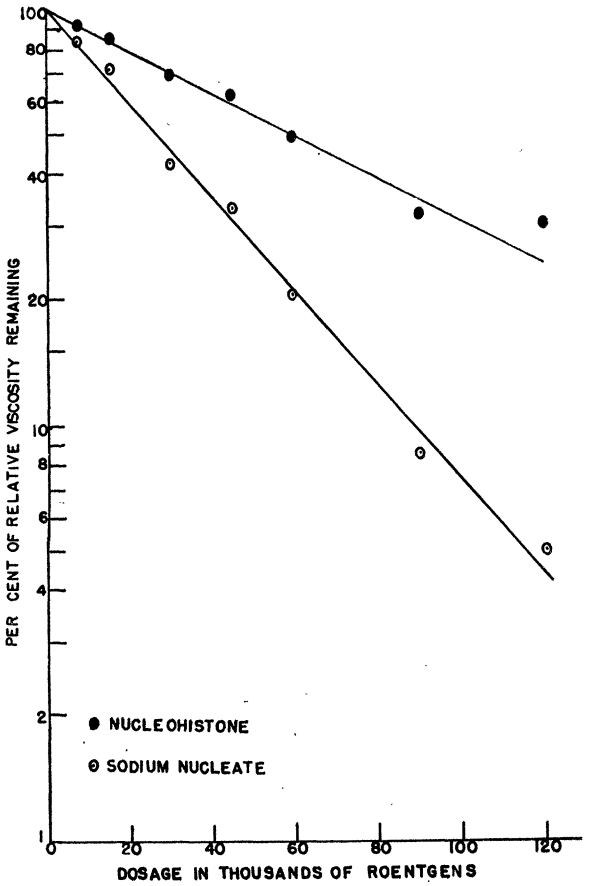

FIG. 1. Effect of X-ray dosage on relative viscosities of solutions of thymonucleohistone and sodium thymonucleate.

Streaming birefringence was present in both nucleate and nucleohistone solutions before raying. After

[1] This investigation was supported in part by a grant from the International Cancer Research Foundation.

120,000 r both solutions showed considerably less birefringence, and again the loss was much greater for the nucleate than for the nucleohistone.

Since the magnitude of relative viscosity and the intensity of flow birefringence are both indicative of the degree of molecular asymmetry, the above changes in these properties probably represent a degradation or partial depolymerization of high molecular weight particles initially present into shorter, more symmetrical chains or segments. Experiments are under way to determine the nature and extent of the breakdown and the size and weight of the degraded particles.

Similar X-ray-induced changes in the molecular configurations of the nucleic acid components of living cells can be expected. Such changes may very probably (1) represent the initial step in the production of gene mutations and chromosomal breaks and (2) be instrumental in causing a breakdown of the normal nucleic acid metabolism of the cell.

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Effect of Long Ultraviolet Radiation on the Human Eye

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The results of an investigation (*2*) which has received widespread attention (*1, 3*) indicate that visual function is deleteriously affected by radiant energy of wave lengths from 300 to 365 mμ. The investigation showed that the absolute light threshold of baby chicks was raised by prior exposure to radiant energy of wave lengths as long as 360 mμ, and it has been inferred that these results apply to human beings.

It is important, therefore, to determine whether or not ultraviolet radiation of wave lengths such as abound in sunlight penetrating the earth's atmosphere—that is, longer than 320 mμ—is harmful to the human eye. If such radiation is harmful, the almost universal wearing of sunglasses outdoors would be indicated.

The radiations from a 1,000-watt mercury arc operating at about 30 atmospheres pressure were filtered so as to remove most of the visible and almost all of the ultraviolet radiation shorter than 320 mμ. The transmission characteristics of the filter combination as determined by measurements with a Beckman spectrophotometer are shown in Fig. 1. Seven individuals, ranging in age from 22 to 38 years, fixated this filtered source at a distance of 30 cm. for five minutes with the left eye while the right was covered. The foveal light-difference sensitivity and critical flicker frequency of both eyes of these individuals had been previously determined. The testing methods employed were sufficiently sensitive to detect characteristic individual differences.

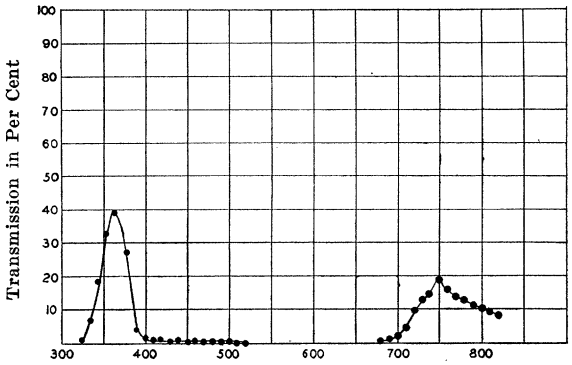

FIG. 1

The observers were tested five minutes and one hour after exposure to the arc. There was no statistically significant difference in the results between the two eyes of six observers or between the measurements of any one eye before and after irradiation. The seventh observer showed a higher light-difference sensitivity threshold in the left eye (exposed) both before and after irradiation. In this individual the irradiation produced a statistically nonsignificant improvement in the light-difference sensitivity of the left eye.

The ultraviolet energy above 320 mμ which was concentrated on the fovea in these experiments was greatly in excess of what could ordinarily be obtained in nature except, for example, by fixation of the sun, in which case eclipse blindness would result from absorption of visible and infrared radiation by the pigment epithelium.

The discrepancy between the results of the previously reported experiments on chicks and ours on human beings might be considered to be attributable, among other factors, to the use of the opticokinetic response in the dark-adapted eye as a test on chicks and the light-difference threshold on human beings. In civilian life it may be doubted whether the average individual ever reaches a comparable state of dark adaptation except possibly when asleep. The most likely cause for the discrepancy between results is, however, the marked difference in absorption and gen-