

In view of this experiment another series of rats were put on the same diet (Sherman and Pappenheimer plus 25 mg. P. per cent., in the form of secondary potassium phosphate). This addition furnishes a level of phosphorus which is still inadequate for the rat, and leads to rickets. Of the four receiving this diet all showed signs of rickets according to x-ray after 32 days. After 48 days, however, the radiographs showed healing. During this period the rats had made a total gain of 92 g. After 74 days the x-ray showed the lesions apparently healed, and the rats were killed. No gross evidences of rickets were found at necropsy. Microscopic examination of the costo-chondral junctions also showed no evidences of active rickets; the rickets was either healing or there was merely osteoporosis.

The explanation suggested for this spontaneous healing is that, with a practically stationary weight over a long period, the phosphorus requirement for the building up of new tissue is greatly reduced. The small addition of P. under such circumstances, to the standard rickets-producing diet, suffices to enable the bone to recalcify.

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A further report on the prevention of rickets in rats by light rays.

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In a previous communication we showed that the development of rickets in rats fed the standard rickets-producing diet of Sherman and Pappenheimer can be prevented by daily exposures to direct sunlight for fifteen minutes.¹ A similar result has been reported by others.² If the rats are placed in a box having flint glass windows, it was found that the sun's rays which had traversed the glass had lost their protective power. Rays which were reflected to the rats from a white surface retained some of their

¹ Hess, A. F., Unger, L. J., Pappenheimer, A. W., *PROC. SOC. EXP. BIOL. AND MED.*, 1921, xix, 8.

² Shipley, P. G., Park, E. A., Powers, G. F., McCollum, E. V., *PROC. SOC. EXP. BIOL. AND MED.*, 1921, xix, 43.

efficacy. Rickets can be prevented in rats by daily exposures of about 2 minutes to the rays of the mercury vapor quartz lamp, or by 4 minutes or less exposure, at a distance of three feet, to the rays from a carbon arc lamp. X-rays were found ineffective.

In order to test the effect of the pigment of the skin on the protective action of light, a group of white and another group of black rats (the melanic form of the Norway rat) were exposed to the radiation from the mercury lamp. In the first experiment both sets of animals were protected as the dosage was excessive. In the second experiment, when one and one-and-one-half minute exposures were employed, all the white but none of the black rats were protected. The black rats showed rickets by x-ray and by

ULTRA-VIOLET RADIATION—WHITE AND BLACK RATS.

| | Wgt. | U.-V. Ray | Diet | X-Ray | Path. | Inorg. P. Mg. per cent. |
|-----------|-------|-----------|-----------------|-------|-------|-------------------------|
| White.... | 70-70 | 1 min. | 84 ^s | Neg. | Neg. | |
| " | 58-60 | " " | " | " | " | |
| " | 60-70 | " " | " | " | " | |
| " | 60-70 | 1½ " | " | " | " | |
| " | 60-80 | " " | " | " | " | 5.45 |
| " | 64-70 | " " | " | " | " | 4.44 |
| Black.... | 50-60 | 1 " | " | R. | R. | |
| " | 50-60 | " " | " | " | " | |
| " | 60-58 | " " | " | " | " | |
| " | 50-50 | 1½ " | " | " | " | 2.92 |
| " | 48-54 | " " | " | " | " | |
| " | 60-60 | " " | " | " | " } | 3.00 |

pathological examination, and their blood contained a less percentage of inorganic phosphate. This experiment shows that pigment retards the rays which are effective in rickets, and indicates one factor in the exceptional susceptibility of negro infants to this disorder.

Prolonged exposure to direct sunlight failed to prevent or to delay the onset of scurvy in giunea-pigs.