Leaves of plants under continuous illumination often show no modification but in a considerable proportion of the species studied they have smaller, thinner blades, and often longer petioles. Leaves of monocotyledons tend to be very much lengthened as do the sinuately deeply-cleft leaves of certain Hydrophyllaceae. Reduction in leaf size is especially noticeable in certain members of the chickweed family, and this with the thin stems and greatly lengthened internodes and frequent paleness of color gives a suggestion of etiolation. But only a few species are sufficiently pale or show the leaves so much reduced as to make the similarity to etiolated plants very pronounced. The greatly lengthened internodes are, however, a practically constant feature.

Internally, the stems of plants grown under continuous light show a thinner cortex, less vascular tissue (especially phloem), and a relatively larger pith than the controls. Leaf-blades in cross-section look as if derived from plants grown in the shade, usually having a single layer of palisade and with more and larger intercellular spaces than the plants grown under ordinary greenhouse conditions. Leaf cells are smaller, hence the leaves are thinner. Roots of the plants of the experimental series show slight development of phloem but otherwise are of usual structure, except that as previously noted they are small and short and with few branches.

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A MAXIMUM POINT IN AN EFFECT OF PROLONGED X-RAY IRRADIATION UPON DROSOPHILA LARVAE

IN a previous report[1] from this laboratory certain effects of X-ray irradiation upon drosophila larvae have been presented. It was found that under the given conditions the mean duration of the prepupal period, φ, (the interval, expressed in days, between the laying of the egg and the formation of the pupa) was an increasing function of the period of irradiation, t. In the work referred to the maximum irradiation interval was six hours, which was taken as a limit to the time for subjection of the larvae to the unnatural environment as well as to the continuous operation of the X-ray tube. As has been stated, an increase of X-ray radiation power was not possible at that time. In view of these circumstances observations were made concerning the effect of radiations of longer wave length with the idea of obtaining more extensive changes. We do not assume, however, that effects of radiations of different wave length are the same. Accordingly, radiations filtered with only 3 mm of cardboard were employed, using a Coolidge air-cooled tube (tungsten target) impressed with a potential difference corresponding to a spark-gap reading (between 12.5 cm spheres) of 2.0 cm and a tube current of 8.0 M.A. with otherwise the same X-ray apparatus.

Larvae were prepared for irradiation and maintained in the same manner as in the work previously reported,[1] except that they were irradiated in wells in paraffin blocks 125 mm square by 35 mm in thickness. The wells were cylindrical (25 mm in diameter and 5 mm deep) and were situated with axis 25 mm from a corner on a diagonal of a square face of the block—one such well in each block. Just prior to irradiations approximately 200 larvae were placed in each of eight such wells and covered with perforated filter-paper permeated with paraffin as described in the earlier work.[1] Four of these blocks were then placed with wells uppermost upon the same plane with the adjacent corner at a point 30 cm vertically beneath the center of the target of the X-ray tube. Periods of irradiation were so chosen that the following scheme could be employed.

The irradiation intervals were seven successive multiples of 35 minutes up to 245 minutes; so that, with the exception of the last, they could be arranged in pairs whose sum was 245 minutes. Accordingly, with just four blocks in position at all times (as described above) it was possible by means of substitution at the proper time of the other member of each pair to complete all the irradiations within the same interval employed for the longest. The eighth block was kept in the same room but shielded from the radiations, and thus corresponded to a zero irradiation interval or control.

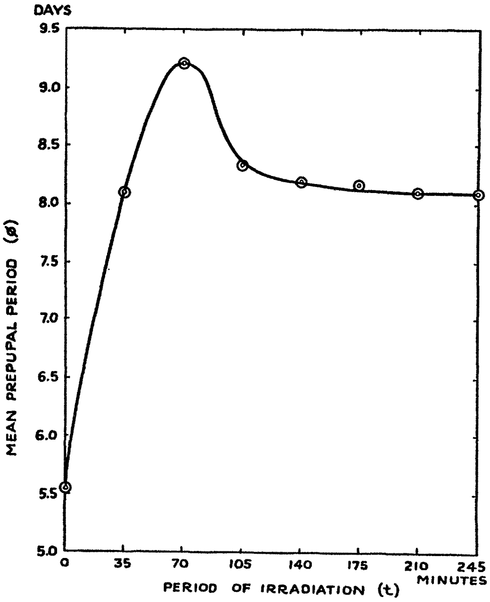

FIG. 1

[1] R. Hussey, W. R. Thompson and E. T. Calhoun, SCIENCE, 66: 65–66, 1927.

Eight independent experiments of this sort were made, the orientation of the respective blocks being successively interchanged as was also the order of irradiation of the respective pairs so that positional or such chronological difference might not influence the means of all these results. These mean values of φ together with the corresponding periods of irradiation, t, are given in the table and represented

TABLE I

t (in minutes)	φ (in days)	A.D.	t (in minutes)	φ (in days)	A.D.
0	5.55	.06	140	8.20	.07
35	8.09	.11	175	8.18	.07
70	9.24	.09	210	8.10	.08
105	8.36	.10	245	8.09	.08

graphically in the figure. In the table also is given the A.D. of each mean (the mean deviation divided by $\sqrt{8}$) which is employed as a precision measure.

The indication of a maximum point on the graph in the interval, 35 to 105 minutes, is statistically significant, and the decline followed by attainment of an almost level plateau is a surprising result. Here, too, the precision measures indicate that this is not due to mere chance.

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THE EFFECT OF SUNLIGHT ON HUMAN BLOOD CELLS

EXPERIMENTS were made to elucidate the action of sunlight on human cells under the condition of general insolation. The first experiments concerned the cells which are easiest to obtain, namely, the red blood corpuscles. The results of these experiments are described below.

It was found first that, in accord with the results obtained by Pfeiffer and Bayer, Hausman and Loewy, and Löhner, red corpuscles suspended in a salt solution exposed to direct sunlight gradually disintegrate and hemolize. This disintegration occurs, however, only if the corpuscles are illuminated by intensive sunlight (clear sky, dry air, at noon). Under such condition the first hemolysis is noticed 10 minutes after beginning of insolation. Diffuse sunlight does not produce any hemolysis. Further experiments show, however, that even diffuse light which is fifty times as weak as direct sunlight makes the corpuscles less resistant and accelerates their spontaneous hemolysis when after the illumination they are kept in the dark in a physiological salt solution. After the exposure of the suspension of corpuscles to direct sunlight their resistance against poisons and hypotony is markedly diminished. But among the rays of sunlight only visible rays decrease this resistance. If the corpuscles are exposed to direct sunlight in quartz tubes no decrease or even an increase of the resistance is observed. Special experiments showed that ultraviolet rays, if they are weak or act for a short time, increase the resistance of the corpuscles and protect them against the harmful effect of visible rays. However, strong ultra-violet rays from a mercury vapor lamp destroy the red corpuscles.

In *in vivo* experiments it was found that a total insolation of men lasting 10 minutes (December, January, in Arizona) increases the resistance of young red corpuscles and decreases the resistance of old corpuscles, the latter being more sensitive to visible light. The insolation of the same men for one hour increases the resistances of all their corpuscles very markedly, but only if the sunlight contains a sufficient amount of ultra-violet rays (clear sky). This increase of the resistance is not lasting and disappears within twenty-four hours. When the sky is partially covered by clouds and the humidity is high or when sunlight is filtered through glass plates (6 mm thick) a marked decrease of the resistance of all corpuscles is observed, and this decrease does not always disappear within twenty-four hours.

The author's experiments twenty years ago showed that the permeability of protoplasm of plant cells for water soluble substances is greater in light than in the dark. This observation was confirmed later by many scientists not only on plant but also on animal cells. We might expect, therefore, the same action of light on red corpuscles. Indeed the present experiments show that the permeability of red corpuscles for water soluble substances is increased by sunlight, and this effect is due to the visible light in this case, too. Human red corpuscles were investigated in respect of their permeability for grape sugar. It may, therefore, be assumed that the nutrition of red cells is enhanced by the action of sunlight. As the chemical and physical structure of red corpuscles is similar to that of colorless cells, the results obtained on red corpuscles can be extended to all cells of our organism, and it is likely that sunlight increases the nutrition of our organism in general.

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THE ISOLATION OF NORMAL PROPYL GUAIACOL AS A DEGRADATION PRODUCT OF LIGNIN

THE woody portions of plants, such as cobs, hulls, stalks, leaves, trunks of trees and shrubs, are composed