blackening through glass screens excludes the emission of both radioactive and visible rays. The necessary conclusion is that upon oxidation ultraviolet rays are produced.

The degree of blackening is apparently a function of the rate of oxidation for the intensity of the image from vigorous oxidation is greater than that from spontaneous oxidation within a given time. The blackening is also a function of the hydrion concentration for the intensity of the image is greater from alkaline medium than from neutral or acid media.

The experimental data further show that the oxidized substances curative of rickets when exposed to ultraviolet radiation liberate oxygen. Therefore the photochemical reaction appears to be reversible and may be expressed by the equation, Oxygen + Rickets-curing Substances $\rightleftarrows$ Oxy-Substances + Ultraviolet Rays.

These experiments point strongly to the common property of emitting ultraviolet rays, of cod liver oil, egg yolk, sperm oil, bile, hydroquinone on the one hand and of sunlight or quartz mercury vapor radiation on the other, as the basis for their identical curative action in rickets.

The experiments recorded may be applicable to physiologic phenomena in general. Not only do they suggest the mechanism common to all rickets-healing processes and imply a method to measure the therapeutic potency of the curative agents but they also disclose the fact that solar energy exerts a hitherto neglected function in the physiology of higher organisms as well as in plants.

I. NEWTON KUGELMASS
IRVINE MCQUARRIE
DEPARTMENT OF PEDIATRICS
YALE UNIVERSITY

THE EFFECT OF INTRAPANCREATIC ADMINISTRATION OF GLUCOSE ON THE BLOOD SUGAR CURVE

THE normal stimulus to the assumed insulin-producing function of the island tissue of the pancreas is as yet undemonstrated. A possible stimulus is the sugar carried to the gland by the blood. Work already published from this laboratory has paved the way for a direct attack upon the problem.[1] The curve of the change in sugar concentration during the two or three hours following the ingestion of glucose has long been used by clinicians as evidence in the diagnosis of underfunction of the insular tissue. Since the rate of absorption of ingested sugar into the blood stream can not be controlled, however, continuous intravenous injections of glucose at the rate of 0.7 gram per kilo of body weight per hour were used, and the course of the curve of blood sugar concentration was studied during the injection. Dogs were used for the experiments. The sugar was introduced into a superficial leg vein. A total of 30 to 50 blood samples was taken during an injection period of two and a half to five hours. These were analyzed in duplicate by the Schaffer-Hartman method. The blood sugar curve thus determined was of materially different form from curves following the alimentary administration of glucose. The typical alimentary curve, as is well known, rises in the first half hour, then returns to fasting level in about three hours. The curves during continuous administration by vein rose similarly but remained elevated throughout the period of injection. Twenty-two such experiments yielded only one curve that returned to the initial level. Having established the average level reached and maintained by the blood sugar curve during injection into a peripheral vein, it was sought to subject the pancreas to a higher concentration of sugar in the blood without, however, increasing the quantity injected, by introducing the sugar into an arterial channel leading to the pancreas.

The animals were anesthetized with isoamylethyl barbituric acid, a substance reported to be without disturbing effect itself upon the blood sugar level.[2] This report was verified in several experiments in which the original route of injection, into a peripheral vein, was used. In the experiments here reported glucose solution was directed into the blood stream supplying the pancreas by injecting it centrally into a collateral duodenal branch of an artery supplying the tail of the gland, or else by injecting it upstream into the splenic artery, and thus via another branch of the celiac axis into the pancreatic circulation.

Eight technically successful experiments have been performed. Four of the resulting curves were not greatly dissimilar to those obtained during injection into a leg vein. Four others, however, rose to a height either equal to or below the average level reached during peripheral injection, then fell steadily to and below the initial level, despite the continuation of the injection. In form and in duration these latter curves closely resemble those resulting from administration of the sugar by mouth. One of these showed so little elevation as to suggest the type seen after alimentary administration of fructose. These four curves are interpreted as evidence of a greater discharge of insulin than occurred in the experiments in which injection was made by peripheral vein.

Further investigations of the problem are in progress.

E. C. ALBRITTON
OHIO STATE UNIVERSITY

[1] E. C. Albritton, *Am. J. Physiol.*, 1924, in press.

[2] I. H. Page, *J. Lab. & Clin. Med.*, 1923, 9, 194–196.