that in the lattice of cellulose I. For alternative *C* this seems to hold true since the relative intensities of the three predominant reflections (101), (10$\bar{1}$) and (002) are very near the same as for cellulose I.

Attempts have also been made to utilize the other less pronounced peaks in the X-ray diffractograms in order to discriminate between the different possibilities without this leading to any substantially new arguments. Further experimental and theoretical work are in progress. A more comprehensive description of the hydrolysis and the experimental technique will be given elsewhere.

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Luminescence of Aqueous Solutions of Substances Irradiated with Ionizing Radiation in the Solid State

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If we place glucose crystals irradiated with X-rays, gamma rays or with fast neutrons over the window of a sensitive photomultiplier (EMI 9514S) we observe a luminescence. This luminescence is also exhibited by some other substances irradiated in the solid state, *e. g.* sorbitol, amylopectin, saccharose and glycine. Dry seeds of *Agrostis stolonifera* also show luminescence after irradiation with X-rays.

The luminescence disappeared completely in all substances investigated during the first hour after irradiation. However, by dissolving *e. g.* irradiated glucose in water, in air and at room temperature, a new luminescence appeared which, after the lapse of one minute from the start of the dissolution, reached a comparatively constant level. During storage for one day at room temperature the luminescence decays to half of the value observed after one minute. Non-irradiated glucose showed no luminescence when dissolved in water.

Glucose which had been irradiated and stored in air at room temperature for some months, still showed luminescence after dissolving in water. The following experiments have been carried out with glucose which was irradiated three months ago in a reactor with a fast neutron dose of 200 Mrad and a contaminating gamma dose of 200 Mrad.

The water solution of this sugar had a pH of 3, 0.2 mole of acid ($pK_a = 4.2$) had been formed from one mole of glucose. The intensity of luminescence — *i. e.* the number of pulses recorded by a scaler (Ecko N530) — was a function of the pH of the solution. After alkalinization with 0.1 N NaOH the intensity of luminescence increased twentyfold. The luminescence of a solution of non-irradiated glucose was negligible on alkalinization. The absorption spectrum of the acid (pH 3) and the alkaline (pH 12) solution of irradiated glucose showed an absorption peak at 265 mμ, probably due to the presence of dihydroxyacetone [1]. The alkaline solution exhibited a stronger light absorption, thus excluding the possibility of the increase of the luminescence intensity of the alkaline solution being due to a decrease of the light absorption.

The luminescence intensity in aqueous alkaline solutions is directly proportional to the amount of irradiated glucose dissolved and also directly proportional to the radiation dose. This experiment has been performed with ^{60}Co gamma irradiated glucose at different dose levels between 60 and 170 Mrad. It should be noted here that irradiation of crystalline glucose with fast neutrons produced five to seven times more luminescence after dissolving in alkaline solution than irradiation with the same dose of gamma rays from ^{60}Co.

The addition of hydrogen peroxide, benzoylperoxide or dioxan containing hydroperoxides to the alkaline aqueous solution of irradiated glucose increases the luminescence intensity about tenfold. The luminescence of non-irradiated glucose in this system was negligible. Burnt glucose, however, also exhibited a strong luminescence in this system. On addition of trace amounts of Fe^{++} or Cu^{++} to the peroxide-irradiated glucose system at pH 3, the

intensity of the chemiluminescence increases even more [2]. With our present photomultipier assembly it was not possible to obtain a time dependency curve of this reaction.

In order to elucidate this catalytic effect of irradiated glucose on the decomposition of hydrogen peroxide, and organic peroxides and hydroperoxides, we tested some compounds which possibly arise by the action of ionizing radiation on glucose [1]. The relative luminescence intensities of the non-irradiated substances investigated in the alkaline hydrogen peroxide system were: glucose 0, glyceraldehyde 100, dihydroxyacetone 7, arabinose 0, glucuronic acid 1. From these data it can be tentatively concluded that glyceraldehyde may possibly be one of the substances responsible for the luminescence of irradiated glucose. This hypothesis is strengthened by the fact that non-irradiated glyceraldehyde exhibits a strong luminescence in aqueous alkaline solution without added peroxide.

Infrared spectroscopy showed that the irradiation induced carboxyl groups already in the solid glucose, while carbonyl groups are not formed until the irradiated glucose reacts with water.

By means of electron spin resonance, it has been shown that long-lived free radicals are induced by X-rays in different substances and in living material [3-5 and quoted literature]. It has been strongly indicated — that at least part of the biological radiation effects are produced *via* free radicals. A portion of the radiation damage in dry plant seeds is latent and can be modified during storage by, *e. g.*, temperature and oxygen. However, when the water content of the seeds rises, *e. g.* during germination, the damage becomes manifest, (*cf.* discussion) [7].

The observations described in this communication may give a method by which we hope to be able to elucidate the role played by water and oxygen in radiobiological processes. The phenomena studied in this communication are also relevant in the discussion concerning the radiation preservation of foodstuffs and the possible mutagenicity of these. It is worthwhile in this connection to mention that mutations have been observed when biologic material — barley and wheat seeds — is treated with the aqueous solutions of irradiated substances, *e. g.* glucose, glycine [8], agar [9].

The investigations are being continued on a quantitative and qualitative basis, including emission spectroscopy during and after irradiation with ionizing radiation.

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Use of Butyl Acetate in Determination of Sialic Acid

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Determination of sialic acid can be performed with several reactions: the Bial [1,2], direct Ehrlich [3], tryptophane-perchloric acid [4], diphenylamine [5,6] and sulphuric acid — acetic acid [7] reactions. Orcinol used in Bial's reaction has been replaced by resorcinol [8]. In all orcinol and resorcinol reactions presented in the literature the colour is extracted by amyl alcohol. This solvent extracts very effectively the developed pigments, but its disadvantages are the long procedure of purification, the necessity of centrifugation after extraction, and especially its ability to extract also the false pigments produced by other carbohydrates. Ion exchange resins and dichromatic readings are used to eliminate