the rate of Western equine encephalitis virus growth in tissue culture was greatest during maximal oxygen consumption by the host cells. Magill and Francis (7) found that influenza virus in tissue culture did not multiply under anaerobic conditions. The data reported here show that the rate of proliferation of influenza virus is low in the intact hypoxic animal as compared with the normally oxygenated one. Further studies are being done on possible mechanisms involved in this response.

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Assay of Uranium-bearing Ores by Fission Analysis[1]

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The common methods of assaying uranium ore by physical means require a knowledge of the equilibrium condition of the sample, since an error may be introduced because of the partial or complete absence of some of the daughter elements in the radioactive series. An error may also be introduced by radiation caused by thorium or potassium.

The possibility of assaying uranium ore by measuring the fissionable content with neutron-induced fissions was investigated by using a 50 mc Ra-Be neutron source[2] and standard alpha scintillation detection equipment. It was assumed that the fission particles, because of their greater energy, could be distinguished from α-particles by counting only scintillation pulses of large amplitude. In this way a direct indication of the U^{235} content of the ores could be obtained. Although the method was found to be too complicated for routine analysis, it seems worth while to record some of the results obtained.

Observations on the unknown ore samples were carried out with the following arrangement. Neutrons from the Ra-Be source were slowed down by a 3″ wall of paraffin and impinged on the sample, which was mounted directly below the photocathode of a 931A photomultiplier. The only one of several methods of preparing the sample which proved satisfactory consisted of mixing a 50-mg sample of ore containing about 40% uranium oxide with an equal amount of Patterson D phosphor. The mixture was spread as a thin uniform layer on a microscope slide and mixed with a binder of amyl acetate.

The zinc sulphide phosphor is relatively insensitive to β- and γ-radiation, so that the background count above which the fission products had to be detected was due mainly to the α-particles emitted by all the uranium daughter elements in the course of their natural decay. The contribution to the total background due to the phototube dark current and to γ-sensitivity was found to be negligible. It was important to allow a sufficiently long period for the phosphor to reach a steady state after exposure to daylight. The main difficulty in evaluating measurements of this type arose from the fact that the pulse amplitude distribution from the α-particles and fission pulses turned out to be much alike, and that the fission pulse counting rate was rather low because of the weak neutron source used.

Fig. 1 shows the counting rate observed with and without exposure to the neutron source, and with and without a sample. The curves indicate that the change in counting rate observed as a result of fission detection is more pronounced at higher discriminator settings. This difference, though significant and measurable, is rather small considering the high uranium content of the sample.

Some observations were also carried out to check the time dependence of the fission counts, and these results are summarized in Fig. 2, which shows the pulse distribution for various times of irradiation relative to the α-pulse distribution. There was a grad-

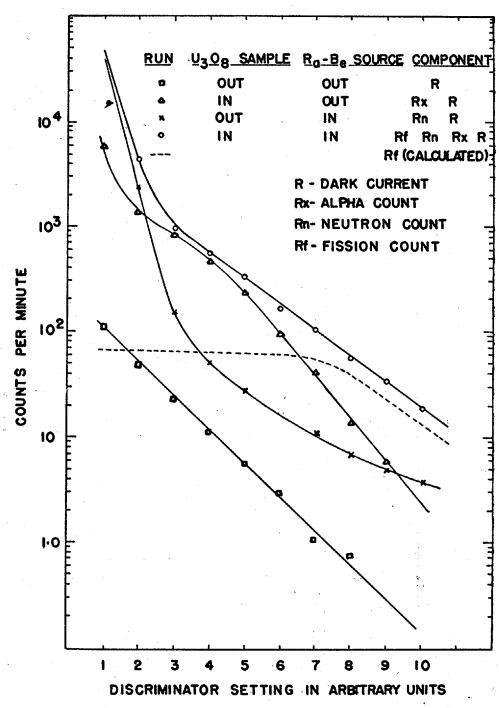

FIG. 1. Scintillation response from uranium-bearing mixture as a result of exposure to the neutron source.

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[2] The loan of the neutron source by the Eldorado Mining and Refining (1944) Ltd., is gratefully acknowledged.

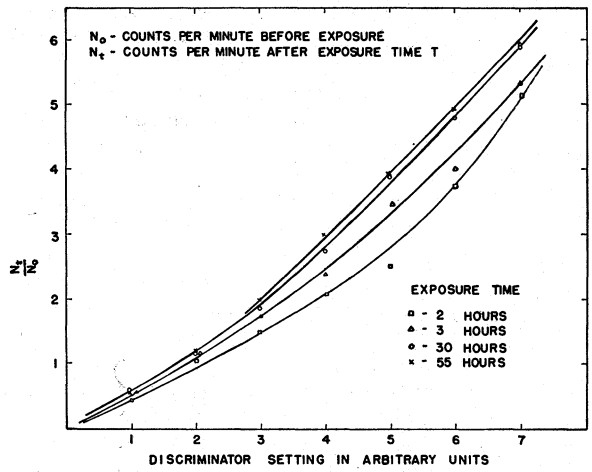

FIG. 2. Differential pulse amplitude distribution and the effect of exposure time on the relative counting rate.

ual increase in activity during the first 24 hr, after which little further increase in activity could be detected. This increase probably represents the gradual approach to equilibrium conditions among the fission products and is due to the extra pulses produced by the recoil of these nuclei and to a lesser extent to the more energetic β-particles associated with them. Similar measurements were carried out with 10% and 1% U_3O_8 samples. For a 10% sample only a small increase in counting rate was observed, whereas no effect was observed for the 1% sample. It appears, therefore, that some useful information concerning the distribution of fission pulses might be obtained by this method, particularly with a stronger source and a more sensitive photomultiplier; for assay purposes, determination of the natural decay radiation is more accurate and convenient.

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Evidence for the Occurrence of Intermediates during Mutation[1]

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A great deal of experimental evidence has been published which demonstrates that environmental factors such as temperature, gas tension, and infrared irradiation can greatly alter the effectiveness of various mutagenic agents (*1, 2*). Much of this evidence suggests that the action of x-ray and ultraviolet radiation on genes and chromosomes is indirect rather than direct and that chemical mutagens are the immediate agents of mutation. Whether the delayed effects of x-ray and ultraviolet radiation depend upon some photochemical product which is produced in the cytoplasm or whether they are due to a slow stabilization of structural alterations in the chromosome induced at the time of irradiation cannot be determined conclusively by supplementary treatments. Previous results concerning the effect of pressure on the mutations induced by nitrogen mustard clearly established the fact that chemical alterations that lead to gene changes are freely reversible for a considerable time after the removal of the mutagenic agent (*3*). These results suggest that a transitory, semiactivated complex is formed which finally decomposes either to the original state or to a new, mutated state. Decomposition to a mutant state apparently proceeds with an increase in volume, since pressure can prevent its occurrence. The results set forth in the present communication also suggest that intermediate activated states are formed by the action of radiation and that it is these activated states that are affected by the supplementary treatments. From the effects of temperature and pressure one must conclude, therefore, that all molecular alterations involved in a change to a mutated form do not necessarily occur simultaneously with the absorption of the radiant energy and that a latent period exists which is affected by temperature or pressure. Swanson and Yost (*4*) have recently published experiments which demonstrate that a similar interpretation can be applied to the effects of infrared irradiation. A theoretical treatment of the subject has been published by McElroy and Swanson (*5*).

A microconidial strain of *Neurospora crassa* (*6*) was used to study the effect of pressure on the mutation rate after exposure to ultraviolet irradiation. Five-day-old conidia were suspended in sterile water and filtered through cotton pads in order to remove mycelial fragments. Samples of the suspension (containing an average of 5×10^6 spores/ml) were placed in a quartz flask, and the latter was attached to a low-speed motor at a distance of 24″ below a Westinghouse sterilamp. During irradiation the suspension was continuously rotated. Immediately after irradiation a sample of the suspension was placed in a sterile rubber balloon, which was then inserted into a pressure bomb, in which the hydrostatic pressure was raised as rapidly as possible to 10,000 psi. From 1 to 2 min always elapsed between the termination of irradiation and the application of pressure. Part of the irradiated suspensions was kept at atmospheric pressure in the sterile quartz flask until the termination of the pressure treatment, which was always for 30 min. At the end of this time both control and pressure-treated suspensions were plated by serial dilution onto a complete medium containing 1.5% *l*-sorbose. After 3–4 days single isolates were transferred to complete slants without sorbose and subsequently scored for morphological mutations. In some experiments the transfers were made to large tubes (16 × 150 mm) containing the complete medium, whereas in others the transfers were made to small tubes (10 × 75 mm). The rate of morphological mutations appears to be somewhat lower on the latter

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