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BANCROFT/UCARC ID NO.	Q2MC 116581/300
CARTON NO.	6
FOLDER NAME	6.12 TY Correspond. 1950
NOTES	P. 12
FOUND BY/DATE FOUND	K. Holmes 1/25/95

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UNIVERSITY OF CALIFORNIA

DIVISION OF MEDICAL PHYSICS
DONNER LABORATORY
BERKELEY 4, CALIFORNIA

May 3, 1950

Dr. John Lawrence

Dear John:

I wish to supplement our telephone conversation. In our cyclotron work we have irradiated rats with fast deuterons in several regions of the body particularly abdominal and chest irradiations. This work has been done with Victor Bond, of Hunters Point Radiological Laboratory. So far our data indicates that the abdomen is more sensitive than the chest region (which was known before) and that within the abdomen the volume of tissue irradiated is the important factor. Where there is more volume less dose is required for the lethal effect. Also in the 75% of the rats which survived for three months after irradiation, several swollen parts of the intestinal loops were noted. These appeared to be the result of ulceration and infection of the intestinal wall with subsequent healing. There is a small chance that some of them might represent neoplastic growth.

The activation analysis work is proceeding, and we will receive a new sample from Hanford within a week. These are human blood samples and we hope to obtain quantitative data, particularly on the Co, Zn, and Fe, and possibly Cu components. The irradiation of micro-organisms with the cyclotron is going very well. In addition to the yeast cells we are working with Lowry Dobson's E. coli as well. I shall represent most of our yeast work at the Oberlin Conference. The basic result is that the lethal effect on the yeast cells appears to depend on producing an effect on one of approximately 16 parts of the chromosomes and that we now have a fairly straight-forward theory that would explain the dependence of the total effect of haploid and diploid yeast on the specific ionization. The linear accelerator is being equipped so that the specific ionization data may be studied in much more detail and also high dose rates up to 1 million r/minute might be available. For the moment we couldn't very well handle the tradescantia cells of Giles because we are swamped and during my trip to Europe we will probably not have any runs. In August, however, this work will be taken up again.

We have studied the multiple hit theory proposed by Opatowski and found the mathematical discrepancy in it. This more or less seems to make it lose validity. Our scintillation counter gives for Fe⁵⁹ 25% as many gamma ray counts as the best beta counts ever reached. Because the preparation of beta samples is a cumbersome process, the actual Fe turnover results have at least

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Dr. J. H. Lawrence

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three times better statistical accuracy than the beta particle results. Rex Huff just told me that the Fe counts on human plasma are now so sensitive that he can detect an effect on the plasma iron concentration before and after meals. The anthracene crystal is the best but we also can use stilbene which is easier to prepare. The directional gamma ray counter for external use on patients is finished and for iron gamma rays it gives between 10 and 15 times as many counts as old type GM counters would have.

Sincerely yours,

Toby
Cornelius A. Tobias

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I would be interested in knowing what work is being carried out at Cambridge with yeast.

Toby.