

Alexander Hollaender

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By Alexander Hollaender

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To E. J. Murphy

E. J. Murphy

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Human Studies Project

58

OAK RIDGE NATIONAL LABORATORY

To: Dr. E. J. Murphy

Date: May 24, 1949

From: Alexander Hollaender - Biology Division

Subject: Oak Ridge National Laboratory Atomic Weapons Test in 1951.

*46
Proposed Problems for 1951 Atomic Test.*

Start here -

~~The little~~ information is given in your memorandum in regard to the type of test which is planned. Will this be an airburst, waterburst, or the use of a weapon distributing material in small particles? In each case, we would need a somewhat different type of approach for our investigations. ~~In any case~~ we are very much interested in taking advantage of this opportunity to investigate the effect of a burst of intense ionizing radiation as well as ionizing radiation combined with ultraviolet and extreme intense infrared. *The focus is a good estimate of the problems of immediate interest to us.* We would like to investigate:

Emphasis heading

→ (1) The effects of radiation on mutation production in Aspergillus terreus. *Mr. Stapleton is making* a comparative study of the efficiency of different types of radiations on inactivation as well as mutation production. Several hundred vials could be prepared with large numbers of fungous spores which could be placed at different locations. This could be extended to the covering of these vials with different types of material which would absorb the infrared and different types of ionizing radiation differentially. These spores could be prepared on the spot and shipped back to Oak Ridge by air for further study. Facilities for sterile work would be necessary.

→ (2) ~~Dr. Giles suggests~~ Tests on the production of biochemical mutants in Neurospora. (a) Tests could be made for mutations from wild types to biochemical mutants by exposing microconidia (dry, in tubes or packets) and making subsequent crosses to wild type for mutant extraction. Presumably, we would transport conidia back to the laboratory at E. to make tests; controls would need to be sent out and returned untreated. (b) Tests for reversions and reverse mutations at selected loci could be made using microconidial strains as above; data would be only semiquantitative, but should be of considerable interest because of the possibility of following individual gene effects. (c) Quantitative data on reverse mutation could be obtained with microconidial stocks; however, exposures would be more difficult and would require immediate testing for mutations. This would necessitate the usual facilities for sterile techniques with microorganisms (an autoclave, glassware, transfer room, constant temperature oven, ~250 C, etc.

→ (3) ~~Dr. Conger suggests~~ Tests on the effect of bomb irradiation on Tradescantia chromosomes. This could demonstrate whether biological

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effects are predominantly from γ rays or from heavy particles (neutrons); approximate radiation levels to be tested ($\sim 20 - 600r$ X-ray equivalent effect). In the method to be used, plants would be placed at various distances from center and collected within 22-24 hours if possible, otherwise 4-5 days; simultaneous exposures would be made of control plants to a burst of X or γ rays, rate $> 200r$ /minute; examinations of chromatid and chromosome aberrations would follow. We would need facilities for keeping plants in good condition until they could be placed on ships as well as in different locations on islands. The material needed would include a small laboratory space, equipped with a microscope and the usual glassware for microscopic work. This is one of the most promising approaches to study of radiation effects. We would like to use as many as several hundred plants in pots. Also inflorescences could be put in vials in different locations. However, the latter would have to be made available for analysis a few hours after the blast.

(4) ~~Dr. Doherty suggests an~~ ^F experiment on the effects of bomb blast on enzymes in vitro and in vivo. ~~We are~~ ^{We are} not certain whether such extensive experimental equipment could be made available on the island. (Is there any change that a Navy vessel would be available on which to set up a laboratory?) ~~His~~ ^{The} proposed experiment would be concerned with prompt isolation of enzyme systems from irradiated animals and determination of activity changes. Purified enzyme systems in vitro would be exposed and the effects determined at once. The following items of large equipment would be necessary for the isolation and determination of enzyme systems at the site:

- 1 cold room 0-5° C equipped with electricity and vacuum *facilities*
- 1 International refrigerated centrifuge, type 2, with assorted heads
- 1 Beckmann pH meter
- 1 Cenco Meg vac pump
- 1 constant temperature bath 25-40° C
- 1 circular Warburg
- 1 analytical balance
- 1 Beckmann quartz spectrophotometer
- 1 balance - to weigh 5 kg

An assortment of laboratory glassware in all sizes would also be necessary.

Alexander Hollaender
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AH:m

cc: J. Z. Bowers, AEC, Washington (Cy 2)
A. Hollaender, (cy 3, 4, 5, 6)

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