Meetings

Repair and Differential Radiosensitivity

Chromosomal breakage and rejoining processes, repair or recovery of potential mutational or lethal damage, dose rate and fractionation effects, and stage sensitivity were the chief subjects of discussion at the symposium on "Repair from Genetic Radiation Damage and Differential Radiosensitivity of Germ Cells" which was held at Leiden, The Netherlands, 15 to 19 August 1962, under the auspices of the Department of Radiation Genetics of the State University of Leiden.

Dealing with various problems in the production of chromosome aberrations, papers by S. Wolff, D. R. Parker, H. J. Evans, and A. T. Natarajan emphasized the importance of the proximity of chromosomes and chromosome parts in determining dose kinetics and stage sensitivity. Wolff pointed out how the concept of a limited number of sites at which the chromosomes could be close enough for rejoining can account for much of the data represented by dose curves, Parker showed how the limited site concept can explain the changes in sensitivity and in kinds of aberrations during oögenesis in *Drosophila*. Evans discussed the role of variations in site number, oxygen tension, and concentration of free thiols in the sensitivity changes during the cell cycle. Natarajan discussed several factors controlling aberration production in seeds, among them postirradiation temperature.

Recent developments in the study of postirradiation repair of premutational damage were summarized in a series of papers on coliphage (W. Harm), *Escherichia coli* (C. O. Doudney and E. M. Witkin), *Paramecium* (R. F. Kimball), and *Drosophila* (F. H. Sobels). Included were the demonstration of gene-controlled repair in phage and bacteria (Harm), the analysis in bacteria of the biochemical processes involved in repair or removal of premutational damage and in its fixation or incorporation as mutation (Doudney, Witkin), the relation between the rates of repair of two classes of chromosomal lesions in *Paramecium* and the role of these two classes in differential sensitivity during the life cycle of the cell (Kimball), and the demonstration of some of the properties of repair of premutational damage during various stages of spermato-

genesis in *Drosophila* (Sobels). Harm discussed repair of lesions by enzymes and the idea that repair, to be effective, must occur before DNA synthesis; this is becoming an increasingly attractive explanation for the various findings with *Escherichia, Paramecium,* and *Drosophila.*

The influence of dose rate and dose fractionation on mutation induction by ionizing radiation was discussed for the mouse (W. L. Russell), silkworm (Y. Tazima and S. Kondo), and *Drosophila* (H. J. Muller, I. I. Oster and S. Zimmering, and C. E. Purdom). The existence of dose rate and fractionation effects is now well established for the mouse and the silkworm but the data for *Drosophila* are still equivocal. Some of the effects in the mouse and silkworm can be explained best by hypotheses involving repair of premutational damage. Other effects require hypotheses postulating some form of selection, such as differential cell killing.

Concerning the changes in sensitivity during gametogenesis and early cleavage stages, a number of striking parallels are found between diverse organisms. A rather full description was given by R. C. von Borstel and W. St. Amand of the changes in sensitivity from early oögenesis to early cleavage in *Habrobracon.* F. E. Würgler studied in detail the changes in sensitivity of *Drosophila* eggs during the first few cleavages. The *Habrobracon* and *Drosophila* studies agree in showing a peak of sensitivity just after meiosis in fertilized eggs and a periodic rise and fall in sensitivity corresponding to the first few cleavage mitoses.

The sensitivity of sperm and of various stages of spermatogenesis in *Drosophila* were discussed. R. Sävhagen summarized her work on the variation of sensitivity to induction of various types of genetic effects during spermatogenesis. J. Mossige considered in some detail the factors responsible for the difference in sensitivity between various batches of mature sperm. H. Traut analyzed the basis for variation in the form of the dose curves for recessive lethals in sperm of different origins. D. L. Lindsley pointed out the relations between the chromosome constitution of the sperm and its sensitivity to inactivation by radiation. B. P. Kaufman and H. Gay discussed electron microscopical and cytochemical studies of spermatogenesis.

Work by L. B. Russell on the sensitivity of various stages in gametogenesis and in the early development of the mouse zygote is now extensive enough to allow a number of comparisons with the studies on *Drosophila* and *Habrobracon.* These comparisons result in several striking parallels. G. E. Magni discussed the major changes in sensitivity that occur during meiosis in yeast and compared the sensitivity of mitosis and meiosis in this organism, both in regard to spontaneous and radiation-induced mutation.

The symposium was organized by F. H. Sobels who assembled a group of approximately 100 major investigators in the field. There were six half-day sessions and an evening session with a total of 24 invited papers. There was adequate time for discussion, and the discussion was lively. The conference was well organized and succeeded admirably in its purpose of defining the present status of research in this general area in the presence of most of the active workers. The invited papers and recorded discussion will be published by Pergamon Press.

Important advances have been made in understanding the mechanisms by which the initial radiation damage to the chromosomes is converted to chromosome aberrations or mutations, and it is becoming possible to apply this knowledge to interpreting variations in radiation sensitivity. The existence of dose rate and dose fractionation effects in the induction of specific locus mutations can no longer be doubted for either the mouse or the silkworm although the situation remains equivocal for *Drosophila.* Work in this area is turning now to analyses of the reasons for these effects. Many data have been accumulated on variations in radiation sensitivity during gametogenesis in various organisms, and some striking similarities have been found between quite diverse organisms. Though a number of more or less plausible explanations have been offered for the variations in sensitivity, general agreement has not yet been reached; the major advances in this area have been more descriptive than analytical.

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Forthcoming Events

January

23–26. American Assoc. of **Physics Teachers**, New York, N.Y. (R. P. Winch, Williams College, Williamstown, Mass.)

23–26. American Group **Psychotherapy**