

wabara (Hokkaido University) described the photoinduced reactions of allylic radicals in gamma-irradiated polyethylene. Alkyl radicals are regenerated by the ultraviolet irradiation of allylic radicals at 77°K, but with light of longer wavelengths scission of the main chain is also reported to occur.

This conference was organized under the auspices of the United States-Japan Cooperative Science Program and was supported by the National Science Foundation and the Japan Society for the Promotion of Science. Professor J. Sohma (Hokkaido University) was the Japanese coordinator.

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References

1. W. S. Dennis, E. Durbin, Jr., W. A. Fitzsimmons, O. Heybey, G. K. Walters, *Phys. Rev. Lett.* **23**, 1083 (1969).
2. M. J. Bronskill, R. K. Wolff, J. W. Hunt, *J. Phys. Chem.* **73**, 1175 (1969).
3. J. Jortner, *Radiat. Res. Suppl.* **4**, 24 (1964).
4. M. Natori and T. Watanabe, *J. Phys. Soc. Jap.* **21**, 1573 (1966).

Gene Regulation in Mammalian Cells

Problems of differentiation and gene regulation in mammalian cells formed the subject matter of the most recent Basel Colloquium, 31 March to 2 April 1969. This was the fifth in a series of meetings taking place every 2 years and devoted to different topics of genetics.

Based on existing knowledge of relations between DNA and proteins, of cell metabolism, and of subcellular structure details, the discussions were focused on conceptual and experimental aspects of gene regulation in mammalian cells. The realization of a close relationship between mechanisms of gene regulation in mammalian cell differentiation and in immune expression provided a thread of continuity for the various sessions.

Whitehouse, in his discussion of possible mechanisms of regulation in mammalian cells, proposed the application of the concept of the "master-slave" gene organization of chromosomes in the control of immunoglobulins. One single gene (the master) is assumed to control the constant part of the myeloma protein molecule, and five alternating genes (the slaves) would control the variable parts of the molecule. Whitehouse also emphasized

the role of the nonhistone, that is, acidic proteins. Their specificity in the unmasking of organ-specific DNA is particularly interesting in view of the acidic protein nature of the specific repressor substance in *Escherichia coli* and bacteriophage. In discussing polytene chromosomes, W. Beerman reported the attachment of acidic proteins as the first event in the puffing phenomenon, preceding RNA synthesis.

Gene amplification and its role in regulation was discussed by several speakers. The DNA body found in oögonia and oocytes of *Acheta*, which is indistinguishable from heterochromatin and appears in electron microscope pictures to resemble synaptonemal complexes, was discussed by Lima-de-Faria in its relation to gene amplification in the nucleolar organizing region. An interesting suggestion of Whitehouse refers to the multiplicity of regulatory functions residing in heterochromatin and the possible absence of crossing over in regulatory genes; if the amplified genome is indeed endowed with regulatory function, crossing over may not be expected to occur in it.

The necessity of distinguishing between the concepts of gene redundancy and gene amplification became apparent in the course of discussions. Redundancy as a constant phenomenon of the genome and defined as the continuous existence of a large number of repeats next to each other must be distinguished from the transitory selective multiplication of genes described as amplification. Giacomoni reported redundancy of ribosomal RNA genes in hamster cells, and Motulsky in his discussion called attention to the interesting findings of Schroeder of multiple hemoglobin γ -chain genes in man.

Mechanisms of inactivation of the mammalian X chromosomes were discussed, among others, by Klinger, Catnach, Fraccaro and Gianelli; the last-mentioned reported an interesting distortion of the expected random distribution of inactivation of parental X chromosomes in the mule. In spite of the indisputable evidence for the existence of X inactivation, its mechanism remains unclear. In this connection, the report by Klinger of the effect of cell density on the frequency of cells with sex chromatin bodies appears most significant.

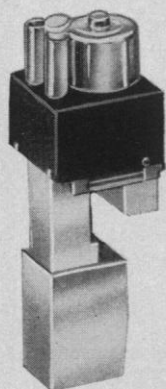
Discussion by B. Ephrussi served to delineate the potentialities as well as the limitations of somatic cell genetic analysis. He dealt with two aspects of

such studies, "karyotype" and "epigenotype," the latter encompassing problems of embryonic differentiation. Ephrussi proposed a division into "household" and "luxury" functions subject to different regulatory mechanisms. He referred to the mutual exclusion of luxury functions in differentiation, a principle which was taken up again later in discussions of immune expression. Further questions raised by Ephrussi concerned concepts of repression and of dedifferentiation, and he proposed a scheme of gene regulation which possibly could be tested experimentally. The emphasis on problems and questions rather than on existing data and answers lent special significance to this talk, which ended with an appeal for the isolation of more mutations in the mouse having relevant effects; these would serve as tools for the analysis of regulatory mechanisms in differentiation.

The early activation of ribosomal RNA genes in the mouse was reported by Monesi. Cell hybridization studies formed the subject of several papers, among them one by Siniscalco and Klinger demonstrating intergenic complementation of two X-linked genes. The problem of somatic segregation was discussed by C. E. Ford, G. Martin, and S. Ohno. The close relation between problems of cell differentiation and of immunology became particularly apparent in Cepellini's talk about the regulation of immunoglobulin genes. Concepts of dosage compensation, of allelic and nonallelic exclusion, and of functional haploidy, particularly in plasma cells, were included in this discussion, as well as possible mechanisms of repression and derepression. Finally, Cepellini challenged the one-gene:one-polypeptide dogma, proposing a new definition of the gene in accord with the possible control of one polypeptide by more than one gene.

The regulation of gene expression in single cells formed the subject of the discussion by Pernis who stressed the evidence for allelic exclusion in the case of immune substances produced by plasma cells. Seegmiller and Danes respectively dealt with problems of regulation of metabolic pathways in several uric acid anomalies and in cystic fibrosis of the pancreas. Gartler reported studies in which X-linked glucose-6-phosphate dehydrogenase variants served as tools for developmental analysis of morphological structures such as hair roots in the skin. This

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year's meeting received partial support from The Population Council as well as from various commercial sources. It was organized, as before, by H. P. Klinger. Approximately 50 people attended. The participants thank Professor G. Stalder, medical director of Children's Hospital, who served as host, and the City Council of Basel for hospitality. There are no printed proceedings.

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Calorimetry

Calorimetric techniques and their applications were discussed at the 24th Calorimetry Conference, held at the Wentworth-by-the-Sea near Portsmouth, New Hampshire, 14-16 October 1969.

The Huffman Memorial Lecture is a feature of the conference and is presented by a man selected on the basis of excellence in thermochemistry and thermodynamics. In 1969 the address was given by Ward N. Hubbard (Argonne National Laboratory), leader of a group engaged in fluorine combustion calorimetry. Hubbard summarized the heat of formation data obtained for some 30 fluorides by direct combustion of the elements in fluorine; he discussed the periodicity of derived bond energies when plotted against atomic number of the central atom. The plot also served to indicate where additional data are needed.

Reports were made on measurements of specific heat at low temperatures and their interpretation in terms of phenomena such as phase transformations in alloys and organic compounds, magnetic ordering in ferrous molybdate and tungstate, antiferromagnetism of DyPO_4 , and molecular motion in clathrates and polymers. The effect of isolated heavy impurity atoms in a light host lattice was discussed at the 1967 Conference; measurements have now been extended to higher temperatures and higher concentrations to test theoretical explanations. Papers on the specific heat of liquid helium provided tests of theoretical predictions of the interaction potential between He^3 atoms and critical point behavior of He^4 . Difficulties in measuring the heat capacity of plutonium carbide due to self-heating were described.

A continuing concern of thermo-

chemists is the accuracy of experimental methods; several papers offered data affording cross-checks by different approaches. The rotating bomb method for heat of combustion of organic chlorine and bromine compounds was checked against solution thermochemistry by means of the hydrochloride and hydrobromide of trishydroxyaminomethane (THAM) at the Thermochemical Center, Lund, Sweden; results were in good agreement. The enthalpy of neutralization of THAM with aqueous HCl has been proposed as a standard exothermic reaction for solution calorimetry; a series of researches at several locations was reported by S. R. Gunn which related this quantity to the long-established heat of combustion of benzoic acid. A direct measurement of the enthalpy of neutralization at the National Bureau of Standards is not in agreement to the desired degree; further work is apparently needed. A new determination was made at Argonne National Laboratory of the enthalpy of formation of aqueous HF by means of the enthalpy of reaction of fluorine and hydrogen to form liquid HF combined with the enthalpy of solution of liquid HF in water. The result did not agree within experimental error with recent data by other approaches; a selected value satisfactory to all is not yet established. New data on a Calorimetry Conference specific heat standard, Al_2O_3 , were reported from the National Bureau of Standards.

New equipment which was described included data acquisition systems for low-temperature specific heat calorimeters, a solution calorimeter, a liquid nitrogen boil-off calorimeter, and solution, titration, and mixing calorimeters. A high precision water bath (Tronac, Inc., Orem, Utah) achieves a long-term stability of 0.0003°C . A microcalorimeter developed at the University of Colorado was applied to the study of the myoglobin oxygen reaction with impressively precise results. A design for miniature platinum resistance thermometers for low-temperature calorimetry was approved and a manufacturer is now being sought to produce such thermometers commercially.

Information about the 25th Calorimetry Conference may be obtained from E. D. West, National Bureau of Standards, Boulder, Colorado.

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