MEETING REPORT

CELL BIOLOGY 1984: MERGING DISCIPLINES

KANSAS CITY, Mo.—Cellular and developmental biologists have traditionally distrusted the reductionist approach of molecular biology, maintaining that the whole is more than the sum of its parts. Tradition notwithstanding, reports delivered here at the November meeting of the Society for Cell Biology showed that the techniques of molecular biology are rapidly illuminating these fields. Indeed, one member of the University of Colorado's Department of Molecular, Cellular, and Developmental Biology quipped that his department should be renamed the Department of Molecular, Molecular, and Molecular Biology.

Molecular Aspects of Development

The DNA methylation patterns of early embryonic stem cell precursors change as these cells differentiate. Janet Rossant of Brock University (St. Catherine's, Ont., Canada), is using DNA probes to analyze cell lineage in the mouse. Cell lineage studies in developmental biology ask where (cell fate), when (cell commitment), and how (the molecular mechanisms which initiate differentiation and maintain the new state). The traditional approach in this type of study is to create a chimera, in which embryonic cells of two different types are mixed and their subsequent development is followed. Any markers chosen should occur in all cells, be neither harmful nor beneficial to the organism, and be detectable *in situ*. Until recently, none of the available markers (coat color, chromosomal translocations, isozymes) met all three criteria. Satellite DNA, however, meets all the criteria and differs substantially in two species of mice, *Mus musculus* and *M. caroli*. Satellite DNA is a short sequence of tandem repeats associated with the chromosomal centromeres. Researchers are uncertain as to its function. Cloned *M. musculus* satellite DNA sequence, labeled with biotin, was used for *in situ* DNA-DNA hybridization. The cavity of an embryonic blastocyst of *M. musculus* was injected with cells of *M. caroli*, and then implanted into a *musculus* uterus. Cell lineage studies derived from analysis of tissue sections demonstrated that the inner cell mass forms the fetus itself; the outer layers of cells form extra-embryonic structures, principally the placenta.

Rossant also studied the patterns of DNA methylation during development. The DNA of cells that form extra-embryonic structures is undermethylated compared to that of the primitive ectoderm, which forms the fetus. Researchers have not yet determined whether this DNA is undermethylated originally or is demethylated at a later stage of development. DNA methylation patterns do, however, correlate with developmental events. That DNA methylation plays a definitive role in differentiation is not yet proven.

Turncoat Parasites Are Elusive

Trypanosomes—evade the host immune response by a mechanism of antigenic variation. George A. M. Cross (Rockefeller University, New York) reported that these species of parasitic flagellate protozoans literally turn their coats by altering their major surface protein, the variant surface glycoprotein (VSG). The coat prevents phagocytosis (ingestion by white cells) and presents a physical barrier to the penetration of macromolecules. Each trypanosome can generate more than 300 different surface antigen determinants from a clonal repertoire of 1000–2000 genes, though only one gene is expressed at a time. The host antibody response to one antigenic determinant selects for the expression of a different determinant. Gene expression is regulated in the insect vector, where the selection of a new antigenic determinant occurs. All active genes can be shuffled from one genomic location to another. The precise control mechanisms for gene activation and expression in this unique system are currently under investigation.

Of General Interest...

Complex modes of learning may utilize the same molecular mechanisms as simple modes of learning. Eric R. Kandel (Columbia University College of Physicians and Surgeons, New York) has found that the defensive withdrawal reflexes of the marine snail *Aplysia* can be modified by sensitization and habituation. These responses are reflected in prolonged changes in synaptic strength at the neuronal terminals. There is increasing evidence that cyclic AMP-mediated protein phosphorylation modulates synaptic strength via transmitter release. Habituation results in the release of less transmitter, sensitization in the release of more. Prolonged sensitization develops into memory. The time course of a memory may be determined at the biochemical level by a sustained protein kinase activity.

—Jennifer Van Brunt

REGULATION

EUROPE PONDERS UNIFORM BIOTECH STANDARDS

STRASBOURG, France—In March the Council of Europe's Conference of Ministers responsible for human rights will meet to examine "the challenge to human rights posed by the development of science and technology: protection of human beings and their physical and intellectual integrity in the context of the progress being made in the fields of biology, medicine, and biochemistry." This follows adoption by the Council of Europe, towards the end of 1984, of a recommendation by its Ad Hoc Committee of Experts on Genetic Engineering (CAHGE) to establish a notification system for recombinant DNA experiments. The measure was designed to harmonize practices among the 21 Western European member states.

In broad outline, that document incorporated the suggestions made in an 1982 text prepared by the European Economic Community for its ten members, but with three differences. Because CAHGE considered the risk of a harmful gene escaping from the laboratory a "conjectural hazzard" which had been overstated, the new text left individual countries to define the categories of hazard. Second, in order to safeguard scientific and industrial secrecy and protect intellectual property, member states were asked to arrange that all notifications should remain confidential unless the notifying laboratories agree otherwise. Third, the Council of Europe decided it would not yet adopt specific provisions concerning recombinant DNA techniques for transfer into human patients. In recent months CAHGE has been studying problems likely to arise from the combined use of genetic engineering and new techniques of artificial procreation. These deliberations will be assessed at the March meeting. **—Bernard Dixon**