

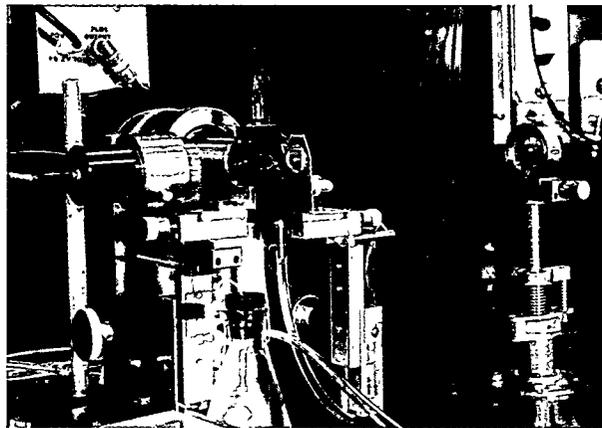
1984 OHER and the International Commission on Protection against Environmental Mutagens and Carcinogens co-sponsored a conference in Alta, Utah, highlighting the growing role of recombinant DNA technologies. The Congressional Office of Technology Assessment would subsequently incorporate the Alta proceedings into a report acknowledging the value of a human genome reference sequence. The following year, Charles DeLisi and David Smith would outline plans for a DOE Human Genome Initiative.

1986 OHER announced its Human Genome Initiative after organizing a meeting in Santa Fe to explore the project's feasibility.

1988 The DOE and the NIH sign a memorandum of understanding for coordination of the U.S. Human Genome Project. Two years later, the agencies would jointly announce the project's first set of five-year goals.

SORTING CELLS

■ Often unsung in the march of scientific progress are the achievements in instrumentation that make modern research possible. One such instrumental foundation stone was laid between 1965 and 1972 when Mack Fulwyler and Marvin Van Dilla developed the flow cytometer at Los Alamos. For the first time, this device made it possible to rapidly sort single cells and subcellular components according to some chosen criterion (the amount of DNA in a cell, for example, or the size of a chromosome). An entire industry subsequently arose to put this device to clinical use—most routinely for performing blood counts—and it now plays a leading role in a host of research areas, from AIDS to toxicology. Adapted for chromosome sorting and purification, it is a staple of the Human Genome Project. ■



A HERITAGE OF GENETICS RESEARCH

But DOE's interest in genetics research is both older and broader than today's genome project. One of the historic efforts, for example, was two decades of research at Brookhaven, culminating in 1982 with the longest DNA sequence then known, the complete genome for the "bacteria-eating" virus T7. Furthermore, the work produced more than just sequence; it provided a profound insight into how the genetic program is translated into action—the molecular mechanisms by which T7

A COLOR-CODED GENE The different coat colors of these Oak Ridge mice arise from mutations in the "agouti" gene, which affects a number of functions, including pigmentation. The mouse in the rear has the normal grizzled agouti coat.

takes over and exploits the reproductive machinery of its host bacterium. As a direct consequence, T7 has now been genetically engineered by the biotechnology industry to serve as cellular "factories" for producing selected proteins.

Oak Ridge scientists also played an early role, owing in large part to their celebrated "mouse house." Years of mutagenesis studies there helped shape the foundation for today's molecular genetics research. Mutant strains of Oak Ridge mice express heritable disorders that model human birth defects, metabolic maladies such as obesity and diabetes, and human cancer. Over the past decade, many of the genes responsible for these disorders have been identified, and often the corresponding human genes have been characterized as well. Further, whereas many of these strains arose from random genetic alterations, modern

biotechnology has now largely supplanted such reliance on chance. Today, at Oak Ridge, Berkeley, Livermore, and many other labs around the world, *transgenic* mice carry "designer mutations" that allow scientists to study specific genetic defects

