spheroplasts. The liposomes interact with yeast spheroplasts, resulting in DNA transfer and subsequent transformation.

E. Baker, Merck and Company (Rahway, NJ), described the use of immobilized cells for production of thienamycin. The Merck group immobilized *Streptomyces cattleya* cells in polyacrylamide beads and alginate beads and attached them to celite. Product formation was more dependent on medium conditions than mode of entrapment. Baker reported that thienamycin has been produced continuously in a liquid bed system for 183 days with no indication of deterioration. **—Julia Cino**

WATSON AND CRICK SPEAK

CELEBRATING THE DOUBLE HELIX

BOSTON, Massachusetts—Francis Crick and James Watson blended anecdote with science when they joined together here in September at a conference celebrating their discovery of DNA's structure more than 30 years ago. They also revealed what may have been the meeting's most intriguing news: a movie depicting their discovery is on the horizon. Watson suggested two British actors for the leading roles—Crick, he said, should be played by Roger Moore, and Watson himself by Dudley Moore.

Sponsored by *Nature*, which published the Watson-Crick proposal that DNA is a double helix, the meeting attracted several hundred attendees, who came for science as well as nostalgia. Speakers from industry and academia stressed the apparently boundless research opportunities resulting from the advanced DNA analysis and genetic engineering technologies Crick and Watson made possible.

Recombinant DNA techniques become easier each day, according to David Baltimore, MIT (Cambridge); scientists can now go into a genome and select a specific segment of DNA for study or manipulation. Walter Gilbert, Biogen (Geneva, Switzerland) proposed that the evolutionary role of intervening DNA sequences is to increase the rate of gene recombination, while in some instances at least, expressed DNA regions seem to be structural and functional units that are assembled into proteins via recombination.

Neurobiology has benefitted from advances in molecular biology, according to Floyd Bloom, Salk Institute (La Jolla, CA), noting that researchers recently have been able to isolate and study brain-specific mRNAs—some of which should code for neuropeptides—in an effort to localize brain peptides and understand their target sites and modes of action.

Other speakers described how transposable elements, which enable scientists to insert foreign genetic material into a genome or rearrange an existing gene sequence, have aided developmental and cell regulation studies. Researchers are using transposable elements native to the genome as well as viruses.

Both quantitative and qualitative gene changes are needed to transform a proto-oncogene into an active oncogene following integration of the viral DNA intermediate, according to Howard Temin, University of Wisconsin (Madison). Scientists need to discover and characterize the products formed by oncogenes, their targets in the cell, and the natural substances that inhibit the products, he emphasized. Vectors such as retroviruses may have long-term applications in gene therapy—the transfer of useful genetic information into a cell line—for such deficiency diseases as Tay-Sachs and Lesch-Nyhan syndrome.

Robert Weinberg, MIT, showed that at least two oncogenes are needed to transform cell cultures, concluding that not all oncogenes affect cells in the same manner. One type of oncogene can be responsible for a variety of carcinomas, however, so he proposed that a small number of mechanisms may be shared by a large number of tumors. According to Weinberg, future research will focus on understanding the connection between the initiation and promotion steps involved in transcribing a message from DNA. With this knowledge, scientists will be close to resolving—and perhaps controlling—the mechanism behind the activation of oncogenes.

Now that the DNA sequences can be determined, argued Charles Weissmann, University of Zurich, researchers should work for a better understanding of the functional correlation between the gene sequence and the gene product. Sidney Brenner, Laboratory of Molecular Biology, (Cambridge, U.K.), concurred. "[Genetic] engineering is more than what we are doing now—engineering contains the essence of design," Brenner asserted. We can manipulate genes, but lack a complete understanding of the molecular and cellular mechanisms underlying cell function. He observed, "Perhaps we are not genetic engineers today, but only genetic mechanics."**—Vicki P. Glaser**