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LOS ALAMOS FUNDED FOR NATIONAL DNA-RNA DATA BANK

LOS ALAMOS, N.M., September 9, 1982 -- Los Alamos National Laboratory has been funded, with an industrial partner, Bolt Beranek and Newman (BBN) Inc., to formally organize a national nucleic acid (DNA-RNA) data bank. The bank will keep researchers around the globe linked to a central computer system where all known nucleic acid sequences are stored.

DNA, short for deoxyribonucleic acid, is the key to all life. DNA molecules carry the genetic information that programs our inheritance. RNA (ribonucleic acid) molecules carry DNA's genetic instructions from the cell nucleus to cell structures that make important body proteins. The field of molecular genetics research is expanding so rapidly that few can keep up with the flood of information about DNA-RNA mechanisms.

Walter Goad, of the Laboratory's Theoretical Division, who will head the Los Alamos portion of the program, says the Laboratory has had a nucleic acid data-bank pilot program, with internal funding, for about three years. This effort has resulted in a data bank containing two-thirds of all known nucleic-acid sequences as published by researchers in the international community.

Cosponsors of the new program are the National Institute of General Medical Sciences, the National Institute of Allergy and Infectious Diseases, the National Cancer Institute, and the Division of Research Resources (all

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components of the National Institutes of Health), the National Science Foundation, the Department of Energy, and the Department of Defense. Los Alamos will receive about $2 million, with $1 million going to BBN Inc., of Cambridge, Mass., a firm known internationally for pioneering work in computer networks and computer systems for scientific research, including those serving thousands of investigators in the biomedical community. The company has a 20-year history of successful technical innovation in the field and has developed and runs several major national resources, such as the ARPANET and National Institutes of Health-sponsored PROPHET System.

Goad says BBN will handle the distribution of information from the data bank, while Los Alamos will be responsible for gathering, annotating, and organizing the information. The Laboratory will work directly with researchers and with about 20 journals in the field, to compile a definitive bank of DNA and RNA sequences.

Los Alamos scientists will search through records dating to 1967, in an effort to assure that no early work on nucleic-acid sequences is overlooked, although Goad says the majority of the effort in molecular genetics has occurred in the last five years. In addition, all new information in the field will be fed into the computerized system and stored for retrieval.

The importance of the data bank is underscored by the fact that directions for the complex chemistry that makes a living cell what it is are encoded in the sequence, or pattern, within DNA molecules. These large molecules contain four kinds of smaller molecules, called bases, and the order in which these occur

comprises the sequence of a specific DNA molecule. Today, researchers are sequencing DNA molecules at the rate of more than half a million bases a year, and the rate is growing, as the field of research expands.

"There are hundreds of researchers in the United States and Europe who are sequencing DNA at a rate in excess of 500,000 bases a year," Goad stresses. "It is vital that we provide a mechanism for storing and making available the information from this research. Our goal is to have all such sequences entered into the data bank within three months of identification."

Nucleic-acid sequences are extremely complicated and are represented by long strings of characters. Los Alamos, which has long been active in solving the problems of pattern recognition, has developed programs for analyzing great amounts of DNA- and RNA-sequence data. Other programs developed at the Laboratory enable researchers to recognize molecular structure and the coding relationships within DNA molecules that have features responsible for specific biological functions within a cell.

Goad comments, "We know, for example, that certain viruses can induce tumors. All of these viruses contain nucleic acids that they insert into infected cells. We can now identify the most likely sites at which the viral sequences are inserted into the host DNA molecules. This information can provide important clues to those trying to uncover the mechanisms of cancer."

Goad, a biophysicist at Los Alamos since 1950, whose interest in theoretical analysis of biological problems began in the early 1960s, will be joined in his new endeavor by a small staff of research assistants and three

other experts. They are Minoru Kanehisa, James W. Fickett, and Christian Burks, all of the Laboratory's Theoretical Division.

Key senior scientists at BBN are Howard Bilofsky and Wayne Rindone, who have been extensively involved in facilitating use of computer-based tools by the life sciences community. Bilofsky says of the program: "Our common goal is to provide a timely, accurate, and accessible major new resource."

Los Alamos National Laboratory is operated by the University of California for the Department of Energy.

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