Argonne NATIONAL LABORATORY

Biosciences

A Multidisciplinary Approach to Understanding the Fundamental Mechanisms of Life

Bioscience research at Argonne National Laboratory conducts multidisciplinary research aimed at understanding the fundamental mechanisms of life and advancing health protection, environmental restoration, energy production, industrial processing and related applications.

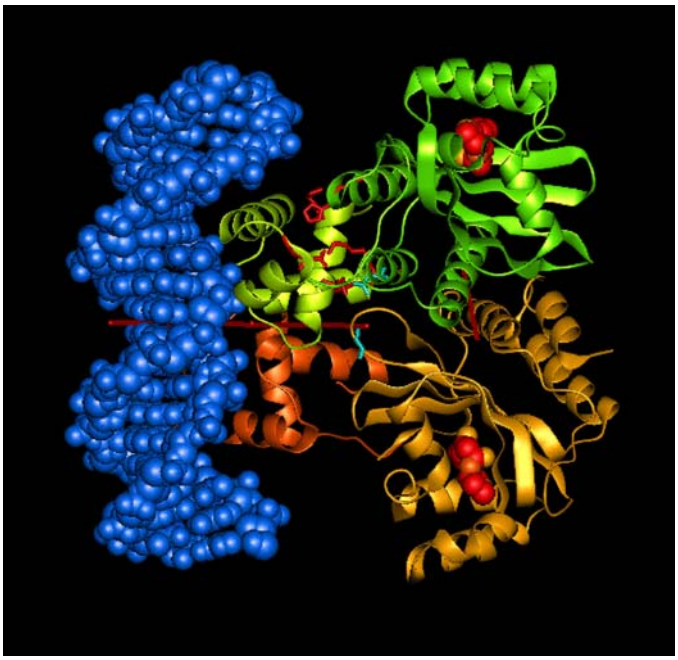
Research ranges from fundamental studies of DNA sequences using molecular biology and computational strategies to the decoding of genomic information, including the selection of targets for protein structure determinations and protein engineering to discover relationships between protein structure and function.

A key thrust is to develop the technology to analyze the genomes of thousands of organisms and to reconstruct their core pathways and systems well enough to develop computer models of whole microbial cells.

Collaborations between computer scientists and biologists are making the Argonne a leader in the emerging field of computational biology, the use of techniques from applied mathematics, informatics, statistics, and computer science to solve biological problems.

Collaborations between materials scientists and biologists are developing new ways to study membrane proteins, which facilitate many key cellular processes, including communications among intra- and intercellular processes. This research is developing soft, nano-structured composites to aid the study of membrane proteins.

Argonne is also a leader in developing robotics to greatly reduce the cost and time of solving protein structures. Since 2000, collaborations with colleagues at the Midwest Center for Structural Genomics have reduced the cost of solving protein structures from $306,000 to $61,000 each, and the time from months to less than a week.



One of more than 1,000 structures determined at Argonne's Structural Biology Center, the TraR protein structure of Agrobacterium tumefaciens *revealed that cells may communicate through releasing and sensing pheromones.*

The Structural Biology Center at Argonne's Advanced Photon Source is the world's most productive and efficient facility for protein characterization. It was the first center to solve 1,000 protein structures.

The newly created Institute for Genomics and Systems Biology is a joint initiative between the University of Chicago and Argonne to further expand resources and capabilities in the emerging areas of integrative biological research.

The primary sponsors of Argonne's biosciences research are the U.S. Department of Energy and the National Institutes of Health.

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