



ACCELERATING ANTIBIOTIC AND DRUG DEVELOPMENT WITH THE ADVANCED PHOTON SOURCE

The breakthrough protein characterization work that is being done at the U.S. Department of Energy's Argonne National Laboratory is helping us, among other things, develop more effective antibiotics and disease-fighting drugs.

THE CHALLENGE

Proteins are the molecular machines of all cells. However, scientists know the structures and functions of only a small fraction of the proteins in living systems. The vast majority remain a mystery.

The root of the problem is scientists' difficulty in "seeing" proteins – that is, imaging their three-dimensional structures. It is impossible to understand how a protein works without knowing what it looks like.

This limited picture of proteins hampers our ability to develop more effective antibiotics and disease-fighting drugs and improve enzymes for bioprocessing of natural products and synthesis of novel compounds.

THE BREAKTHROUGH

Work by researchers at the U.S. Department of Energy's Argonne National Laboratory is helping medical researchers image proteins more quickly and with higher proficiency than ever before.

Working at the Advanced Protein Characterization Facility and the Advanced Photon Source (APS) – one of the world's most powerful X-ray sources – scientists use a technique known as macromolecular crystallography to gain a clear picture of proteins.

THE IMPACT

- When a new protein structure is discovered, the data are deposited in the Protein Data Bank repository to make it available to researchers around the world. The APS is far and away the world leader in protein structure deposits, helping us, among other things, develop more effective antibiotics and disease-fighting drugs.
- Two Nobel Prizes for Chemistry have been awarded for APS-based research involving crystallography.

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