



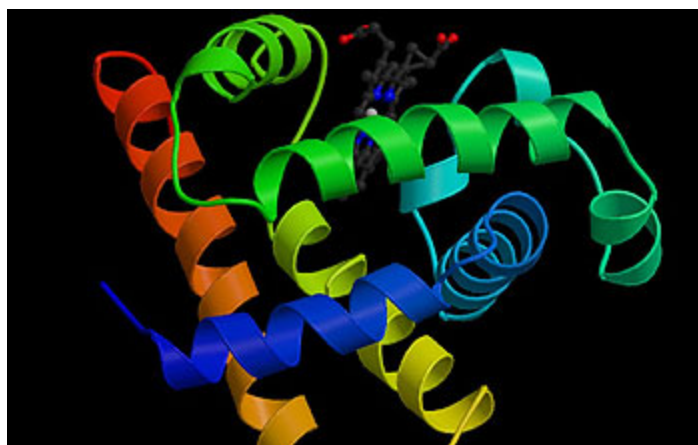
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## Fact Sheet

# Protein Data Bank - Chronology

## Timeline for Structural Biology and the Protein Data Bank



Myoglobin, the first protein structure to be determined at high resolution.

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## January 21, 2004

- 1913      **X-ray diffraction:** Max von Laue, William Henry Bragg, and William Lawrence Bragg discover that crystals diffract X-rays, producing an orderly pattern that can be used to deduce the location of every atom in the crystal.
- 1957      **Muscle's myoglobin, the first protein structure revealed:** After 22 years of work, John Kendrew of the Cavendish Laboratory in Cambridge (UK) uses X-ray diffraction to determine the 3-dimensional structure of myoglobin, the first protein to have its structure determined. Kendrew and Max Perutz received the 1962 Nobel Prize for their work on protein structure determination. During the next decade, fewer than a dozen structures of proteins would be determined.

- 1967 **First American groups to solve a protein structure:** Two teams announce the structure of a ribonuclease: One was from the Roswell Park Memorial Institute (now the Roswell Park Cancer Institute) (See G. Kartha, J. Bello, and D. Harker. "Tertiary structure of ribonuclease." *Nature* (1967) 213 ,862-65.) The other was from Yale University. (See H. W. Wyckoff, K. D. Hardman, N. M. Allewell, T. Inagami, D. Tsernoglou, L. N. Johnson, and F. M. Richards, "The structure of ribonuclease-S at 6 Å resolution" *J. Biol. Chem.* (1967), 242, 3749-3753.)
- Summer, 1971 **Idea hatches for repository:** At a Cold Spring Harbor Symposium on "Structure and Function of Proteins at the Three-Dimensional Level," participants propose the development of a dual repository in the United Kingdom and U.S. for macromolecular structure information. Walter Hamilton of the Department of Energy volunteers to set up the U.S. component at Brookhaven National Laboratory
- Oct. 1971 **Protein Data Bank established:** The establishment of the Protein Data Bank at Brookhaven is announced in *Nature New Biology* (see "Crystallography, Protein Data Bank [Announcement]", *Nature New Biology* 233, 223). The new repository contains fewer than a dozen structures.
- 1975 **NSF begins support:** Thomas Koetzle, who assumed responsibility for the Protein Data Bank after Walter Hamilton's untimely death, submits an unsolicited proposal to NSF. The first NSF award in support of the Protein Data Bank is made on November 1, 1975 (NSF-7518956).
- 1975 **Deposits:** 18 structures are deposited in the Protein Data Bank in 1975, yielding a total of 37depositions since its founding in 1971.
- 1980 **Deposits:** 19 structures are deposited in 1980, bringing the total to 184 depositions since the founding of Protein Data Bank.
- 1989 **Protein Data Bank partnership grows:** The Protein Data Bank becomes a broad, interagency endeavor when the Department of Energy (DOE) and components of the National Institutes of Health (NIH) join NSF in providing direct support for Protein Data Bank activities.
- 1990 **Deposits:** 236 structures are deposited in Protein Data Bank in 1990, with a total of 951 depositions since its founding.
- 1994 **Interagency support grows:** Memorandum of Understanding signed by NSF, DOE, the National Library of Medicine, and the National Institute of General Medical Sciences (NIGMS) forms an interagency partnership for support of the Protein Data Bank.
- 1995 **Renewed support for Protein Data Bank:** Open competition results in award to Joel Sussman of the Brookhaven National Laboratory for continued support of the Protein Data Bank (DBI – 9510694).

- 1998 **RCSB given reins:** Open competition (NSF 98-66) results in award (DBI-9814284) to the Research Collaboratory for Structural Biology (RCSB), which consists of groups led by Helen Berman (principal investigator) and John Westbrook of Rutgers University, Peter Arzberger and Phillip Bourne of the San Diego Supercomputer Center at the University of California at San Diego (SDSC/UCSD), and Gary Gilliland of the National Institute of Standards and Technology (NIST).
- 2000 **Deposits:** 2,937 structures are deposited in Protein Data Bank in 2000, with a total of 15,832 depositions since its founding.
- 2000 **MOM's poster proteins:** The Molecule of the Month, authored by David Goodsell of The Scripps Research Institute, begins its profiles of key and interesting biomolecular structures with myoglobin. Subsequent honorees include DNA, RNA, ribosomes, and anthrax toxin.
- Aug. 2003 **Agencies double:** A new Memorandum of Understanding creates a broad coalition of eight federal agencies in support of the Protein Data Bank: NSF, DOE, NLM, NIGMS, National Cancer Institute (NCI), National Center for Research Resources (NCRR), National Institute of Biomedical Imaging and Bioengineering (NIBIB), and the National Institute of Neurological Disorders and Stroke (NINDS).
- Dec. 2003 **Global collaboration:** The Protein Data Bank achieves formal, international status as an agreement for international management of the Protein Data Bank archives is announced in Nature Structural Biology. Signatories are the RCSB, the European Bioinformatics Institute (EBI) and the Institute for Protein Research at Osaka University. The partners are to serve as custodians of the worldwide Protein Data Bank, "with the goal of maintaining a single archive of macromolecular structural data that is freely and publicly available to the global community."
- 2003 **Deposits:** While the first protein structure took 22 years to solve, structures now come into Protein Data Bank at an average rate of more than 10 per day: more than 4,600 new deposits of molecular structures were made in 2003, bringing the total of accessible structures to nearly 24,000.
- 2004 **New era launched:** With funding from eight federal agencies, the new five-year, \$30 million management period begins with the RCSB.

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