The BMRB archive of Protein, Nucleic Acid and Metabolite NMR Data

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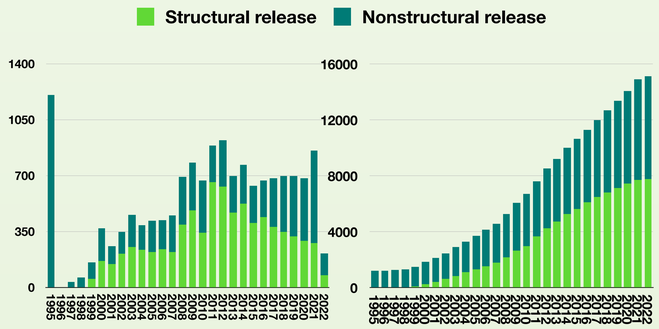
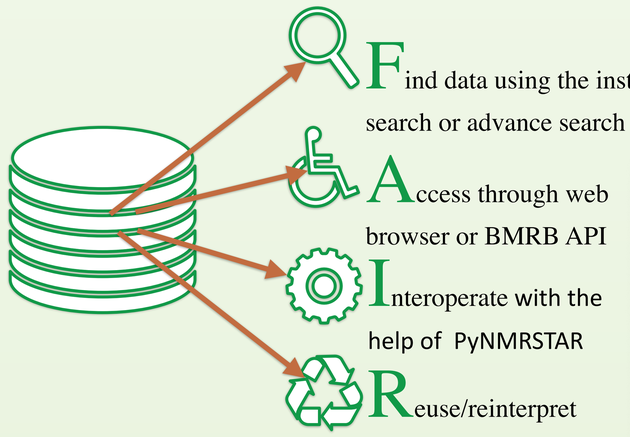
The Biological Magnetic Resonance Data Bank (BMRB: https://bmrb.io) serves the biomolecular NMR community by supporting a curated archive of primary and derived data and metadata linked to scientific investigations under the "FAIR Principles" (Findable, Accessible, Interoperable, and Reusable)[1]. BMRB is a member and a core archive of the Worldwide Protein Data Bank (wwPDB: https://www.wwpdb.org), which collects the coordinate data along with assigned chemical shifts and restraints from NMR structural studies through the OneDep (https://deposit.wwpdb.org) deposition system. NMR data from other studies are collected by the BMRBdep (https://deposit.bmrb.io) deposition system. BMRB's goal is to empower scientists in their analysis of the structure, dynamics, and chemistry of biological systems and to support further developments in the field of biomolecular NMR spectroscopy.

BMRB growth statistics

The bar graph shows the growth of the BMRB archive. As of April 2022, BMRB holds 15083 entries with 7759 entries having corresponding coordinate data in the PDB archive and 7324 BMRB only entries.

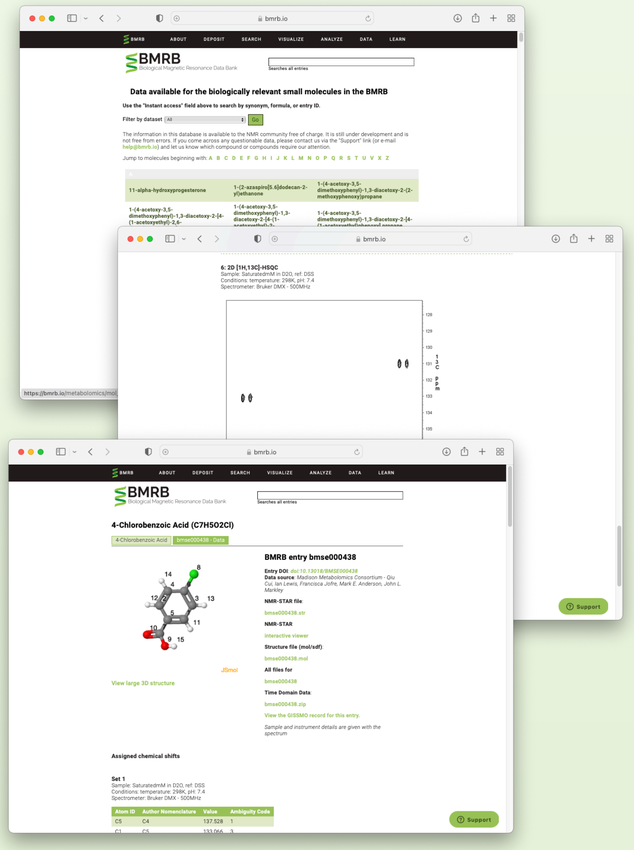


Data access



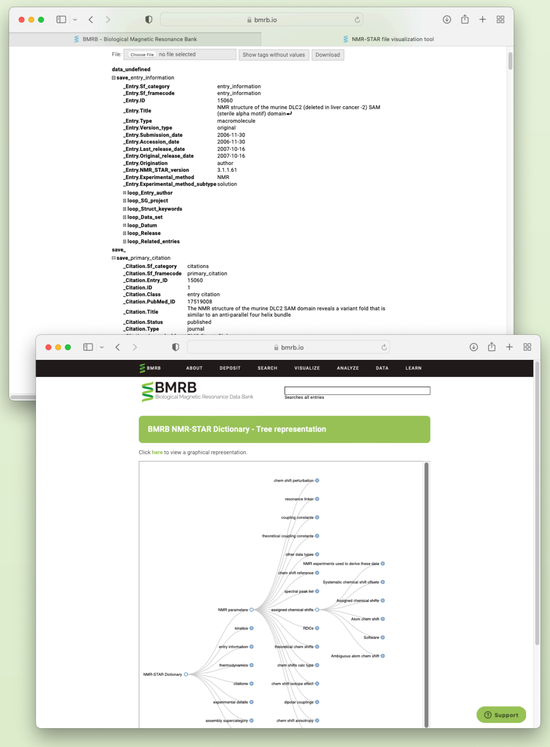
Small molecules library

BMRB maintains a library of carefully curated NMR spectroscopic data of over 1000 biologically important small molecules.



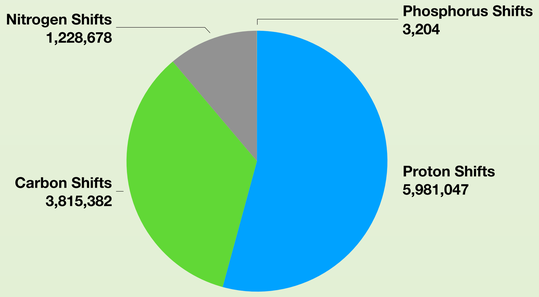
NMR-STAR data model

NMR-STAR[2] is the official data format of BMRB and the deposition and archival format of NMR spectroscopic data at the wwPDB. It is a Self-defining Text Archive and Retrieval (STAR) format with controlled vocabularies(tags) defined by the NMR-STAR dictionary. The NMR-STAR data model supports many kinds of NMR data, metadata and derived data.

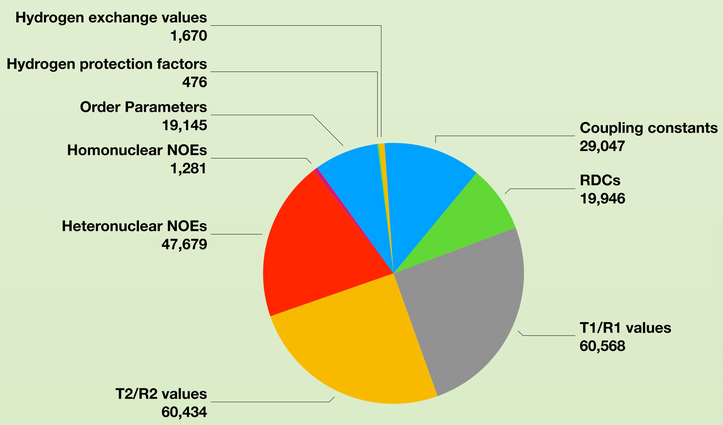


BMRB data content (chemical shifts)

As of April 2022, BMRB holds over 10 million chemical shifts from 14156 protein, 548 DNA and 532 RNA entries. In addition to the chemical shift data, other NMR data are also available at the BMRB



BMRB data content (other NMR data)



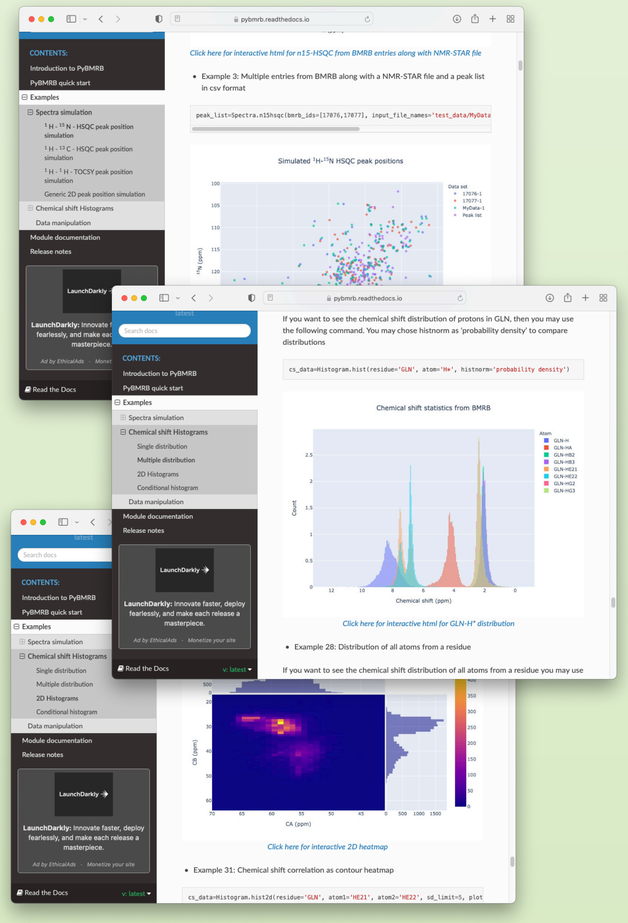
BMRB Software resouce

BMRB GitHub: https://github.com/bmrb-io

- BMRB - API : provides machine to machine access to BMRB data base
- PyNMRSTAR : Python NMR-STAR parser
- PyBMRB: BMRB data visualization tool in Python
- RBMRB: BMRB data visualization tool in R

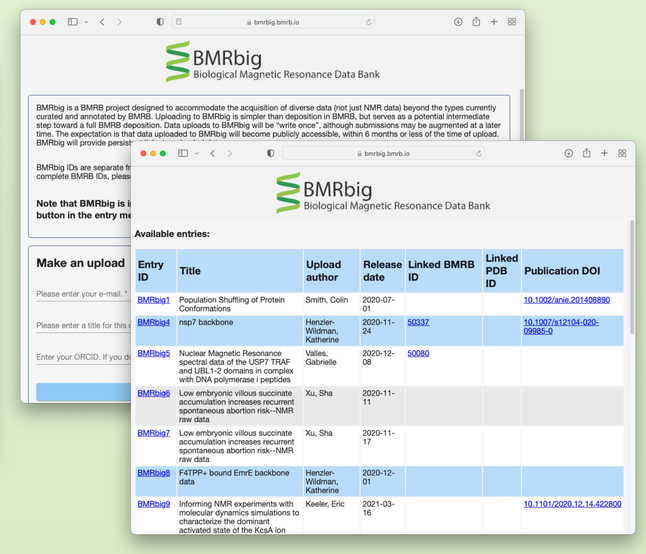
BMRB data visualization

Chemical shift histograms and simulated HSQCs can be generated using PyBMRB or RBMRB.



BMRBig

BMRbig is a BMRB project designed to accommodate the acquisition of diverse data (not just NMR data) beyond the types currently curated and annotated by BMRB. Uploading to BMRbig is simpler than deposition in BMRB, but serves as a potential intermediate step toward a full BMRB deposition. Data uploads to BMRbig will be "write once", although submissions may be augmented at a later time



Entry ID	Title	Upload author	Release date	Linked BMRB ID	Linked PDB ID	Publication DOI
BMRbig1	Population Shuffling of Protein Conformations	Smith, Colin	2020-07-01			10.1002/anie.201408890
BMRbig4	nsp7 backbone	Henzler-Wildman, Katherine	2020-11-24	50337		10.1007/s12104-020-09985-0
BMRbig5	Nuclear Magnetic Resonance spectral data of the USP7 TRAF and UBL1-2 domains in complex with DNA polymerase i peptides	Valles, Gabrielle	2020-12-08	50080		
BMRbig6	Low embryonic villous succinate accumulation increases recurrent spontaneous abortion risk--NMR raw data	Xu, Sha	2020-11-11			
BMRbig7	Low embryonic villous succinate accumulation increases recurrent spontaneous abortion risk--NMR raw data	Xu, Sha	2020-11-17			
BMRbig8	F4TPP+ bound EmrE backbone data	Henzler-Wildman, Katherine	2020-12-01			
BMRbig9	Informing NMR experiments with molecular dynamics simulations to characterize the dominant activated state of the KcsA ion	Keeler, Eric	2021-03-16			10.1101/2020.12.14.422800

PDF version of the poster

BMRB is supported by NIH through grant R01GM109046

1. *Wilkinson, M. D.; et al. Scientific data 2016, 3, 160018.*
2. *Ulrich, E. L.; et al. J. Biomol. NMR 2019, 73 (1-2), 5.*