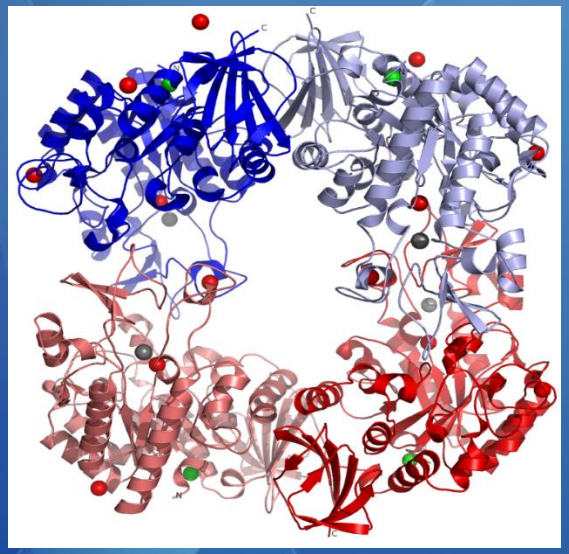
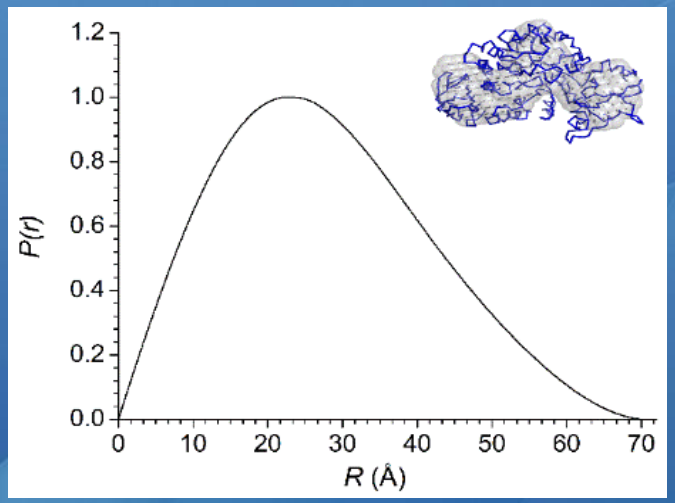
Protein Crystallography Section – RB&HSD

BARC has a long tradition of research in crystallography. The foundation was laid in early 70's from neutron diffraction studies of Hydrogen-bonded systems and amino acid complexes. Later protein crystallography research group evolved around Dr. K.K. Kannan, which solved the first 3-dimsional crystal structure of a globular protein in India in 1989. The protein crystallography group has grown as interdisciplinary research group in recent years. The major focus has been in 'rational' discovery of novel drugs, protein engineering and on structure-function studies of biotechnological important proteins. A large number of macromolecular systems have been probed. These include Carbonic anhydrase, HIV protease, bacterial phosphatases and bacterial cell division proteins, plant and fungal stress proteins, eukaryotic translin-like proteins, human proteins including seminal plasma protein and kinases, mosquito-larvicidal proteins used as bio-insecticide, solar energy harvesting phycobiliproteins, ribosomal P proteins from malarial parasite and proteins involved in cellular redox response. Recently, protein deuteration facility has been developed for 'contrast matched' small angle neutron scattering studies of biological complexes, and research programmes for *in-silico* screening and design of potential therapeutic compounds have been taken up.

Structure solved

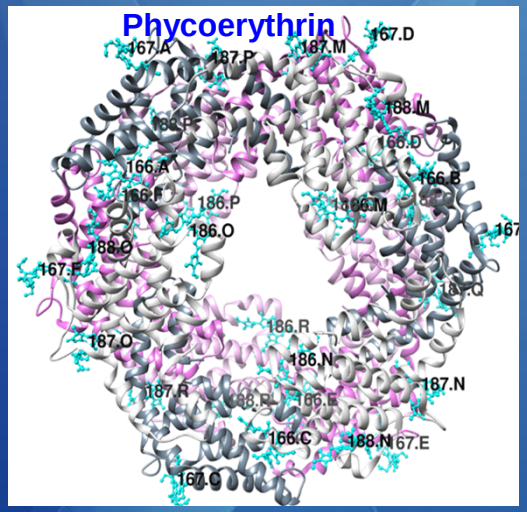


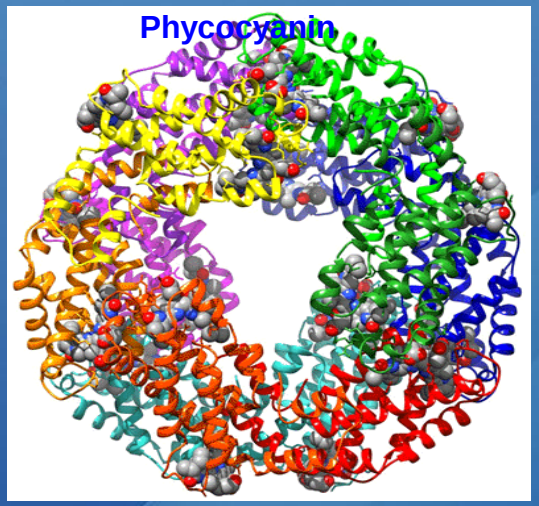
Crystal structure of mosquito larvicidal BinAB receptor (Cqm1) protein from Culex



Oligomeric status of Cqm1 changes on interaction with BinB-'contrast matched' SANS study

Insect Biochem Mol Biol. 2018;93:37-46.
Int J Biol Macromol. 2019 ;140:1315-1325
IUCr J, 2019.





Solar-energy harvesting phycobiliproteins

PloS One, 2015; 10, e0124580
Photostnthesis Res. 2016, 129, 17-28.
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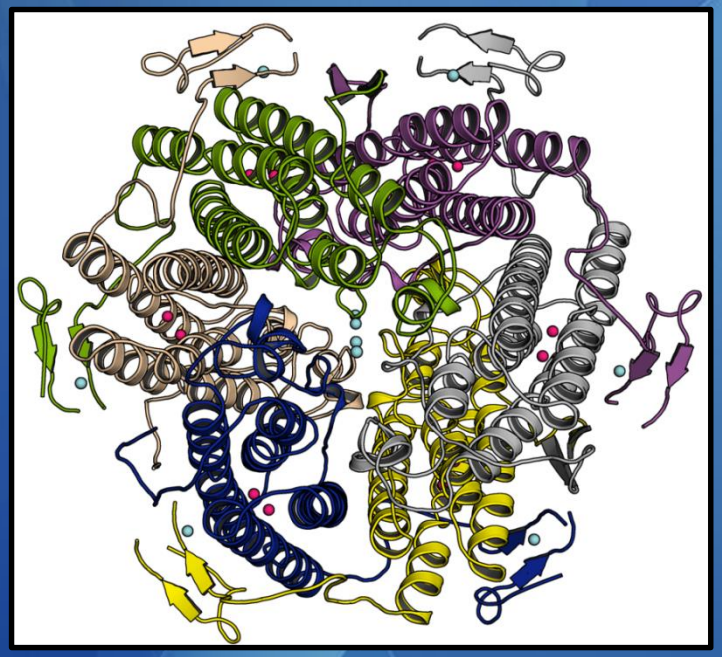
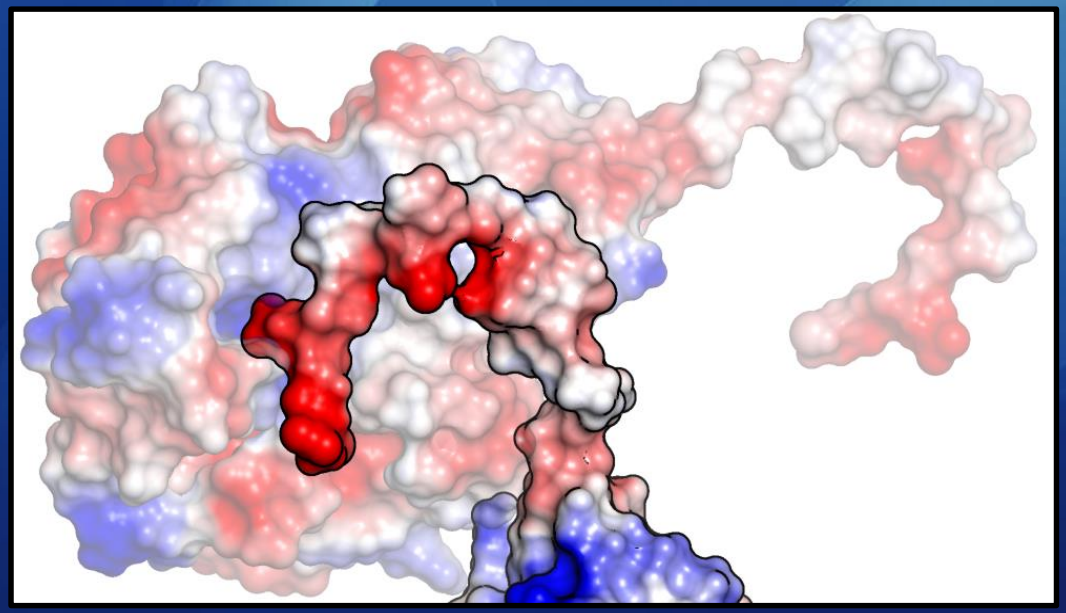


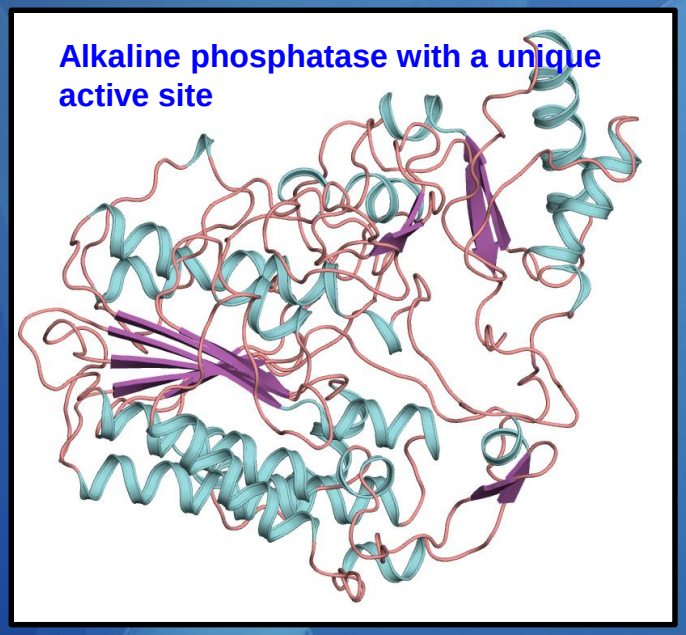
KatB: Mn catalse from *Anabaena*

Plant Cell Environ (2019) 42(8):2508-2521
Free Rad Biol Med (2016) 93:118-129.

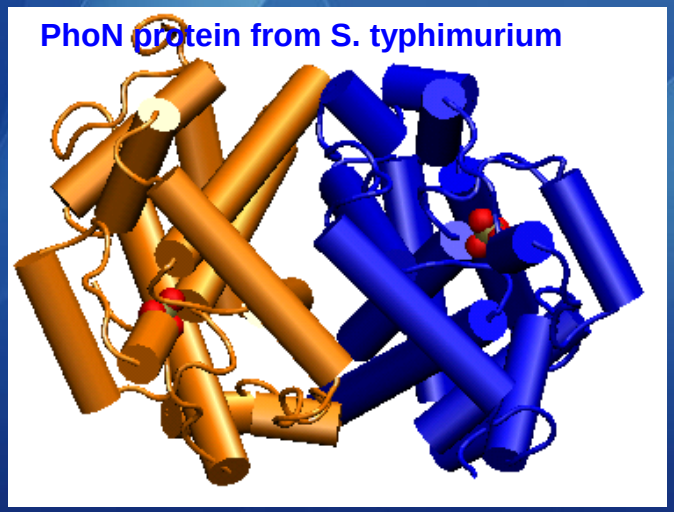


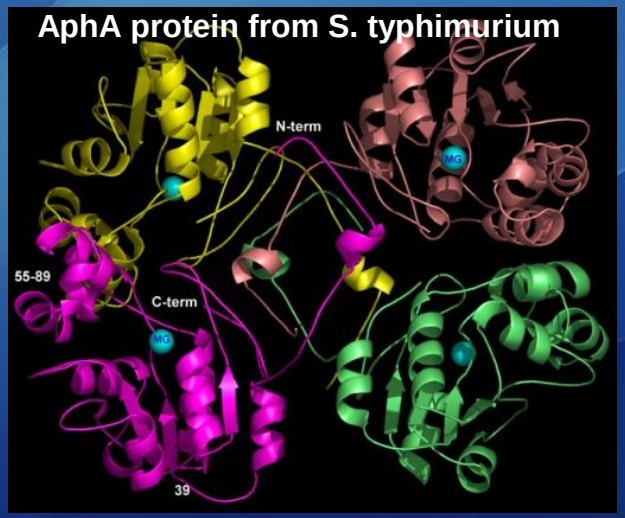
FrnE: novel disulfide oxidoreductase from *Deinococcus radiodurans*

Antioxidants & redox signaling 2017; 28: 296-310

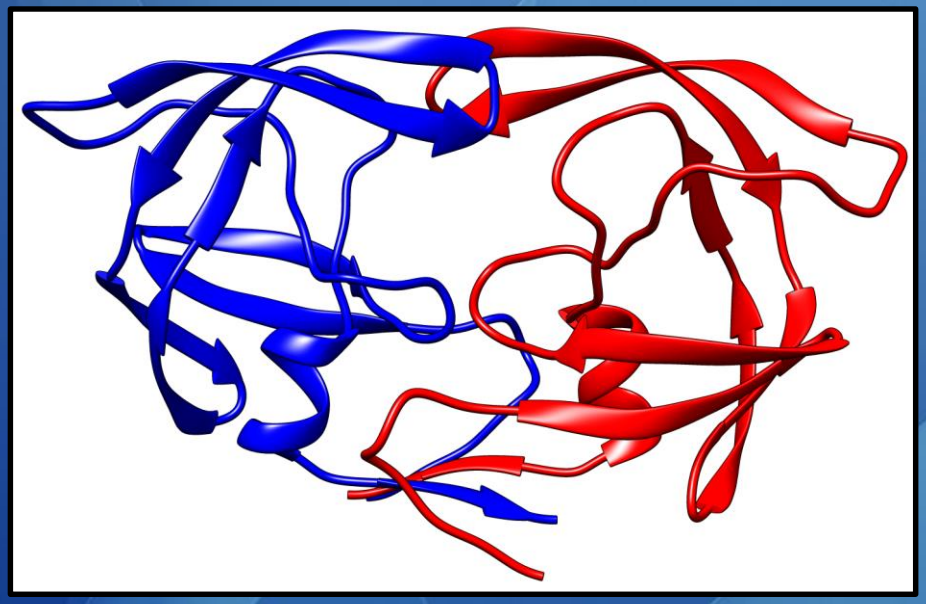


PLoS One. 2011; 6: e22767





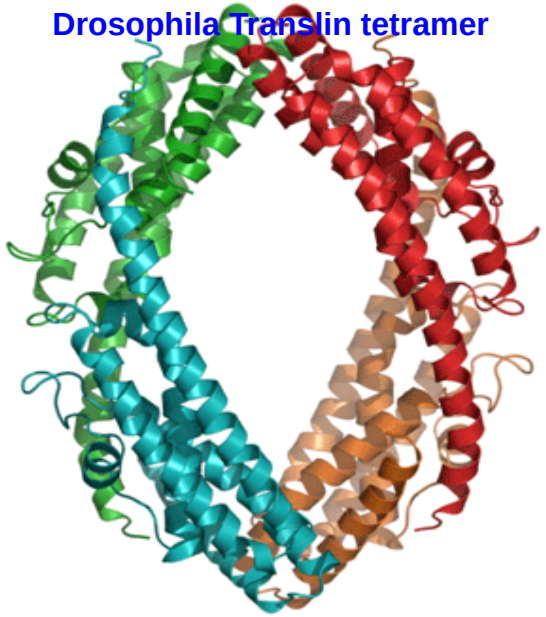
Biochemistry, 2007; 46: 2079-2090
Archives of Biochemistry and Biophysics, 2007; 464: 70-79



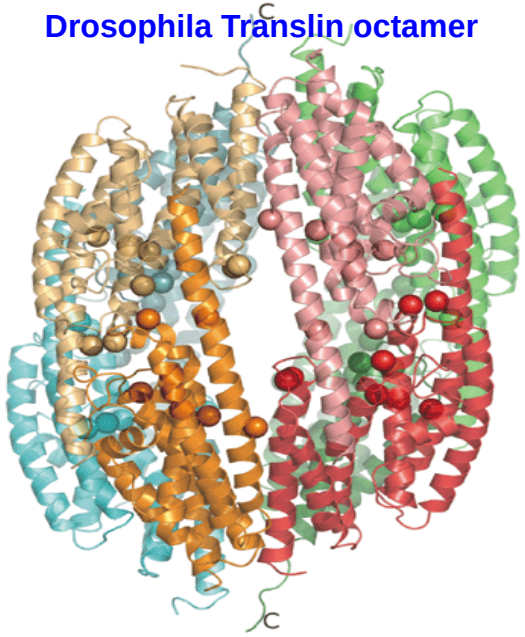
HIV-1 Protease

Chem Biol & Drug Des 2015; 86:302-308
J Am Chem Soc 2010; 132: 6366–6373
Biochem Biophys Res Comm 2010; 389: 295–300
PLoS ONE 2009; 4(11): e7860
Proteins 2008; 74: 594-602
PNAS 2006; 103 (49) 18464-18469
Biochem Journal 2005; 389 (2), 365-371

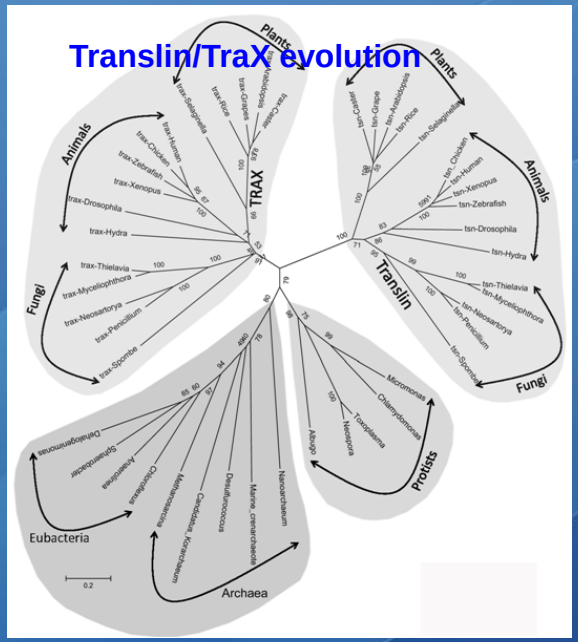
Drosophila Translin tetramer



Drosophila Translin octamer



Translin/TraX evolution

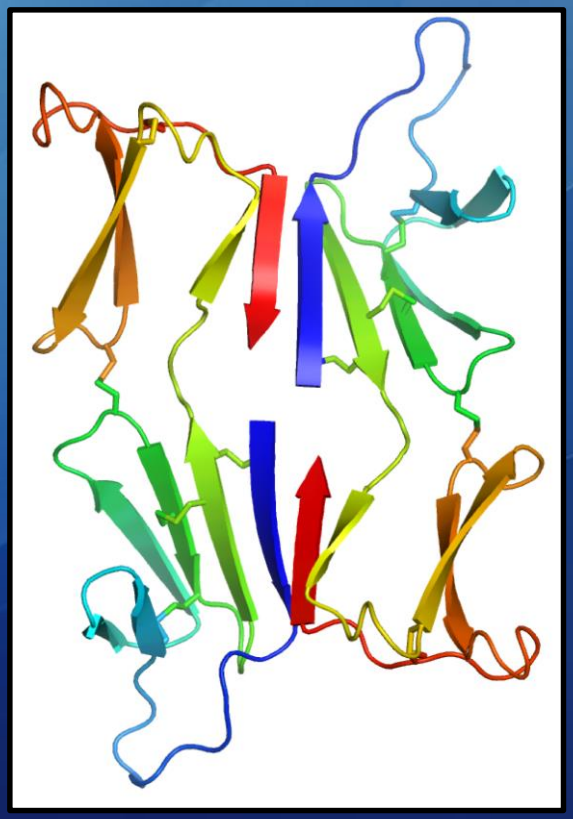


Translin-like proteins

FEBS J 2008; 275, 4235-4249
FEBS Openbio 2012; 2:37-46
J Mol Evol 2012; 75:155-167

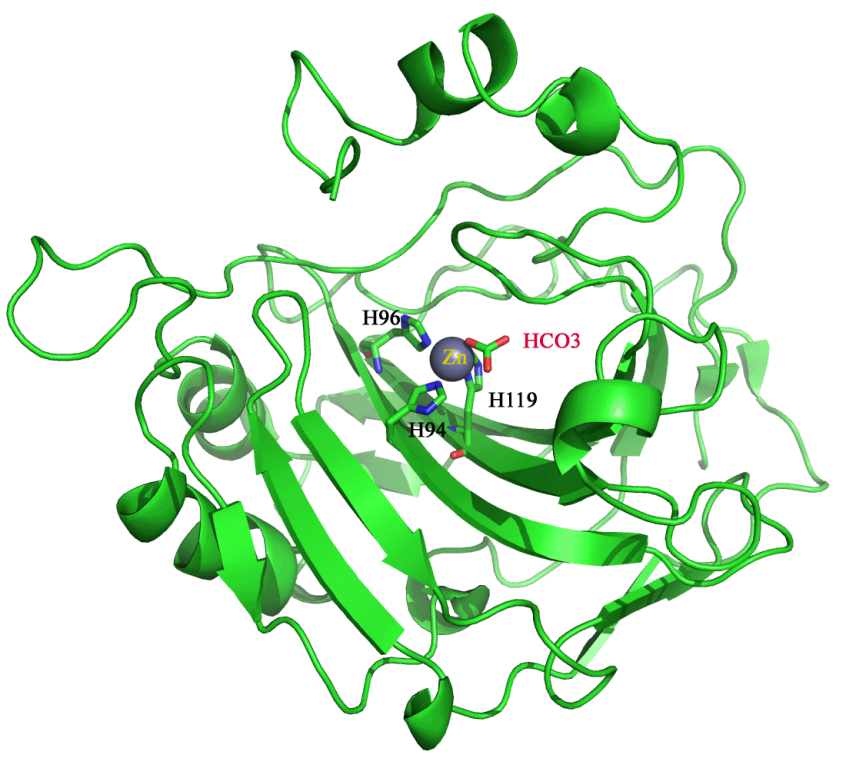
Structure 2015; 23, 2331-2340
Biochemistry 2014; 53 (19), 179–3186

Human Protein Kinase A



JMB 2010; 397 (4), 947-956

Prostate secretory protein PSP94



Carbonic anhydrase

Ann N Y Acad Sci. 1984;429:49-60
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J Mol Biol. 1994;241:226-232
J Mol Biol. 1994;243:298-309
Acta Crystallogr D Biol Crystallogr. 1994;50:731-738
Indian J Biochem Biophys. 1994;31:377-386

Facilities at protein crystallography section

Protein Production

Cell homogeniser

Protein purification system

Protein Crystallization

Liquid handling systems

Crystal Imager

X-ray diffraction

Microfocus sealed tube X-ray source
with CCD detector

Metaljet X-ray source with Pilatus 1M detector

Single Crystal X-ray diffraction systems

Protein chracterization

Circular Dichroism Spectropolarimeter

Multi Mode Plate Readers

Surface plasmon resonance (SPR)

Infrared Spectroscopy for biomolecules

Protein chracterization

Spectrofluorometer

Dynamic light scattering

Isothermal Titration Calorimeter (ITC)

Differentail Scanning Calorimeters (DSC)