December 6, 2011. Supercomputer simulations and neutron diffraction studies at the U.S. Department of Energy's Oak Ridge National Laboratory, in research led by Jerome Baudry and Yinglong Miao, who are jointly affiliated with ORNL and the University of Tennessee, have been employed to characterize the motions of water molecules in P450 enzymes. Results show a very dynamic hydration process with more water molecules in the active site than previously believed.

December 6, 2011. A team led by researchers at the Scripps Research Institute, in La Jolla, CA, has uncovered the crystal structure of a region of the potent anti-HIV antibody PGT 128 in complex with an HIV envelope protein. Reportedly this antibody can neutralize about 70% of globally circulating HIV strains by blocking their ability to infect cells, and it can do so at lower concentrations than any previously reported broadly neutralizing anti-HIV antibody.

December 7, 2011. Professor William Duax is interviewed relative to his work as the founder and lead mentor of Hauptman-Woodward Medical Research Institute's high school program, which invites students to take a hands-on role in cutting edge research examining the structure and fabric of life on earth.

December 10, 2011. A research team led by Prof. Kam-bo Wong of the Centre for Protein Science and Crystallography, School of Life Sciences at The Chinese University of Hong Kong (CUHK), has released its research results that show how a bacterium, Helicobacter pylori, that infects half of the human population, causing peptic ulcers and stomach cancer worldwide, manages to survive in the acidic environment of the human gut.

December 12, 2011. The detailed architecture of a crucial component of a protein linked to the bone development disorder cherubism, and involved in a myriad of cellular processes, has been identified by the Samuel Lunenfeld Research Institute's Drs. Frank Sicheri, Tony Pawson and Sebastian Guettler, in collaboration with Dr. Robert Rottapel at the Ontario Cancer Institute.

December 14, 2011. Cornell scientists, led by Chae Un Kim using the Cornell High Energy Synchrotron Source (CHESS), have gained new insight into the underlying mechanisms of how protein structures change at low temperatures. The protein dynamical transition was probed by temperature-controlled X-ray protein crystallography, with results suggesting that the protein dynamical transition was enabled by motional freedom provided by surrounding water molecules.

December 14, 2011. Vladimir Yarov-Yarovoy, an assistant professor of physiology and membrane biology at the University of California Davis School of Medicine, drew on X-ray crystallography and experimental data to discover a new way to foster drug development that could lead to new treatments for pain and neurological conditions such as epilepsy.

December 16, 2011. A team of researchers, led by Wladek Minor at the University of Virginia with Soheila Maleki from the U.S. Department of Agriculture and Heimo Breiteneder from the Medical University of Vienna, determined that the emerging cutting-edge use of a recombinant, or artificially produced, protein in diagnostic tests may not be a suitable replacement for the natural protein Ara h 1, one of the major peanut allergens.

December 20, 2011. An international research team headed by DESY scientists from the Center for Free-Electron Laser Science (CFEL) in Hamburg, Germany, and led by Dr. Anton Barty and Prof. Henry Chapman, has recorded the shortest X-ray exposure of a protein crystal ever achieved. The incredibly brief exposure time of 30 femtoseconds opens up new possibilities for imaging molecular processes with X-rays.

December 20, 2011. In the winter issue of Wellcome News, Dr Liz Carpenter - from the Structural Genomics Consortium in Oxford - shares the toil and triumph behind using X-ray crystallography to obtain the first structure of a human integral membrane protein.
New York Structural Biology Discussion Group. Registration is free, but may be limited by room size. Rigaku believes that this is an excellent meeting and highly recommends it to anyone who has a chance to attend.

Funny Video
Holiday Party Tricks

http://www.youtube.com/watch?v=i_T3lxxTWxc

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Lab in the spotlight: Privé Lab

Dr. Gil Privé
Senior Scientist, Ontario Cancer Institute
Professor, University of Toronto
Department of Medical Biophysics
Department of Biochemistry

The Privé Lab is interested in protein structure, molecular recognition, transcriptional repression and membrane proteins. Most projects have the theme of understanding protein-protein, protein-peptide and protein-lipid interactions at the molecular level and relating this to function. They use biochemical and biophysical techniques, including X-ray crystallography.

Useful links for crystallography

Protein Explorer in Jmol (Jmol.ProteinExplorer.Org) — a Jmol version of the original Protein Explorer ported and greatly enhanced by Bob Hanson.

Selected recent crystallographic papers


Overexpression, purification, crystallization and preliminary X-ray crystallographic analysis of the periplasmic domain of outer membrane protein A from Acinetobacter baumannii. Park, Jeong Soon; Lee, Woo Cheol; Choi, Saehae; Yeo, Kwon Joo; Song,


**Book review:**

*The Better Angels of Our Nature*  

Pinker is a professor of psychology at Harvard University. He is the author of several books including *The Blank Slate* and *The Stuff of Thought*. I started reading this as soon as I heard an interview with Pinker on *Science Friday*. Since then it has been discussed in *Nature*, *The New York Times*, and *Scientific American*. Like his other books, *The Better Angels of Our Nature* is long but well written and very well referenced.

Pinker proposes the hypothesis that we are living in a time when we are less likely to die at the hands of another human than other time in history. He spends several hundred pages providing copious evidence to support why he thinks this is true. When you consider that certain warring tribes have kill rates as high as 25%, this is an astounding turn of events. You are thirty times less likely to die a violent death in Europe than 500 years ago. You can cheat and read the *Nature* summary by Pinker but you will miss all the data that help support the author’s hypothesis.

Pinker suggests that there are five changes in human culture responsible: the formation of states, gentle commerce, feminization, humanization and reason. The formation of states, *The Leviathan* from Hobbes’ book of the same name, is important because the state gains a monopoly on violence. This can be detrimental, as in the case of totalitarian regime, but beneficial in a democracy. The state has the ability to make the punishment for the crime harsher than the crime itself. The return on the crime is diluted and, therefore, no longer as appealing.

Pinker believes gentle commerce is important because it is costlier to take that which does not belong to you than it is to trade equitably for it. In other words, you are more likely to die in the process of taking something than while trading for it. If you have something to live for, let’s say a family, it makes sense to trade rather than take.

The next notable change is the feminization of society. This is important because women are less prone to violence. Pinker lists a number of reasons for this related to the large investment women have to make in ensuring their genes are passed down. Also important is the fact that since women have gained control of their reproductive faculties they can contribute to society at much higher levels ... reducing violence.

The author suggests that the development of humanization is important but could not happen until the printing press became available. The ready availability of books allowed people with time, usually upper classes, to begin to think about what life was like for others. This empathy allows for changes in attitude about oneself and others. Also included in humanization are self-control and morality. Although, like *The Leviathan*, morality can be misused, resulting in more violence rather than less.

Finally, Pinker suggests we are getting smarter as a race. He uses the Flynn effect as an example; that is, the renormalization of IQ tests to maintain a mean of 100. We are learning to reason better and faster, which reduces violence through the previous four changes. Pinker is optimistic that violence will continue downward. I am not so optimistic because, in order for violence to keep reducing, we will need to keep improving our ability to reason, as a species, and there are clearly forces working against us in the form of fundamentalism and conservatism.