

[MO-A12]

(DCMMP/DPMCM)

**Scientific Images in the Public Sphere / *Les images scientifiques
dans la sphère publique***

MONDAY, JUNE 14

LUNDI, 14 JUIN

10h30 - 12h30

[Room/Salle : Ballrooms B/C]

Chair: M. Campbell, U. Waterloo

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PHYSICS IN CANADA

May / June 2004

MO-A12-1 10h30**F. PETER OTTENSMEYER**, University of Toronto*Images of the Invisibly Small: from Atoms to Biomacromolecular Structure and Function*

In the last four decades developments in instrumentation in electron microscopy, in techniques and in specimen preparation have made it possible to image proteins such as the insulin receptor, nucleic acids, peptides such as vasopressin, and even individual atoms such as palladium, iodine and sulphur. While some of the images of these small things are spectacular, and even beautiful, it is another challenge to derive the 3D structure of biomacromolecules and their complexes from such 2D representations of reality. Over the years a number of image processing approaches for 3D reconstruction were developed, and are still being improved, for structures with high internal symmetry, or lateral 2D symmetry, or one or a few highly preferred orientations, or for structures that were completely randomly oriented when imaged. In some instances the images were sufficient to derive atomic coordinates, such as for bacteriorhodopsin; but such resolution detail has not been achieved in general. Nevertheless, even at lower resolution, the structures derived serve as crucially important 3D templates of the complexes into which to fit smaller component domains for which the structures have been solved by x-ray crystallography or NMR. While such a construct is still a static entity, for some the structure itself has led to an understanding of their function, and of the chemistry and the mechanics by which that function is carried out. From initial microscopy to the final 3D mechanism, this process of discovery is driven by images, and so is accessible and understandable in principle by all.

MO-A12-2 11h00**AUSTIN ROORDA**, University of Houston College of Optometry*From Telescopes to Ophthalmoscopes: Adaptive Optics for Microscopic Imaging of the Living Eye*

Adaptive optics (AO) describes a set of techniques to measure and compensate for optical aberrations that cause blur in images. AO was invented to remove the blur in astronomical images from ground based telescopes caused by phase distortions caused by turbulence in the earth's atmosphere. In the last decade, the same techniques have been applied in ophthalmoscopes to correct for optical aberrations of the human eye. Using AO, microscopic features, such as single cone photoreceptors and dynamic blood flow in the smallest capillaries, are revealed in the eye. The most important aspect of AO imaging is that it offers noninvasive imaging for living, functioning eyes, which facilitates efforts to relate structure to function. Applications range from the study of basic visual processes to the identification of phenotypes for specific genotypes of blinding eye diseases. In this talk, will describe the techniques, discuss the applications and, of course, display the images.

MO-A12-3 11h30**CAROL CHRISTIAN**, Space Telescope Science Institute*Public Impact of Scientific Images: Examples from Space Science*

Public interest in scientific findings can be greatly enhanced through the use of imagery augmented with suitable background materials. As an example, Space Scientists (astronomers, solar system experts, etc.) have learned that persistent dissemination of new results, showcased through imagery, can have a positive effect on the support of their discipline by federal agencies. Today, the physical sciences must compete with healthcare, security, and social science issues to obtain suitable funding. The use of imagery is one powerful tool that can be used to raise public awareness, improve public perception of science and thereby garner fiscal stability for basic research.

MO-A12-4 12h00**MICHAEL BRONSKILL**, Sunnybrook and Women's College Health Sciences Centre, University of Toronto*Imaging Physics Meets Public Perception: Is Private MRI Bad?*

The clinical applications of NMR in the form of magnetic resonance imaging (MRI) have now matured over twenty years. Their impact and significance have already been recognized with two Nobel Prizes in Medicine. Originally implemented to provide detailed anatomical images of soft tissues, clinical MRI is now developing capabilities for obtaining much more sophisticated information about the human body by measuring physiological functions and by providing guidance and monitoring of interventions and therapies. These capabilities will be illustrated briefly with some examples of MR angiography, functional MRI of the brain, and monitoring of temperature during experimental thermal therapy. Despite these remarkable capabilities, MRI remains a curiously restricted resource in the Canadian health care system. The history and logic behind this fairly rigid control of MRI systems will be examined, using the situation in Ontario as the prime example. At a time when public expectations of high technology medical imaging are fueled by instant Internet knowledge, does this pattern of restriction make sense? Is there economic evidence that MRI is too expensive for mainstream Canadian medical practice? In particular, the media representation of "private" MRI as a potential violation of the universality of Canadian health care became a political issue in the recent Ontario provincial election. This concept will be explored in an attempt to determine whether private MRI really is bad.

12h30 Session Ends / Fin de la session