



## **Funding awarded for a new multi-photon confocal microscope:**

Dr. Lantz has received official notification from the Department of Defense that his application for funding for a new multi-photon confocal microscope has been approved. The Vice President for Research and the College of Medicine will be providing additional funds for this state-of-the-art microscope. In the next few months we will be evaluating the commercially available instruments, going out for bid and then selecting the best instrument that we can afford. More details should be available in the summer newsletter.

## **What is a multi-photon confocal microscope?**

The confocal microscopes that are currently available on campus all use the same principle. An intense light source (*laser*) of a selected wavelength shines on a specimen and excites a fluorescent dye. The dye emits light of a longer wavelength, which is detected by a photomultiplier tube. The presence of pinhole in the optical pathway allows the confocal to create a digital image that is composed of only the light from the in-focus portion of the image.

A multi-photon confocal microscope can operate in a similar mode as described above (*sometimes referred to as single-photon confocal microscopy*), but with the addition of a pulsed infrared laser it can operate with some distinct advantages. The principle is that the combined energy of two or three infrared photons, if they arrive in the plane of focus at essentially the same time, can be summed to equal the amount of energy of a single photon of shorter wavelength light. This means that infrared light can be used to excite many of the commonly used fluorescent dyes. This also means that the only place that the fluorescent dye is excited is in the plane of focus, since anywhere else in the specimen there are only single photons of infrared light. Since the plane of focus is the only place in the specimen that is fluorescing, multi-photon confocal microscopes can operate without a pinhole in the optical pathway. The instrument can then collect all the light coming from the specimen.

## **Advantages of multi-photon confocal microscopy:**

- Photo-bleaching of the fluorescent dyes is greatly reduced, since the only place in the specimen that the dye is excited is in the plane of focus.
- Operating without a pinhole increases the efficiency of the instrument in gathering the light from the dyes.
- Infrared wavelengths can penetrate somewhat deeper into the specimen than visible light wavelengths.
- Photo-damage to the specimen is reduced, making the instrument better for live cell work.

## **Disadvantages of multi-photon confocal microscopy:**

- Tuning the > \$150,000 pulsed infrared laser will require the services of an instrument operator, making the hourly fees for operating in this mode much higher.
- Only certain fluorescent dyes can be excited by the multi-photon principle.
- Operating without the pinhole does reduce the optical resolution of the instrument.

## **Deconvolution microscope coming:**

A generous private donor to the College of Medicine has provided funding for a deconvolution microscope, to be placed in the department of Cell Biology & Anatomy. Deconvolution is a computationally intensive method for acquiring crisp images of fluorescently stained specimens. Drs. Antin & Gregorio of CBA wrote the successful in-house proposal. More details will be available after the instrument has been installed in the next few months.

## **Histology Lab fee increases:**

The department of Cell Biology & Anatomy recently sent out a letter announcing that the fees for certain procedures would be changing, effective May 1, 2001. Copies of the letter and a comparison of the old & new fee schedule are available in the Histology lab. See the lab's web site at: <http://www.cba.arizona.edu/histology-lab.html>

### **Contacts:**

R. Clark Lantz, Ph.D.  
Douglas W. Cromey, M.S.  
Claire M. Payne, Ph.D.  
Kathleen Kunke, B.S.

Core Director  
Core Manager

626-6716  
626-2824  
626-2870  
626-5514

LSN 447  
AHSC 4212A  
AHSC 6111  
LSN 625

[clark-lantz@ns.arizona.edu](mailto:clark-lantz@ns.arizona.edu)  
[cromey@arizona.edu](mailto:cromey@arizona.edu)  
[claire-payne@ns.arizona.edu](mailto:claire-payne@ns.arizona.edu)  
[kathleek@u.arizona.edu](mailto:kathleek@u.arizona.edu)