

# IU's Light Microscopy Imaging Center aiding researchers, drawing wows: [www.heraldtimesonline.com](http://www.heraldtimesonline.com)

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Every day, cutting-edge work done in the Light Microscopy Imaging Center at Indiana University gives researchers insight into areas that can range from cell biology and construction to the path of neurons through a slice of brain tissue.

Sometimes what comes out of a powerful microscope and digital photography system may be of marginal use to research but looks really, jaw-dropping cool.

Executive director Claire Walczak and manager Jim Powers acknowledged this week that the wow factor is always fun, as is the constant challenge of harnessing the technological advances in optics and computer imaging software.

But their reason for existing provides ample gratification — giving researchers across the institution access to state-of-the-art light microscopy systems and instruction on how to use the complex and expensive equipment.

"We're still relatively new as a campus entity, just two years old this July," Walczak said. "We don't doubt that there are still areas within the university that don't know we exist and that we are here to serve the entire campus."

Center managers also are parents of local school students and offer their expertise and services to science education projects in the Monroe County Community School Corp. when asked.

The most likely IU disciplines to use the Light Microscopy Imaging Center in Myers Hall already are customers: primarily graduate students in biology, neurobiology, medical science, optometry, chemistry and the School of Medicine. As a campuswide service, the center charges researchers to use the facility and its instructional services but at a rate greatly less than what one might expect for time on machines and work stations that can cost a half-million dollars or more.

The imaging center is one example of how the university can save money through centralization. While centralization is not the solution for every problem or challenge, in this case, it brought together microscopes from various departments, some seldom used, and paired them with sophisticated imaging systems. And it put the expertise to conduct light microscopy imaging in one place. While Walczak and Powers acknowledged their own talent and expertise in the lab, both said technical director Sid Shaw, who wasn't present for the interview, "scares people."

"We had a high-res (resolution) microscope that Sid ripped apart and upgraded, for about \$100,000, into a \$500,000 microscope," Walczak said with a laugh. "He met with people from (camera and lens manufacturer) Nikon a while back and they were asking him questions."

The various microscopes and imaging equipment stations in the lab each have strengths and weaknesses, which makes Powers' job in managing the facility crucial. Live organisms require systems that can capture a usable image using the least light possible, while other applications have a critical need for the highest resolution.

One machine uses a robotic component to grab trays with multiple cells of living organisms from an incubator and place them under a microscope and imaging system that can perform thousands of functions.

"The bottleneck used to be in the imaging. It was hard to get the proper image but when you did, the analysis was not the demanding part. Now it's reversed," Walczak said. "You can program the imaging to the point you can get so much information that the analysis can be overwhelming."

Through the use of color filters and, sometimes, the introduction of certain proteins, the microscopes and computer software can spit out images that are dazzling in their color, shape and texture. Powers called up an image of a rat's brain tissue, for example, that showed a twisting, irregularly shaped blue rope snaking through brain tissue. Then he rotated it in three dimensions on the computer screen, showing how a researcher could examine the image from various perspectives.

In another image, the fibers within the cell of a common weed, colored purple, look like a luxurious shawl.

"Actually, our cameras are black and white, so all these colors are added by the computer so that we can compare locations of differently labeled structures," Powers explained. "Only the plant leaves have color; the other samples are really colorless. We stain different proteins with different labels, take the picture in black and white, then tell the computer what color to make the digital image."

Some of the simplest and tiniest things can engender a gee-whiz response from the seasoned technology team.

And then, there's always the teaching aspect and the regular phenomenon of experiments gone wrong. Many of the approximately 170 researchers signed up to use the lab are just learning how light imaging can enhance their research.

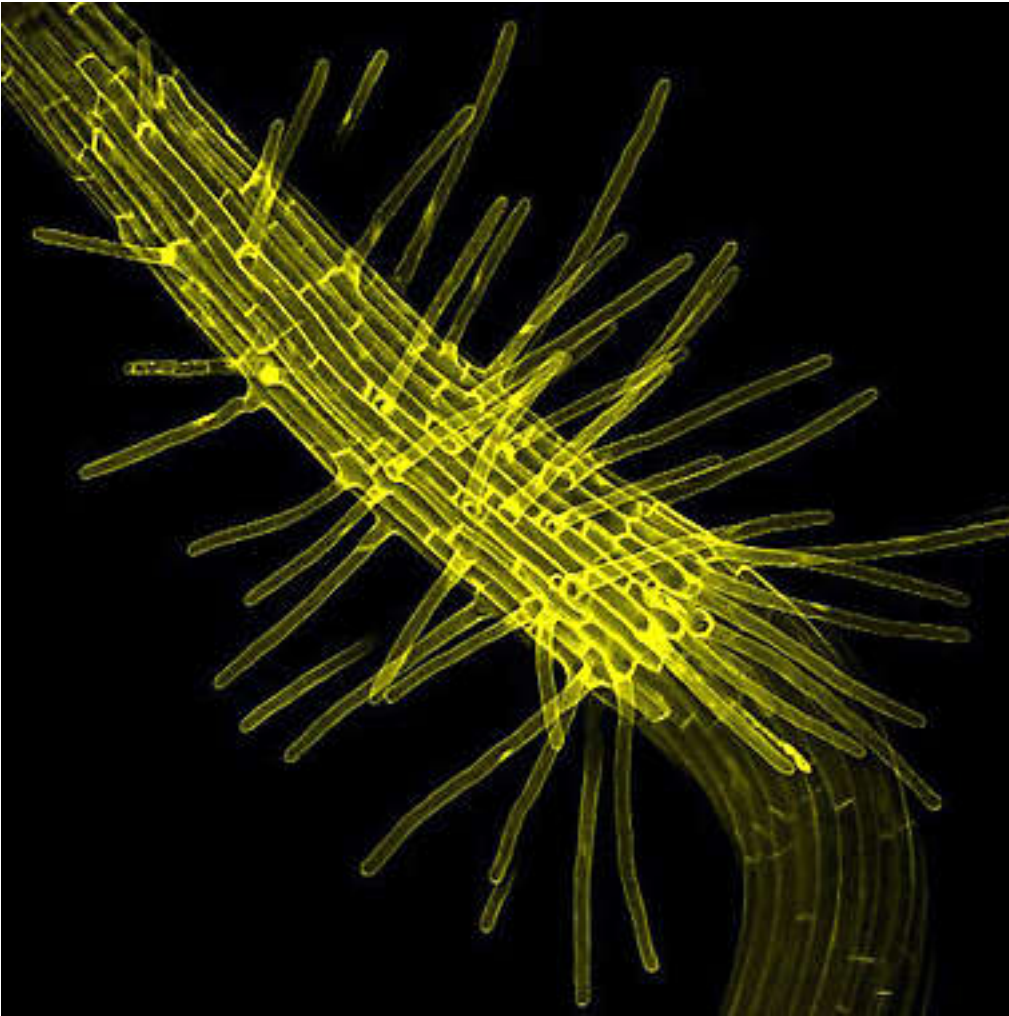
"Jim's job needs a calm personality," Walczak said. Sometimes, for example, a student has either constructed a sample improperly or failed to maintain it correctly, or has committed any number of other sins of commission or omission. As in any laboratory, that can lead to extreme frustration under a deadline.

"When there's a problem, my first question usually is, 'Is it your problem or my problem?'," Powers said with a grin.

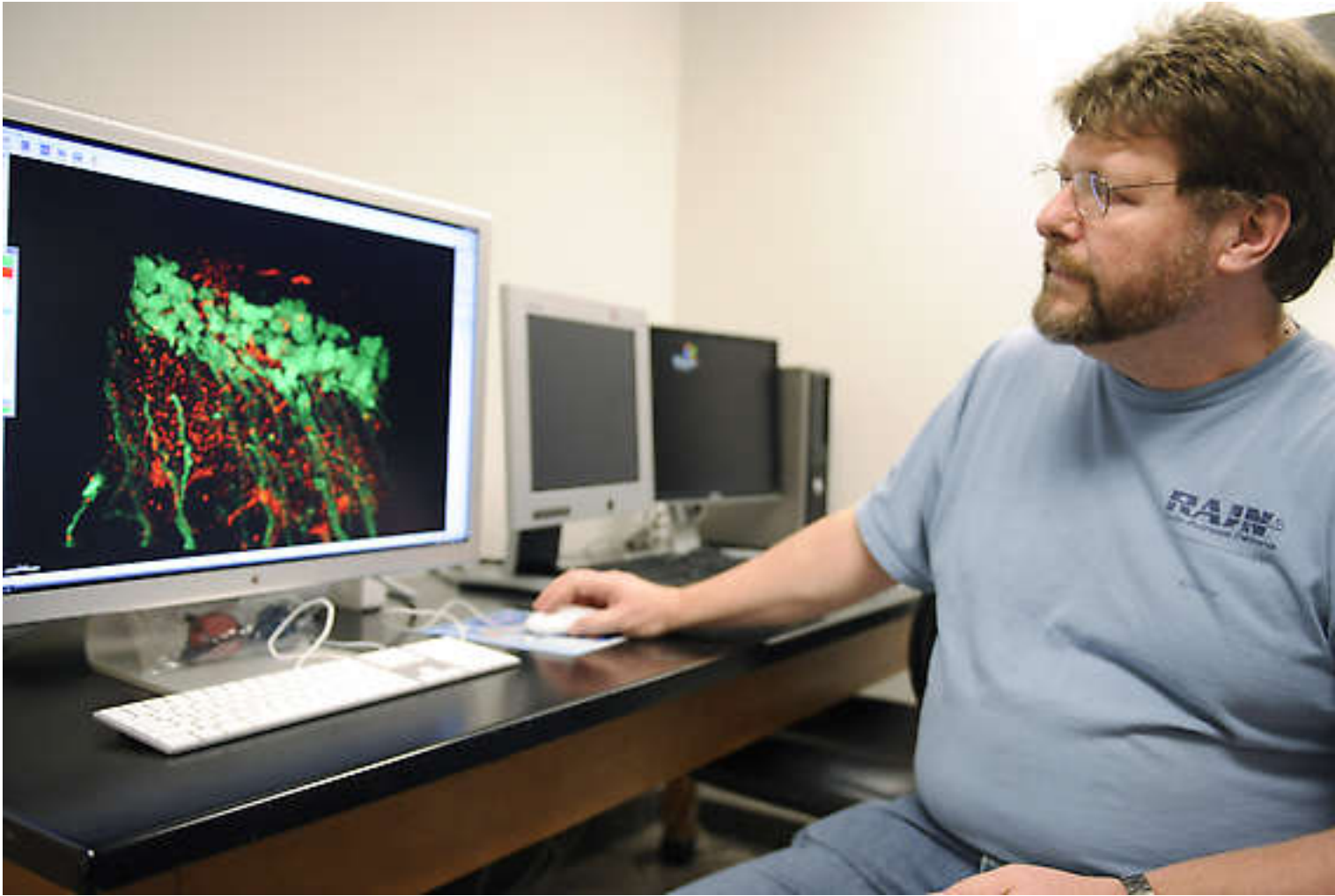
First leaves of an arabidopsis seedling. Jessica Lucas | IU Light Microscopy Lab



Root hairs of an arabidopsis plant. Jessica Lucas | IU Light Microscopy Lab



Jim Powers displays a three-dimensional image of mouse brain tissue from a research project photographed at the Light Microscopy Imaging Center at Indiana University.  
Monty Howell | Herald-Times



This is a kidney cell from a potoroo, a small marsupial related to the kangaroo. In red is the DNA in the cell nucleus; in green are fibers that are part of the cell skeleton. Madhura Kadaba | IU Light Microscopy Lab

