January 2025: Volume 2, Issue 1

Happy New Year

THE IRF INSIDER

University of South Carolina School of Medicine
Instrumentation Resource Facility
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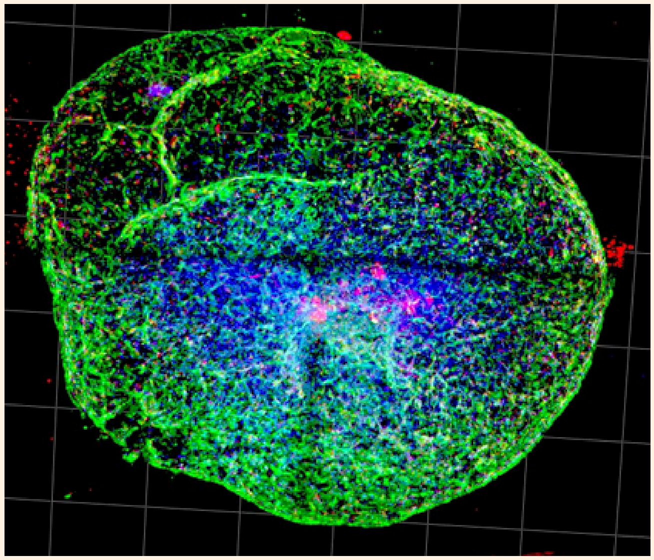
In Case You Missed It

- The IRF hosted two Lunch & Learns towards the end of the semester. These were focused on the new Zeiss Lightsheet 7 microscope and the ThermoFisher QuantStudio Absolute Q. Both of these were very well attended with great questions and discussion. Looking forward to our 2025 Lunch & Learns!

- Dr. Ahmed Mohammed is no longer with the IRF as the EM and Flow Cytometry expert. We will be hiring a Research Specialist for these areas, however, if you have questions regarding these areas in the meantime, please contact Dr. Jason Kubinak (Flow) or Ryan Ball (EM).

- The IRF has unveiled a new travel grant (sponsored by the Dr. Robert L. Price Instrumentation Resource Facility Endowment Fund). To date, we have only had a single applicant. Apply now for the Spring cycle of awards!

- The IRF did a soft launch of the new Zeiss Lightsheet 7 microscope. This was a great success with a variety of specimen provided to image. Beginning January 1st, imaging performed on the microscope will be charged. This system will be run as assisted use only. Contact Anna Harper for questions!



Organoid from Dr. Tan
Imaged by Anna Harper
Zeiss Lightsheet 7

Be the First to Know!

Welcome to the *IRF Insider*, brought to you by the USC Instrumentation Resource Facility. In this newsletter, we recap what you missed, give updates on upcoming events, highlight our state-of-the-art equipment, and give you bits of knowledge. We hope you enjoy!

- The IRF has two exciting new pieces of equipment arriving this spring.
    - The **Leica UC Enuity ultramicrotome** represents a new generation of efficiency and precision, saving you time and resources with its advanced automated setup and state-of-the-art sectioning quality for TEM samples. Designed to streamline ultramicrotomy tasks, UC Enuity eliminates complex manual setup steps with features like autoalignment, which automatically aligns the block face and knife. Its intuitive user interface and automated functions ensure consistent, high-quality results while reducing the need for extensive user training. Critical sample preparation steps, including high-quality ultra-thin sectioning, are now automated, empowering all lab users to achieve exceptional results with ease.
        - Delivery: *January* - Location: *SOMC B51*
    - Unlock the future of fluorescence imaging with the **Leica Stellaris 8 with TauSTED,** a cutting-edge confocal microscope that combines unparalleled resolution with advanced photon efficiency. Powered by TauSTED technology, it delivers sharper images, deeper insights, and exceptional performance for your most demanding applications. Whether you're exploring complex cellular structures or conducting high-resolution molecular studies, the Stellaris 8 redefines what's possible in fluorescence microscopy. Experience clarity like never before—transform your research with the Stellaris 8!
        - Delivery: *Late Spring* - Location: *Main Campus Microscopy Core until new HSC is completed.*

Have You Used This Yet?

Mosquito Face

JEOL JSM IT100 Scanning Electron Microscope
IRF Location: B59

- Experience precision and versatility with the JSM IT100 Scanning Electron Microscope (SEM), designed for biotechnology, nanotechnology, materials development, and quality control. This compact, all-in-one system offers:
  - High-Resolution Imaging: 3.5nm (secondary) and 10nm (backscatter), with magnifications from 5X to 300,000X.
  - Enhanced Flexibility: Motorized X-Y stage, eucentric tilt (-5° to +90°), 360° rotation, and sample sizes up to 5 inches.
  - Advanced Control: Adjustable accelerating voltages (0.5-30kV) and preset Z working distances.
  - Comprehensive Software: Vision Software Package for advanced imaging and analysis.
- Perfect for imaging biological surfaces, studying cell interactions, and visualizing surface molecules. The JSM IT100 delivers precision for all your research needs. Unlock your potential today!

Read This Today!

The use of fluorescence in imaging has been a pivotal factor in advancing our scientific understanding. As microscopy continues to evolve, the terminology used to describe these techniques becomes increasingly complex, often resulting in a bewildering array of acronyms that resemble alphabet soup. Among the most prominent acronyms are those associated with advanced fluorescence microscopy techniques: Fluorescence Loss in Photobleaching (FLIP), Fluorescence Localization after Photobleaching (FLAP), Fluorescence Recovery after Photobleaching (FRAP), Förster Resonance Energy Transfer (FRET), and Fluorescence Lifetime Imaging Microscopy (FLIM). Each of these methods provides invaluable insights into molecular dynamics and interactions within living cells and tissues. This article, Part 2 of the Alphabet Soup of Microscopy series, aims to clarify these widely used fluorescence microscopy techniques and to illuminate their contributions to our understanding of cellular processes.

Austin N Worden, The Alphabet Soup of Microscopy: An Introduction to Advanced Imaging Techniques. Part II: What the FLIP, FLAP, FRAP, FRET, and FLIM is Going On?, Microscopy Today, Volume 32, Issue 5, September 2024, Pages 53–57, https://doi.org/10.1093/mictod/qaae065

Science MEME Quarterly

Quote Corner

"Equipped with our five senses - along with telescopes and microscopes and mass spectrometers and seismographs and magnetometers and particle accelerators and detectors sensitive to the entire electromagnetic spectrum -we explore the universe around us and call the adventure science."

-Edwin Hubble, American astronomer

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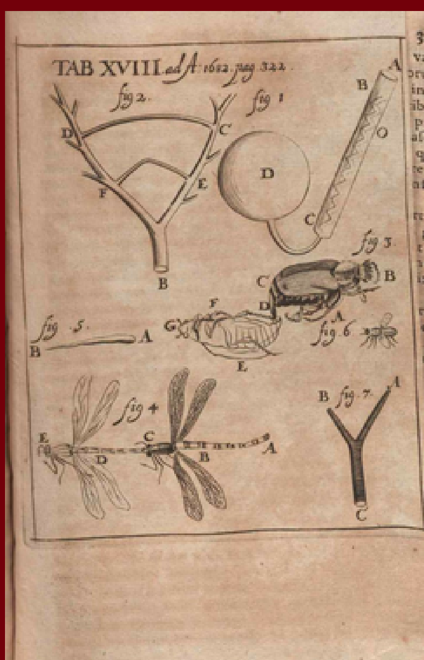

Leeuwenhoek's Illustrations

Leeuwenhoek's Microscope

Microscopy History

1675: Antonie van Leeuwenhoek, known as the "Father of Microbiology," was the first scientist to observe bacteria using microscopes he designed and built, with lenses capable of magnifications from 50x to 300x. He famously studied "animalcules" (bacteria) from sources like rainwater, ponds, and the human body. In 1677, he described spermatozoa from insects, dogs, and humans, while also making groundbreaking observations on optical lenses, muscle striations, insect mouthparts, and plant structures, even discovering parthenogenesis in aphids. He extended Marcello Malpighi's work on blood capillaries, provided the first accurate description of red blood cells, and observed that yeast consists of minute globular particles. In 1702, while studying rotifers, he noted the ubiquity of microscopic life, observing that "animalcules" can be carried by the wind and found in all standing water. Leeuwenhoek's meticulous work laid the foundation for microbiology and cell theory.

In Other News

- Starting in 2025, the IRF will strictly enforce the Core Usage Guidelines to ensure the safety, cleanliness, and proper functioning of all equipment for every user. We encourage you to review these guidelines by clicking here. Thank you for your cooperation in maintaining a safe and efficient research environment!
- The Southeastern Microscopy Society is excited to host its 2025 Annual Meeting right here in Columbia! If microscopy plays a role in your research, we highly encourage you to attend this fantastic event. Don't miss this opportunity to connect with peers, share your work, and celebrate excellence in microscopy!
  - **Accommodations**: Learn more about lodging and venue details here.
  - **Robert Simmons Micrograph Competition:** Showcase your best microscopy image for a chance to win! Find out how to submit your entry.
  - **Ruska Award Student Competition:** Students are invited to compete for this prestigious award. Learn how to participate.
- It is vastly important that the IRF is acknowledged in publications and grants as we fight for more funding. Please use the QR code below labeled "Acknowledgement Guide" and follow the instructions to use our prefabricated statements.

Want more information? Scan or Click the QR Code!

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