

MICHIGAN

BIOLOGICAL IMAGING CENTER



The digital imaging workstation at the MBIC; light microscopy in 4 dimensions.



The Michigan Biological Imaging Center (MBIC) has been providing state-of-the art image analysis since 1983 under the aegis of the College of Arts & Sciences at Western Michigan University. The facility is directed by Dr. Rob Eversole. The MBIC provides comprehensive scientific/ technical imaging expertise to Michigan academic and industrial investigators as well as educational programs and training for undergraduate and graduate students. The facility has a strong track record in providing drug safety and efficacy data at the cellular level to pharmaceutical industry clients.

SERVICES

Our facilities are operated under the federal guidelines of Good Laboratory Practice (GLP) in order to serve those clients who require Food and Drug Administration approval. Imaging in biological specimens and/or molecules starting from the animal, cell and/or in vitro synthesis through image interpretation and publication is provided on a fee-for-service basis. We specialize in protocols for transmission electron microscopy, scanning electron microscopy, confocal laser scanning microscopy, 3D wide field fluorescence microscopy and general light microscopy. This includes services pertaining to tissue handling and fixation, rapid freezing technology, fluorescent probes and compartment-specific, as well as molecular-specific

probes. Board-certified pathologist Dr. Charles Mackenzie provides evaluation at the histological and ultrastructural levels.

EQUIPMENT

Light microscopy equipment includes a Nikon Microphot FXA with complete optics for bright field, dark field, phase contrast, differential interference contrast and epi-fluorescence microscopy. The highest numerical aperture objective lenses are available for both oil and water immersion specimens. A Nikon Diaphot TMD inverted microscope with long working-distance lenses for Hoffman modulation, phase contrast and fluorescence microscopy is available. These microscopes are both digital and analog capable for image acquisition with digital imag-

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ing in four dimensions (x, y, z and t). Digital capture can be accomplished in video, (Javelin RGB: color, Hamamatsu BW) or digital cooled CCD (Hamamatsu C4742-95). The digital camera has high resolution and low light (sub-visual) capability. These devices are coupled to a Datastor pentium III processor through a Mutech Imaging board. Digital acquisition and processing is done utilizing Metamorph software from Universal Imaging Corporation.



Feeding adult nematode on the surface of the intestine captured by prototype 2-photon laser scanning confocal microscope (Eversole, R., Zipfel, W. and Webb, W.)

The latest addition to photonic imaging is a state-of-the-art Zeiss LSM 510 laser scanning confocal microscope. This instrument is on an Axiovert 100 M inverted microscope equipped with DIC optics and a full range of high quality lenses including the highest resolution lenses for both oil (N.A. 1.4) and water (N.A. 1.2) immersed specimens. Currently available laser lines include 488nm, 565nm and 633nm. The scan head is equipped with the necessary elements for 3 confocal channels for emission/ reflectance and transmitted light.

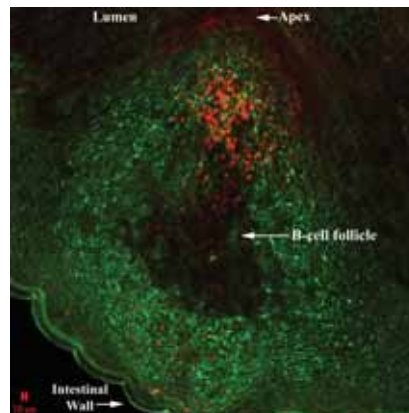
The BIC is equipped with a transmission electron microscope (TEM) made by JEOL that is a model 1230 TEM with a Gatan Digital Imaging System (1024 x1024 pixel). This instrument has special lensing for high resolution-high contrast imaging in biological samples. Our scanning electron microscope is an ISI-DS 130



Lee Honors College student Katrina Thelen working in the MBIC as an undergraduate research associate.

with a macro stage that can work with specimens up to 6 inches in diameter. The upper stage has STEM capability. This instrument is equipped with a Robinson backscatter detector and an elemental analysis and mapping system from KEVEX. All electron optics in the BIC are under OEM service contracts.

The BIC has the latest equipment for sample preparation, microtomy, ultramicrotomy, tissue handling and cell culture within our facilities. This includes the necessary incubation, refrigeration and freezer space for sample handling and archival all contained within the security of the BIC facility.



Laser scanning confocal image of Peyer's patch from rats infected with *Nippostrongylus brasiliensis* where dendritic cells are labeled green (FITC anti-S-100) and eosinophils are labeled red (Biebrich scarlet).

ACCESS

All of the microscopes except the JEOL 1230 transmission electron microscope are accessible to clients upon determination that they are qualified to operate them. To facilitate access, the latest user friendly systems are utilized, and training sessions on the operation of workstations are available as needed. The JEOL 1230 transmission electron microscope is always operated by core facility personnel, however, customers may work alongside of core facility operators so that they may directly observe their samples being analyzed.

CONTACT INFORMATION

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