Winter 2020

AIF News

Advanced Imaging Facility Newsletter

In this issue:

- Introduction
- New Zeiss confocal installed
- Techno bite - Deconvolution
- Microscopes in AIF
- Camera workshop
- Dates for diary

Introduction

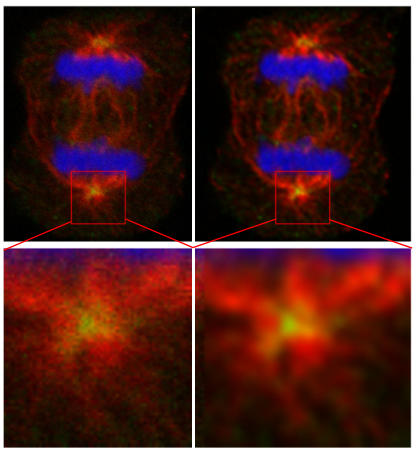
In front of you the third AIF News, the newsletter from the Advanced Imaging Facility. The AIF is the light microscopy facility of the College of Life Sciences. It is part of the Centre for Core Biotechnology Services (CBS) and managed by Dr Kees Straatman (krs5, 7085). It provides access to and support for advanced light microscope systems for researchers and students, including undergraduate students.
Website: www.le.ac.uk/advanced-imaging-facility
Academic lead: Dr Kayoko Tanaka, Department of Molecular and Cell Biology.

New Zeiss confocal installed

I have been busy with the installation of the new Zeiss Airyscan confocal laser scanning microscope funded by the BBSRC ALERT18 call in the HWB. This meant that we had to say farewell to our Leica SP5 CLSM, which was purchased in 2006 on a Wellcome Trust grant to Prof Andrew Fry. This system has served us well over the years and resulted in many publications but it became now time to upgrade to a faster imaging system with super resolution capability.
We have obtained some nice images using the new super resolution options but have also come across some problems which we now try to solve in collaboration with Zeiss. We hope to have the system fully operational soon.

Techno bite - Deconvolution

When obtaining images using an optical microscope we end up with images that are degraded by blurring and noise, in a process called convolution. The blurring is largely due to diffraction, the noise is mostly shot noise. Shot noise $=\sqrt{Signal}$. So the weaker the signal the more effect shot noise will have. This is especially the case in fluorescence microscopy where we often work with a limited number of photons. This means that resolution of the resulting image is compromised and fine details are lost. We can improve/restore the contrast and resolution by an image processing technique called deconvolution. Nearly all fluorescence images can be deconvolved, including confocal images and our new Zeiss Airyscan system also uses deconvolution to obtain the final super resolution image. AIF has **Huygens Essential Deconvolution** software available.



Single optical section obtained using the Olympus FV1000 CLSM. Left before, right after deconvolution using Huygens Essential deconvolution software available in AIF. Inset enlarged on second row.

Microscopes in AIF

Microscope	Location	Use
Nikon Confocal microscope C1si	RKCSB	F
Nikon TE300 wide field microscope 1	HWB	F
Nikon TE300 wide field microscope 2	EM facility Adrian Building	F
Nikon Eclipse Ti microscope	MSB	C,F,H,L,Sr
Nikon Eclipse Ti microscope	HWB	F,H,L,Sr
Olympus Scan^R/Cell^R	Adrian Building	F,H,L
Olympus confocal microscope FV1000	Adrian Building	F,L, Sr?
Olympus Cyto-system	Adrian Building	F,H
Olympus LV 200 bioluminescence system	MSB	B,L
PerkinElmer Vectra Polaris slide scanner	RKCSB	F
Phasefocus Livecyte label free imaging system	Adrian Building	F,H,L
VisiTech-Infinity3 confocal laser microscope	HWB	F,L,Sr
Zeiss LSM 980 Airyscan2 confocal	HWB	F,H,L,S, Sr
Zeiss Multi-photon microscope	MSB (Currently out of use)	F

B = Bioluminescence; C = Colour camera available F = Fluorescence; H = High content screening; L = environmental chamber for live cell imaging; S = Super resolution imaging (Direct); Sr = Super resolution imaging (via SRRF). All system can acquire bright field images.

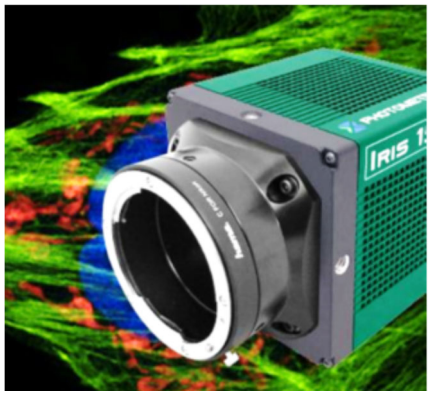
Camera Workshop

Photometrics will be visiting University of Leicester on Tuesday 24th March to hold educational camera comparison sessions which will be held in HWB room 0/40B. They will demonstrate the latest back illuminated sCMOS, which have 95% QE for the ultimate in sensitivity, and explain how this differs to the technologies used before. Please stop by to:

- Learn more about the differences between CMOS cameras and CCD/EMCCD's
- Test the latest 95% sCMOS cameras
- Discuss which technologies are most relevant to you

They will provide an overview of different camera types and the advantages they offer for your applications in terms of resolution, speed, field of view and signal to noise. They will show how to optimize settings, how to calculate noise and how to calculate signal. If you are a frequent microscope user doing quantitative image analysis sign in for one of the sessions to understand the correct use of a digital camera.

To book a 1 hour slot please contact Daisy.hamilton@teledyne.com or krs5@le.ac.uk



Dates for your diary

Tuesday 24th of March – Camera Workshop

Monday 8th of June – Introduction to Image/Fiji

Tuesday 9th of June – Macro writing in ImageJ