Core Facilities Annual Report FY2011

Dr. Charles Delwiche and Amy Beaven

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Executive Summary

The Imaging Core's (IC) two confocal microscopes, a Leica SP5X and a Zeiss LSM710, saw a combined average usage of 58.8 hours per week in FY2011, which is a 5% increase over the previous year. In contrast to FY2010, when use of the two microscopes was evenly distributed, the Zeiss was used 437 more hours (roughly 14%) than the Leica in FY2011. One goal of the IC in the coming year will be to increase use of the Leica by encouraging researchers to take advantage of the microscope's unique capabilities, including a motorized stage, white light laser, high speed scanner and environmental chamber.

From FY2009 through the end of FY2011, 194 different researchers were trained to independently operate the two confocal microscopes, including students taking the 2-credit course, BSCI427/CBMG688W, Principles of Microscopy. Use of the two microscopes has already resulted in 21 publications, bringing the total number of publications made possible through the use of the IC's current and previous microscopes to at least 62.

The IC strives to keep users costs at a minimum. However, because current costs are receiving temporary subsidy associated with the acquisition of the two new microscopes, it will be necessary to substantially increase rates until subsidies end in FY2013. At the 2010 User's Meeting it was decided that rather than have a one-time large jump in costs it would be preferable to ramp up user fees to the anticipated level. A detailed analysis of the facility's finances using current and projected income and expenses shows that an 18% rate increase each year until FY2015 will be necessary to 1) help offset the expected decrease in income due to loss of subsidies in FY2013 and 2) make up for the expected increase in the cost of the Leica SP5X service contract in FY2013. The new rate of $22.00/hr for unassisted use of the confocals, which will go into effect on September 1, 2011, is still well below the average hourly rate of $39.00 seen at similar institutions with equivalent instrumentation. The ultimate hourly rate for unassisted anticipated in FY2015 is roughly $36/hour, but this will be revised based on real income and expenses.

While the IC has grown significantly in the last few years, there remains room for further expansion. Specific recommendations include: 1) An upgrade to the Leica's AOBS system and the replacement of one or more PMTs with hybrid detectors. This new technology has the potential to increase sensitivity and improve image quality, particularly for live cell imaging. 2) A new computer workstation and a reliable way to backup/store image data. Although the IC applied for and was promised funding from the Dean's to upgrade the IT infrastructure in FY2010, the facility never received this money. The IC desperately needs a new computer workstation in order to provide users with access to the Zeiss image analysis software, which does not function on the current workstation. Researchers also need a fast and reliable way to backup image data, either by uploading data to the college server or by the purchase of one or more high capacity hard drives. Acquisition of advanced image analysis software would also be desirable. In addition, the Director of the IC requires a new iMAC with a large monitor in order to complete the LSM710 Quickstart Guide.

Introduction

Established in the year 2000 by the Department of Cell Biology and Molecular Genetics, the Imaging Core (IC) was designed to enhance research and education at the University by providing students and faculty with access to sophisticated light microscopes and imaging instrumentation whose purchase and maintenance costs far exceed the budgets of individual investigators. Serving as the primary resource for advanced light microscopy in the Biological Sciences at the University of Maryland, the IC carries the mission of providing state of the art light microscopy instrumentation, training users in basic and advanced light microscopy techniques and introducing the latest technology and innovations in light microscopy.

Located in room 0107 Microbiology Building, the IC facility contains 9 rooms, five of which are dedicated microscope space, a working darkroom, office space for the Director and a wet-bench lab space with fume hood. When first established, the IC contained a single confocal microscope and a deconvolution microscope. Over the years, demand for time on the instruments increased dramatically, necessitating the purchase of a second confocal in 2008. At present, the IC contains 2 state-of-the-art confocal microscopes, a deconvolution microscope, 2 fluorescence microscopes and an automatic film processor.

The Director of the IC, Amy Beaven, oversees the routine operation of the laboratory and is available during normal business hours to provide training on all equipment, guidance on experimental design, assistance with image analysis and technician-assisted microscope operation. Since taking over the IC operation in November 2005, Ms. Beaven has trained over 346 researchers from at least ten different departments in six colleges and three different campuses of the University of Maryland.

The IC is used by a diverse group of investigators, including undergraduates, graduate students, post-docs, technicians and faculty. Students enrolled in the annual 2-credit class, Principles of Microscopy, gain hands-on experience in the operation of the IC's fluorescence and Leica SP5X confocal microscope. This course has trained an average of ten students each year for the past ten years.

Funding for operation of the IC comes from a combination of user fees and cost-sharing from the University of Maryland. The Director's salary is provided by the Department of Cell Biology and Molecular Genetics and equipment maintenance costs have been subsidized by the college, thereby providing even occasional users with appropriate training and access to instrumentation, while simultaneously, keeping instrument use costs low. We have found that this strategy provides exceptional opportunities for research and training, and enables our students to perform experiments with instrumentation that is at the leading edge of technology.

Facility Mission

The mission of the Imaging Core Facility, located in 0107 Microbiology Building, is to enhance research and education within the College by:

- Providing access to state-of-the-art light microscopy and imaging instrumentation.
- Offering detailed training opportunities and support in basic and advanced light microscopy techniques.
- Keeping researchers up to date with the latest technology and innovations in light microscopy.

Organizational Structure and Governance

- Director of the Facility: Amy Beaven
- Faculty supervisor: Dr. Charles Delwiche, Professor
- Advisory Committee: Dr. Charles Delwiche, Professor (CBMG) Dr. Ian Mather, Professor (AGNR), Dr. Stephen Wolniak, Professor (CBMG), Dr Wenxia Song, Associate Professor (CBMG)

Personnel

The Director of the Facility, Amy Beaven, is the only full-time staff member within the facility. She was hired in 2005 to manage the Imaging and Genomics Core facilities and was promoted to Director in 2010. Ms. Beaven received her Master's degree in Biology in 1999 and has over 9 years intensive experience in confocal imaging techniques. She is available during the hours of 8am-4:30pm to provide guidance in experimental design, training on all equipment, technician-assisted confocal operation and assistance with image analysis.

History of the Facility:

Amy Beaven was hired to manage the Imaging Core Facility in November 2005. She took over for the previous director of the facility, Dr. Robert Brown, who had left the University several months previously. At this time, the facility contained both Imaging and Genomics related equipment. Instrumentation included a Zeiss LSM 510 confocal microscope (0107E), a DeltaVision deconvolution microscope (0107F), an Olympus fluorescence microscope (0107), a Bio-Rad FX Pro Plus Imager, a Konica film processor (0107A), an ABI 3730xl DNA sequencer (0107H), two ABI 3100 DNA Sequencers (0107H) and an ABI 7700 Sequence Detector Real-Time PCR machine (0107H).

Summary of changes in instrumentation since November 2005

- August 2006
  - A Mini Med 90 Film Processor (cost: $3,588.00) replaced the old Konica processor. The department paid $2,500.00 of the total cost and each of the following PIs contributed $109: Jonathan Dinman, Jeffrey DeStefano, Kenneth Frauwirth, David Mosser, Anne Simon, Wenxia Song, Richard Stewart and Elizabeth Gantt. The developer is serviced monthly by United Medical.
- October 2006:
  - Dr. Steve Wolniak (Interim Chair of CBMG) procured a Zeiss Axiophot fluorescence microscope for the facility from Dr. Ron Weiner's old laboratory. A CoolSnap EZ monochrome camera, computer workstation and Nikon Elements software (total cost: $13,400.00) were purchased in 2007 for the microscope using CBMG funds.
- April 2007:
  - The 7700 Sequencer Detector was replaced with a Roche LightCycler 480 Real-Time PCR machine, which was purchased through CBMG using the Bioscience Research Building capital equipment funds.
- August 2007:
  - Due to a drop in usage, the 3100 "North" DNA sequencer was taken out of operation.
- December 2008:
  - The instruments in 0107H MICB (two ABI 3100 DNA sequencers, the ABI 3730xl DNA Sequencer and the Roche LightCycler 480 Real-Time PCR machines) were moved to the new Genomics Core, room 2229 Bioscience Research Building.
- December 2008:
  - The Leica SP5 X confocal microscope was installed in room 0107H MICB. This microscope was obtained by Dr. Ian Mather and Dr. Steve Wolniak via an NSF grant.
- October 2009:
  - The LSM510 confocal microscope was dismantled to make way for the new LSM710 confocal microscope. This microscope was purchased using College Funds, authorized by Dean Norma Allewell.
- January 2009:
  - Genomics Core Equipment: Bio-Rad CFX 96 Real-time PCR machine was purchased and placed in room 2229 BRB
- April 2010:
  - Genomics Core Equipment: Due to a drop in usage, the 3100 "West" DNA sequencer was taken out of operation.
- September 2010:
  - Dr. Charles Delwiche donated a Napco CO2 incubator to the Imaging Core.
- July 2011:
  - Genomics Core Equipment: July 2011: Both the 3100 "West" and 3100 "North" DNA sequencers were sold through Terrapin Trader.

Current Imaging Core Equipment

Equipment	Location	Description	Purchase Date	In-College Rate History (Academic Year)
Zeiss LSM 710 Confocal Microscope	0107E MICB	405 diode, argon (458, 488, 514nm), 561, 633. 3 PMTs, manual stage	October 2009	2009/2010: 15.00/hr 2010/2011: 18.60/hr
Leica SP5X Confocal Microscope	0107H MICB	405 diode, argon (458, 488, 514), WLL. 5 PMTs, automated stage, resonance scanner, environmental amber	December 2008	2008/2009: 15.00/hr 2009/2010: 15.75/hr 2010/2011: 18.60/hr
Deltavision Deconvolution Microscope	0107F MICB	Standard DAPI, FITC, Rhodamine filters, automated stage	1999	2008/2009: $8.00/hr 2009/2010: $8.00/hr 2010/2011: $8.00/hr
Axiophot Fluorescence Microscope	0107G MICB	Standard DAPI, FITC, Rhodamine filters, CoolSnap monochrome camera, workstation with Nikon Elements	CoolSnap, Elements: ~ July 2007	$2.00/hr since purchase
Olympus Fluorescence Microscope	0107 MICB	Standard DAPI, FITC, Rhodamine filters	Unknown	$2.00/hr since 2005
Mini Med 90 Film Processor	0107A MICB	Standard film processor	August 2006	$0.00/hr since purchase

Current Genomics Core Equipment

Equipment	Location	Description	Purchase Date	In-College Rate History (Academic Year)
3730xl DNA Sequencer	2229 BRB	96 capillary DNA sequencer	June 2004	2005/2006: $25.00/hr 2006/2007: $35.00/hr 2007/2008: $35.00/hr 2008/2009: $37.00/hr 2009/2010: $38.00/hr 2010/2011: $38.00/hr
Roche LightCycler 480 qPCR	2229 BRB	96 and 384 well real-time PCR machine	April 2007	2007/2008: $7.00/hr 2008/2009: $7.50/hr 2009/2010: $8.00/hr 2010/2011: $8.50/hr
Bio-Rad CFX96 qPCR	2229 BRB	96-well real-time PCR machine	January 2009	2009/2010: $8.00/hr 2010/2011: $8.50/hr

Summary of Facility Usage

During FY2011, use of the Zeiss LSM710 averaged 33.8 hours per week and Leica SP5X usage averaged 25.4 hours per week. The combined average usage of 58.8 hours per week is an increase over previous years (52.8 hours/week in FY10 and 49 hours/week in FY09), with both microscopes seeing an increase in the total number of hours used.

Zeiss LSM710 Summary Data:

Fiscal Year	Total Income	Total # Hours Used	Total hours used for UMCP courses	Total # Training Sessions
2010	$12,370.13	803.675	0	44
2011	$33,448.35	1762.25	0	33
Total	$45,818.48	2,565.93	0	77

Leica SP5X Summary Data:

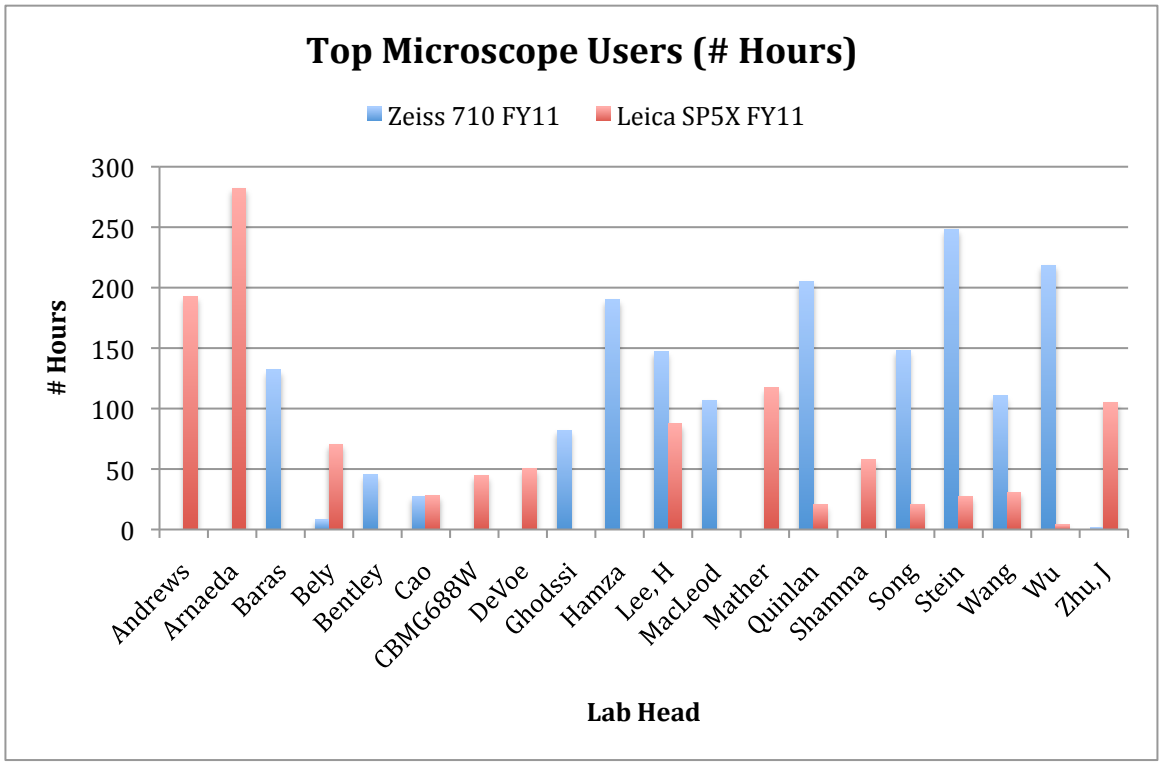
Fiscal Year	Total Income	Total # Hours Used	Total hours used for UMCP courses	Total # Training Sessions
2009	$5,090.75	345.78	0	39
2010	$18,362.80	1282.517	70.96	43
2011	$24,290.48	1325.3	55.5	35
Total	$47,744.03	2953.597	126.46	117

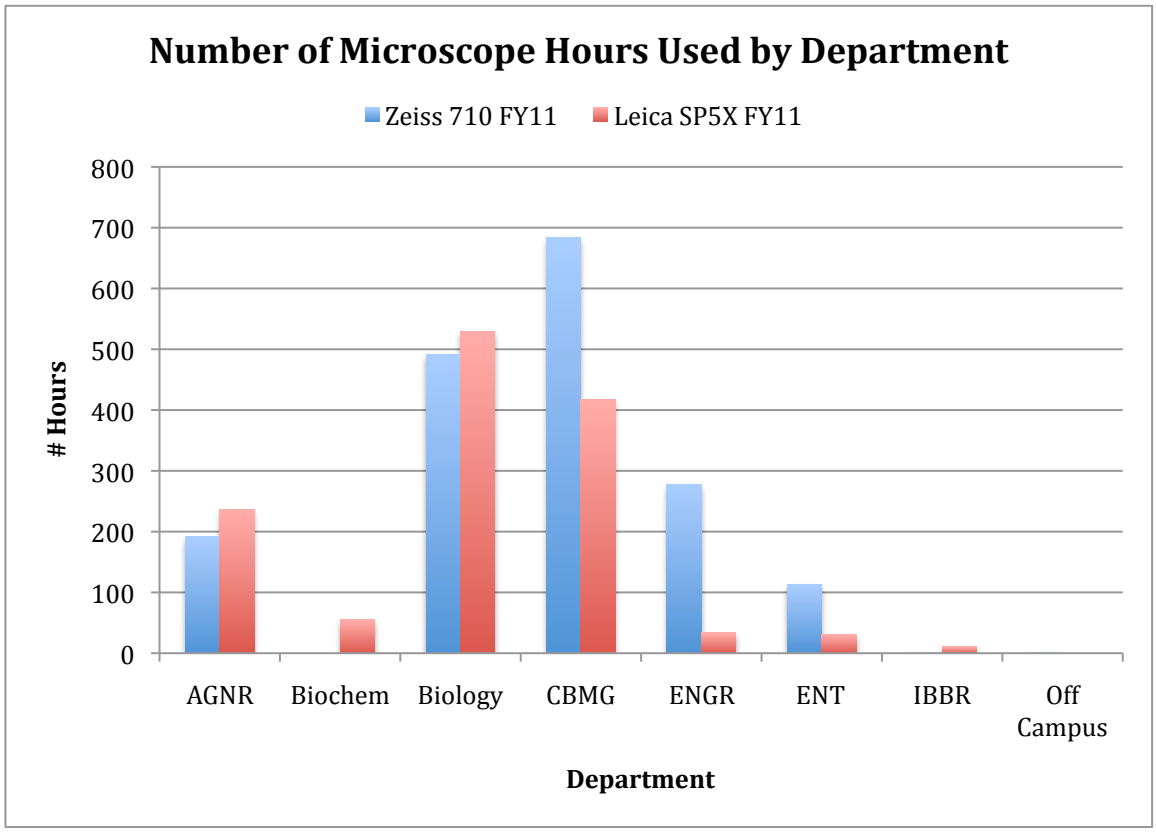
Combined Microscope Data:

Fiscal Year	Total Income	Total # Hours Used	Total hours used for UMCP courses	Total # Training Sessions
2009	$5,090.75	345.78	0.00	39
2010	$30,732.93	2086.19	70.96	87
2011	$57,738.83	3087.55	55.50	68
Total	$93,562.51	5519.52	126.46	194

During FY2011, forty-two different laboratories from 7 different departments (ANSC, Biochemistry, Biology, CBMG, IPST, ENT, IBBR) made use of the facility's confocal microscopes. CBMG and the Biology department accounted for 69% of total microscope use.

Please see the following page for more information about microscope use by PI and department.


Top Microscope Users (# Hours)
Zeiss 710 FY11
Leica SP5X FY11
Hours
300
250
200
150
100
50
0
Andrews
Arnaeda
Baras
Bely
Bentley
Cao
CBMG688W
DeVoe
Ghodssi
Hamza
Lee, H
MacLeod
Mather
Quinlan
Shamma
Song
Stein
Wang
Wu
Zhu, J
Lab Head


Number of Microscope Hours Used by Department
Zeiss 710 FY11
Leica SP5X FY11
Hours
800
700
600
500
400
300
200
100
0
AGNR
Biochem
Biology
CBMG
ENGR
ENT
IBBR
Off Campus
Department

Publications

Publications that entailed the use of the Leica SP5 X (to date):

1. Sikes, J. M. and Bely, A. E. (2008), Radical modification of the A–P axis and the evolution of asexual reproduction in *Convolutriloba* acoels. Evolution & Development, 10: 619–631. doi: 10.1111/j.1525-142X.2008.00276.x
2. Sikes, J.M. and Bely, A.E. (2009), Making heads from tails: Development of a reversed anterior-posterior axis during budding in an acoel. Devel. Biol. 338 (1): 86-97.
3. Hou, H.Y., Heffer, A., Liu, J., Anderson, W.R., Liu, J., Bowler, T. and Pick, L. (2009) Stripy Ftz target genes are coordinately regulated by Ftz-F1. Dev. Biol. 335:442-453.
4. Zhang, H., Liu, J., Li, C.R., Momen, B., Kohasnki, R.A. and Pick, L. (2009). A fly model for diabetes: deletion of Drosophila Insulin-Like peptides causes growth defects and metabolic abnormalities. Proc. Natl. Acad. Sci. U S A. 106:19617-22.
5. Jammes, F., Song, C. J., D. Shin, Munemasa, S., Takeda, K., Gu, D., Cho, D. S., Lee, S., Giordo, R., Sritubtim, S., Leonhardt, N., Ellis, E. B., Murata, Y. and Kwak, J. M. (2009) Two MAP kinases, MPK9 and MPK12, are preferentially expressed in guard cells and positively regulate ROS-mediated ABA signaling. Proc. Nat'l. Acad. Sci. USA, 106: 20520-20525.
6. Kong, D., Cho, D. S., Hu, H.-C., Li, J., Lazzaro, M., Lee, S., Jeon, B.-W., Munemasa, S., Murata, Y., Nam, H. G, Pei, Z.-M. and Kwak, J. M. (2010) Arabidopsis glutamate receptor homologs form Ca2+-permeable cation channels and contribute to Ca2+ uptake. Submitted.
7. Cho, D.S., Villiers, F., Kroniewicz, L., Lee, S., Zhao, J., Hirschi, K., Leonhardt, N. and Kwak, J. M. (2010) CAX1 and CAX3 contribute to the regulation of cytosolic pH and function in crosstalk between auxin and ABA in guard cells. In preparation.
8. Bely, A.E. and J.M. Sikes (2010). Latent regeneration abilities persist following recent evolutionary loss in asexual annelids. Proceedings of the National Academy of Sciences 107:1464-1469.
9. Flannery, A, Czibener, C. and Andrews, N.W. (2010) Palmitoylation-dependent association with CD63 targets the Ca2+ sensor synaptotagmin VII to lysosomes. J. Cell Biol. 191:599-613.
10. Zattara, E.E. and A.E. Bely (2011). Evolution of a novel developmental trajectory: fission is distinct from regeneration in the annelid Pristina leidyi. Evolution & Development 13:80-95.
11. Cortez, M., Huynh, C., Fernandes, M.C., Kennedy, K.A., Aderem, A. and Andrews, N.W. (2011) Leishmania promotes its own virulence by inducing expression of host CD200. Cell Host & Microbe 9:463-471. Highlight in Nature Reviews Microbiology
12. Fernandez, M.C., Cortez, M., Flannery, A.R., Tam, C., Mortara, R.A. and N.W. Andrews. (2011) Trypanosoma cruzi subverts the sphingomyelinase-mediated plasma membrane repair pathway for cell invasion. J. Exp Med. 208(5): 909-21.
13. Nunez-Parra A., Pugh V., Araneda R.C. (2011) Regulation of adult neurogenesis by behavior and age in the accessory olfactory bulb. Mol Cell Neurosci. 2011 May 10. [Epub ahead of print]
14. Huang J, Wang Y, Raghavan S, Feng S, Kiesewetter K, Wang J. (2011) Human down syndrome cell adhesion molecules (DSCAMs) are functionally conserved with

Drosophila Dscam[TM1] isoforms in controlling neurodevelopment. Insect Biochem Mol Biol. [Epub ahead of print]
15. Feng S, Huang J, Wang J. (2010) Loss of the Polycomb group gene polyhomeotic induces non-autonomous cell overproliferation. EMBO Rep. 12(2):157-63.

Publications that entailed the use of the LSM710 (to date):

1. Roy V., Smith J.I., Wang J., Stewart J.E., Bentley W.E. & Sintim H.O. (2010) Synthetic analogs tailor native AI-2 signaling across bacterial species. Journal of the American Chemical Society, 132 (32), pp 11141–11150
2. Montey KL, Quinlan EM. (2011) Recovery from chronic monocular deprivation following reactivation of thalamocortical plasticity by dark exposure. Nat Commun. 2:317.
3. He, K., A. Lee, L. Song, P. O. Kanold, and H.-K. Lee. (2011) AMPA receptor subunit GluR1 (GluA1) serine-845 site is involved in synaptic depression but not in spine shrinkage associated with chemical long-term depression. *Journal of Neurophysiology,* 105: 1897-1907.
4. Dong C.-H., Jang M., Scharein B., Malach A., Rivarola M., Liesch J., Groth G., Hwang I. and Chang C. (2010) Molecular association of the *Arabidopsis* ethylene receptor ETR1 and a regulator of ethylene signaling, RTE1. *J. Biol. Chem.* 285: 40706-40713.
5. Liu, X., Lu, L., Palaniyandi, S., Zeng, R., Gao, L.Y., Mosser, D.M., Roopenian, D.C. and X. Zhu. (2011). The neonatal FcR-mediated presentation of immune-complexed antigen is associated with endosomal and phagosomal pH and antigen stability in macrophages and dendritic cells. J. Immunol. 186(8): 4674-86.
6. Meyer, M.T., Roy, V., Bentley, W.E. and R. Ghodssi. (2011). Development and validation of a microfluidic reactor for biofilm monitoring via optical methods. J. Micromech. Microeng (21): 054023 (10pp).

Outreach Activities During FY11

1. August 17-19, 2010: The Imaging Core hosted the Nikon Advanced Imaging Workshop. This three day workshop included seminars as well as hands-on confocal (A1 system) and TIRF demonstrations. Seminars were given by Nikon personnel. Topics included:
    a. Confocal Fundamentals: Basic Concepts for Success
    b. Advanced Confocal Principles: Multi Photon and Live Cell Muliti-Dimensional Imaging
    c. Super Resolution Microscopy, TIRF and "Perfect Focus": M-SIM and N-STORM- Imaging Beyond the Abbe Limit.

2. August 27, 2010: CBMG Departmental Retreat. Amy Beaven prepared and presented a poster for the Retreat.

3. August 2010: A new Core webpage was created to market the Imaging, Proteomics and Flow Cytometry Cores to off campus users. The webpage was created by Dr. Debbie Weinstein with assistance from Amy Beaven, Kenneth Class and Yan Wang.

4. 2011 Fall Semester: Amy Beaven trained members of the class CBMG688W, Principles of Microscopy, to use the Axiophot fluorescence microscope and the Leica SP5X confocal microscope.

5. December 2011: Amy Beaven assisted members of BSCI415 with the acquisition of confocal images.

6. February 2011: Amy Beaven and Christine Bianchini from Leica Microsystems assisted members of the Microscopy and Imaging Shared Resource group from Georgetown with confocal imaging on the Leica SP5X.

Operating Cost Analysis

Current Data

To date, the Imaging Core has accumulated a surplus of $77,359.85. This surplus will help offset 1) the expected decrease in income due to loss of subsidies in FY2013 and 2) the expected increase in the cost of the Leica SP5X service contract from $36,075.00 to $52,296.00 per year in FY2013.

Imaging Core Facility Income and Expenses from FY09-FY11

Total Imaging Core Income (including subsidies) FY09-FY11	Total Imaging Core Expenses FY09-FY11	Account Balance
$168,561.55	$91,201.70	$77,359.85

Cost breakdown by microscope (Leica SP5X)

Year	Service Contract Cost	Expenses	Income	Income (subsidies)	Balance
FY2009	$0	$6,113.25	$5,090.75	$232,500 (purchase)	$-(1,022.50)
FY2010	$26,000.00	$2,375.80	$18,362.80	$37,500.00	$27,487.00
FY2011	$36,075.00	$488.25	$24,290.00	$37,500.00	$25,226.75
Total	$62,075.00	$8,977.30	$47,743.55	$75,000.00	$51,691.25

Table 7: Cost breakdown by microscope (LSM710)

Year	Service Contract Cost	Expenses	Income	Income (subsidies)	Balance
FY2009	$0	$0	$0	$0	$-
FY2010	$0	$1,187.90	$12,370.00	$0	$11,182.10
FY2011	$17,730.00	$1,231.50	$33,448.00	$0	$14,486.50
Total	$17,730.00	$2,419.40	$45,818.00	$0	$25,668.60

It should be noted that, without current subsidies, the Leica SP5X expenses would greatly exceed income generated by the microscope. This is primarily due to the higher cost of the Leica SP5X service contract relative to the Zeiss LSM710 contract, and the fact that the Leica SP5X was used ~14% less than the Zeiss LSM710 in FY2011.

The Leica SP5X service contract is much more costly than the LSM710 contract because the microscope has many additional features, including an environmental chamber, high speed scanner, white light laser and motorized stage.

Projected Cost Analysis:

Through FY2020, the facility will need to recoup a total of $555,548.47 in expenses, including service contracts and consumables. This data does not include projected income from charge-backs:

Year	SP5X Contract Cost	LSM 710 Contract Cost	Expenses (Consumables)	Current Balance	Subsidies	Total
FY09	$0	$0	$6,113.25	$0	$0	$6,113.25
FY10	$26,000	$0	$3,563.70	$0	+$37,500.00	+$7,936.30
FY11	$36,075	$17,730	$1,719.75	+$77,359.00	+$37,500.00	+$59,334.25
FY12	$52,296	$17,730	$2,663.53	$0	+$37,500.00	$35,189.53
FY13	$52,296	$17,730	$2,663.53	$0	$0	$72,689.53
FY14	$52,296	$17,730	$2,663.53	$0	$0	$72,689.53
FY15	$52,296	$17,730	$2,663.53	$0	$0	$72,689.53
FY16	$52,296	$17,730	$2,663.53	$0	$0	$72,689.53
FY17	$52,296	$17,730	$2,663.53	$0	$0	$72,689.53
FY18	$52,296	$17,730	$2,663.53	$0	$0	$72,689.53
FY19	$52,296	$17,730	$2,663.53	$0	$0	$72,689.53
FY20	$52,296	$17,730	$2,663.53	$0	$0	$72,689.53
Total	$532,739	$177,300	$35,368.47	+$77,359.00	+$112,500.00	$555,548.47

Due to the loss of subsidies and an increase in the Leica SP5X service contract price in FY2013, the facility will need to increase rates for both microscopes in order to prevent a negative balance by FY2020. As shown in the table below, based on current usage data and projected expenses, if rates are not increased, the facility will be in debt by least $51,000.00 by FY2020:

Microscope	Projected Expenses (consumables & service contracts)	Projected Income (including subsidies and charge-backs)	Projected Balance
SP5X	$554,604.57	$347,090.40	($207,514.17)
LSM710	$190,802.90	$346,850.00	$156,047.10
Combined	$745,407.47	$693,940.40	($51,467.07)

Currently, the hourly rate for both microscopes is $18.60/hr. Although the Leica SP5X service contract is significantly more costly than the LSM710, a discussion of the rate structure at the 2010 users meeting led to the decision to keep the hourly rate equivalent for both microscopes. This helps ensure that load is balanced across the two microscopes, and provides an incentive for users to learn to take advantage of the advanced capabilities of the Leica SP5X.

In last year's Annual Report, a rate increase of 18% per year was proposed. Although the original projection called for continued increases of this magnitude through 2015, it may be possible to have smaller increases in the future. Because usage of both microscopes has increased, and because the costs of service contracts are not scaled by number of hours of

use, the service contract costs are being shared by a larger number of users than in the past. This suggests that it may be possible to have smaller future rate increases than was projected in 2010. To illustrate this point, based on current usage and expenses, increasing the rates of both microscopes by 18% per year through FY2015 and then keeping rates steady from that point onward, would result in a surplus of $156,652 by FY2015 and $315,000 by FY2020. This projected surplus would be entirely due to income generated from the Zeiss LSM710.

Proposed Rate Schedules

Proposed rate schedule for unassisted use (includes an 18% increase per year until 2015):

Academic Year	Users w/in CLFS & AGNR (excluding VetMed)	On-campus users not affiliated with CLFS	Users Not affiliated with campus
Current Rates	$18.60/hr	$31.00/hr	$62.00/hr
2011-2012	$22.00/hr	$36.50/hr	$73.00/hr
2012-2013	$26.00/hr	$43.00/hr	$86.25/hr
2013-2014	$30.50/hr	$51.00/hr	$102.00/hr
2014-2015	$36.00/hr	$60.00/hr	$120.00/hr
2015-2016	$36.00/hr	$60.00/hr	$120.00/hr

Proposed rate schedule for assisted use (includes an 18% increase per year until 2015):

Academic Year	Users w/in CLFS & AGNR (excluding VetMed)	On-campus users not affiliated with CLFS	Users Not affiliated with campus
Current Rates	$40.00/hr	$50.00/hr	$150.00/hr
2011-2012	$47.20/hr	$59.00/hr	$177.00/hr
2012-2013	$55.70/hr	$69.62/hr	$208.86/hr
2013-2014	$65.72/hr	$82.15/hr	$246.45/hr
2014-2015	$77.55/hr	$97.00/hr	$291.00/hr
2015-2016	$77.55/hr	$97.00/hr	$291.00/hr

A thorough examination of confocal microscope rates at other institutions indicates that the facility's microscopes are priced competitively. The average rate for similar confocal microscopes at 12 institutions was $39.00/hour. For more details, please see the table on the follow page.

Example Confocal Rates

Facility	Instrument	Hourly Rate	Additional Information
UMD School of Medicine	LSM 510 Meta	$40.00	Training is $200 per person
Iowa State University Confocal Microscopy Facility	Leica SP5 X Nikon CS1	$30.00 unassisted $49.50 assisted	Rate increase this year for the CS1 from $25.00-$30.00/hr
Northwestern University Cell Imaging Center	Zeiss LSM 510 Meta Nikon CS1	$44.00 $40.00	Training + $27/hr
UMBC Imaging Facility	Leica SP5	$12.00	
Duke University Light Microscopy Core Facility	LSM 510, Leica SP5, Zeiss LSM780	$25 .75	Heavily subsidized. Rate increase this year from $25 to $25.75
Stanford U Medical Center, Cell Science Imaging Facility	Leica SP2 confocal	$50.00	$280 set up fee for training, setting up computer accounts etc.
New York University School of Medicine	LSM 510, LSM 710 MP and Leica SP5	$40.00 $44.00	Training is $50/hr. Rate increase this year. LSM510 $35 to $40, LSM710 and Leica SP5 from $40 to $44.
Yale School of Medicine Stem Cell Center	Leica SP5	$40.00	
Harvard Medical School Imaging Center	Nikon A1	$50.00	$100- $200/person training fee
Cornell U Life Sciences Imaging Core	Zeiss LSM 710	$30.00 unassisted $75.00 assisted	Training Fee: $110 per user
Oregon State U	Zeiss LSM 510 Meta	$15.00 unassisted $45.00 assisted	Training: $120 per person
Rockefeller U	Zeiss LSM 510	$42.00	Rate increase this year from $40 to $42.
IUPUI	Zeiss LSM 510	$55.00	Training: $55/hr plus system rate

Genomics Core Facility

1. The 3730xl DNA sequencer budget has a surplus of $8,388.21 for FY2011. However, after I installed a new capillary array during the last fiscal year, I did not order a replacement. The cost of a new array is $4,975.00. Also, the price of polymer is expected to increase in the next calendar year, so I believe it would be prudent to keep the current rate of $38.00/run through the next academic year.
2. Use of the LC480 decreased significantly over the last year. Income generated from user fees was not enough to offset the cost of the service contract and consumables. However, the Bio-Rad CFX96 generated enough income to make up for the loss. Also, because the CFX96 has been under warranty since it's purchase, the qPCR machines have accumulated a surplus of $8,980.00. Consequently, once the CFX96 service contract becomes a continuing expense it will likely be necessary to raise rates by roughly 10%, but it should be possible to delay this increase by one or two years by making use of this surplus.

Genomics Core Facility Income and Expenses FY2011 Only

Instrument	Income	Consumables	Service contract	Total Expenses	Balance
3730xl	$34,276.00	$6,005.79	$19,882.00	$25,887.79	$8,388.21
LC480	$3,430.88	$212.95	$5,500.00	$5,712.95	$(2,282.08)
BioRad CFX96	$5,966.13	$0	under warranty until 1/22/2012	$0	$5,966.13

Genomics Core Facility Income and Expenses from FY2010-2011

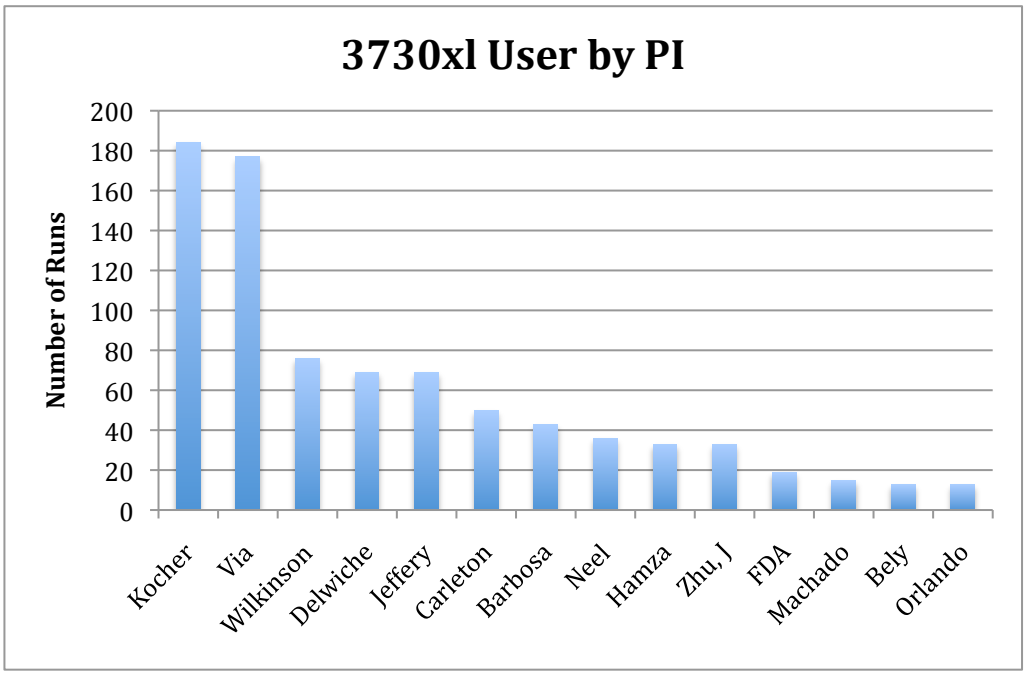
Instrument	Income	Consumables	Service contract	Total Expenses	Balance
3730xl	$60,606.00	$11,888.09	$39,764.00	$51,652.09	$8,953.91
LC480	$10,416.88	$1,492.20	$11,000.00	$12,492.20	$(2,075.33)
BioRad CFX96	$8,980.13	$0	under warranty until 1/22/2012	$0	$8,980.13

3. Starting on 1/22/2012, the cost of the CFX96 contract will be $3,700.00. Based on the average income and expenses of both instruments over the last two fiscal years, and the expected cost of the service contracts, the instruments will be in deficit by $247.50 at the end of FY2012. However, due to the surplus of funds generated over the last 2 years, the facility should have enough money to cover the cost of both contracts. I propose to keep the hourly rate the same ($8.50/hr) for both machines at this time.

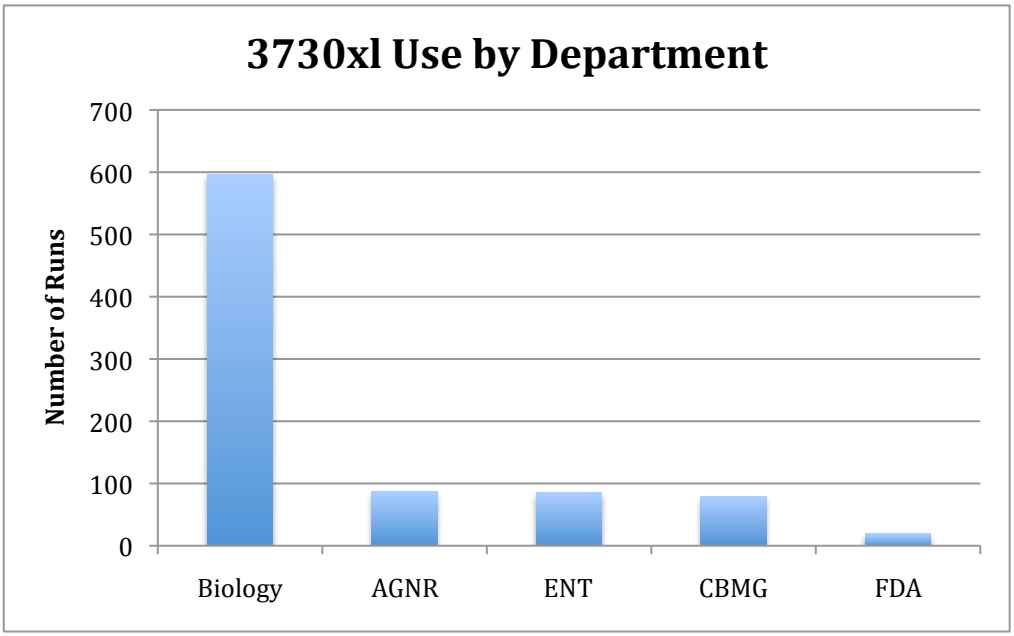
Genomics Core Facility Income and Expenses from FY2010-2011

Projected Yearly Income	Projected Consumables Expenses	Projected Service Contract Costs	Projected Total Combined Expenses	Projected Loss for FY2012
$9,698.50	$746.00	$9,200.00	$9,946.00	$(247.50)

Top DNA Sequencer Users FY2011



DNA Sequencer Use by Department FY2011



Current and Proposed (in parenthesis) Imaging and Genomics Core Rate Schedule

Instrument	Users within College of Life Sciences	On-campus users not affiliated with the College	Users not affiliated with the campus
Zeiss LSM710	$18.60/hr ($22.00/hr)	$31.00/hr ($36.50/hr)	$62.00/hr ($73.20/hr)
Leica SP5 X	$18.60/hr ($22.00/hr)	$31.00/hr ($36.50/hr)	$62.00/hr ($73.20/hr)
DeltaVision Deconvolution	$8.00/hr ($8.00/hr)	$11.00/hr ($11.00/hr)	$20.00/hr ($20.00/hr)
Olympus Fluorescence	$2.00/hr ($2.00/hr)	$2.00/hr ($2.00/hr)	$2.00/hr ($2.00/hr)
Axiophot Fluorescence	$2.00/hr ($2.00/hr)	$2.00/hr ($2.00/hr)	$2.00/hr ($2.00/hr)
MiniMed Film Processor	$0.00 ($0.00)	$0.00 ($0.00)	$0.00 ($0.00)
ABI 3730xl South DNA Analyzer	$38.00/run ($38.00/run)	$38.00/run ($38.00/run)	$100.00/run ($100.00/run)
Roche LightCycler 480 Real-Time PCR	$8.50/hr ($8.50/hr)	$14.00/hr ($14.00/hr)	$21.00/hr ($21.00/hr)
Bio-Rad CFX 96 Real-Time PCR	$8.50/hr ($8.50/hr)	$14.00/hr ($14.00/hr)	$21.00/hr ($21.00/hr)