

WHAT'S NEW FOR RU RESOURCE CENTERS – FY17

The Rockefeller University Resource Centers' continue to support our scientific community with cutting edge equipment and technological advances, while improving techniques and methodologies and fine tuning services to meet researchers changing needs.

A concerted effort was made to revitalize the **Scientific Advisory Committees (SAC)**. Rosters were updated with new members and each committee met at least once by the end of the summer. The goal was to increase communication between HOLs and the Resource Centers administration. The role of the SACs is to advise on issues related to user requirements, equipment needs and technology trends, monitor the quality of the scientific services, and help resolve disputes between users and the centers should they arise.

The **High Performance Computing (HPC)** data center with a shared cluster of 1,600 cores was completed and the **HPC Program** experienced significant growth. Thirty-two groups are participating and investigators



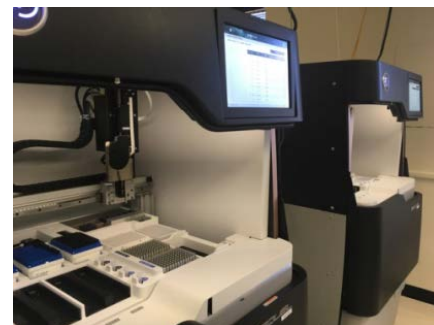
have contributed approximately 2,400 additional cores as part of the condominium model. According to **Jason Banfelder**, Director of HPC Systems and Applications, "We're not just about renting processor time. We can help you with your scientific applications and workload and provide collaboration to those who are interested in that. Not only can we help with technical things like hosting a computer or building applications, but now we can also help you with things like scaling up your computing campaigns, integrating or adapting your workflows to our scheduling system, and efficiently parallelizing your workflows and algorithms."



Thomas Carroll, Ph.D., arrived on campus in June as the Director of the newly established **Bioinformatics Resource Center (BRC)**. The BRC was created to provide bioinformatics analysis, experimental design consultation, software infrastructure, and training to the scientific community at the University. With a specific expertise in the processing and analysis of high-throughput genomic sequencing data, and in collaboration with both wet and dry lab biologists, the BRC aims to support and accelerate the diverse and cutting-edge research conducted at the University through the creation of analytical pipelines, analysis of biological data via direct collaborations, and training of and collaboration with Rockefeller's faculty, students, and scientific staff.



The **Vertebrate Genome Laboratory (VGL)** began full operations, located on the 7th floor of the Weiss Research Building. The VGL is equipped with two state of the art PacBio Sequencing Systems built on single Molecule real time (SMRT), a BioNano Saphyr, and – in conjunction with the **Genomics Resource Center** – a 10X Genomics Chromium Plus for whole exome sequencing prep. The primary objective of the VGL is to generate at least one high-quality, phased, chromosome-level, annotated, reference genome assembly of all approximately 66,000 vertebrate species in coordination with the Vertebrate Genome Project (VGP). The VGP plans to utilize those genomes to address fundamental questions in biology, conservation, and disease. **Olivier Fedrigo, Ph.D.**, is the Director of the Vertebrate Genome Laboratory. The VGL is co-directed by Erich Jarvis. The VGL plans to provide sequencing support to University Laboratories beginning in the second half of FY18.



NEW EQUIPMENT HIGHLIGHTS

The **Seahorse XFe96 Analyzer**, available in the **High Throughput & Spectroscopy Resource Center**, measures OCR and ECAR of live cells in a 96-well plate format. These rates are key indicators of mitochondrial respiration and glycolysis and provide a systems-level view of cellular metabolic function in cultured cells and ex-vivo samples.



Arivis InView VR System enables **Bio-Imaging Resource Center** users to experience their data in Virtual Reality. Explore and interact with 3D or 4D datasets by natural movements of the head and body. For the first time Direct Volume Rendering in combination with VR technology allows free navigation through data sets derived from various imaging techniques

The new **Boeckler UltraMicrotome** in the **Electron Microscopy Resource Center** produces *extremely thin sample sections*. These extremely thin cuts are important for use with transmission electron microscope (TEM) and serial block-face scanning electron microscopy (SBFSEM), also important for light-optic microscopy.



EXPANDED METABOLOMICS SERVICES

The University added three new instruments to the **Proteomics Resource Center** to enhance and expand metabolomics services.



The **LCMS Q Exactive Plus** is designed for high-performance, high-throughput screening, compound identification, and quantitative analysis. Thanks to its Orbitrap mass analyzer, the Exactive Plus system delivers high-resolution, accurate-mass (HR/AM) full-scan mass spectrometry for fast, precise and reproducible results and tremendous analytical confidence.



GC MS for Metabolomics Gas chromatography-mass spectrometry for metabolomics. Metabolic fingerprinting, the main tool in **metabolomics**, is a non-targeted methodology where all detectable peaks (or signals), including those from unknown analytes, are considered to establish sample classification.

The **Gerstel Multipurpose Sampler** is a multifunctional autosampler and sample preparation robot for gas chromatography (GC/MS), liquid chromatography (LC/MS), and standalone operations.



OTHER EQUIPMENT PURCHASED WITH UNIVERSITY FUNDS: **EMRC:** Tousimis Critical Point Dryer **GRC:** Nano Drop

MAKING AN IMPACT

Acknowledgement of the Centers ensures that the University meets contractual obligations to funding agencies, strengthens the reputation of the Centers and increases the competitiveness of grant applications that reference use of the Centers. In FY17, more **than 40 published articles** included Resource Center staff as co-authors and **over 70 articles acknowledged** use of one or more Resource Centers.

Referenced in Grant Applications

The use of one or more Resource Centers was reported in 302 of the 316 sponsored research applications filed with OSPA in FY17.

Education and Outreach

The heads of all the Centers participated in the **orientation for first year Graduate Students** on September 19th to introduce them to the support, services, training and consultative services available from the Centers. • The Office of Research Support ran the 13th annual **Scientific Resource Center Presentation Series** from January to April. The Resource Center heads each presented an overview of his/her Center's services. These presentations also include reports on results obtained by center users, information on new trends and technologies and case studies. The **BIRC** and **CEMRC** sponsored tours for *Science Saturday*, on May 6th.

Accreditation

The **Comparative Bioscience Center** had its tri-annual audit with **AAALAC** in March 2017, maintaining its **full accreditation status**.

On and Off Campus Lectures

BIRC session European Light Microscopy Initiative (ELMI) Dubrovnik, Croatia, "Should research be performed in core facilities?" talk on preparing bead slides and other standard slides for quality control of microscopes. Alison North. May 2017 • **GRC** lecture at Clinical Scholars Bioinformatics Course "Introduction to RNA-Seq" (11/2/2016)

Classes and Training

FCRC "Beyond the Basics Flow Cytometry Class" • **CBC Orientation**, Investigator Training Workshops, *Updated* Aseptic Techniques & Tri-Institutional Seminar • **PFF** Autonomous and Simple Equipment Training & Heavy Equipment Training • **HTSRC** RU User Group Conference, "Label-free detection of protein binding using new methodologies in microscale thermophoresis." 6/6-7/17. • **SBRC** RU Scientific Techniques course, presented with Alex

Jaramillo Cartagena, Darst Lab 5/12/17. • **CEMRC** Cryo-EM Course with comprehensive background on EM technology and techniques.

Key Methodology Publications/Presentations

Demmerle J, Innocent C, **North AJ**, Ball G, Müller M, Miron E, Matsuda A, Dobbie IM, Markaki Y and Schermelleh L (2017) "Strategic and practical guidelines for successful structured illumination microscopy". *Nat. Protocols* 12: 988-1010.

Svetlana Mazel, Fang Fang, **Stanka Semova**, Rui Gardner (2017) "Size Matters: Calibrating Laser Time Delay for Large Cells in Sorters." CYTO2017, Boston, MA.

Technology and Vendor Presentations

GRC Dr. Britt Flaherty, sequencing specialist from Illumina, The latest Illumina NGS technology and applications. • **EMRC** Kunihiro Uryu organized HPF Leica EM ICE demo from 04/17 through 04/27/2017.

RU Sponsored Retreats

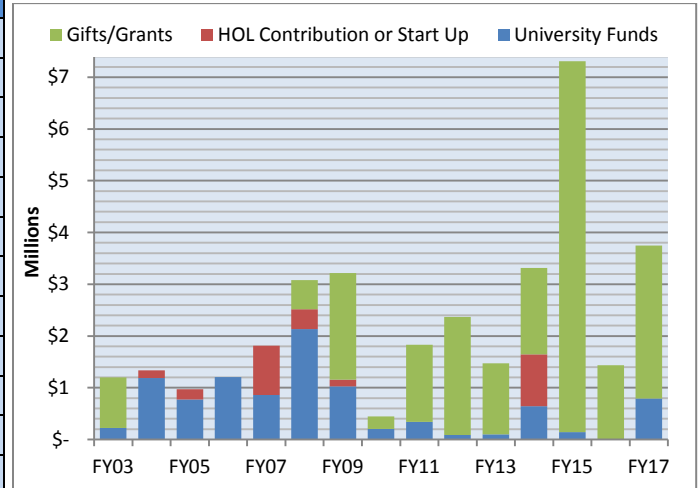
Connie Zhao, Ph.D. (GRC) and Kunihiro Uryu, Ph.D. (EMRC) attended the Rockefeller Neuroscience Retreat May 17th to 19th.

# of Labs Using the Resource Centers	RU	External
Bioimaging	60	46
CBC	51	1
Cryo EM	11	-
Electron Microscopy	29	12
Flow Cytometry	42	2
Genomics	48	1
Gene Targeting	9	1
Glasswashing	63	-
High Thruput & Spectroscopy	44	30
Antibody & Bioresource	20	150
PFF	35	-
Proteomics	45	40
Structural Biology	12	9
Transgenic Services	20	1

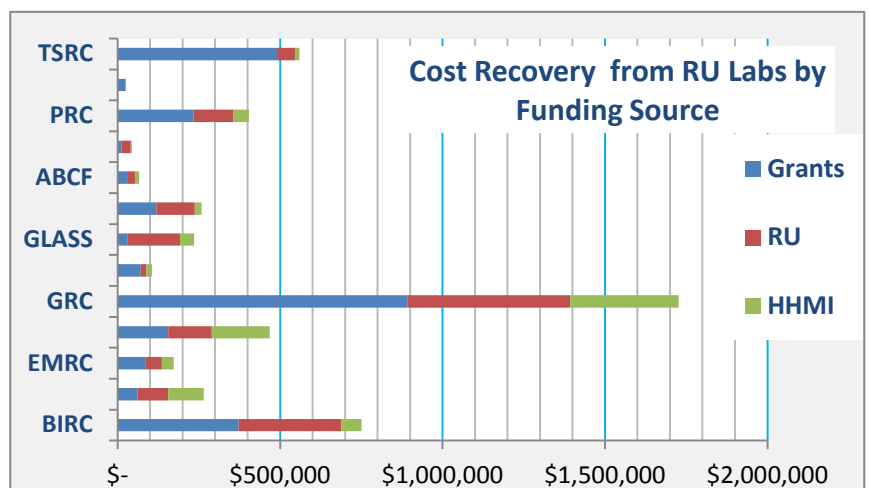
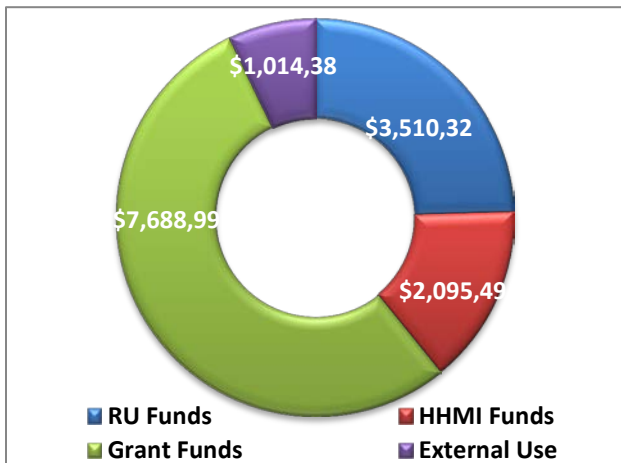
BY THE NUMBERS – OPERATIONAL & CAPITAL INVESTMENTS

Resource Center	FY15		FY16		FY17	
	Operating	Cost Recovery	Operating	Cost Recovery	Operating	Cost Recovery
BIRC	1,045,646	591,068	987,177	716,362	997,437	791,505
CBC	10,731,129	9,552,277	10,183,146	8,481,573	10,693,729	8,413,349
CEMRC	11,023	-	325,914	124,189	442,690	284,556
EMRC	573,983	187,700	634,753	256,652	686,201	276,655
FCRC	751,801	403,598	759,040	415,840	796,497	468,320
GRC	1,949,131	2,051,289	1,734,063	1,890,803	2,198,209	1,902,927
GLASS	423,506	211,965	428,884	219,678	444,843	232,214
HTSRC	1,305,059	877,998	1,239,371	760,934	1,089,927	705,555
ABCF	101,474	76,474	147,929	142,425	144,183	61,734
PFF	-	-	127,009	21,500	135,720	43,500
PRC	1,126,265	554,273	1,148,314	642,932	1,139,406	715,247
SBRC	202,852	6,287	209,750	6,028	173,927	10,285
TSRC	1,117,219	755,417	1,090,167	680,807	907,368	574,021
GTRC	804,436	190,306	790,877	166,276	898,159	120,162
TOTAL	20,143,524	15,458,652	19,806,394	14,525,999	20,748,296	14,600,030
OVERALL SUBSIDY	23%		27%		30%	

Capital Equipment (>\$70K) Expenditures



Annual average: \$2,315,500



FY17 Cost Recovery by Funding Source: Grants, RU funds, HHMI, External Users