WHAT'S NEW FOR RU RESOURCE CENTERS – FY21

The Rockefeller University Resource Centers continued to support our scientific community with expert staff, cutting edge equipment and services in fiscal year 2021. The Resource Center staff continued to conduct applied research to improve techniques and methodologies and fine tune services to meet researchers' changing needs.

As the COVID-19 pandemic cases began to level off, and with the introduction of COVID vaccinations for the RU community and to the public at large, the University was able to transition to a Phase III+ mode of operations. This change in operational status allowed the Centers to adjust user capacity and to allow limited but expanding use by external researchers. Revised user guidelines were referenced and updated in the Resource Centers' websites.

While not possible to report on all the many contributions the Resource Centers make to further and support science and the University's mission, we do want to highlight some of these contributions as examples.

A FEW HIGHLIGHTED CONTRIBUTIONS

The Precision Instrumentation Technologies (PIT) facility, headed by Peer Strogies, joined with Thomas Sakmar's group to develop an open-source UV-disinfector for N95 respirators. This group effort later created nine UV-Disinfectors deployed in numerous locations on RU campus that continue to aid the program to provide N95 respirators to employees who commute by public transportation. The PIT crew designed, fabricated, and equipped the Rice Lab, Rock Lab, Ravetch Lab, CBC, Friedman Lab and Plant Ops with magnet adapters to allow for easier doffing and donning of Positive Air Pressure Respirators (PAPRs). The PIT also installed magnetic PAPR doffing stations in the Rice Lab and CBC ABSL3 facilities

The High Throughput and Spectroscopy Resource Center (HTSRC), directed by Fraser Glickman, conducted five COVID-related screens, and in the process, screened one million compounds in three months. Two of these projects have proceeded through the hit validation phase, and one of these projects has yielded a potent and selective inhibitor of nsp14, a methyltransferase enzyme seemingly required for SARS-CoV-2 replication. It is not cytotoxic, and active in blocking the replication of the Sars-CoV-2 virus at micromolar concentrations. Medicinal chemistry studies suggest that this class of compounds has a good chance of resulting in the development of an orally bioavailable medicine to treat SARS-CoV2. The technology HTSRC has used could be used for identifying new drugs for other related viruses.

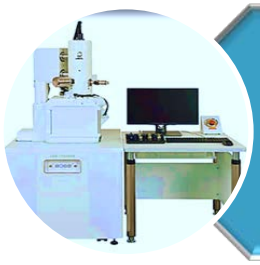
The High Performance Computing Resource Center (HPCRC), headed by Jason Banfelder, expanded the slate of pre-installed, ready-to-run scientific software available to the Rockefeller community. A new site license for MATLAB allows it to now run at scale on the HPCRC cluster, and grants all faculty, staff, and trainees access to all toolbox add-ons as well as the ability to run MATLAB on their personal and lab computers. Additionally, the HPCRC implemented the SPACK system for managing versioned builds of a broad constellation of open-source scientific software, improving the breadth and reproducibility of software installs.

The Flow Cytometry Resource Center (FCRC), directed by Svetlana Mazel, further developed and fine-tuned procedures for the main and "satellite" facilities, added a second Cytek Aurora, and enhanced training, consultations troubleshooting and support procedures with hybrid remote and in person methods.

The Comparative Bioscience Center (CBC), directed by Ravi Tolwani, continued to provide animal care and support throughout this pandemic period, with no break following University closure on March 18, 2020. While some operations remain modified as compared to the pre-pandemic period, currently all services such as import and export of mice, training, technical support and experimental animal model design and guidance are being supported by the CBC team. The SOPs in place during this time resulted in the almost no reported cases of COVID-19 among staff members while staff continued all on-site essential operations.

EQUIPMENT

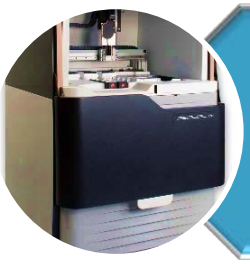
CRYO-ELECTRON MICROSCOPY- Cryo confocal for CLEM (Leica) Purchased with Anderson Funds. For safe, contamination-free sample transfer and loading from cryo sample preparation instruments.



ELECTRON MICROSCOPY- JEOL SEM JSM-IT500HR, Scanning Electron Microscope Purchased with the help of the Kirby Foundation. The high-brightness electron gun system provides amazing high-resolution imaging along with high sensitivity and high spatial resolution analysis at faster speeds.

FLOW CYTOMETRY- A second Cytek Aurora Full Spectrum Analyzer was added increasing access to this unique method that allows measurement of the entire emission spectra of the fluorescent dyes excited by multiple lasers. The full spectrum capture enables the use of the novel un-mixing algorithms for the further data analysis..

HIGH THROUGHPUT AND SPECTROSCOPY- GE Biosciences Cytiva Biacore 8K (SPR technique) measures binding kinetics of various small molecule and antibody analytes.



REFERENCE GENOME CENTER- Two PacBio Sequel II instruments upgraded to Sequel IIe, increased computational capacity and on-instrument data processing, delivers HiFi data faster and with significant reduction in compute and data storage costs.

MAKING AN IMPACT

Acknowledgement of the Resource 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 the period, 2020-2021 to date, University Resource Centers were acknowledged in 201 and Resource Center staff were co-authors on 117 publications by the University and other institutions' scientists.

EDUCATION AND OUTREACH

The heads of all the Centers participated in the *orientation for first year Graduate Students* on **September 14, 2020,** to introduce them to the support, services, training, and consultative services available from the Centers. The Dean's Office reported that 24 of 30 incoming PhD students were in attendance for the online presentation. *The Resource Center Presentation series* followed – scheduled weekly from **January 27, 2021** to **June 2, 2021** – were recorded and posted to Center websites. Both programs were implemented through Zoom.
Research Resource Identification numbers (**RRIDs**) were added to Resource Centers through the ABRF's partnership with the RRID Initiative. This RRID, when published, links directly back to the research component cited making it easier to identify and replicate research findings. Each Resource Center's RRID tag can link a publication citation back to its Core Marketplace listing.

ON AND OFF CAMPUS LECTURES (Examples)

BIRC, CEMRC • Alison North, Donovan Phua, Johanna Sotiris and Honkit Ng. "*Science Saturday Webinar: Using Microscopes to See What Our Eyes Can't*", **May 9, 2020**.
https://www.youtube.com/watch?v=8Iiqm1POGG4
HTSRC • Fraser Glickman, "*HTS and Drug Discovery", CTSC Scientific Techniques Lecture*, **March 19,2021**.

CLASSES AND TRAINING (limited listing)

Glasswashing Services • Created a training video with LS&EH on proper operation of an autoclave featuring staff members Lourdes Matthew and Derek Boadi-Ansah. **RGRC** • *Genome Sequencing and Assembly*, presentation in BRC Bioinformatics course, **March 23, 2021.**

METHODOLOGY PUBLICATIONS/PRESENTATIONS

BIRC • Nature Methods, *Tutorial: guidance for quantitative confocal microscopy,* Alison North, **Vol 15(5), 2020**. **BIRC** • Alison North, "*QUAREP-LiMi: A community-driven initiative to establish guidelines for quality assessment and reproducibility for instruments and images in light microscopy*, Whitepaper, **January 2021**. **RGRC** • Nature, "*Towards complete and error-free genome assemblies of all vertebrate species"* Olivier Fedrigo, **Vol 592, April 2021**.

SOME RU TECHNOLOGY AND VENDOR PRESENTATIONS

FCRC• Sponsored Cytek presentation, "*Getting a Return on Your Investment: Leveraging Clean Data for Meaningful Results*" **Feb 24, 2021**. **GRC•** Lecture on Nextgen sequencing technology at Bioinformatics training class, **March 8,2021**.
HTSRC • Online user group meeting: "*Measuring Cell Metabolism with Agilent's Seahorse XFe96,*" **March 11, 2021**.

GRANTS and AWARDS

Beckman Foundation Instrumentation Grant for Advanced Light-Sheet Microscopy and Data Science. (awarded; start date May 1, 2021) Involves **BIRC, BRC, HPCRC and Library. • HTSRC** Telomerase project, funded by Robertson Therapeutic Development fund. 2021**.** • CZI has awarded $1.3 million to Bio-Imaging North America (BINA). Alison North, **BIRC,** is the Co-Founder of BINA.

NEW HIRES

- Ilona Nudelman, Research Support Specialist, **HTSRC**
- Priyam Banerjee, Research Support Specialist, **BIRC**
- Ileana Miranda, Comparative Pathologist, **CBC**
- Morganne Campbell, Postdoc Fellow in Laboratory of Animal Medicine, **CBC**

Number of Labs Using Resource Centers	RU Users	External Users
Antibody & Bioresource	9	>100
Bio-Imaging	54	10
Bio Informatics	28	0
CBC	45	6
Cryo-EM	12	0
Electron Microscopy	22	2
Flow Cytometry	39	0
Genomics	46	0
CRISPR & Genome Editing	15	6
Glasswashing	66	1
High Performance Computing	56	1
High Throughput & Spectroscopy	47	12
Laboratory of Comparative Pathology	18	>20
Precision Instrumentation Technologies	38	1
Proteomics	39	36
Reference Genome	4	25
Structural Biology	11	0
Transgenic & Reproductive Technologies	14	4

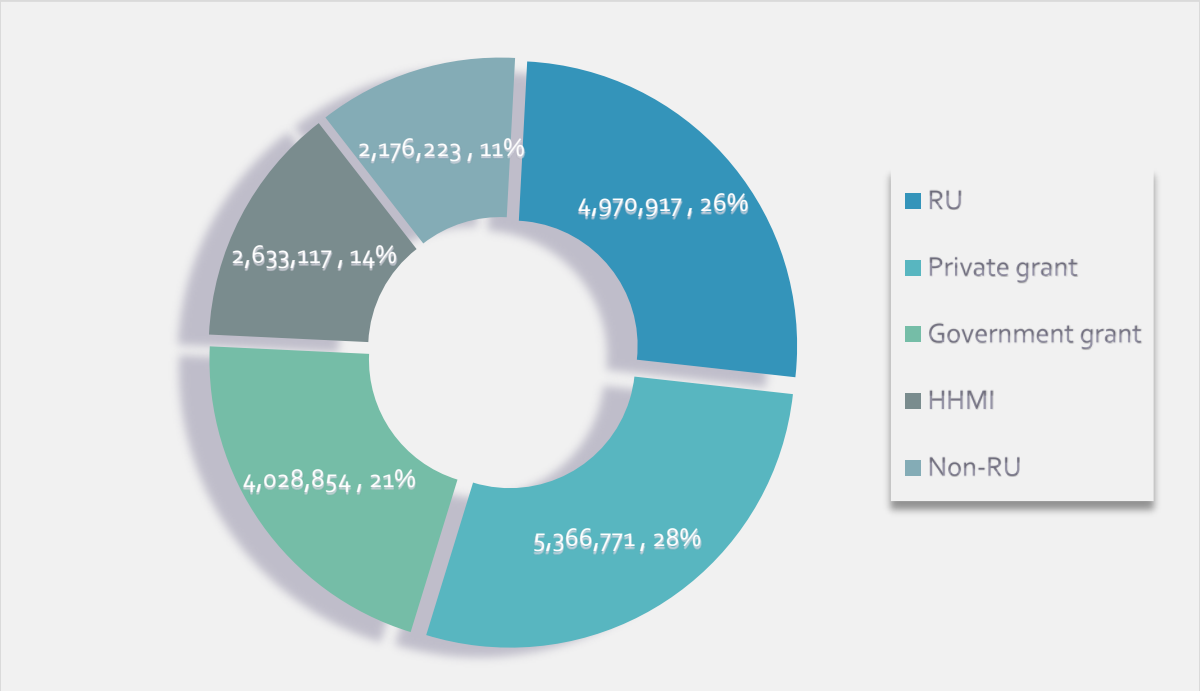
Operating funds for the Resource Centers are drawn from the University's annual operating budget and are offset, to varying levels, by user fees. User fees for center services and products are set to offset only direct operating costs, e.g., consumables, service contracts and labor. User fees do not include capital equipment costs.

User fees for services and products are established by the University administration with input from the Centers' Scientific Advisory Committees, and with review by University Finance.

	FY19		FY20		FY21	
Resource Center	Operating	Cost Recovery	Operating	Cost Recovery	Operating	Cost Recovery
Antibody & Bioresource	32,753	32,753	41,000	61,600	86,133	25,380
Bio-Imaging	1,227,634	756,368	1,251,267	617,960	950,096	463,439
Bioinformatics	342,475	80,900	537,491	189,121	692,003	201,331
CBC	11,578,969	9,540,218	12,261,781	9,303,496	11,791,150	9,257,085
CRISPR & Genome Editing	968,614	172,460	969,349	155,030	907,818	174,679
Cryo-EM	604,847	308,274	685,846	412,500	937,812	279,990
Electron Microscopy	471,714	98,077	530,302	92,608	419,992	100,148
Flow Cytometry	1,044,822	487,401	1,073,987	363,831	976,219	424,263
Genomics	2,509,800	2,487,546	2,211,047	1,970,000	2,502,574	2,143,202
Glasswashing	510.104	269,399	480,249	213,032	482,471	249,989
High Performance Computing	475,653	176,080	555,186	263,937	564,128	297,895
High Throughput & Spectroscopy	1,278,697	723,556	1,322,811	862,005	1,329,119	740,580
Precision Instr. Technologies	514,750	111,240	561,175	88,343	634,547	120,603
Proteomics	1,307,846	740,472	1,214,535	787,791	1,315,609	862,865
Reference Genome	1,553,506	982,325	1,063,168	811,266	1,055,103	744,068
Structural Biology	179,467	7,505	187,233	10,153	127,758	22,912
Transgenic & Reproductive Tech	1,061,884	480,000	1,010,046	437,432	1,010,33	719,646
TOTAL	**24,678,288**	**17,278,494**	**25,401,287**	**16,376,168**	**24,772,532**	**16,722,466**
Subsidy	30%		36%		33%	

BY THE NUMBERS- OPERATIONAL AND CAPITAL EQUIPMENT EXPENSES

FY21 Cost Recovery by Funding Source



FY21 Capital Equipment FY03- FY21