Introduction to
The Rockefeller University Resource Centers

Overview for New Graduate Fellows

September 11, 2019

The Role of Core Facilities

- Ensuring and encouraging access to expertise, equipment, services and products that are beyond the financial or technical means of most individual laboratories
- Supporting research in a cost effective and scientifically effective manner
- Improving competitiveness for researchers and the University
- Providing continuity of staffed expertise
- Training and education in specialized methods and technologies
- Serving as scientific brokers both internally and externally

Cryo-Electron Microscopy Resource Center

Microscopy Suite: CRC B13
Phone: 212-327-7282

Mark Ebrahim
Senior Staff Scientist
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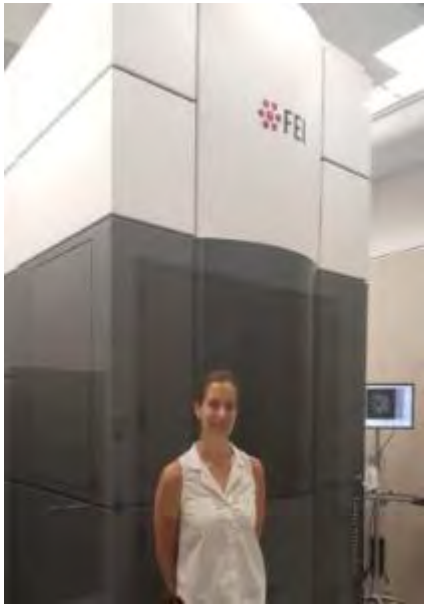

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Senior Research Support Specialist
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Honkit Ng
Research Support Specialist
hng@rockefeller.edu

Cryo-Electron Microscopy Resource Center

200 kV

300 kV

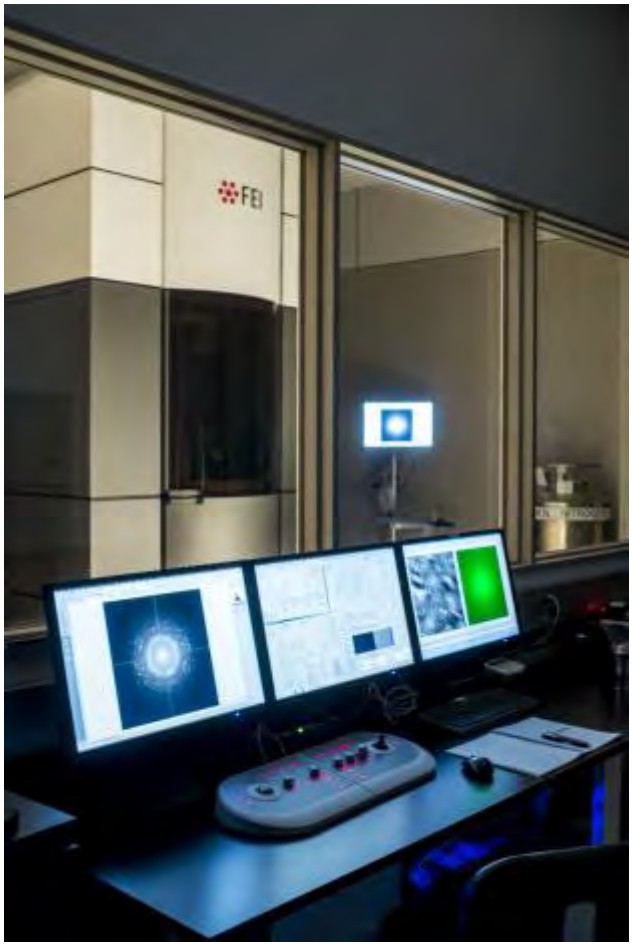
Talos Arctica

Titan Krios G2 – “Krios 1”

Titan Krios G3i – “Krios 2”

Cryo-Electron Microscopy Resource Center

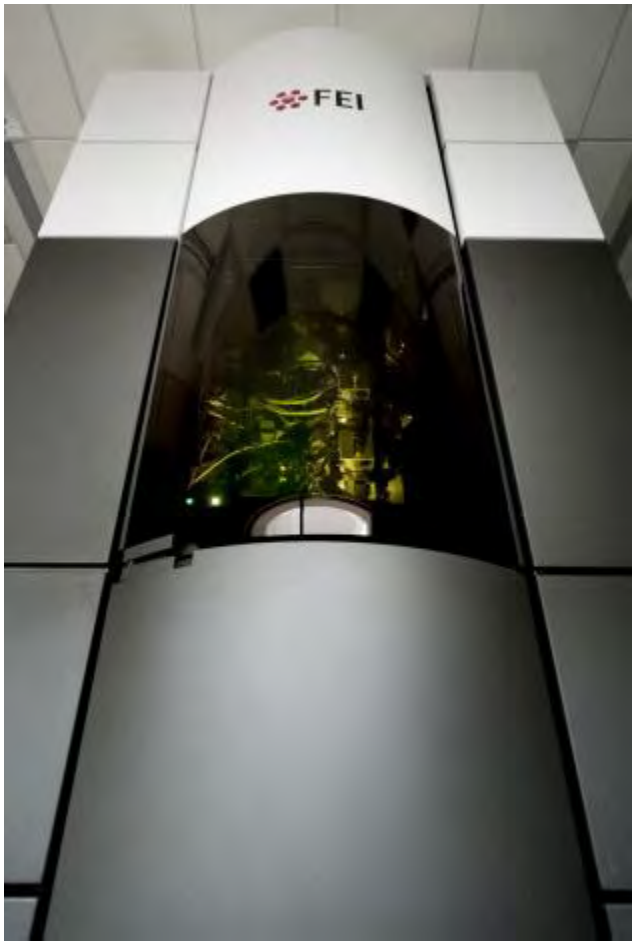
FEI Titan Krios G2 (“Krios 1”)



300kV Transmission Electron Microscope

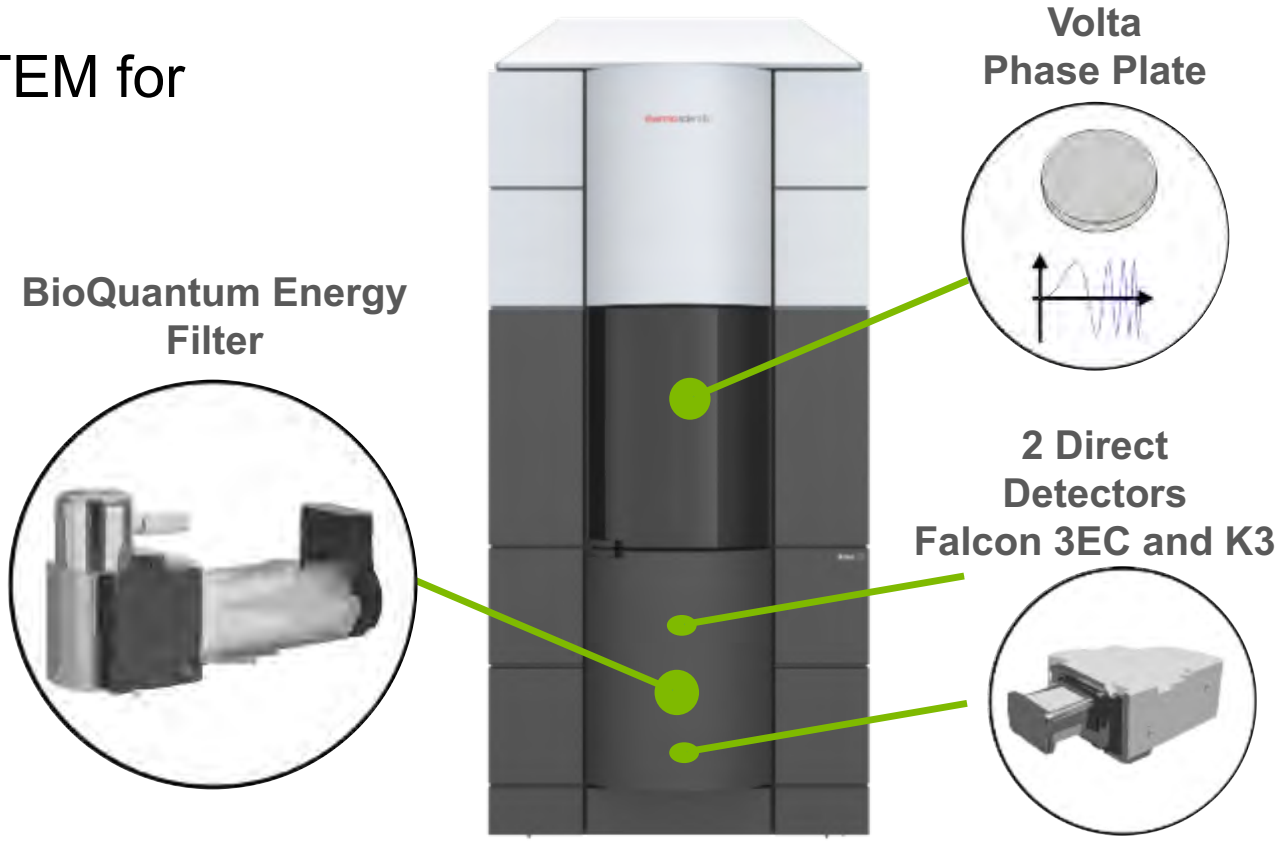
1.0 Angstrom Resolution

Equiped with Gatan K2 Summit direct electron detector



Krios 2 has a configuration suitable for Cryo Electron Tomography of Eukaryotic Cells

- Krios 300 kV Cryo-TEM for
  - Structural Biology
  - Cell Biology



Aquilos

Cryo Focused Ion Beam Scanning Electron Microscope (FIB/SEM)

- For optimal sample preparation for high-end cryo-electron tomography
- Cryo-FIB milling of vitreous specimens
- Produces cryo-lamellae for the cryo-tomography workflow

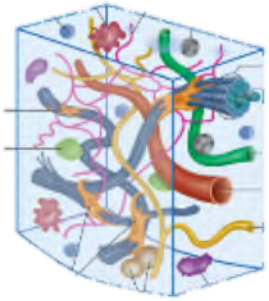
Cryo-Tomography: From protein structure to cellular context

Protein coding Gene

Structure of folded Protein

Function of Protein in cells

Cellular organisation in tissue



NextGen Sequencing

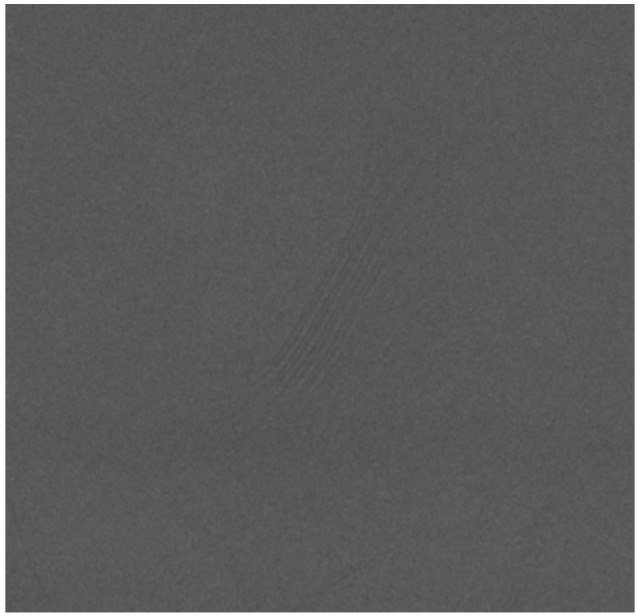
SPA

Cryo-Tomography

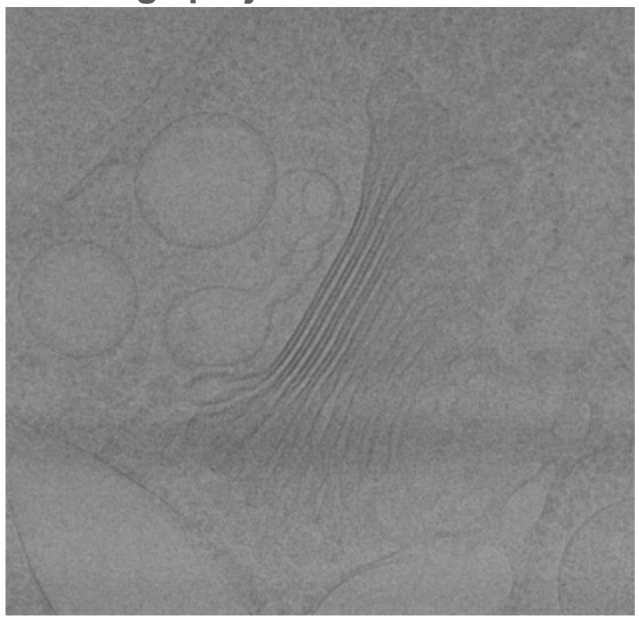
Large Volume Analysis

Cryo-Tomography Workflow | Thermo Scientific Krios

Single frame



Tilt image projection



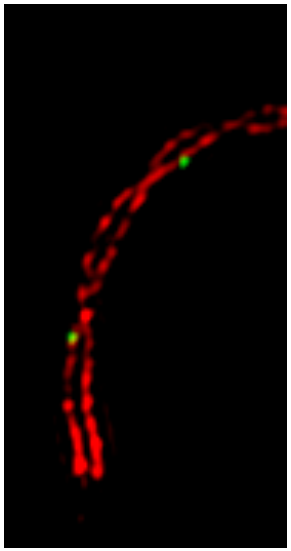
Reconstructed tomogram

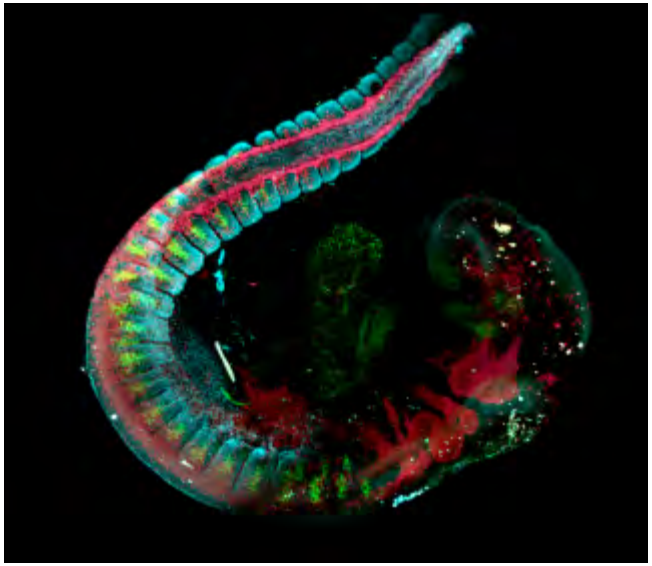
Thermo Scientific Titan Krios
+ Volta phase plate, K2 detector
Spot size 7, 13 frame/s, 42kMag, total dose: ~ 60 e/A^2, Defocus = - 0.5µm
~180-nm thin cryo-FIB lamella

Bykov et al., eLife 2017

Bio-Imaging Resource Center

Advice on microscopy and specimen preparation
Training on the microscopes
Training in image analysis
Initial consultations and tours
Possible collaborations





Widefield

Light Sheet

TIRF

Super-resolution

Confocal

Spinning disk confocal

Deconvolution

Multiphoton

FRET

FLIM

FCS

Laser microdissection

You can even climb inside your own 3D data sets with our Virtual Reality system…

Staff of the BIRC

(DWB 201-203)

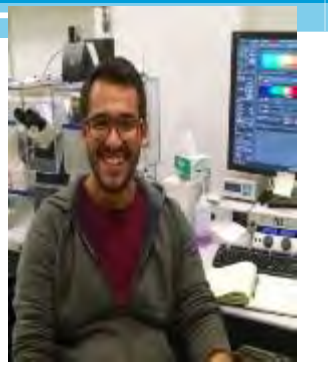
http://inside.rockefeller.edu/bioimaging/

Alison

- Alison North (Senior Director) - Ph.D. in Cell Biology - any microscope I can get my hands on in between doing the less exciting administrative stuff, plus OMX specialist;
- Christina Pyrgaki (Senior Research Support Specialist) - Ph.D. in Molecular Biology – all types of microscopy, multiphoton and light sheet specialist;

Christina

- Carlos Rico (Research Support Specialist) - Ph.D. in Chemical Biology – all types of microscopy, FCS specialist;
- Tao Tong (Research Support Specialist) - Masters in Computing and in Biochemistry/Molecular Biology – systems administration, image analysis, microscopy;
- Kate Cialowicz (Research Support Specialist) – Ph.D. in Biology, with an emphasis in super-resolution microscopy;

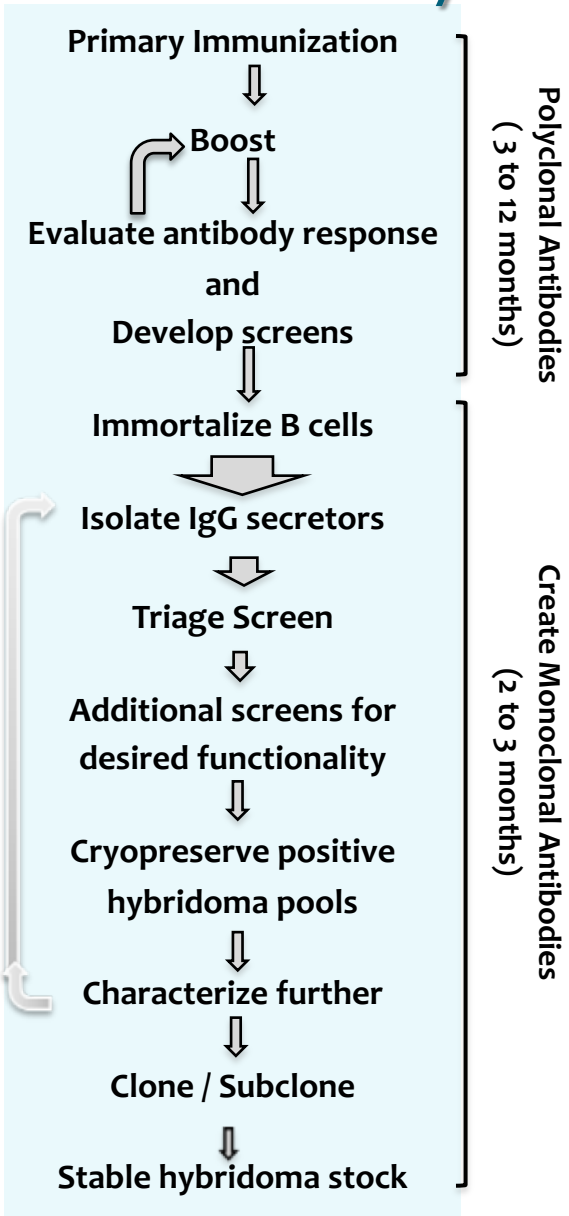


Carlos

Kate

Tao

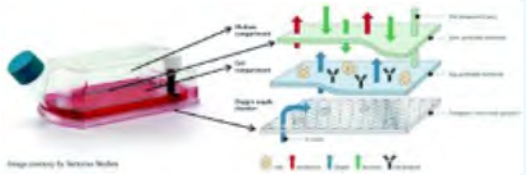
Antibody and Bioresource Core Facility

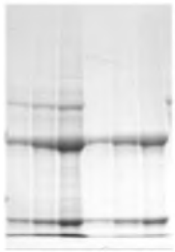


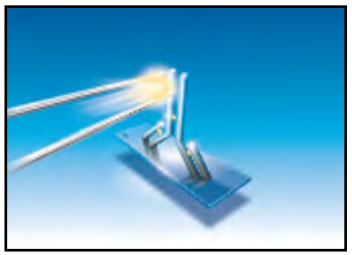
Custom MAb Development

- Comprehensive project design and management
- Generate robust humoral response
  - Immunogens: Cells, protein, peptides, and other haptens
  - Hosts: Mice (WT/KO), hamsters, and rats
- B cell immortalization (10's of thousands of hybridomas)
- Isolate IgG secreting hybridomas (100's pf hybridomas)
- Screen hybridomas by ELISA
- Cryopreserve antigen specific hybridomas
- Clone hybridoma cultures to establish stable lines
- Advise on further characterization and validation

Antibody and Bioresource Core Facility



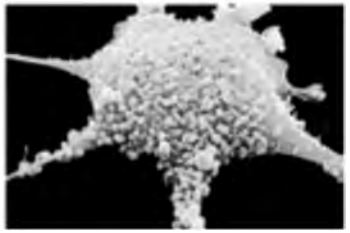




Monoclonal Antibodies

- ***In vitro* production**
  - Conditioned media
  - Large scale productions in bioreactors
- **Purification**
  - milligrams to grams at > 95% purity
- **Modification**
  - Conjugation to fluorophores, HRP & biotin
  - Fragmentation into Fab & F(Ab')2

Antibody and Bioresource Core Facility



Mycoplasma Testing

Cell Line Distribution Service

- Alleviates the research lab the work associated with distributing cell lines (e.g. MTA, validation, shipping logistics)
- Informational and physical repository for published cell lines
- Hybridomas & cell lines (e.g. tumor and stem cell)

Antibody and Bioresource Core Facility

Anne Mui

Lou Mattera

Greg Davis

Syeda Rizvi

Michelle Riley

Frances Weis-Garcia

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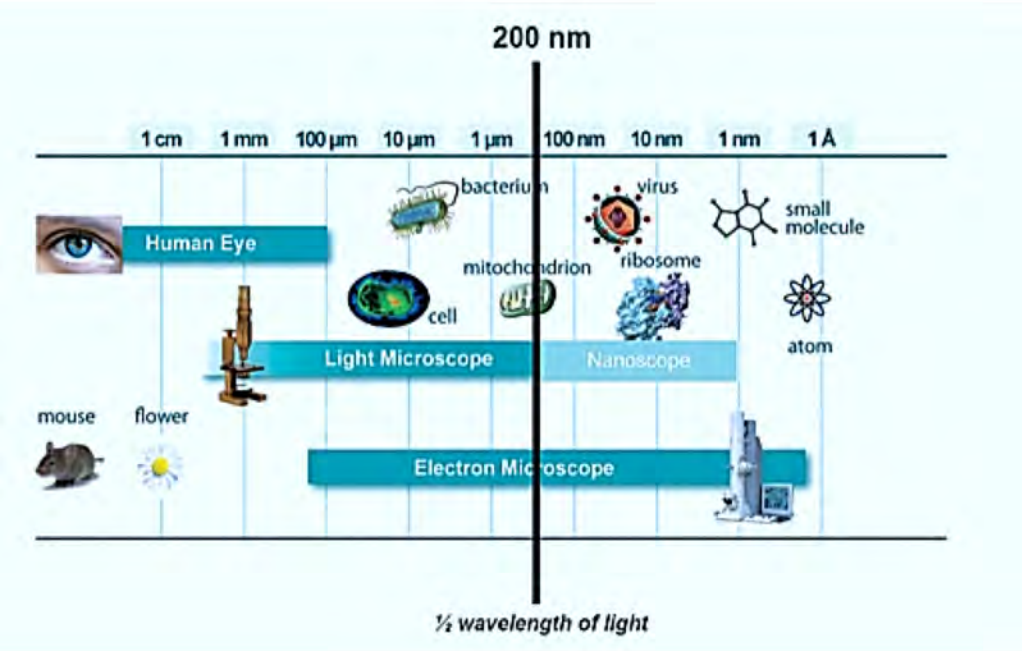
Electron Microscopy Resource Center

Hilda Amalia Pasolli, Ph.D.
Director

Nadine Soplop, Ph.D.
Senior Research Support Specialist



- Sample preparation for transmission and scanning Electron Microscopy
- Development of EM protocols according to the scientists needs
- Immuno-labeling (colloidal gold, HRP, APEX)
- Correlative light-electron microscopy (CLEM)
- Training in the use of equipment and techniques

We can do EM for a variety of experimental models!

How do we do EM?

- Chemical fixation
- High pressure freezing followed by freeze-substitution
- Microwave fixation and embedding
- Semi-thin and ultrathin sectioning
- Critical point drying
- Metal coating
- TEM and SEM imaging

Microwave

High Pressure freezer

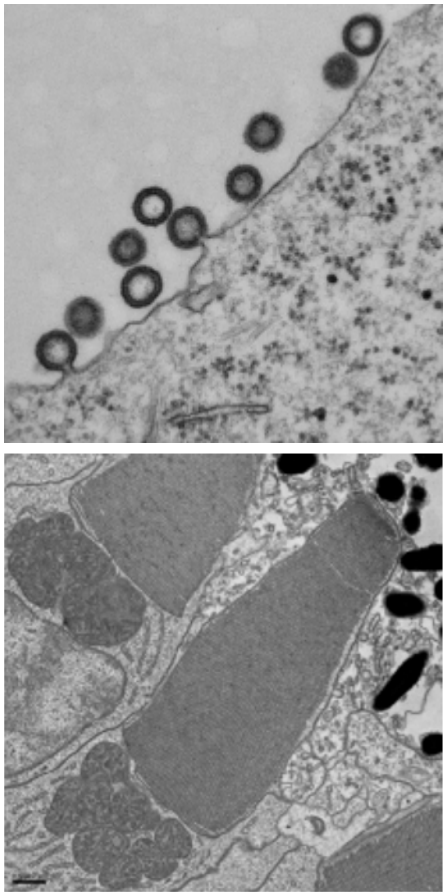
Freeze-substitution

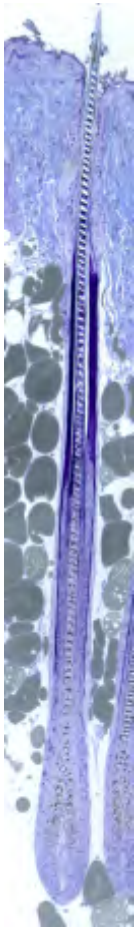
Ultramicrotome

Diamond knife

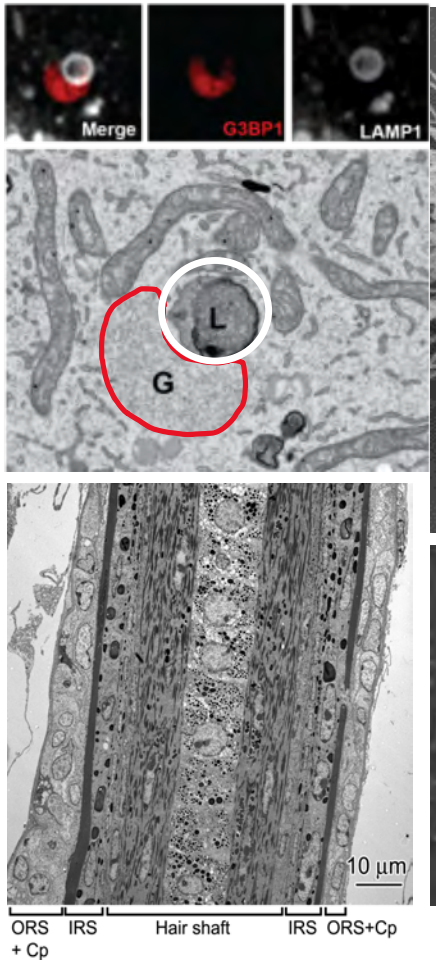
Electron Microscopy Resource Center

TEM

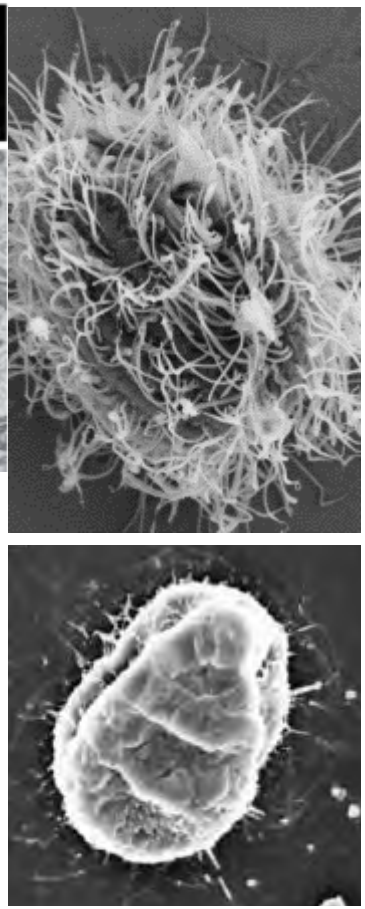




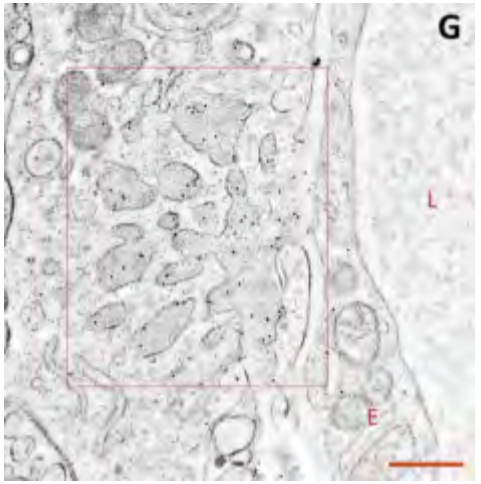
Correlative LM-TEM

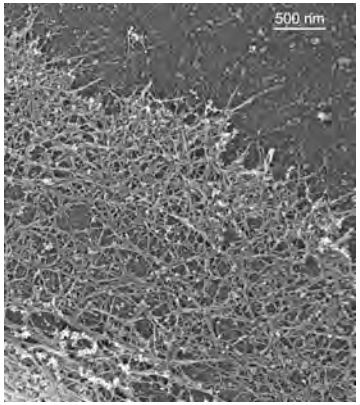


SEM



Immunogold





Flow Cytometry Resource Center (FCRC)

http://www.rockefeller.edu/fcrc/ DWB 205 - DWB 211

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Stanka Semova

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Alena Keprova

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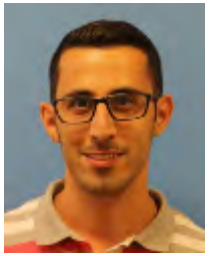
- #7657



Samer Shalaby

- Research Support Associate
- *sshalaby@rockefeller.edu*
- #7657

Brandon Yoo

- Information Technology
- Senior Computer Support Specialist

FCRC Services

On Equipment

- **Staff-operated equipment at FCRC**
  - Cell sorting on three BD FACSAria (cell sorters)
  - Data acquisition on the ImageStream-X (imaging flow cytometer)
- **All the Flow Cytometry equipment at FCRC**
  - Maintenance
  - Quality control testing
  - Troubleshooting and minor repairs
  - Communication with the vendors for appropriate service
    - Service request
    - Post-service follow-up
  - Data management

- **Equipment and computer/programs upgrades and acquisitions**
  - Proposals
  - Installations with sufficient quality controls

Education and Training

- **"Beyond the Basics" Flow Cytometry Class**
  - FCRC Classes in groups of 5-15 people
  - Pre-scheduled approximately once a two months

- **Instrumental Training "Hands-on"**
  - Personal sessions sc based on re
  - Hands-on trainings
  - Help with instrument setup and troubleshooting

- **Software Training (Introduction or Troubleshooting)**

Consultation and Help

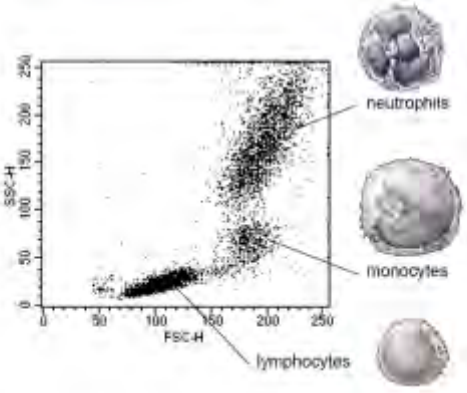
- **Consultations**
  - Experimental Design
  - Pre-Sort
  - Pre-ImageStream
  - Pre-Hands-On

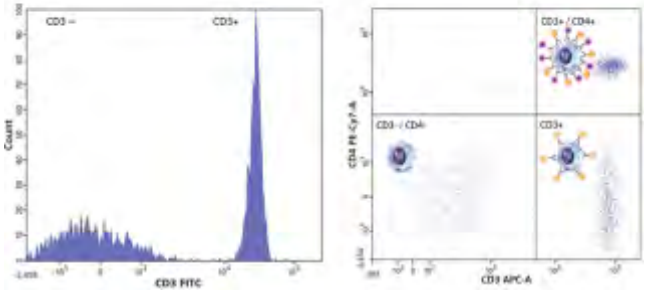
- **Troubleshooting**
  - On experimental design
  - On the instruments

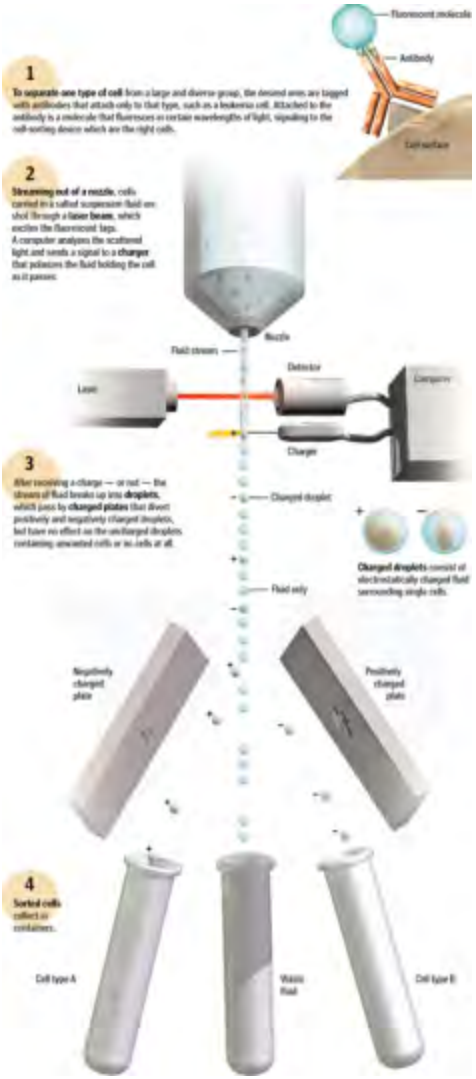
- **Help and Assistance with:**
  - Data analysis
  - Data preparation for the publication and scientific presentations
  - Experiments to produce preliminary data for proposals and grant applications
  - Letters of support for proposals and grant applications

What Could Be Done at FCRC, the Flow Cytometry Resource Center?

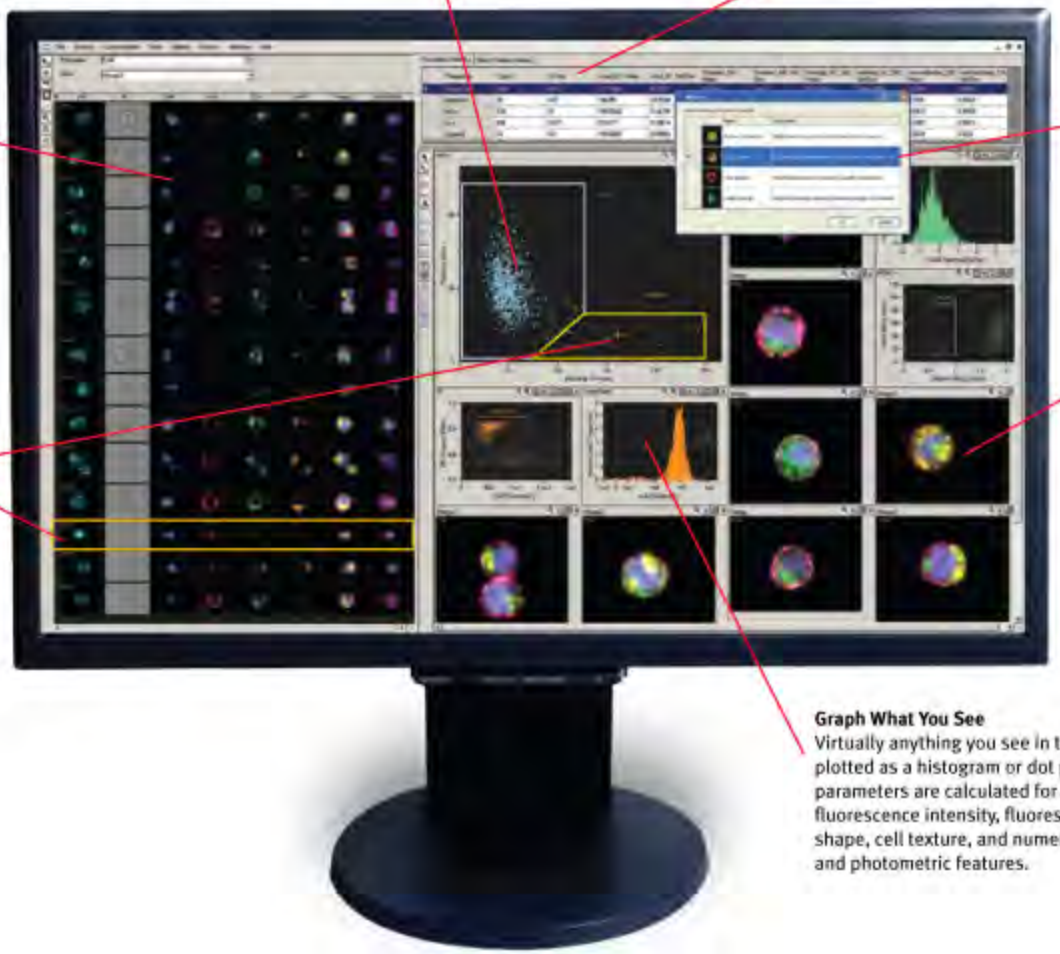
Operations	Extended Business Hours, by FCRC Staff				24/7/365, Self-Operated					
	Sorters			Image Analyzer	Spectral Analyzer	Advanced Analyzers			Basic Analyzers	
Lasers (Wavelength) and # of Fluorescent Detectors	BD FACS Aria-II-1	BD FACS Aria-II-2	BD FACS Aria-II-3	Image Stream-X	Cytek Aurora	BD LSRII-1	BD LSRII-2	BD LSR-Fortessa	ThermoFisher Attune NxT	BD Accuri C6
Blue (488nm)	3	3	3	5	14	3	3	3	3	4/3/2
Red (633-658 nm)	3	3	3	2	8	3	3	3		0/1/2
Violet (405-407 nm)	3	4	4	5	16	4	4	5		
Yellow/Green (561nm)	4	4	4	4	10	4	4	4	4	
UV (355 nm)		2	2			2		3		
Blue/Violet (445 nm)			2				2			
Total # of Detectors	13	16	18	10	48	16	16	18	7	4







What Could Be Done at FCRC, the Flow Cytometry Resource Center?



Graphical Population Definitions
Define populations using familiar graphical tools and combine them with logical functions.

Comprehensive Population Statistics
Characterize your cell populations with a wide range of statistical metrics to reveal differences in cell morphology, phenotype, and function.

Inspect Your Populations
The Image Gallery allows you to see every image of every cell or perform a "virtual cell sort" to inspect and validate the cells within a specific population.

Wizards Simplify Analysis
Pre-configured and optimized analysis wizards are provided for many common applications.

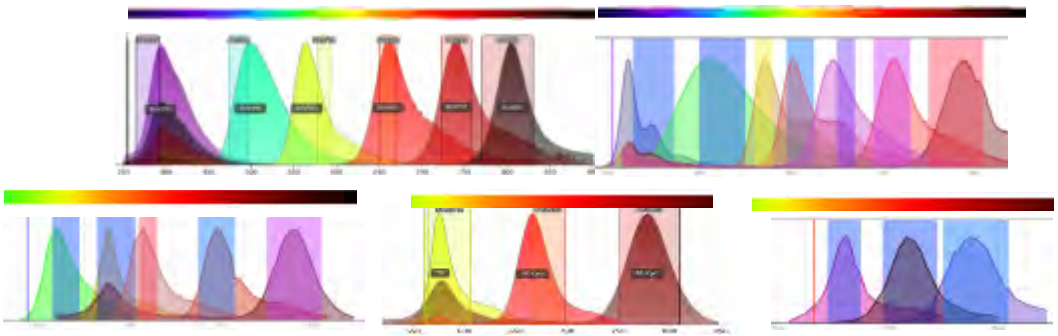
Images for Every Dot
Every dot in every scatter plot is linked to the corresponding cell imagery. Simply click on a dot to see the associated cell images or vice-versa.

Flexible Image Display Tools
Create composite images, pseudo-color representations and a host of other image transformations for reporting and publication.

Graph What You See
Virtually anything you see in the imagery can be plotted as a histogram or dot plot. Hundreds of parameters are calculated for every cell, including fluorescence intensity, fluorescence location, cell shape, cell texture, and numerous other morphologic and photometric features.

Revolution in Flow Cytometry – Spectral Flow Cytometer, Cytek Aurora™

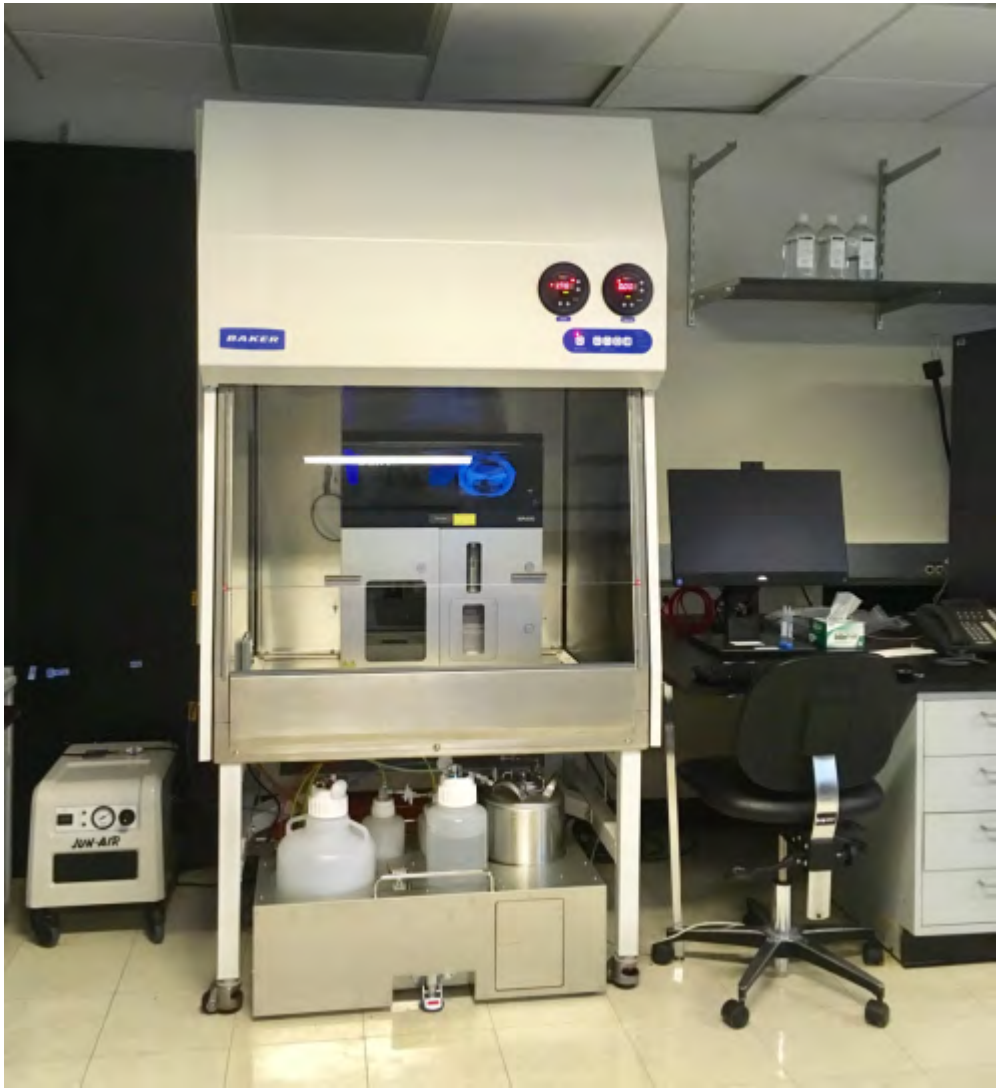
Cytek Aurora Spectral Analyzer



- 1980 — 1 Laser, 2 Colors
- 1990 — 2 Lasers, 4 Colors
- 2000 — 3 Lasers, 8 Colors
- 2010 — 3 Lasers, 13 Colors
- 2017 — 3 Lasers, 20 Colors
- 2018 — 4 Lasers, 24 Colors
- 2019 — 5 Lasers, 32 Colors

CYTEK

Sony MA900 Cell Sorter



Self Sorting???

Services at the Genomics Resource Center

- Next-generation sequencing
  - Whole genome and whole exome sequencing
  - Targeted sequencing
  - RNA-Seq: Transcriptome analysis
  - Small RNA seq: small RNA discovery and quantitation
  - ChIP-seq: Protein-DNA binding
  - Methyl-Seq: epigenetic analysis of DNA methylation
  - Ribo-Seq: Ribosome profiling for active translation
  - TRAP-Seq: cell type specific mRNA profiling
  - ATAC-Seq: chromosomal accessibility
  - CROP-Seq: pooled CRISPR screening with single-cell transcriptome readout

NovaSeq 6000

NextSeq 500

MiSeq

- 10 x Genomics Chromium Single Cell System
  - Single cell gene expression
  - Single cell full-length V(D)J profiling
  - Single cell ATAC-Seq
  - Single cell RNA Seq with CRISPR Screening

QuantStudio 12K-flex

- Realtime PCR systems
  - Individual gene expression analysis
  - Pathway analysis
  - Individual SNP genotyping

- Others
  - Covaris Ultrasonicator
  - Agilent Bioanalyzer
  - Agilent TapeStation
  - Qubit fluorometr
  - NanoDrops
  - PCR machines 96/384-well

Sequencer Selection

NovaSeq
800 million to 10 Billion reads

- Whole genome and Whole exome sequencing
- Paired-end RNA-Seq
- ATAC-Seq
- Large scale RNA-Seq
- Single cell RNA-Seq

NextSeq
400 million reads

- Small scale RNA-Seq up to 16 samples
- ChIP-Seq
- Small RNA Seq

MiSeq
1 – 20 million reads

- PCR Amplicon Sequencing
- 16S rRNA Metagenomic Sequencing as 300bp x 2
- Library prep method development
- Library QC

Transcriptome Sequencing (RNA-Seq)

- **mRNA sequencing**
  - Start with 100 ng total RNA
  - Gene expression and splicing analysis of coding RNA
- **Total RNA sequencing (with rRNA depletion)**
  - Start with 100 ng Total RNA
  - Gene expression analysis of coding and non-coding RNA
- **Low-input mRNA sequencing**
  - Start with as low as 100 pg – 1 ng total RNA
- **Ribo-profiling**
  - Which mRNA are actively translated
- **TRAP-Seq**
  - Cell type specific mRNA expression
- **Single Cell RNA sequencing**
  - mRNA profiling at single cell level

Genomics Resource Center

WRB 725 24/7 access
www.rockefeller.edu/genomics
genomics@rockefeller.edu

Connie Zhao, Ph.D.
Director

Hong Duan, PhD
Research Support Specialist

Bin Zhang
Research Support Specialist

Christine Lai
Research Support Specialist

Xiaoyun Qiu
Research Support Assistant

Sophie Huang
Bioinformatics Specialist

High Throughput and Spectroscopy Resource Center, DWB 216

http://inside.rockefeller.edu/htsrc

The HTSRC provides scientific and technical support and access to instrumentation in the following areas:

- assay cascades used in drug discovery projects
- miniaturized assay development
- high throughput liquid handling
- high-throughput screening
- identifying tool compounds or lead compounds for drug discovery
- determination of structure activity relationships/medicinal chemistry efforts
- measuring the kinetics and thermodynamics of biomolecular interactions
- analysis of small molecular weight compound structure and purity

How Is An HTS Project Accomplished?

1 assay/many compound classes

Chemical library

Nanoliter Compound delivery into microtiter plates using nanosyringes or pin-tools

Biological assay

Biological assays are developed using cells, cell extracts, enzymes, purified proteins, antibodies. Microtiter plates are filled with liquid-handling robots

Read assay

Assays are read using optical microplate readers or automated microscope

Database

Results entered into a database with software allowing for sub-structure /similarity searching and comparison of assay results. Hits are selected

Concentration-response

Compounds picked and re-tested for EC50 determination

Many assays/ few compound classes

Secondary assays

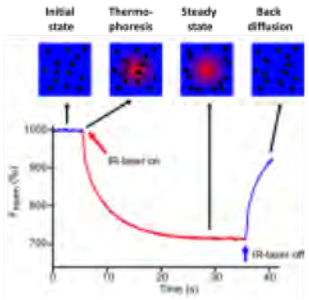
HPLC-MS

Biophysical Techniques for Binding Measurements

Microscale Thermophoresis: Nanotemper MST

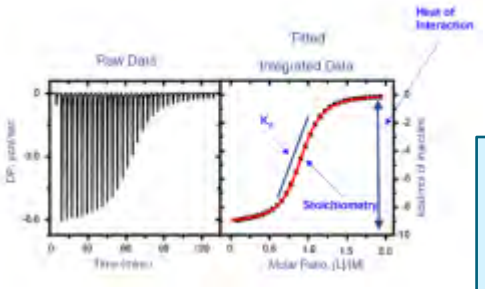
Principle

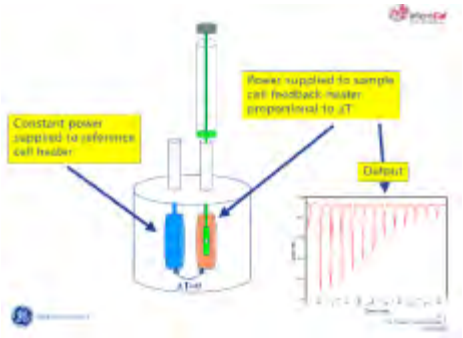
Molecules migrate along a temperature gradient at different rates depending upon size, shape (hydration shell) and charge thus allowing differentiation between unbound and bound state



Isothermal Calorimetry

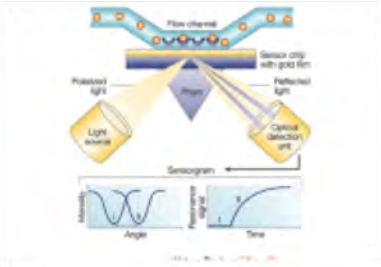
- Label-free
- Autosampler
- 400uL/1 mg protein per experiment





Surface Plasmon Resonance : Proteon XPR

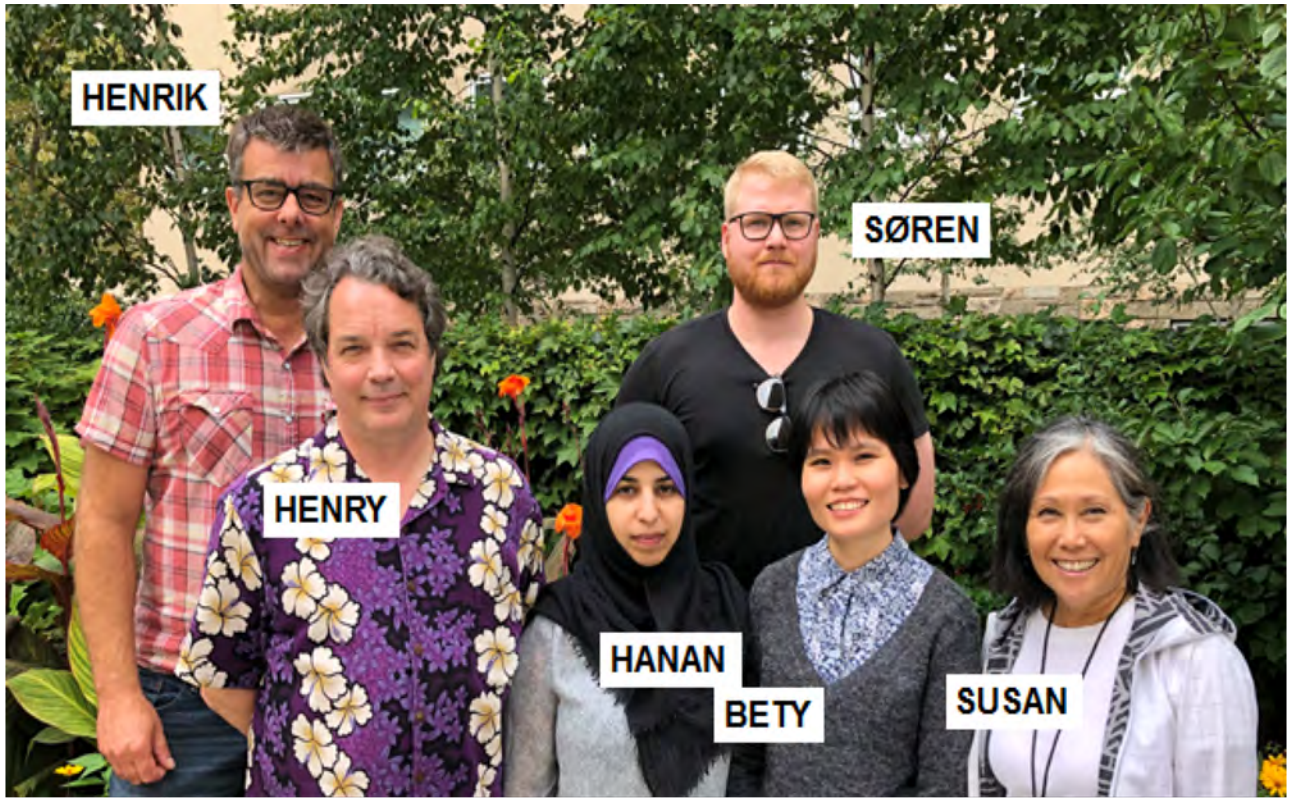
20-50ugs Protein
Immobilized to Gold Sensor Chip
Measures on-rate and off-rate
Immobilization through free-amines, antibody, biotin



HTSRC Staff

- Fraser Glickman, Ph.D., *Director*
- Carolina Adura, Ph.D., *Manager of Spectroscopy*
- Jeanne Chiaravalli, M.S., *Research Support Specialist*
- Lavoisier Ramos-Espiritu, Ph.D., *Research Support Specialist*

Proteomics Resource Center



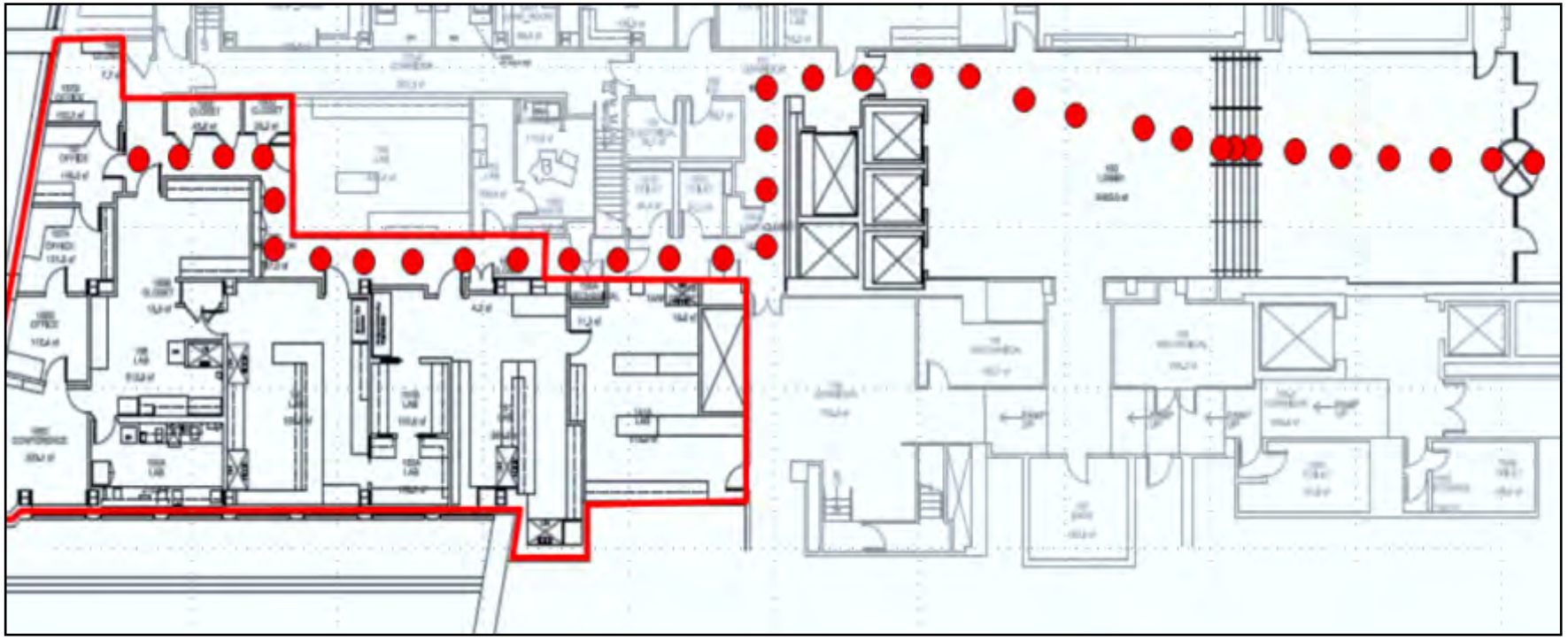
Proteomics Resource Center

What we do…

- Proteomics – identification and quantitation of proteins, peptides and small molecules by mass spectrometry
- Peptide synthesis
- Analytical chemistry
- User instrumentation
- Help planning experiments...

Proteomics Resource Center

Where to find us…

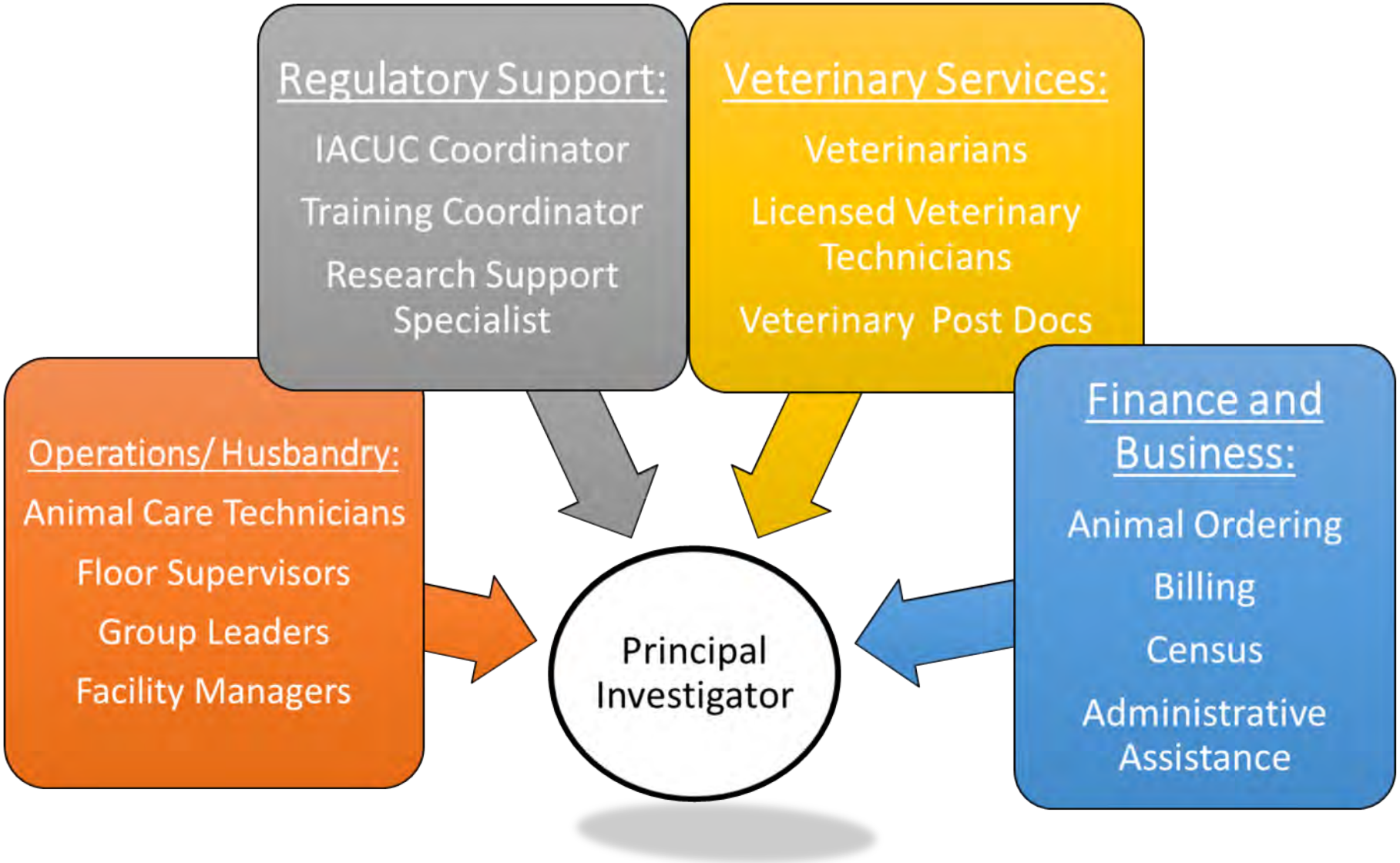


Rockefeller Research Bldg. Room 157

http://inside.rockefeller.edu/proteomics/

Comparative Bioscience Center (CBC)

Structure of the CBC



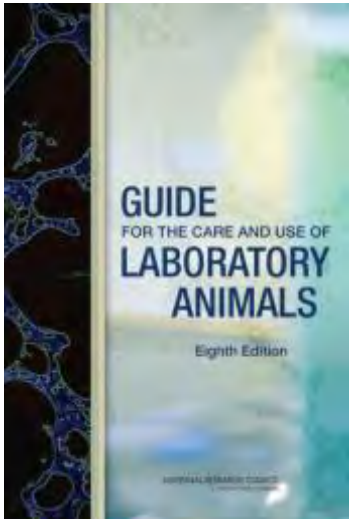
The CBC Facilitates Quality Biomedical Research

IACUC

- Institutional Animal Care and Use Committee
  - Ethics review
  - Scientific review

High Standards of Animal Care

- Optimal environment
- Optimal health
  - Maintained disease free
  - Extensive health surveillance programs
- Minimize research variables



aaalac INTERNATIONAL
AN ACCREDITED ANIMAL CARE & USE PROGRAM SINCE 1971

Office of Laboratory Animal Welfare
OLAW

Educational/ Research Support

1. CBC Orientation
   - Lecture &Lab (Restraint, Anesthesia, Dosing)
2. Aseptic Techniques for Surgery
3. Micro-Ultrasound/IVIS Imaging
4. Safe use of Hazards
5. Dosing: SC, IM, IV, PO
6. Blood Collections
7. Tissue Collections
8. Tri-Institutional Seminars
   - Rodent Breeding, Phenotypic Characterization of Mice

Vevo 2100 Ultrasound

- High anatomical resolution
  - Color Doppler for blood flow identification
- Research areas applicable:
  - Cardiovascular studies
  - Urology
  - Contrast imaging
  - Cancer
  - Developmental biology
- Useful with mice, rats, fish

IVIS Spectrum

- High Sensitivity in vivo fluorescence and bioluminescence imaging
- Monitor disease progression
- Cell trafficking
- Gene expression
- Measure up to 5 mice at a time

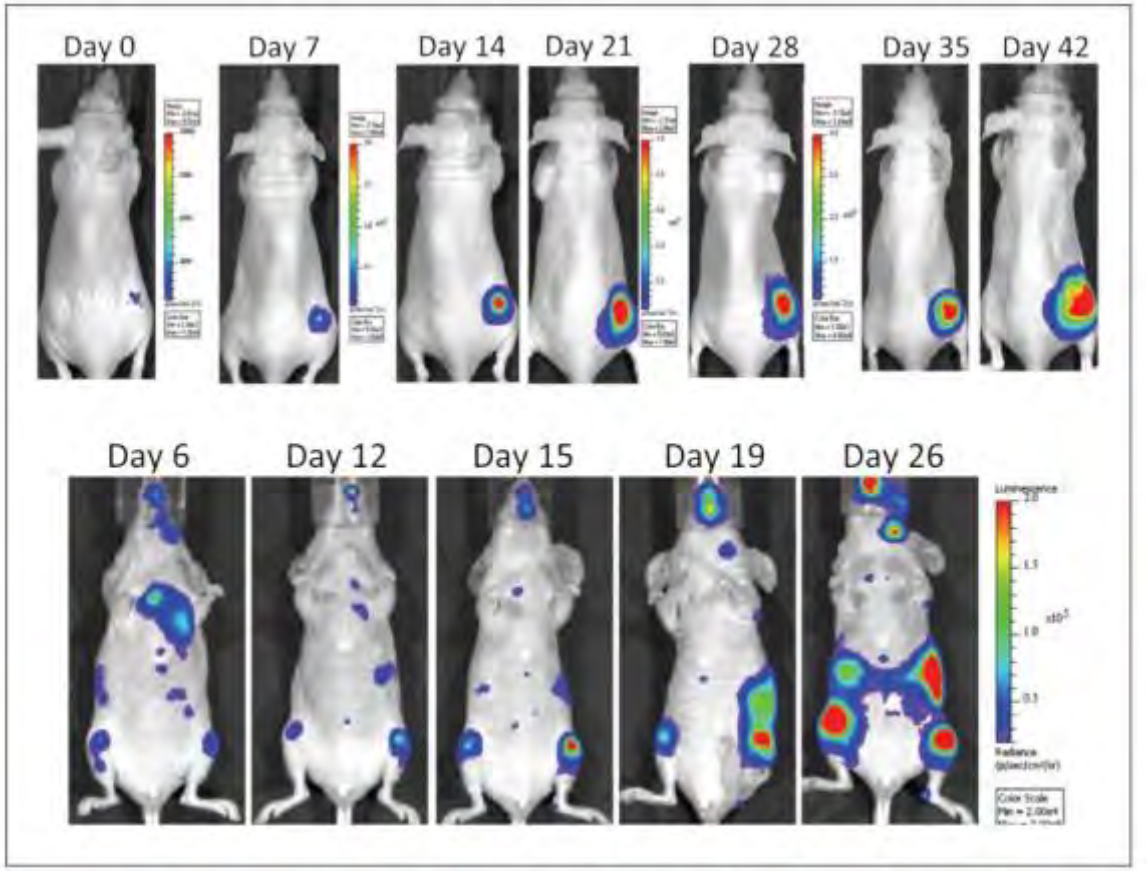
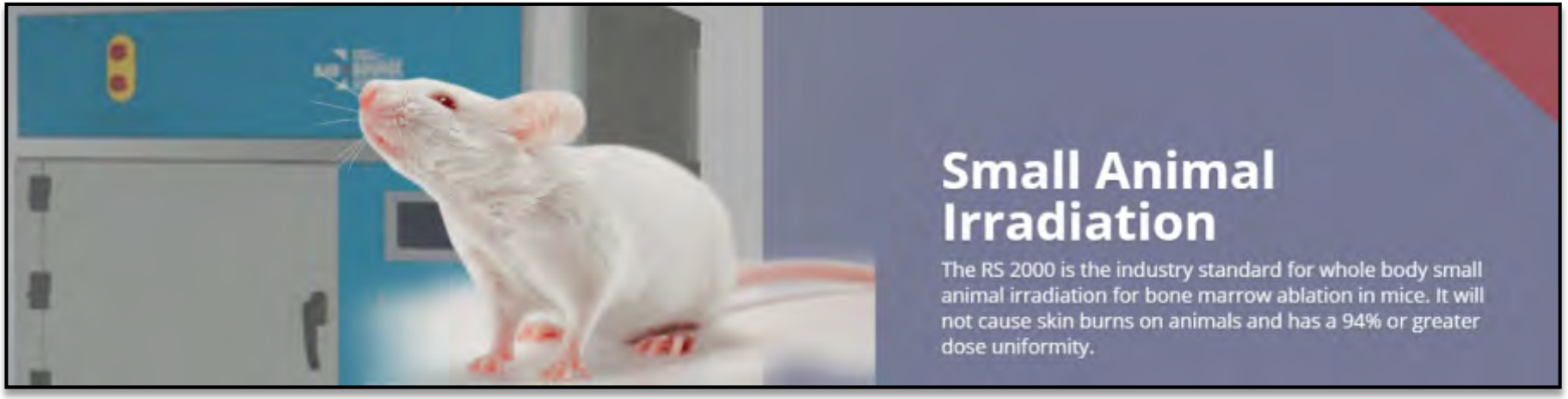


Figure 4. Detection of five 4T1-luc2 cells injected subcutaneously in nude mice (top) and monitoring metastasis post intracardiac injection of MDA MA-231-luc2 cells (bottom) longitudinally.

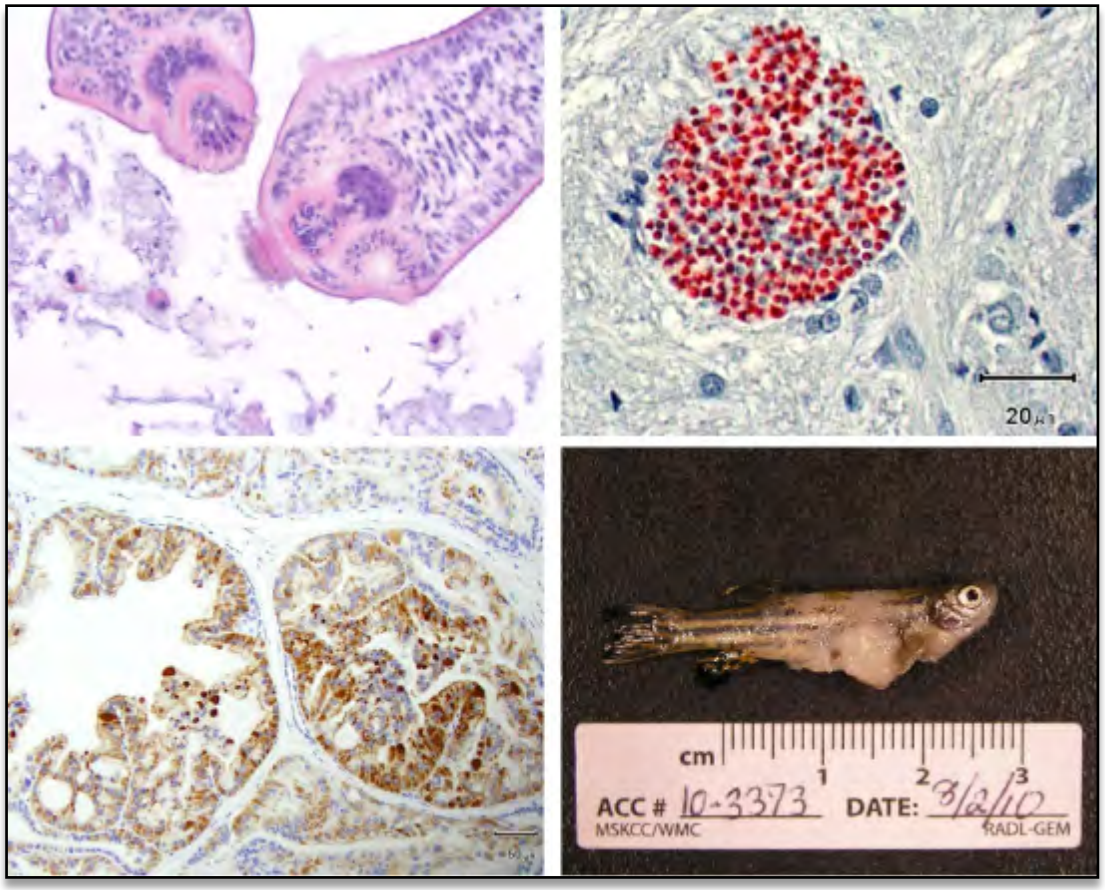
Rad Source 2000 X-Ray Biologic Irradiator



- Generate bone marrow ablation in mice
- Useful for
  - Cancer studies
  - Targeted Tumor irradiation
  - Host - Viral Infection

Laboratory of Comparative Pathology

- Genetically Modified Animal Phenotyping
- Hematology and Clinical chemistry
- Complete Necropsy
- Histology
- Radiology
- Bone marrow evaluation
- Organ-specific research studies: mammary gland, prostate, heart



Leslie Diaz, Associate Director, CBC ***ldiaz@rockefeller.edu***

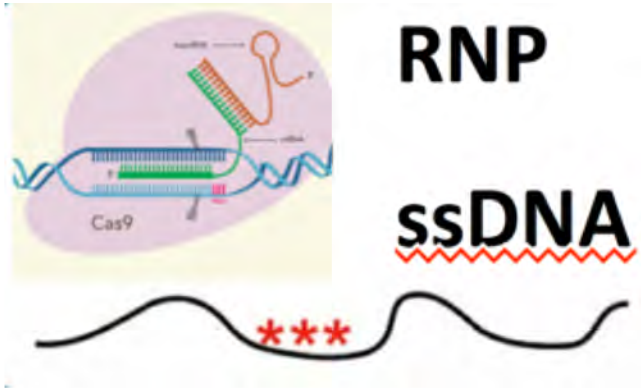
CRISPR & Genome Editing Center

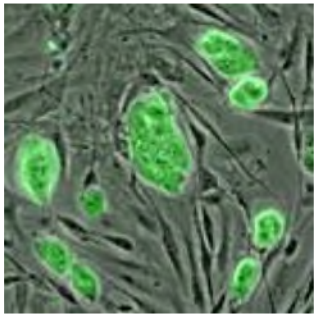
Chingwen Yang, Ph.D.
Director
DWB 703

Tel: 212-327-8649
yangc@rockefeller.edu

Gene editing Service

- mouse embryos
- adult mice
- mES cells
- mouse lymphoma cell lines
- human iPSC
- primary human cancer cells





Genome Editing in mouse zygote

KO: ctRNP

frameshift mutation
genomic deletion & Inversion
high efficiency, easy to achieve homozygous mutants
microinjection, embryo electroporation, iGONAD

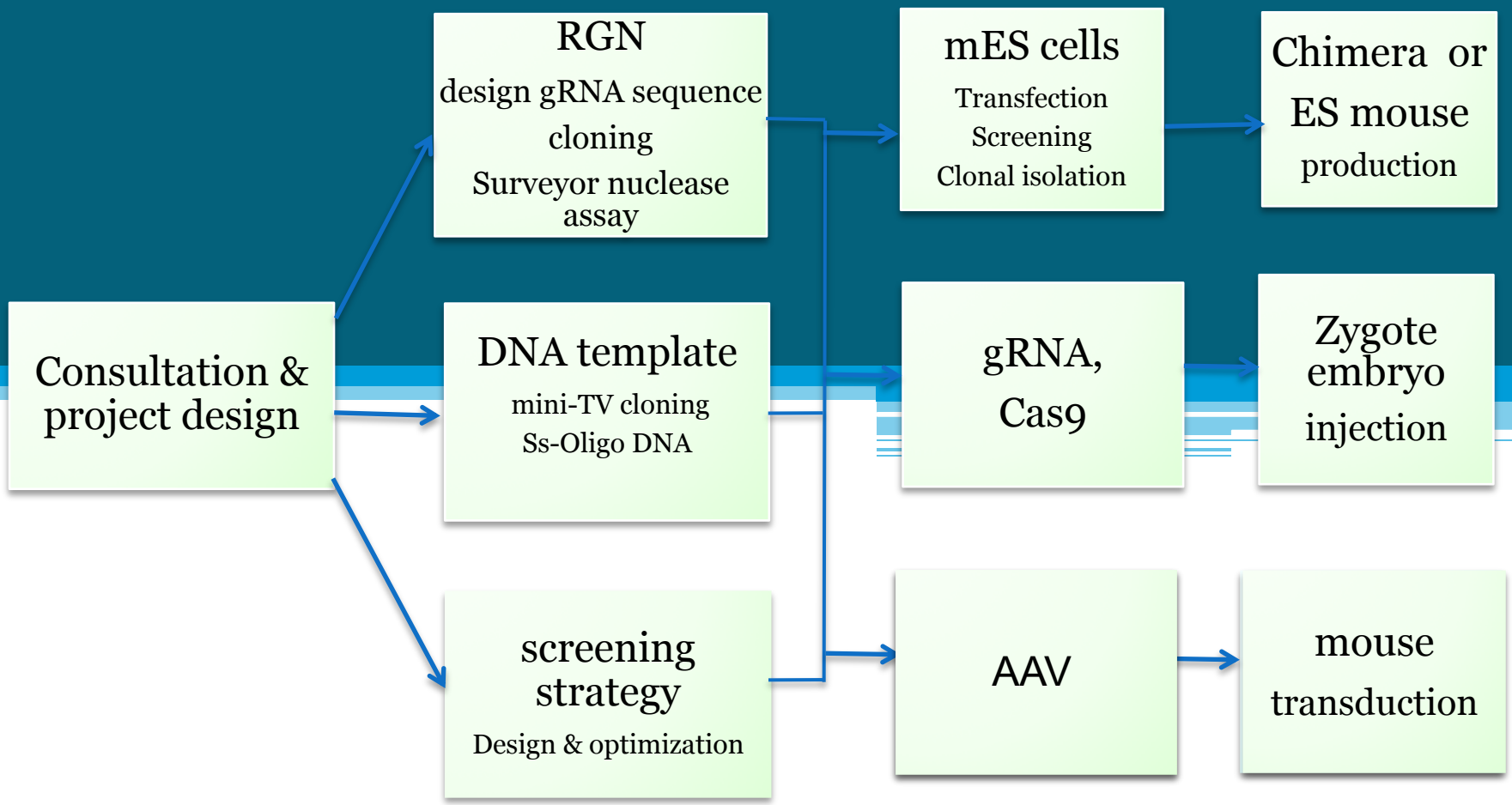
KI of short modification: ctRNP + ss oligo (<200 bases)

missense mutation
insertion of loxP site, small tag
modification up to 60nt
high efficiency, sometimes homozygous
microinjection, embryo electroporation, iGONAD

EasiCRISPR: ctRNP + ssDNA (500 -2500 bases)

KI of reporter
conditional KO allele
exon replacement
modification up to 1500bp
medium efficient, less likely for complete homozygous alleles
microinjection~~, embryo electroporation, iGONAD~~

CRISPR & Genomic Editing Center



CRISPR & Genome Editing Center

DWB 702-703

327-7307, -8650, -8649

Chingwen Yang, Ph.D., Director

Jing Gao, M.D., Manager in cell biology

Dorjee Shola, Ph. D., Manager in molecular biology

Chia-Yun Han, M.S, Research support specialist

Pradip Kar, M.S., Research support specialist

Qilie Luo, Ph. D. Research support specialist

Vhy-Shelta Kewalder, B.S., Research support specialist

Transgenic and Reproductive Technology Center

CBC 542-546
x7783, x7738

Director:
Rada Norinsky
Rada.Norinsky@rockefeller.edu

Research Support Specialists:
Jahnney Torres
Eunyong Kim
William Ramirez
Roxana Cubias

Mutant Mouse Models Production Services

Targeted Mutations (KI, KO, conditional KO)

- Microinjection of CRISPR/Cas9 complex directly into zygotes

Transgenic Mice

- Microinjection of plasmid DNA and BAC DNA into zygotes

Chimeric Mice

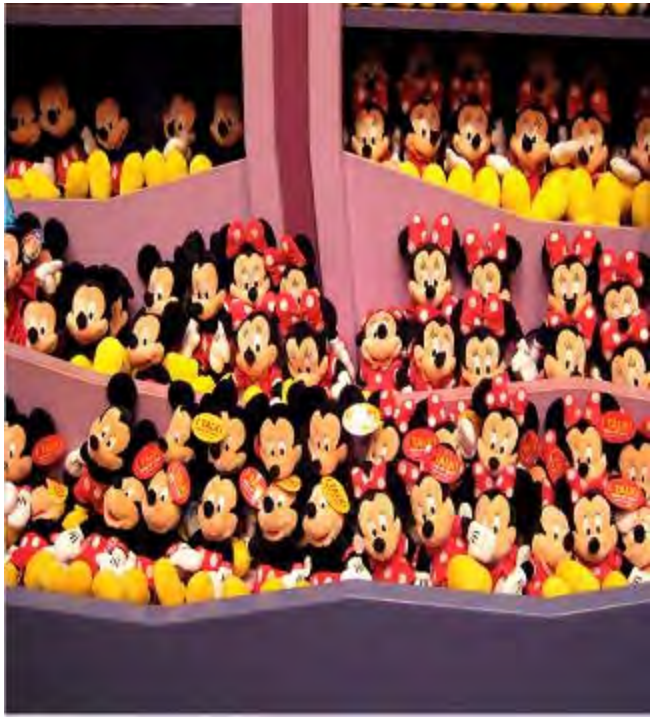
- Microinjection of ES cells into blastocysts

Assisted Reproduction/Rederivation Services

- Accelerated colony expansion

(IVF with fresh and frozen sperm)

- Accelerated embryos cryopreservation
- Assisted reproduction for difficult lines
- Resuscitation of cryopreserved mouse embryos
- IVF recovery of lines from frozen sperm
- Rederivation from frozen embryos/sperm for generation pathogen free mouse lines



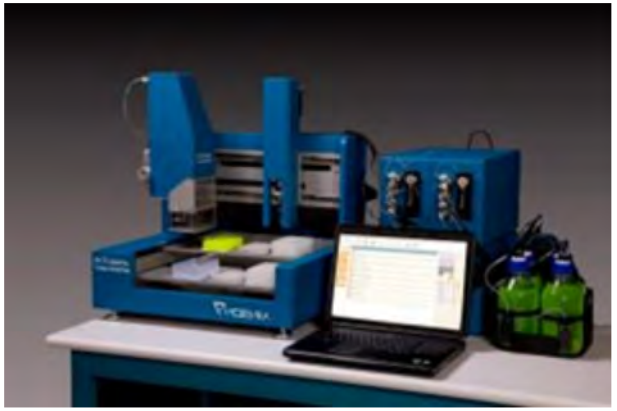
GLASSWASHING SERVICES

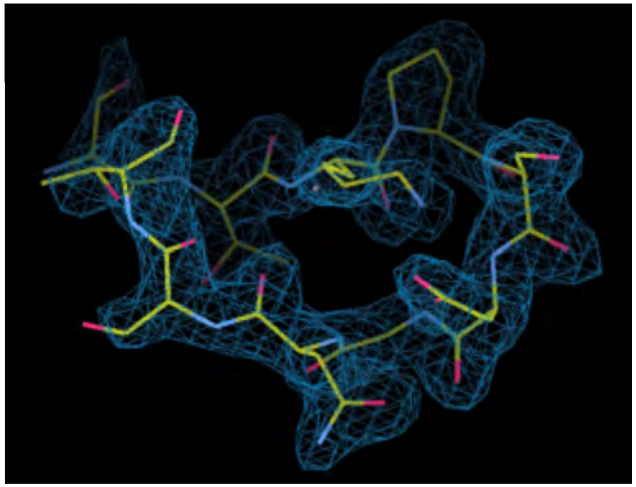
CRC Room CO2E (Greenberg Building)
7AM-3PM
http://www.rockefeller.edu/glasswashing/

Structural Biology Resource Center

Do X-ray crystallography with us

From crystal growth to structure determination





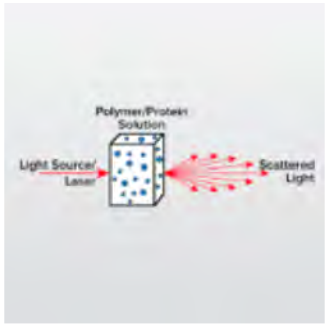
Structural Biology Resource Center

Or…. make and purify proteins with us

DO YOU WANT PURIFIED PROTEIN?

The Structural Biology Resource Center has a new protein expression and purification training center.

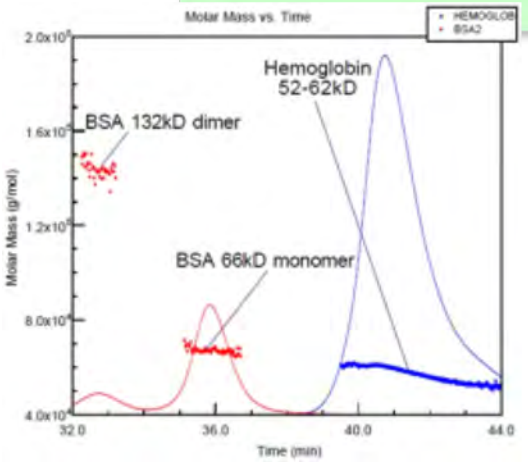
- **We will provide the tools and knowledge for satisfactory results.**
- **You will develop the expertise to continue working independently.**



NEW SEC-MALS

What is SEC-MALS?

Size Exclusion Chromatography coupled to Multi-Angle Light Scattering



Deena Oren, Ph.D.
Manager
RRB Suite 140
inside.rockefeller.edu/sbrc

Precision Instrumentation & Technology
Makerspace

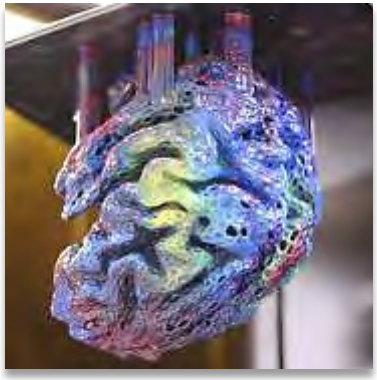
How Can You Improve Your Science?

- Training to use various design and fabrication tools
- Stock materials (plastic and metal)
- Workspace, CAD computers
- Equipment
  - Sketch, Surface, Solid Body Modeling
  - 3D Printers (FDM, DLP, MJP)
  - Laser Cutter (CO_2 Emission)
  - CNC Mills (5-Axis, 4-Axis)
  - Electronics and Microcontrollers
  - Lathe
  - Micro Welder
  - Knee Mill

Services

How Can We Improve Your Science?

- Free Expert Consultations
- Custom Scientific Equipment Design & Fabrication
  - Precision Machining
  - Prototyping
  - Parametric Modelling
  - Metrology
  - Integrated Systems
- Procurement & Referrals
- Process Improvement
- System Analysis, Diagnosis & Repair
- Training




KURT

The PIT

Dan Gross

Scientific Engineer

Jim Petrillo

Instrumentation Engineer

Peer Strogies

Scientific Machinist

Location: Plaza Building, A level

inside.rockefeller.edu/fabrication/

Bioinformatics Resource Center

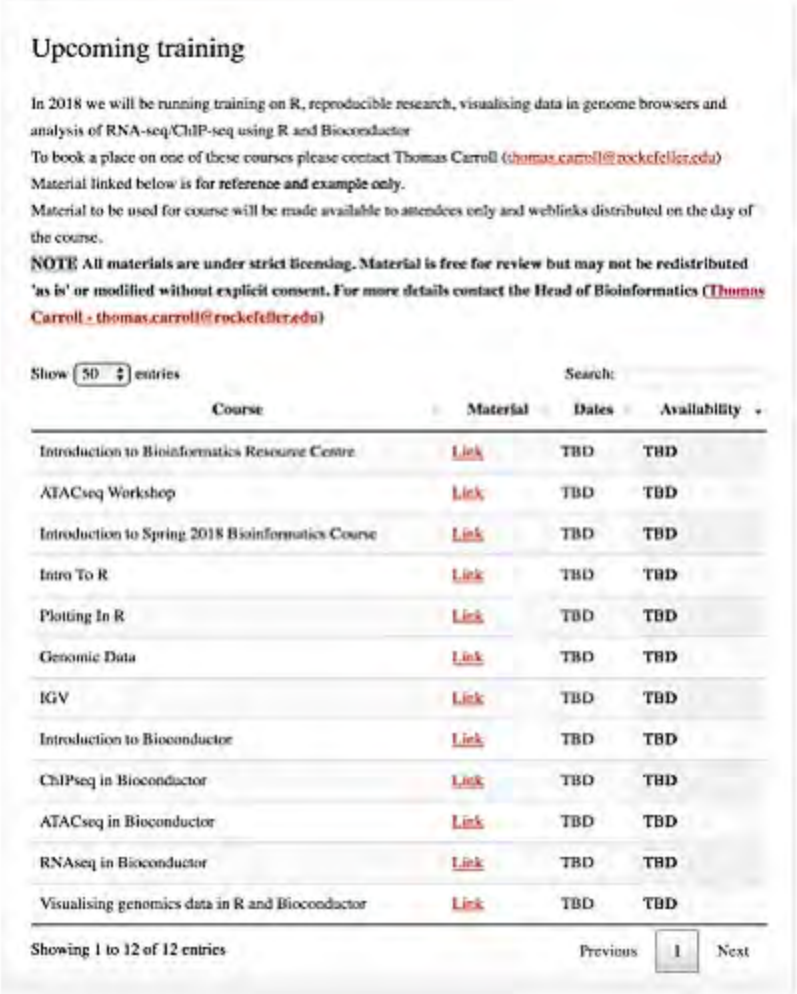
- Provide bioinformatics software infrastructure.
- Conduct training courses and community events.
- Work with wet and dry biologists on both a consultative and collaborative basis.
- Experimental design.

Bioinformatics Resource Center

- Who we are.
  - Tom Carroll
  - Ji-Dung Luo
  - Matt Paul
- What we do.
  - Training
  - Infrastructure
  - Analysis on demand.

BRC- Training

- Analysis of high-throughput-data in R and Bioconductor.
- New York R and Bioconductor meetups
- Bioconductor Conference 2019 at RU -> 2020 organizing commitee.
- 1 to 1 training through Github.



Upcoming training

In 2018 we will be running training on R, reproducible research, visualising data in genome browsers and analysis of RNA-seq/ChIP-seq using R and Bioconductor

To book a place on one of these courses please contact Thomas Carroll (thomas.carroll@rockefeller.edu)

Material linked below is for reference and example only.

Material to be used for course will be made available to attendees only and weblinks distributed on the day of the course.

NOTE All materials are under strict licensing. Material is free for review but may not be redistributed 'as is' or modified without explicit consent. For more details contact the Head of Bioinformatics (Thomas Carroll - thomas.carroll@rockefeller.edu)

Show 50 entries Search:

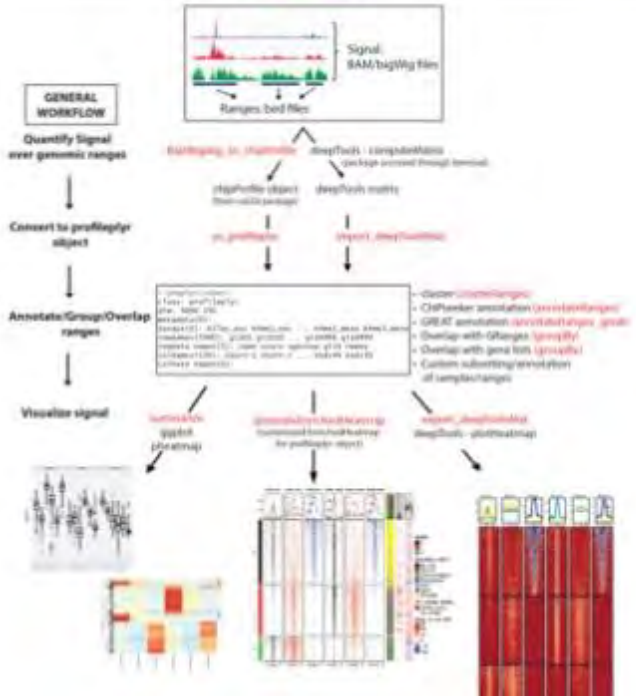
Course	Material	Dates	Availability
Introduction to Bioinformatics Resource Centre	Link	TBD	TBD
ATACseq Workshop	Link	TBD	TBD
Introduction to Spring 2018 Bioinformatics Course	Link	TBD	TBD
Intro To R	Link	TBD	TBD
Plotting In R	Link	TBD	TBD
Genomic Data	Link	TBD	TBD
IGV	Link	TBD	TBD
Introduction to Bioconductor	Link	TBD	TBD
ChIPseq in Bioconductor	Link	TBD	TBD
ATACseq in Bioconductor	Link	TBD	TBD
RNAseq in Bioconductor	Link	TBD	TBD
Visualising genomics data in R and Bioconductor	Link	TBD	TBD

Showing 1 to 12 of 12 entries Previous 1 Next

Software

- HTS pipelines
  - RNA-seq, ChIP-seq, ATAC-seq, WGS, Exome-seq.
- Reproducible, scalable and standardized, rapidly deployable on multiple systems.
- Pipeline directly linked to training course (no black box).
- ~ 700 samples in last month.
- Automating delivery of results through Box.

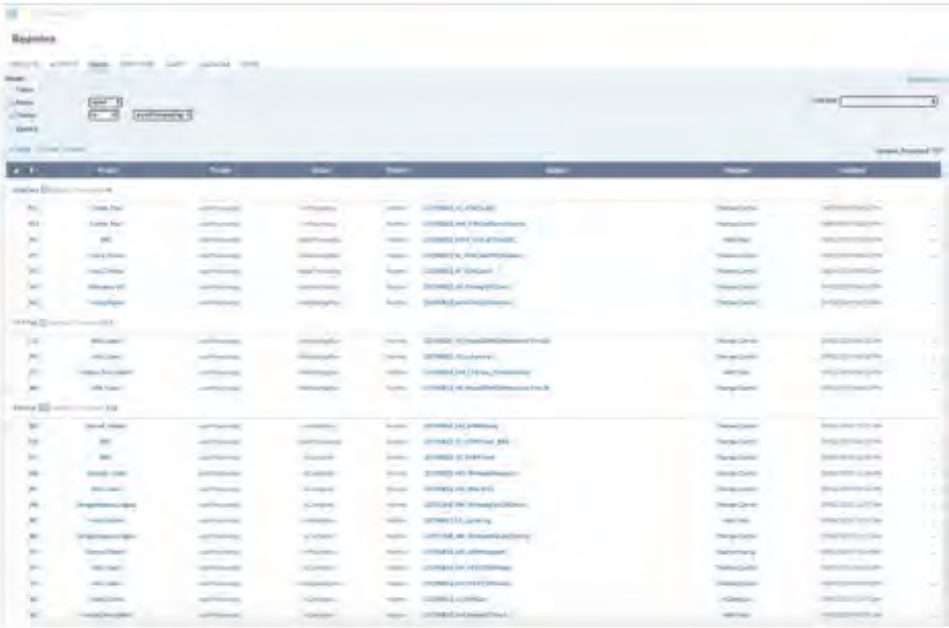
- Profileplyr bioconductor package (Doug Barrows).
- 2 softwares packages in development.



Analysis on demand

Analysis as requested

- ~30 groups.
- Custom analysis fitted to project.
- Regularly assess requests and adapt pipelines and/or training dependent on demands for analysis types.



High Performance Computing

Jason Banfelder
Director, HPC Systems and Applications

Rebecca Bennett
Senior Systems Engineer

Bala Jayaraman
Senior HPC Systems Administrator

Logan Sweezy
Scientific Systems Administrator

High Performance Computing

- On campus support for **data intensive science**
- Processing Power (257 double-precision TFlops)
  - More cores to devote to a problem (4,808 cores under management)
  - Specialized architectures: 54 GPUs; large memory (3 TB RAM) nodes
  - Batch vs. interactive
- Data Storage (2.8 PB)
  - Hundreds of disks for more IOPS
- Networking (56 Gbps/100 Gpbs)
  - Low latency InfiniBand

Other Data Storage Options

- Box.com
  - No cost to users (IT provided)
  - File size limit
  - Extramural bandwidth limits
- Data Park
  - "cheap, deep, and simple"
    - 1/3 the cost of other options
  - Available for
    - SMB (Mac/Windows on campus)
    - sftp (Linux and cyberduck)
- Other Cloud (e.g. Amazon glacier)
- Protected or regulated data (e.g. HIPAA)?

$$a + \frac{1}{4} \cdot \sum_{n=1}^{\infty} a \cdot r^n = 2 \cdot a$$

when $r = 0.8$

HPC Software and Applications

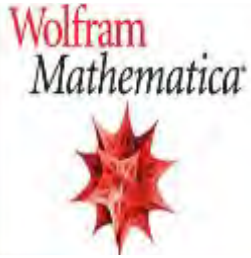
- Image Processing (e.g. CryoEM)
- Genomics
- Neural Simulations
- Molecular Dynamics
- Artificial Intelligence (Deep Neural Networks)

⋮

- Campus licenses for Mathematica and Schrödinger

http://hpc.rockefeller.edu



The Vertebrate Genome Laboratory (VGL)

Olivier Fedrigo, Director

Weiss 7th floor

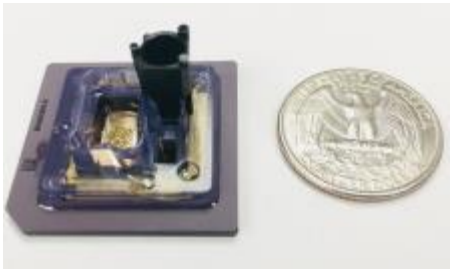
Email: VGL@rockefeller.edu

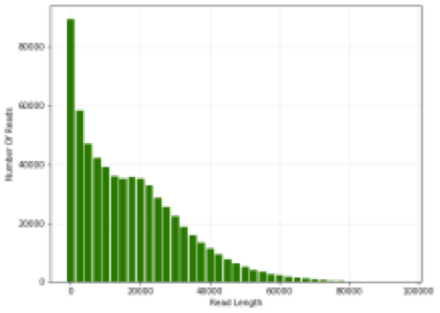
PACBIO®

BIONANO GENOMICS

PacBio Sequels

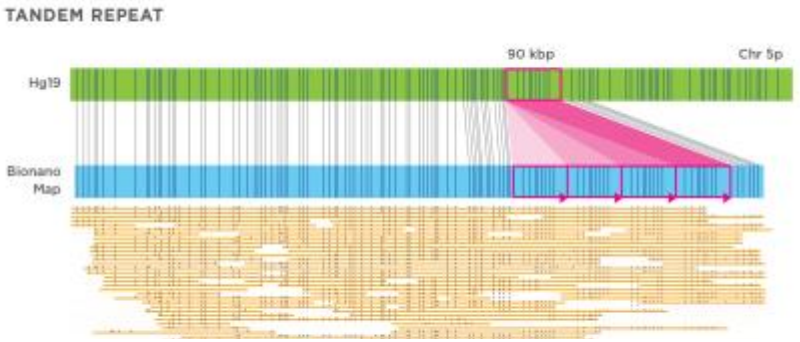
- Single molecule sequencing
- 3 Sequel and 2 Sequel II instruments
- 15-25 kilobases sequences (average)
- Up to ~120 gigabases per run





Bionano Saphyr

- Optical mapping
- >150kb fragments (N50 >220kb)
- 24+ hours run; >300Gb per run



- Whole genome sequencing
- Targeted sequencing (e.g. HLA)
- Complex populations (e.g. microbial communities)
- RNA sequencing (full length transcriptomics)
- Epigenetic
- Structural variants
- Genome scaffolding

The Vertebrate Genome Laboratory

(212) 327-8216

VGL@rockefeller.edu

https://vertebrategenomelaboratory.youcanbook.me

http://inside.rockefeller.edu/vgl/

Our team:

Weiss 7th floor
Room 735

If you are interested in long reads, come visit us at the VGL to discuss your ideas and projects

Resource Center Locations

- **Antibody and Bioresource Core Facility** (DWB 415)
- **Bio-Imaging** (DWB 201-203)
- **Bioinformatics Resource Center** (IT Pavillion, 1st floor)
- **Comparative Bioscience Center** (CBC)
- **CRISPR & Genome Editing Center** (DWB 703)
- **Cryo-Electron Microscopy** (CRC B13)
- **Electron Microscopy** (RRB 120)
- **Flow Cytometry** (DWB 205-211)
- **Genomics** (WRB 725)
- **Glasswashing** (CRC-C level)
- **High Throughput and Spectroscopy** (DWB 219)
- **High Performance Computing** (IT Pavillion, 1st floor)
- **Instrument Design and Fabrication** (Plaza Building–A level)
- **Precision Fabrication Facility** (Plaza Building–A level)
- **Proteomics** (RRB 157)
- **Structural Biology** (RRB 1st floor)
- **Transgenics (CBC 542-546)**
- **Vertebrate Genome Laboratory** (WRB, 7th Floor)