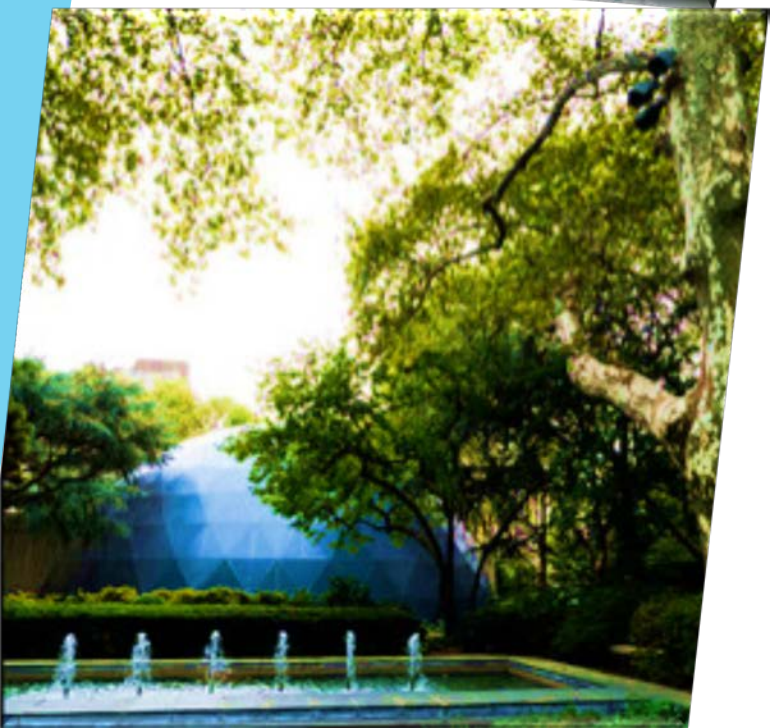


Introduction to The Rockefeller University Research Centers

Overview for New Graduate Fellows

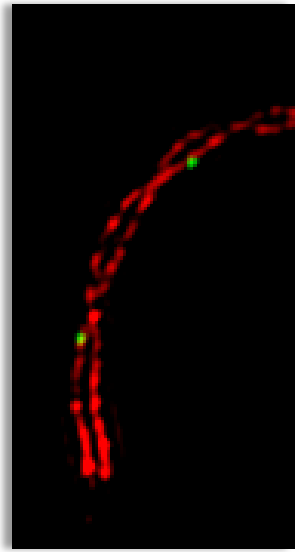
September 14, 2020

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

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

We have the most comprehensive set of super-resolution systems of any regional imaging facility

- 3D-SIM (OMX, GE)
- iSIM (VisiTech)
- STORM/PALM (Nikon)
- Airyscan (Zeiss)

And even the first Abberior Instruments Facility Line STED system installed worldwide, personally signed by Stefan Hell, the Nobel laureate who invented the STED technique.

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;**

Tao

- **Christina Pyrgaki (Senior Research Support Specialist) - Ph.D. in Molecular Biology – all types of microscopy, multiphoton and light sheet specialist;**

Christina

- **Tao Tong (Research Support Specialist) - Masters in Computing and in Biochemistry/Molecular Biology – systems administration, image analysis, microscopy;**

Kate

- **Kate Cialowicz (Research Support Specialist) – Ph.D. in Biology, with an emphasis in super-resolution microscopy.**

+ ?

Cryo-Electron Microscopy Resource Center

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

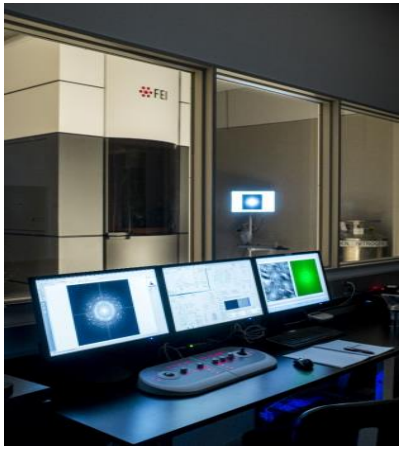
Mark Ebrahim
Senior Staff Scientist
mebrahim@rockefeller.edu

Johanna Sotiris
Senior Research Support Specialist
jsotiris@rockefeller.edu

Hongkit Ng
Research Support Specialist
hng@rockefeller.edu

Cryo-Electron Microscopy Resource Center

Instruments



FEI Titan Krios
300kV Transmission Electron Microscope

1.0 Angstrom Resolution

Equipped with Gatan K2 Summit direct electron detector

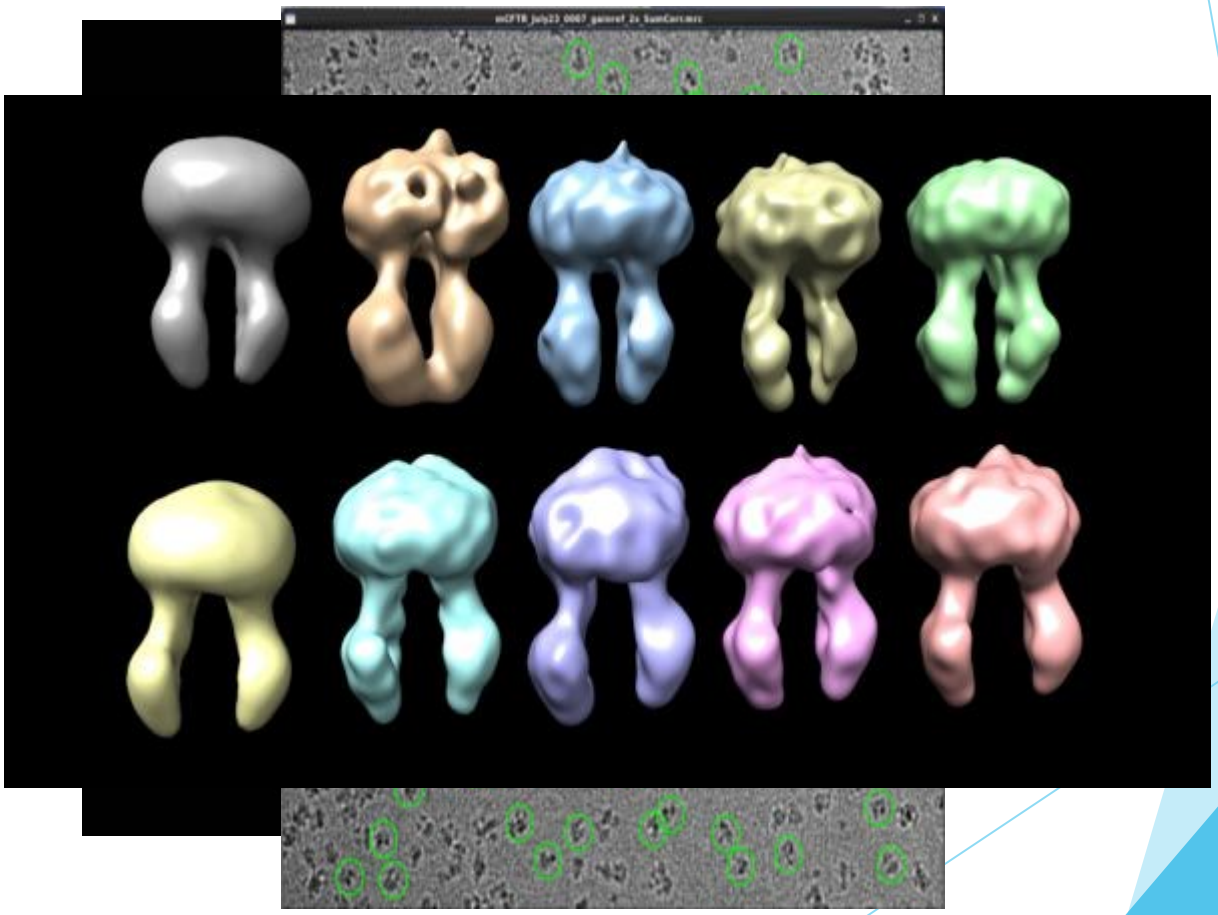
FEI Talos Arctica
200kV Transmission Electron Microscope

1.4 Angstrom Resolution

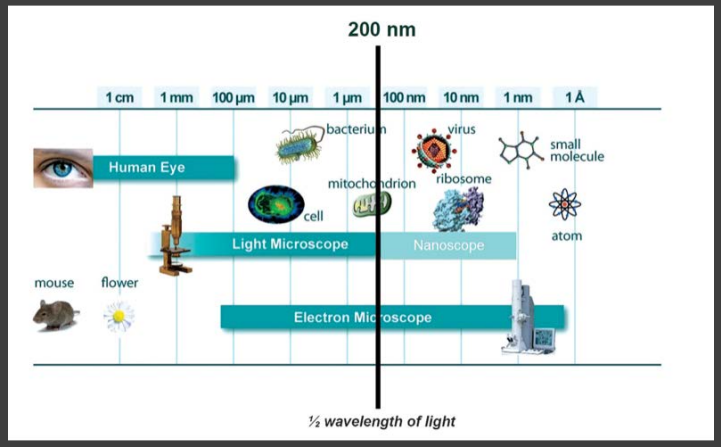
Equipped with Gatan K2 Summit direct electron detector

Cryo-Electron Microscopy Resource Center

Applications



Electron Microscopy Resource Center



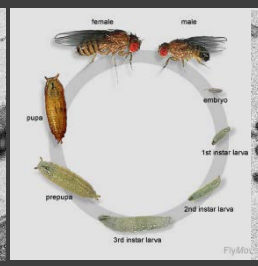
Director: Hilda Amalia Pasolli, Ph. D
apasolli@rockefeller.edu

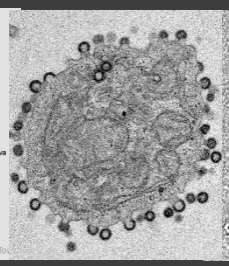
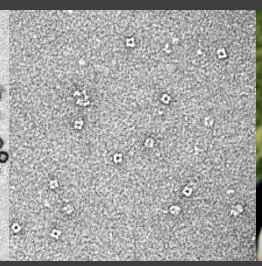
RRB 120-130
http://inside.rockefeller.edu/emrc/

We can do EM for a variety of experimental models!!








How do we do EM?

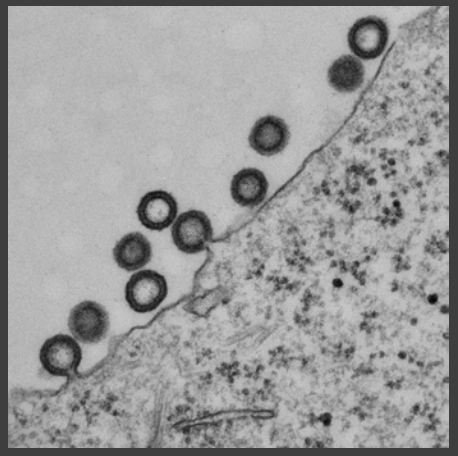
- Sample preparation for Transmission and Scanning Electron Microscopy.
- Development of EM protocols according to the scientist needs.
- Immuno-labeling (colloidal gold, HRP, APEX)
- Correlative light-electron microscopy (CLEM)
- Training in the use of equipment and techniques
- Interpretation of images

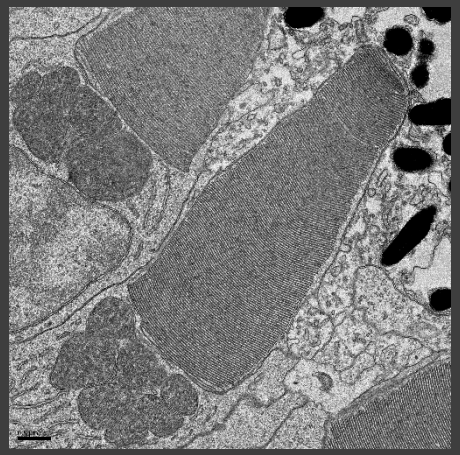
High Pressure freezer

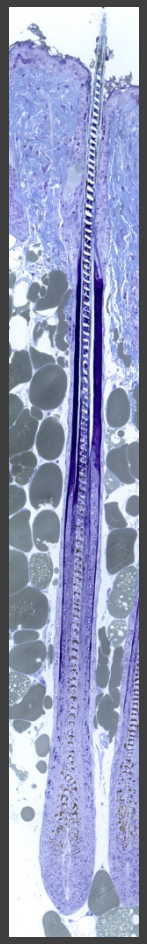
Transmission electron microscope

Ultramicrotome-
Diamond knife

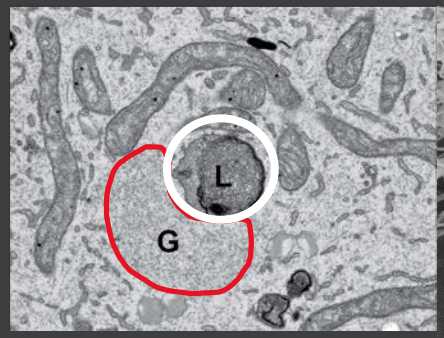
TEM

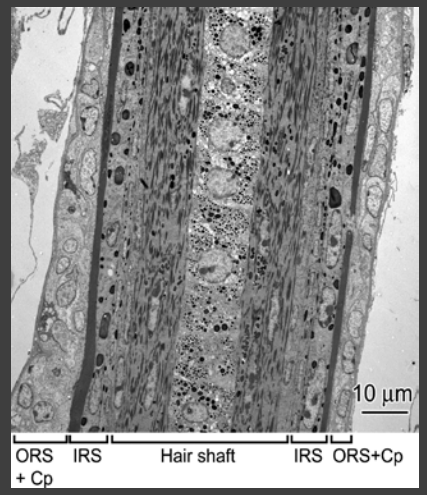




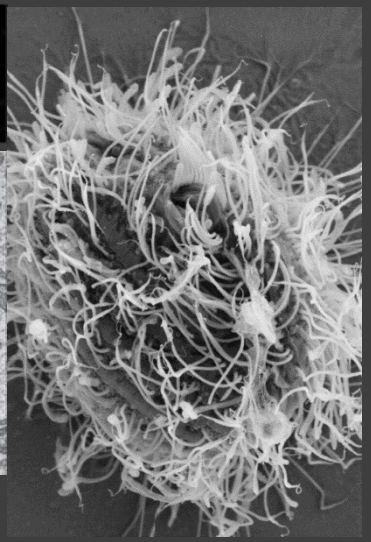


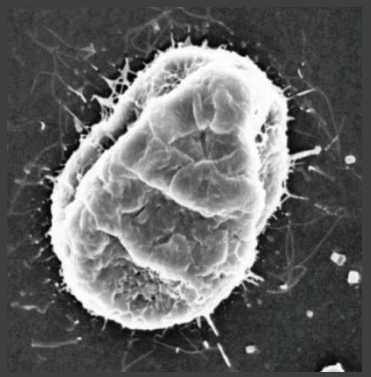
Correlative LM-TEM



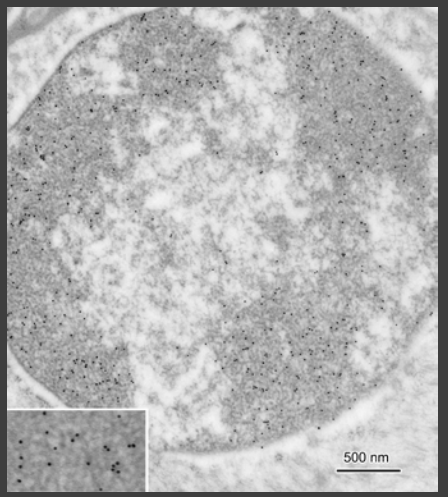


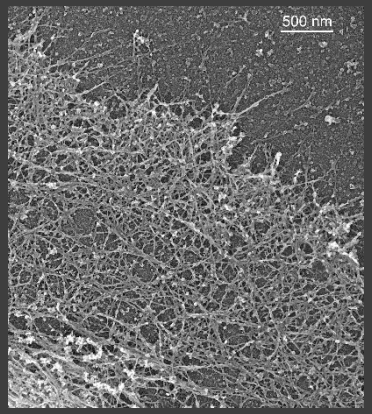
SEM





Immunogold





Flow Cytometry Resource Center (FCRC)

http://www.rockefeller.edu/fcrc/

DWB 205 - DWB 211- DWB404 - DWB406

- **Svetlana Mazel**
  - Director
  - ***mazels@rockefeller.edu***
  - #7656

- **Songyan Han**
  - Research Support Specialist
  - ***shan@rockefeller.edu***
  - #7657

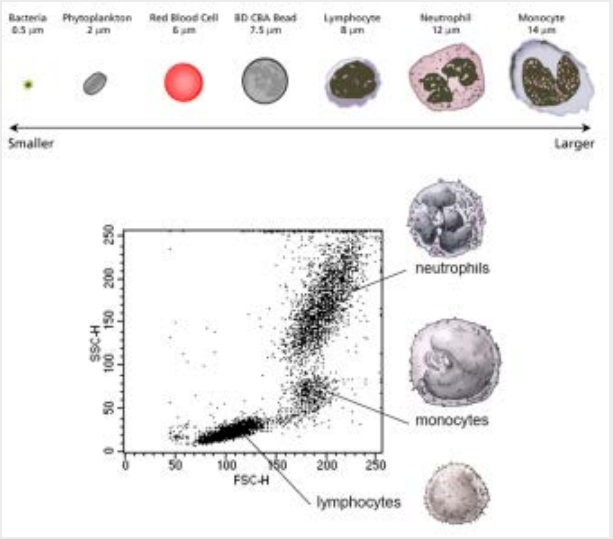
- **Stanka Semova**
  - Operations Manager
  - ***ssemova@rockefeller.edu***
  - #7657

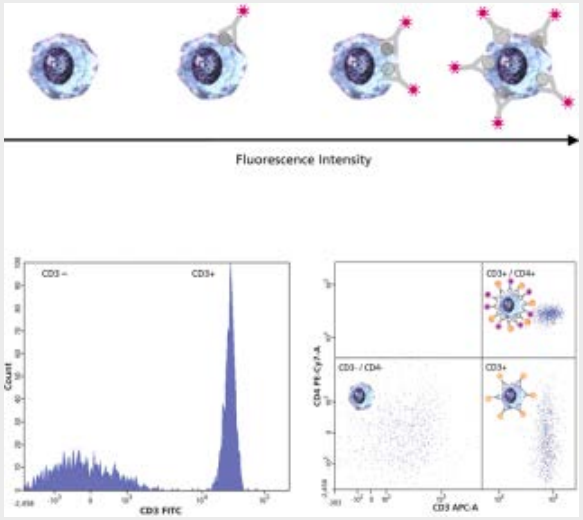
- **Samer Shalaby**
  - Research Support Associate
  - ***sshalaby@rockefeller.edu***
  - #7657

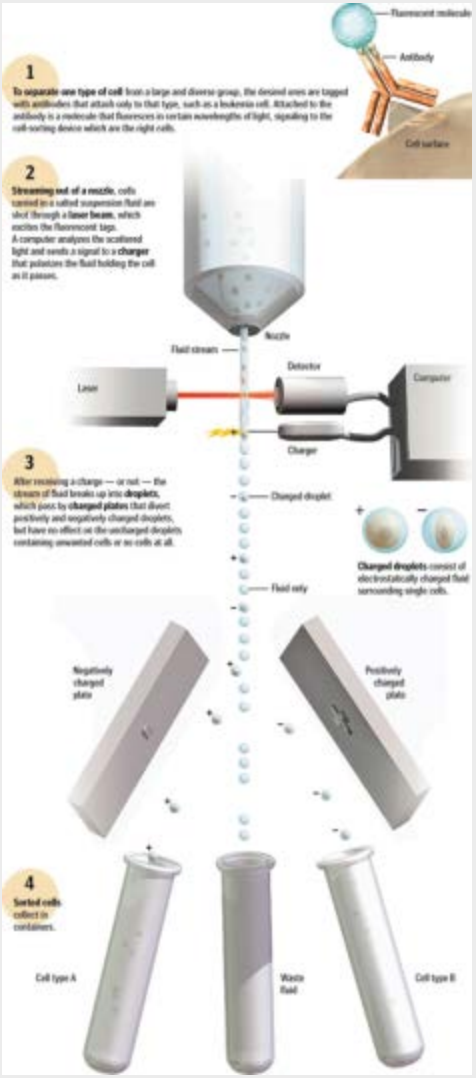
- **Brandon Yoo**
  - Information Technology
  - Senior Computer Support Specialist

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

Operations	Extended Business Hours, by FCRC Staff					24/7/365, Self-Operated						
Lasers (Wavelength) and # of Fluorescent Detectors	Cell Sorters				Image Analyzer	Full-Spectrum Analyzers		Advanced Analyzers				Basic Analyzer
	BD FACS Aria-II-1	BD FACS Aria-II-2	BD FACS Aria-II-3	Sony MA900	Image Stream-X	Cytek Aurora-1	Cytek Aurora-2	BD LSRII-1	BD LSRII-2	BD LSR-Fortessa	ThermoFisher Attune NxT	BD Accuri C6
Year of Manufecture	2005/ 2010	2008	2010	2019	2010	2018/ 2019	2020	2004/ 2009	2007/ 2011	2014	2018/ 2020	2011
UV (355nm)		2	2			16	16	2		3		
Violet (405-407nm)	3	4	4	7	5	16	16	4	4	5	6	
Blue/Violet (445nm)			2						2			
Blue (488nm)	3	3	3	5	5	14	14	3	3	3	2	4/3/2
Yellow/Green (561nm)	4	4	4	4	4	10	10	4	4	4	3	
Red (633-640nm)	3	3	3	3	2	8	8	3	3	3	3	0/1/2
Total # of Detectors	13	16	18	12	10	64	64	16	16	18	14	4

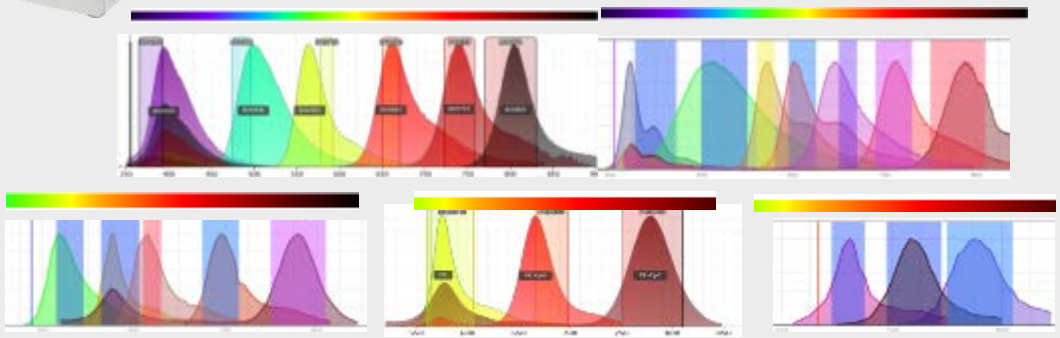






Revolution in Flow Cytometry:

Cytek Aurora™ – Full-Spectrum Analyzer



OMIP

ISAC CYTOMETRY Journal of Quantitative Cell Science PART A

MIFlowCyt

OMIP-069: Forty-Color Full Spectrum Flow Cytometry Panel for Deep Immunophenotyping of Major Cell Subsets in Human Peripheral Blood

Lily M. Park,[1] Joanne Lannigan,[2] Maria C. Jaimes[3*]

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, 40 Colors

CYTEK

CRISPR & Genome Editing Resource Center (DWB703)

Chingwen Yang, Ph.D.
Director
8649
yangc@Rockefeller.ed

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

Dorjee Shola, Ph. D.
Manager
molecular Biology

Chia-Yun Han, M.S.
Research Support
Specialist

Jing Gao, M.D
Manager
Cell Biology

Pradip Kar, M.S.
Research support
specialist

Qilie Luo, Ph. D.
Research support
specialist

CRISPR & Genome Editing Resource Center

Mutant alleles

KO

KI: point mutation, small tag, gene reporter

Conditional Allele: KO, KI

Exon replacement

Gene editing Service

mouse embryos

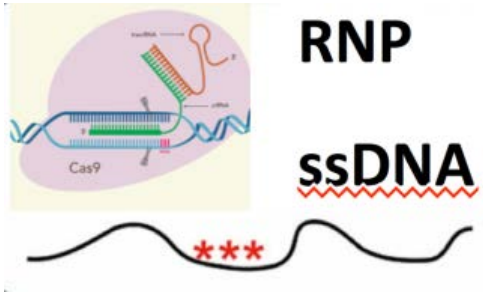
adult mice

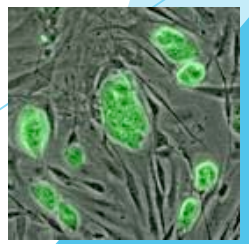
mES cells

mouse lymphoma cell lines

human iPSC

primary human cancer cells





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

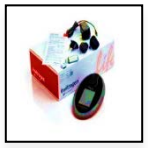
MiSeq

- 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

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

QuantStudio 12K-flex

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



Sequencer Selection

NovaSeq

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

800 million to 10 Billion reads

NextSeq

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

400 million reads

MiSeq

- PCR Amplicon Sequencing
- 16S rRNA Metagenomic Sequencing as300bp x 2
- Library prep method development
- Library QC

1 – 20 million reads

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 723 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

PIPETTE CALIBRATION CLINIC

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

PIPETTE CALIBRATION CLINIC

- Clean, Repair, Replace seals, O-rings, and Calibrate. Monthly on the second Tuesday of each month.

- Rainin professional technicians preform all service including hands on training on proper pipetting techniques.

GLASSWASHING STAFF

Manager, Alice Dyer

212-327-8285

dyeral@rockefeller.edu

Research Support Aides

Angela Howell

Lourdes Mathew

Khalil Koiner

Beverley Guthrie-Turenne

Derek Boadie-Ansah

glasswashing@rockefeller.edu

High Throughput and Spectroscopy Resource Center, DWB 216
http://inside.rockefeller.edu/htsrc

- The HTSRC provides scientific guidance, 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
- Access to a large compound library for drug/tool compound discovery
- Discovery of tool compounds or compounds for drug discovery
- measuring the kinetics and thermodynamics of biomolecular interactions

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

Secondary assays

HPLC-MS

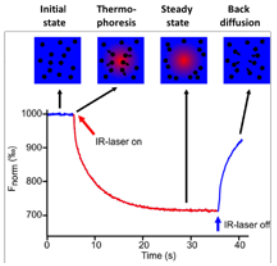
Many assays/ few compound classes

Biophysical Techniques for Binding Measurements

Microscale Thermophoresis: Nanotemper MST

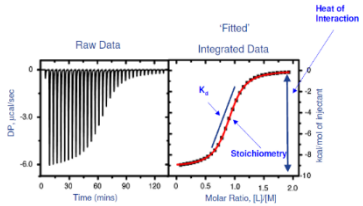
Principle

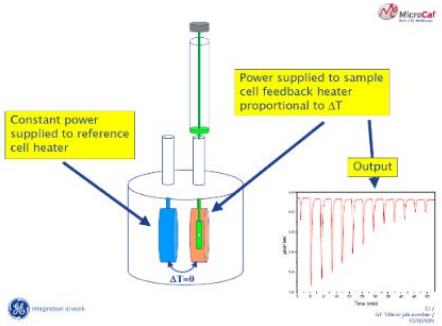
Molecules migrate along a temperature gradient at different rates depending upon size, shape (hydration shell) and charge thus allowing differentiation between unbound and bound state



Isothermal Calorimetry

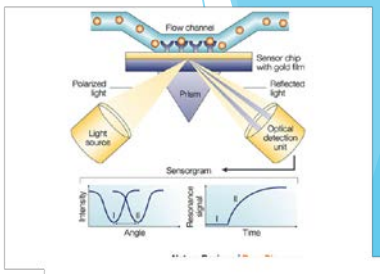
- Label-free
- Autosampler
- 400uL/1 mg protein per experiment





Surface Plasmon Resonance : Proteon XPR

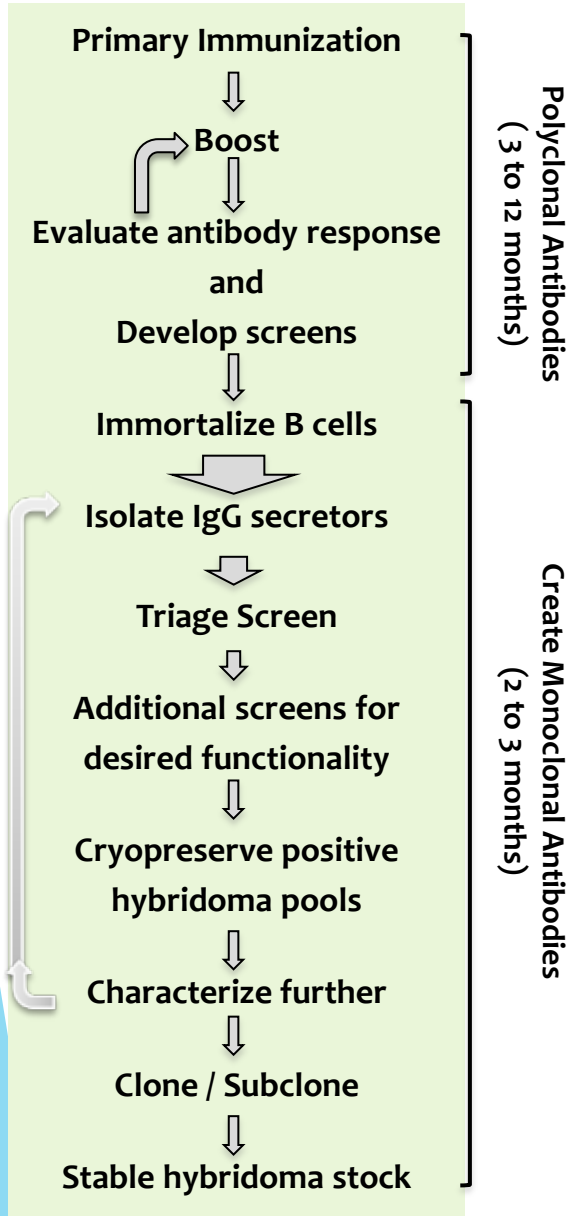
20-50ugs Protein
Immobilized to Gold Sensor Chip
Measures on-rate and off-rate
Immobilization through free-amines, antibody, biotin



HTSRC Staff

- Fraser Glickman, Ph.D., *Director*
- Carolina Adura, Ph.D., *Manager of Spectroscopy*
- Chloe Larson, B.S., *Research Support Assistant*
- Lavoisier Ramos-Espiritu, Ph.D., *Research Support Specialist*

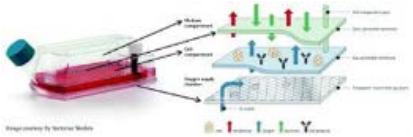
Antibody and Bioresource Core Facility

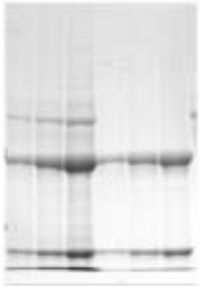


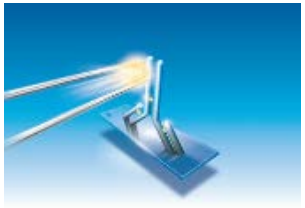
Custom MAb Development

- 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

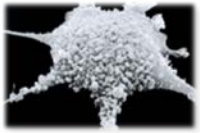






- Monoclonal Antibodies
  - ***In vitro* production**
    - Conditioned media
    - Large scale productions in bioreactors
  - **Purification**
    - milligrams to grams at > 95% purity
  - **Modification**
    - Conjugation to fluorophores, HRP & biotin
    - Fragmentation into Fab & F(Ab')2

- **Mycoplasma** Testing



  - **Cell line distribution service**
    - **Alleviates research lab with the work of 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

Frances Weis-Garcia

Bronk 415
x 7030

ZRC 1553
646-888-2331

skiabcf@mskcc.org
macfwebext.mskcc.org

Precision Instrumentation Technologies (The PIT)

Dan Gross
Scientific Engineer

Jim Petrillo
Instrumentation Engineer

Peer Strogies
Scientific Machinist

Location: Plaza Building, A level
inside.rockefeller.edu/fabrication/

Precision Instrumentation Technologies

How Can You Improve Your Science?

Makerspace

- 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

Professional Engineering

- 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

Proteomics Resource Center

Analytical Mass Spectrometry applied many different questions, but mainly metabolomics and proteomics. 600+ projects yearly from ~200 users.

How we work:

- We share our expertise with you and your project.
- ‘Full Service’ model - you drop-off samples*.
- If needed, we help you understand the data.

https://www.rockefeller.edu/proteomics/

box (13,629) - henrik.molina@g
The Rockefeller University » Samp
rockefeller.edu/proteomics/sample-preparation/
Thermo Fisher Scie... plims Web Content Mana... Inside The Rockefell... New Tab Forms and Policies... https://formspolici...

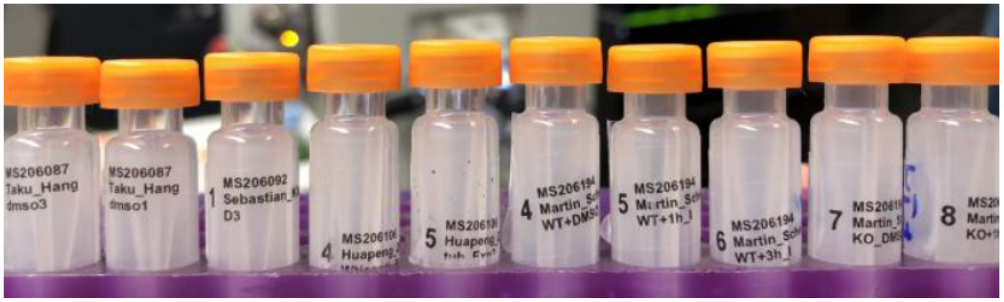
Phase III Operations: The University is open for expanded research operations; only authorized personnel will be admitted on campus. More info here.

Sample Submission

For most sample submissions it is beneficial to discuss the experiment, goals and expectations and we therefor encourage users to arrange, ahead of time, an appointment. For peptide synthesis we suggest to fill out our Custom Peptide and Peptide Library Submission Form.

For a user opting to ship/mail samples, please use our mailing address and share tracking number if available.

All samples are logged and labelled with a tracking number which typically begins with P (for peptides) or MS (for mass spec experiments) followed by a number where the two first digits indicate the Fiscal Year. Internal users can track the progress/status for submitted requests here. When contacting the PRC re. past analyses, please refer to the P or MS number.



Internal Rockefeller users can access pLIMS sample information, progress, and final invoices using the link below.

SAMPLE STATUS

Proteomics Resource Center

Henrik

Susan

Bety

Henry

Soren

Alexandra

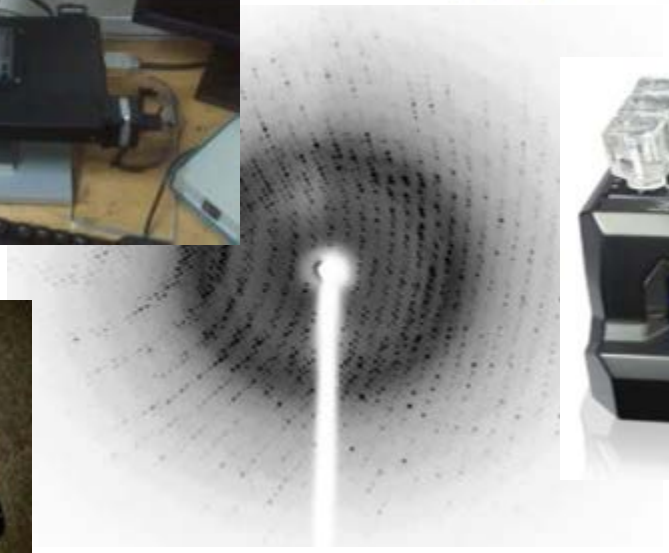
Hanan

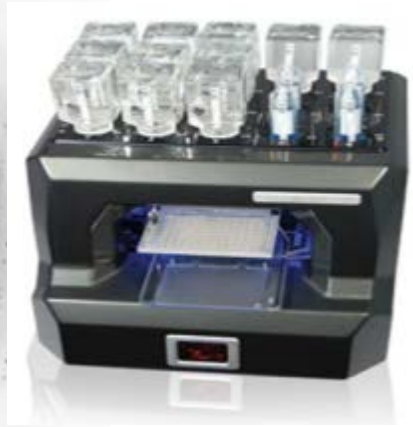
https://www.rockefeller.edu/proteomics/

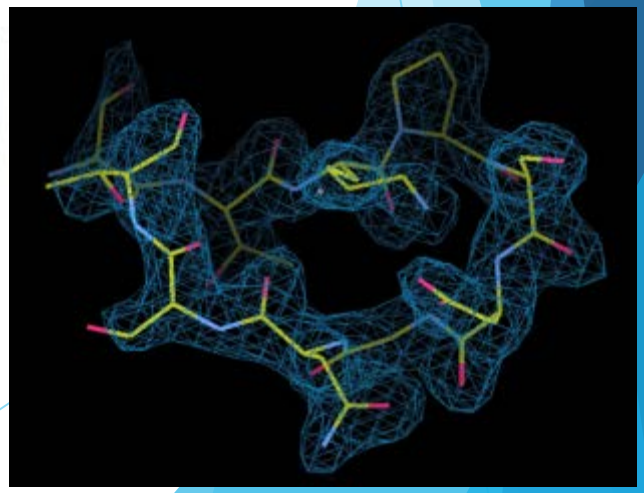
Structural Biology Resource Center

Do X-ray crystallography with us

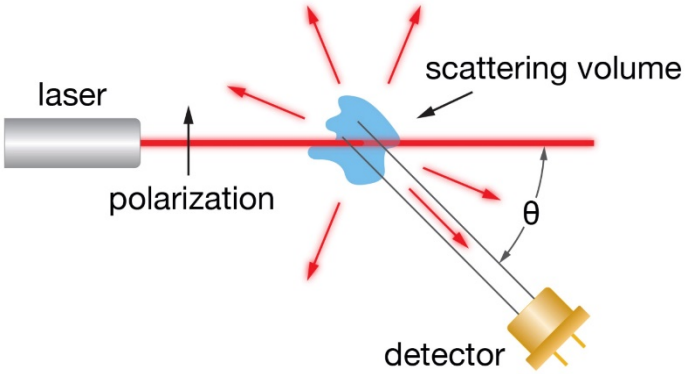
From protein expression to structure determination





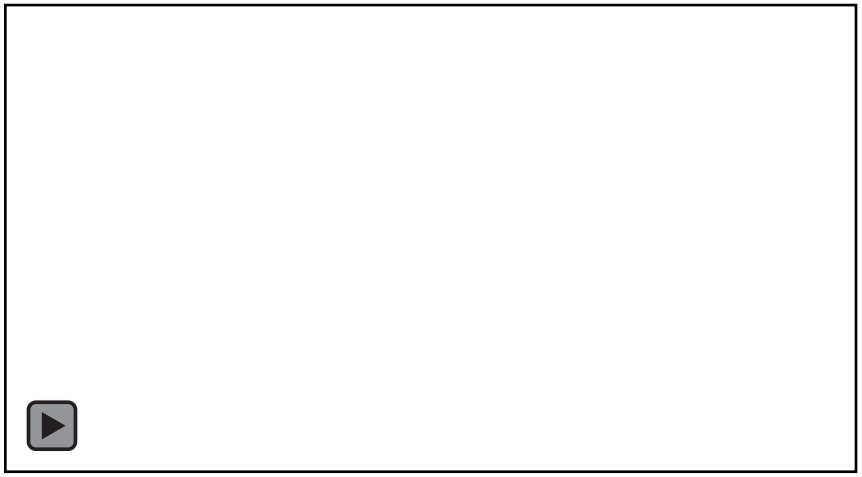


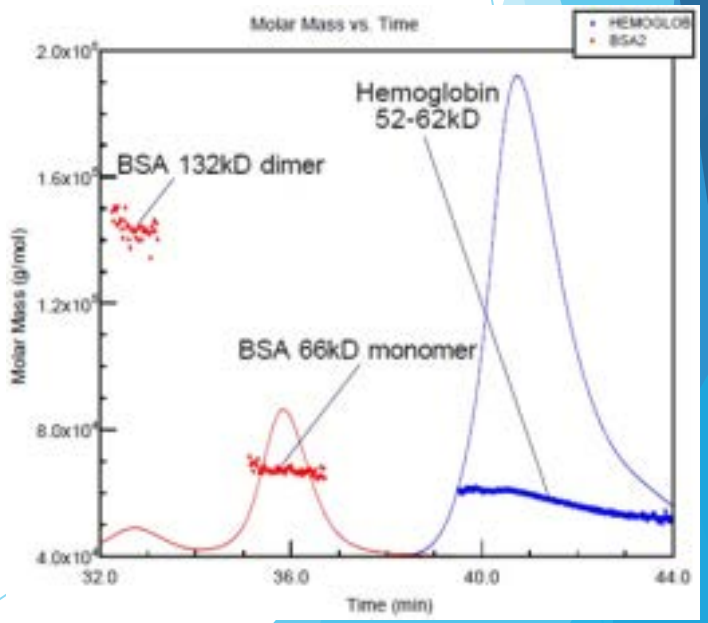
Structural Biology Resource Center



Multi-Angle Light Scattering

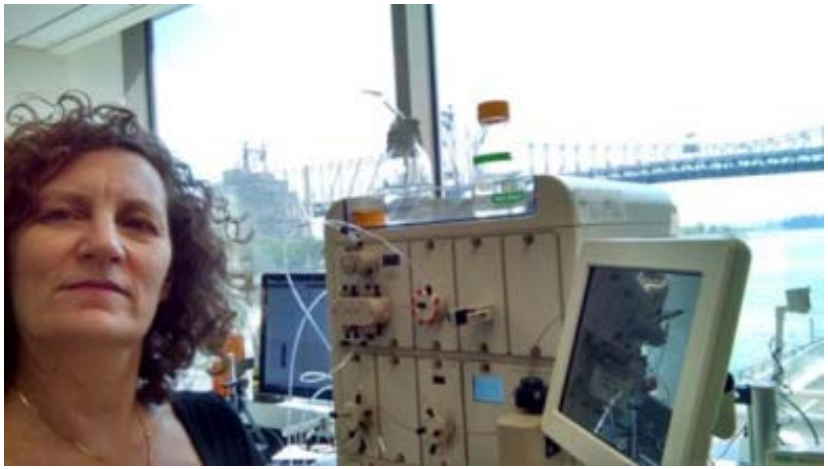
Nano Volumes Dispensing





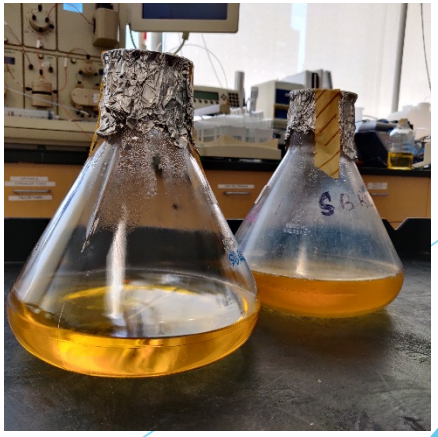
Structural Biology Resource Center

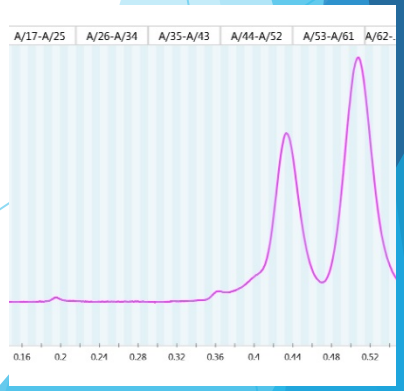
Or…. make and purify proteins with us



We will guide you in the design, experimentation and problem solving on the path of expressing and purifying recombinant proteins. We also offer the protein preparation on a fee-for-service basis

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





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

Production of Genetically Modified Mice

CRISPR/Cas9 mediated genome editing

- Gene KO (whole gene, small deletions)
- Gene KI (point mutations, small tags KI)
- Targeted KI (GFP, Cre)
- Conditional KO (floxed lines)

Method 1

If partial insertion (one LoxP site)
2 methods to resolve

Additional pronuclear injection till both LoxP sites are in

Method 2

Breeding founder to homozygocity

IVF to create heterozygous zygotes

Pronuclear injection of second LoxP site

Transgenic animals production

- BAC transgene microinjection
- Plasmid microinjection

Chimera Production

- ES cells injections into host blastocyst
- ES cells injection into 8 cell morulae

Completely ES cells derived animals

- ES cell injections into tetraploid blastocysts

Assisted Reproductive Technology

Rapid Colony Expansion

- Cohorts matched by sex and age
- Custom made with complex genotypes

Triple transgenics and/or KO, single, double mutation, Cre lines

- Cohort size 10</=300 pups (according to request)

Assisted reproduction

- Hard to breed lines
- Aged/last/never able to breed founder

Mutant zygotes generation

CRISPR/Cas9 pronuclear injection

BAC injection

Rapid embryo cryopreservation

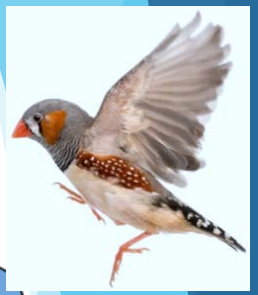
- Custom made with complex genotypes

Triple transgenics and/or KO, single, double mutation, Cre lines

- **Sperm Cryopreservation**
- **Rederivation** of mouse lines from live animals, live embryos
- **Resuscitation** of strains from frozen embryos/ frozen sperm

All generated animals are SPF facility compliant

Comparative Bioscience Center



Regulatory Support:
- IACUC Coordinator
- Training Coordinator
- Research Support Specialist

Veterinary Services:
- Veterinarians
- Licensed Veterinary Technicians
- Veterinary Post Docs

Operations/ Husbandry:
- Animal Care Technicians
- Floor Supervisors
- Group Leaders
- Facility Managers

Principal Investigator

Finance and Business:
- Animal Ordering
- Billing
- Census
- Administrative Assistance

Educational/ Research Support

1. CBC Orientation
   - Lecture &Lab (Restraint, Anesthesia, Dosing)
2. Aseptic Techniques for Surgery
3. Suturing Techniques
4. Safe use of Hazards
5. Dosing: SC, IM, IV, PO
6. Blood Collections
7. Tissue Collections
8. Protocol Specific Training
9. Investigator Seminar Series
10. Tri-Institutional Seminars
    - Rodent Breeding
    - Phenotypic Characterization of Mice

IVIS Spectrum

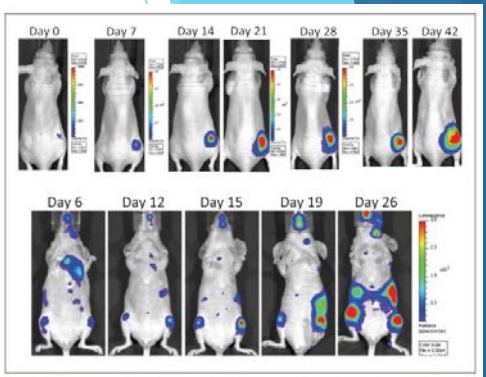
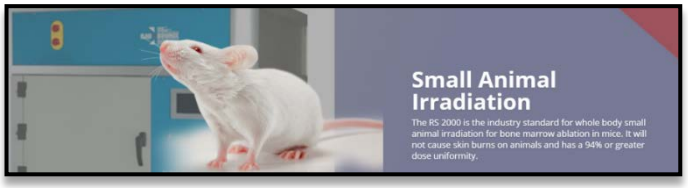


Figure 4. Detection of five 4T1-luc2 cells injected subcutaneously in nude mice (top) and monitoring metastasis post intracardiac injection of MDA MA-231-luc2 cells (bottom) longitudinally.

X-Ray Biologic Irradiator



Vevo 2100 Ultrasound

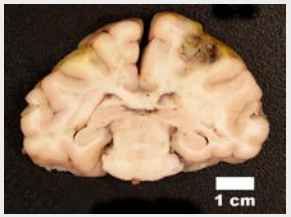
Digital Radiology

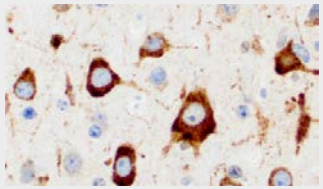
Ravi Tolwani, AVP, CBC
rtolwani@rockefeller.edu

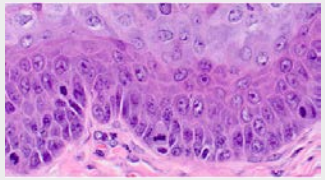
LABORATORY FOR COMPARATIVE PATHOLOGY

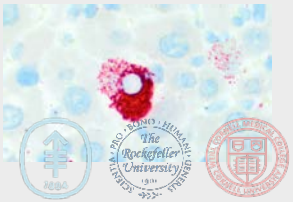
ANATOMIC PATHOLOGY

Necropsy (autopsy) laboratory
Histology laboratory
Automated and manual
Single and multiplex IF, IHC and RNA-ISH
> 300 IHC stains developed for specific studies
3 board certified anatomic pathologists (ACVP/ECVP)









CLINICAL PATHOLOGY

Clinical chemistry
Cytology
Hematology
Urinalysis

Microbiology
Parasitology
Serology

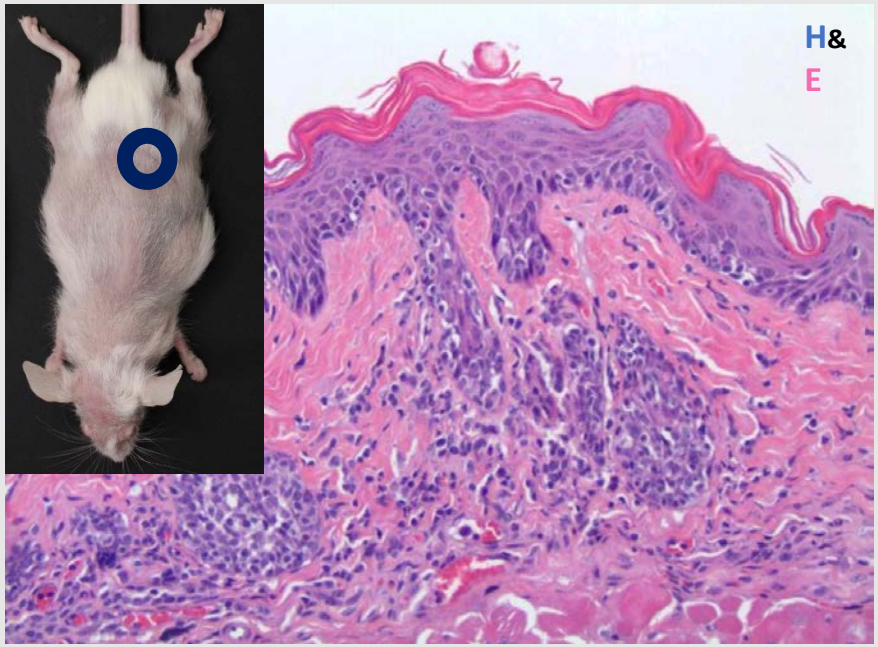
MOUSE PHENOTYPING / STUDY PLANNING AND INTERPRETATION

Validation of new GMAs as animal models of human diseases
Investigation of gene function

PATHOLOGY OF PRECLINICAL EFFICACY AND SAFETY MODELS
UNEXPECTED OUTCOME INVESTIGATIONS

Anatomic Pathology

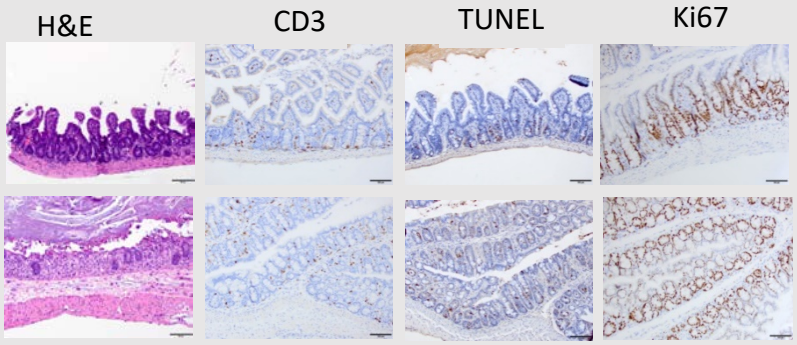
Qualitative examination: Morphologic diagnosis



Skin: Lymphocytic interface dermatitis.

Anatomic Pathology

Manual semi-quantitative scoring



Signalment			
LCP Accession #	18-3593	18-3593	18-3593
LCP Animal #	1	2	3
Histologic examination			
Small intestine GVHD scoring	6	8	7
SI Villus blunting	0	0	0
SI crypt hyperplasia (Ki67)	1	2	1
SI Crypt apoptosis (TUNEL)	3	2	3
SI Crypt loss	0	2	1
SI LP fibrosis	0	0	0
SI CD3 positive cells	2	2	2
SI Mucosal ulceration	0	0	0
Large intestine GVHD scoring	10	10	8
LI Mucosal erosion/sloughing	0	0	0
LI Crypt hyperplasia (Ki67)	3	3	3
LI Crypt apoptosis (TUNEL)	3	3	3
LI Crypt loss	2	2	0
LI LP fibrosis	0	0	0
LI CD3 positive cells	2	2	2
LI mucosal ulceration	0	0	0

Quad-Institutional resource: MSKCC, WCMC, RU, HSS

Physical locations:

MSKCC lab and offices: Z-940 (Zuckerman Building)

646-888-2422

WCMC lab: C-708, 710 (Histology services)

212-746-3399

LCP@mskcc.org

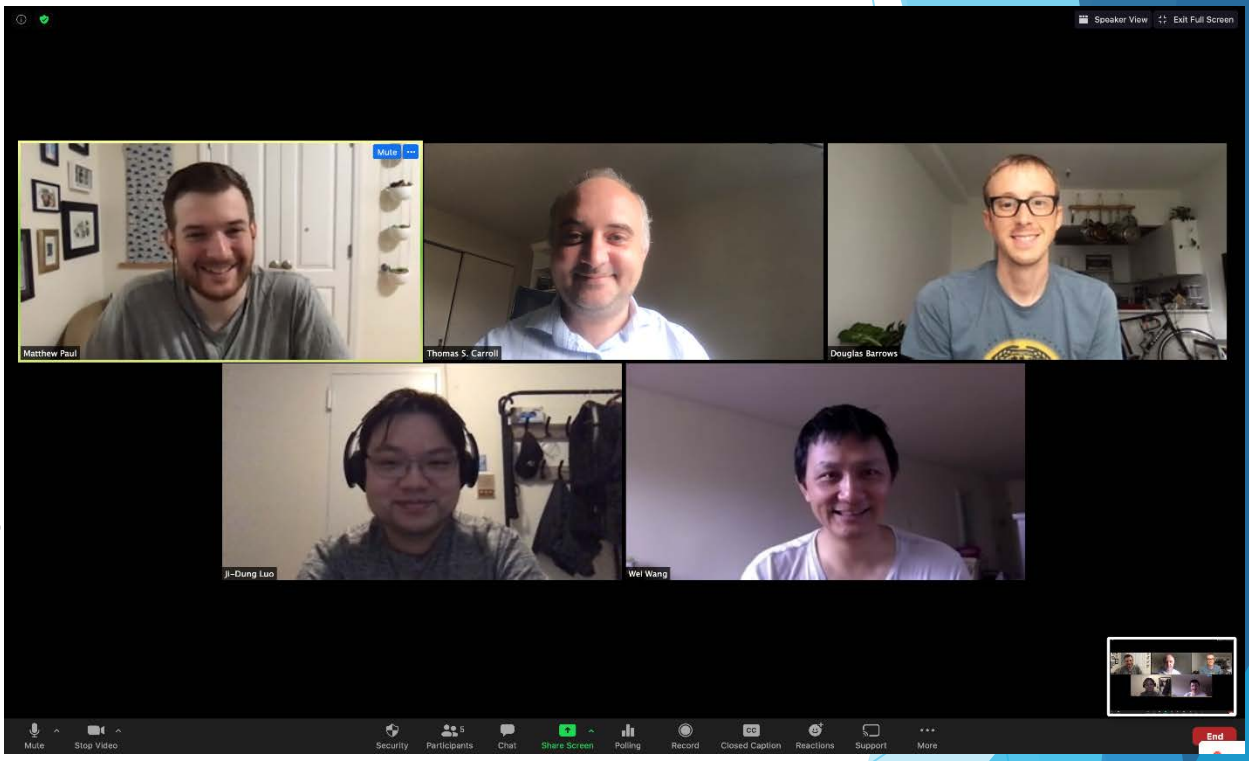
LCP@med.cornell.edu

amichel@rockefeller.edu

Bioinformatics Resource Center

Who are we?

- Thomas Carroll
- Ji-Dung Luo
- Matt Paul
- Wei Wang
- Doug Barrows



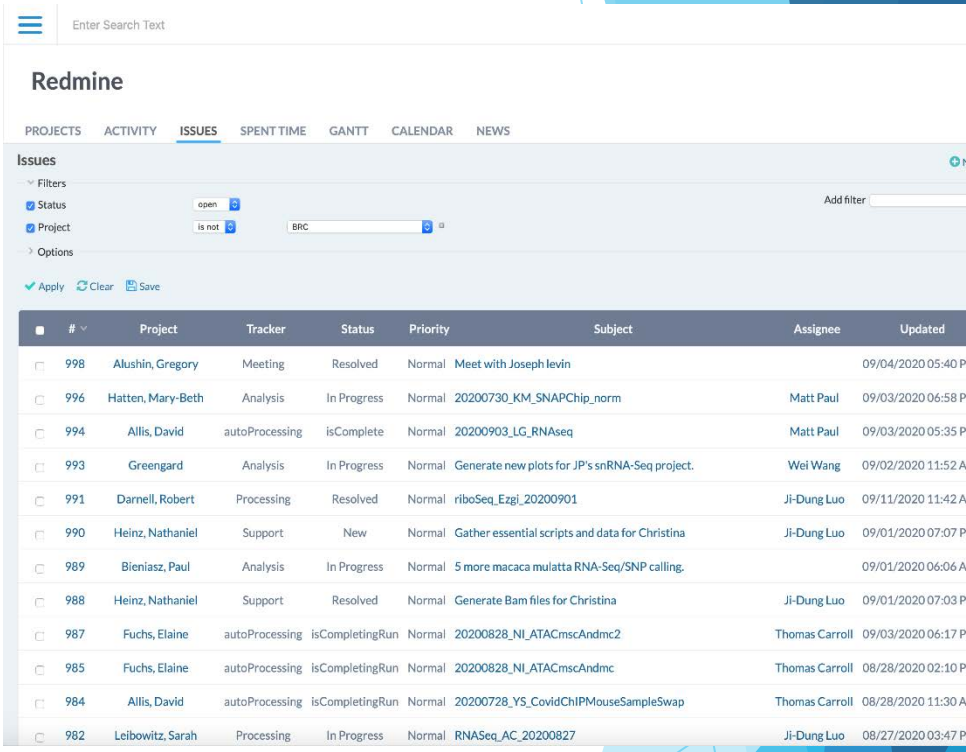
What do we do?

- Analysis.
- Training
- Software

Bioinformatics Resource Center

Bioinformatics Analysis

- Types of analysis
  - High-throughout sequencing (RNA-seq, ChIP-seq, ATAC-seq, Ribo-seq, scRNA-seq, CLIP-seq, WGS)
  - Image analysis.
- ~ 38 groups, 1000 bioinformatics projects in 3 years.
- 1 to 1 analysis/training.



Bioinformatics Resource Center
https://rockefelleruniversity.github.io

Training

- Publicly available site
- Automatically tested on current R and latest software versions.
- Autocompilation of material covering 1000 slides, 200 pages.
- Training clinics alongside courses.
- > 150 people over last two parallel zoom sessions.

Software

- Develop internal and on demand software
- Internal
  - NgsPipeR – Custom pipeline for analysis of HTS data. (> 5000 samples)
  - Profileplyr, Rfastp, Herper* released(*ing) in Bioconductor.
- On demand
  - Shiny/R tools ranging from simple lab calculations to complex visualisations.
  - R/C++ package for high throughput processing of custom sequencing types.

High Performance Computing


runs Linux

- On campus support for **scalable and data intensive science**
- Processing Power (275 double-precision TFlops)
  - More cores to devote to a problem (4,868 cores under management)
  - Specialized architectures: 56 GPUs; large memory (3 TB RAM) nodes
  - Batch vs. interactive
- Data Storage (4.4 PB)
  - Hundreds of disks for more IOPS
- Networking (56 Gbps/100 Gpbs)
  - Low latency InfiniBand


Jason


Rebecca


Bala


Logan

it_hpc@rockefeller.edu

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

RELION

OPEN OnDemand

SCHRÖDINGER

PyMOL

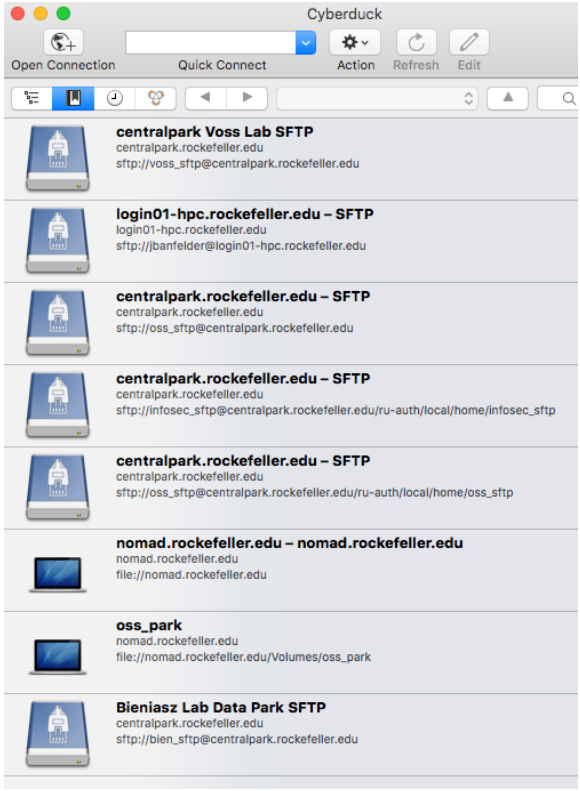
GitLab

Other Data Storage Options

- RUFS
  - SMB or NFS
  - Includes snapshots and replication
- Data Park
  - “cheap, deep, and simple”
    - 1/3 the cost of other options
  - Available for
    - sftp (Linux and cyberduck)
    - rsync (e.g. for backup target)
    - SMB (Mac/Windows on campus
- Other Cloud (e.g. Amazon glacier, Wasabi, OneDrive)
  - Be aware of bandwidth, file size limitations, and especially egress fees.
- Protected or regulated data (e.g. HIPAA)?

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

$$\text{when } r = 0.8$$



The Resource Genome Center

Olivier Fedrigo, Director

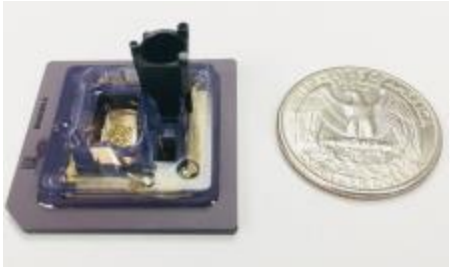
Weiss 7th floor
Email: VGL@rockefeller.edu

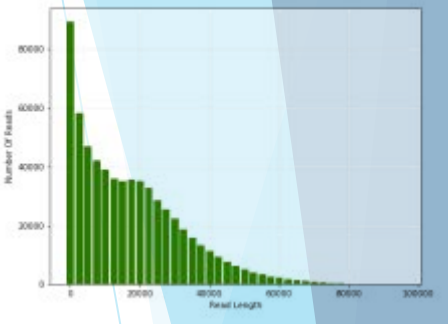
PACBIO®

BIONANO GENOMICS

PacBio Sequels

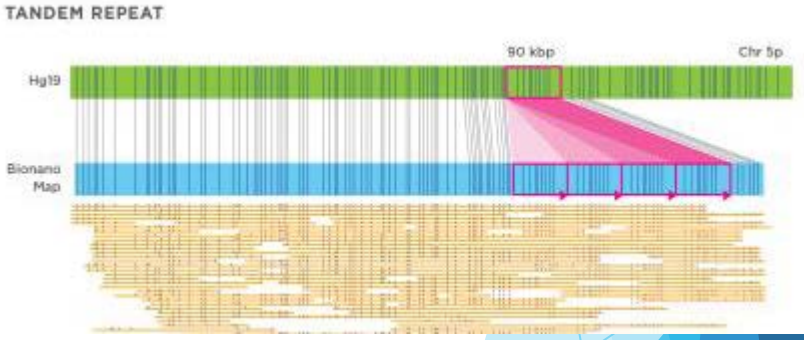
- Single molecule sequencing
- 15-20 kilobases sequences (average)
- 5-10 gigabases per run
- ~10 hours per run





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

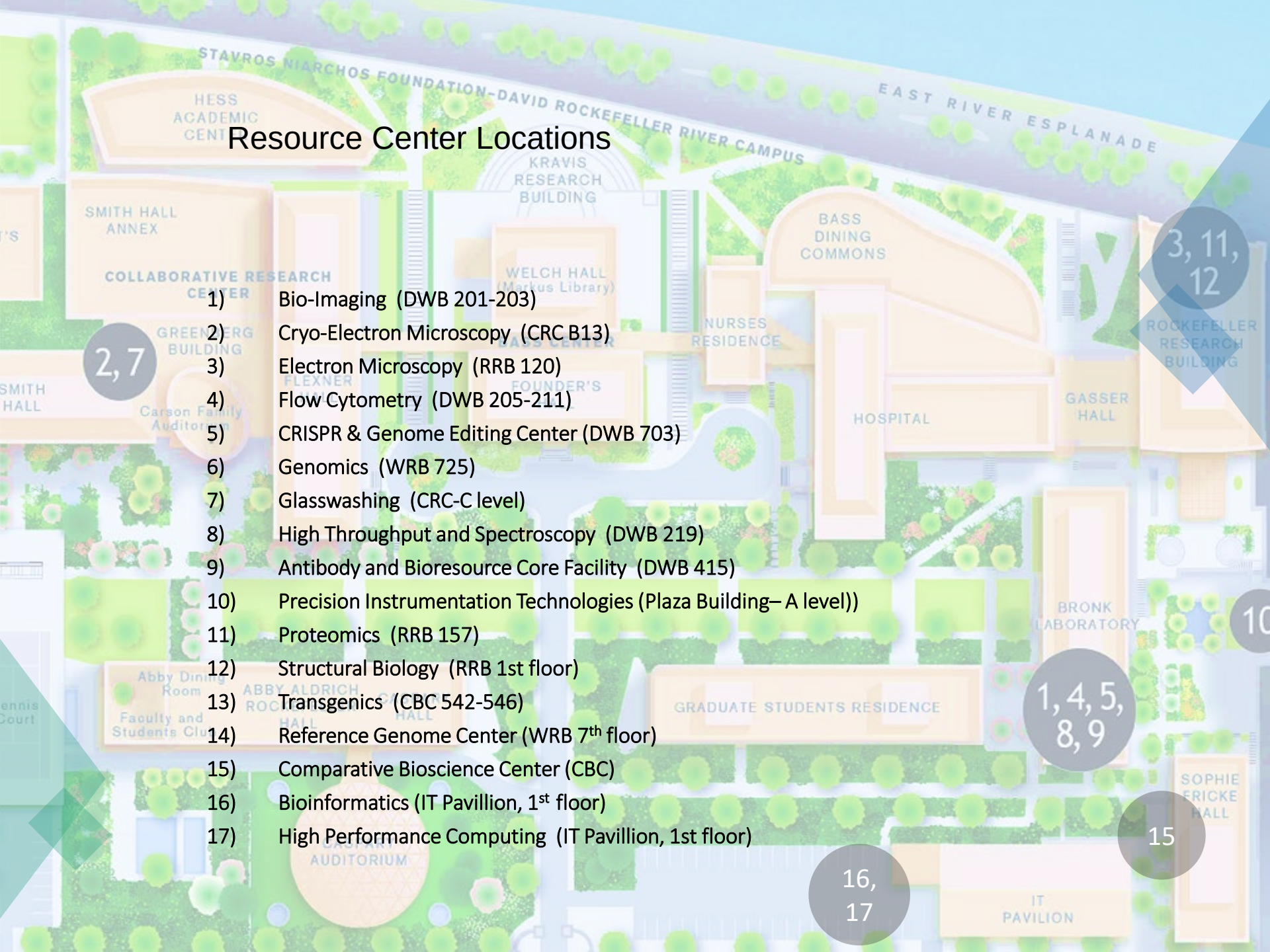
http://inside.rockefeller.edu/vgl/

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



1) Bio-Imaging (DWB 201-203)
2) Cryo-Electron Microscopy (CRC B13)
3) Electron Microscopy (RRB 120)
4) Flow Cytometry (DWB 205-211)
5) CRISPR & Genome Editing Center (DWB 703)
6) Genomics (WRB 725)
7) Glasswashing (CRC-C level)
8) High Throughput and Spectroscopy (DWB 219)
9) Antibody and Bioresource Core Facility (DWB 415)
10) Precision Instrumentation Technologies (Plaza Building– A level))
11) Proteomics (RRB 157)
12) Structural Biology (RRB 1st floor)
13) Transgenics (CBC 542-546)
14) Reference Genome Center (WRB 7th floor)
15) Comparative Bioscience Center (CBC)
16) Bioinformatics (IT Pavillion, 1st floor)
17) High Performance Computing (IT Pavillion, 1st floor)