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
mebrahim@rockefeller.edu

Johanna Sotiris
Senior Research Support Specialist
jsotiris@rockefeller.edu

Honkit Ng
Research Support Specialist
hng@rockefeller.edu
Cryo-Electron Microscopy Resource Center

- **200 kV**
  - Talos Arctica
- **300 kV**
  - 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

Equipped 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
**Single frame**

**Tilt image projection**

**Reconstructed tomogram**

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**Thermo Scientific Titan Krios**
+ Volta phase plate, K2 detector
Spot size 7, 13 frame/s, 42kMag, total dose: ~ 60 e/A², 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 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;

- 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;
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
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

Bronk 415  
x 7030
ZRC 1553
646-888-2331
skiabcf@mskcc.org
macfwebext.mskcc.org
Electron Microscopy Resource Center

Hilda Amalia Pasolli, Ph.D.
Director

Nadine Soplop, Ph.D.
Senior Research Support Specialist
We can do EM for a variety of experimental models!

- 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
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
Flow Cytometry Resource Center (FCRC)

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

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

- **Stanka Semova**
  - Operations Manager
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  - #7657

- **Samer Shalaby**
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  - #7657

- **Songyan Han**
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  - shan@rockefeller.edu
  - #7657

- **Alena Keprova**
  - Research Support Specialist
  - akeprova@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 scheduled on request
  - 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?

<table>
<thead>
<tr>
<th>Operations</th>
<th>Extended Business Hours, by FCRC Staff</th>
<th>24/7/365, Self-Operated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sorters</td>
<td>Image Analyzer</td>
</tr>
<tr>
<td>Lasers (Wavelength)</td>
<td>BD FACS</td>
<td>BD FACS Aria-II-1</td>
</tr>
<tr>
<td>and # of Fluorescent Detectors</td>
<td></td>
<td>Image Stream-X</td>
</tr>
<tr>
<td>Blue (488nm)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Red (633-658 nm)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Violet (405-407 nm)</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Yellow/Green (561nm)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>UV (355 nm)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total # of Detectors</td>
<td>13</td>
<td>16</td>
</tr>
</tbody>
</table>

- Blue (488nm) lasers can be used for sorting and analyzing cells.
- Red (633-658 nm) lasers are used for advanced analysis.
- Violet (405-407 nm) lasers are used for basic analysis.
- Yellow/Green (561nm) lasers are used for fluorescence measurements.
- UV (355 nm) lasers are used for detecting bacteria.

Diagram: Flow cytometry analysis of cell samples, showing fluorescence intensity and cell morphology.
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.
Cytek Aurora Spectral Analyzer

Revolution in Flow Cytometry - Spectral Flow Cytometer, Cytek

Aurora™

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
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
  – CROPI-Seq: pooled CRISPR screening with single-cell transcriptome readout

• **10x 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

• **Others**
  – Covaris Ultrasonicator
  – Agilent Bioanalyzer
  – Agilent TapeStation
  – Qubit fluorometer
  – NanoDrops
  – PCR machines 96/384-well
Sequencer Selection

MiSeq
1 – 20 million reads
• PCR Amplicon Sequencing
• 16S rRNA Metagenomic Sequencing as 300bp x 2
• Library prep method development
• Library QC

NextSeq
400 million reads
• Whole genome and Whole exome sequencing
• Paired-end RNA-Seq
• ATAC-Seq
• Large scale RNA-Seq
• Single cell RNA-Seq

NovaSeq
800 million to 10 Billion reads
• Small scale RNA-Seq up to 16 samples
• ChIP-Seq
• Small RNA Seq
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

Hong Duan, PhD
Research Support Specialist

Bin Zhang
Research Support Specialist

Christine Lai
Research Support Specialist

Connie Zhao, Ph.D.
Director

Xiaoyun Qiu
Research Support Assistant

Sophie Huang
Bioinformatics Specialist
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?

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
Biophysical Techniques for Binding Measurements

Isothermal Calorimetry

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

**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

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

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

Principal Investigator
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
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
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

Consultation & project design

- RGN
design gRNA sequence cloning
Surveyor nuclease assay

- DNA template
  mini-TV cloning
  Ss-Oligo DNA

- screening strategy
  Design & optimization

mES cells
  Transfection
  Screening
  Clonal isolation

Chimera or ES mouse production

Zygote embryo injection

- gRNA, Cas9

- AAV

- mouse transduction
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/
Do X-ray crystallography with us

From crystal growth to structure determination
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.

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 (CO₂ 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
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 committee.
- 1 to 1 training through Github.
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)?
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 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

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

(212) 327-8216
VGL@rockefeller.edu
https://vertebrategenomelaboratory.youcanbook.me
http://inside.rockefeller.edu/vgl/
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)