

INSTITUTE FOR SYSTEMS GENOMICS NEWSLETTER

ACADEMIC PLAN

The **Institute for Systems Genomics (ISG)** was awarded a grant by the University of Connecticut for their Academic Plan proposal entitled *Genetics, Genomics, and Personalized Medicine*. This grant will allow the ISG to imbed two high level scientists with computational genomics expertise in the Center for Genome Innovation and hire an additional support staff in order to build data analysis pipelines and provide training in Next Generation Sequencing. The ISG's plan is based on the need for such an infrastructure based on the results of a survey of Next Generation (NextGen) sequencing needs at UConn that was commissioned by the Office of the Vice-President for Research. Responses were evoked from 76 faculty members in 27 UConn Departments with 81.4% respondents requesting an in-house NextGen sequencing facility at UConn. In response to a question about the most challenging aspect of NextGen sequencing, 44.2% indicated data analysis. The ISG's specific aims to fulfill the NextGen infrastructure needs at UConn are: 1) strengthen the portfolio of genomics research across campus; 2) allow researchers and students to stay competitive in a rapidly evolving area, and 3) keep valuable and increasingly competitive grant dollars within the UConn system. For more information: <http://cgi.uconn.edu>.

Additionally, through the generous support of the recent Provost's Academic Plan and CLAS funding, a **Murine Behavioral Neurogenetics Facility (MBNF)** is now under development at the Storrs campus. This cross-Departmental facility will provide an array of behavioral phenotyping services on mouse models that have been engineered in PI labs, or can provide assistance in the development of new models for the study of clinical conditions. Phenotyping data obtained can serve as pilot findings for grant applications, or aid in the development of new projects and collaborations. Initial assessments will be performed gratis through Provost funding, although scheduling constraints may limit the projects and timing of work performed. Interested PI's should contact the MBNF Director, Dr. Holly Fitch, or Co-Director Dr. Joe LoTurco, for more information and/or to discuss a project. We expect to be up and running by September 2015. A University webpage with more information will be launched soon.

Craig Nelson and his colleagues were also awarded a grant to further enhance UConn's reputation in Single Cell Biology. The proposal is to define and visualize (for both scientists and the public) the first high-resolution cell lineage map of mammalian development. The objective of this innovative research is to enumerate and illustrate the "family tree" of cellular ancestry from fertilized egg to newborn mammal. The construction of this lineage map will utilize cutting-edge microfluidic single cell technology and will undoubtedly build new areas of expertise at UConn and attract significant extramural funding. The project is coupled to the ISG's plan expand its research, infrastructure and expertise in Next Generation Sequencing and Bioinformatics and support these efforts to investigate and characterize mouse (and human) embryonic development, tissue and organ structure, cell type identities, and study fundamental principles of biological organizations at the level of the single cell. This rare sponsored research opportunity with Fluidigm Corporation is one of five to ten projects funded in the world.

Rebecca Skloot and the Lacks Family Event: Genomics, Family, and Health

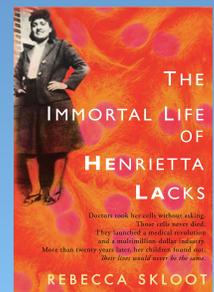


The Institute for Systems Genomics, in collaboration with many UConn Schools, Institutes, and Centers, and The Jackson Laboratory, welcomes best-selling author, Rebecca Skloot, and

the Lacks Family to the University of Connecticut on **Thursday, September 24, from 7:00-9:30PM** in the Jorgensen Center for the Performing Arts.

Skloot's book, "The Immortal Life of Henrietta Lacks", has put ethics and genomic medicine at the forefront of discussion and has already helped to frame guidelines that will shape the future of genomic medicine. The event will provide an opportunity to hear about important issues of genomics, health disparities, and the ethics of personalized medicine.

The event is free and open to the public. A book signing with Skloot and the Lacks family will take place immediately following the lectures.



Single Cell Genomics Center

The University of Connecticut (UConn) and The Jackson Laboratory (JAX) have entered into an agreement to jointly partner together to establish a Single Cell Genomics Center. The new Center is located within the JAX's Farmington location. The Center will enable investigators from both JAX and UConn to study biology at the level of its fundamental unit, the individual cell. ([Link to UConn Today Article](#))

ISG Welcomes New FY2015 Recruits:



Nichole Broderick joins the Department of Molecular and Cell Biology as an assistant professor. Dr. Broderick received her Ph.D. from the

University of Wisconsin, and her post-doctoral training at the Swiss Polytechnic University of Lausanne. She later worked in Dr. Jo Handelsman's lab as Associate and Lead Research Scientist at Yale University. The Broderick lab addresses fundamental questions related to animal biology by understanding the mechanisms that underlie animal-microbiome interactions.



Justin Cotney joins the Department of Genetics and Genome Sciences as an assistant professor. Dr. Cotney received his Ph.D. from Emory University, and

his post-doctoral training at Yale University. The Cotney lab is interested in determining how gene regulatory elements, namely enhancers, control gene expression during mammalian development. Dr. Cotney is the recipient of a NIH Pathway to Independence Award (K99/R00) entitled: "Identification of human orofacial enhancers and their role in orofacial clefts."



Sheida Nabavi joins the Department of Computer Science and Engineering as an assistant professor. Dr. Nabavi received her Ph.D. from Carnegie Mellon University, and

her Master's in Bioinformatics at Harvard Medical School. The Nabavi lab is developing novel computational methods, based on statistical machine learning and signal/image processing techniques, to detect and integrate genomics features for addressing biological and translational challenges in cancer. Dr. Nabavi is the recipient of a NIH Pathway to Independence Award (K99/R00) entitled: "Novel integrative method to detect biomarkers of breast cancer resistance"

Grants Awarded:

- Congratulations to **Li Wang**, Professor of Physiology and Neurobiology, who was awarded multiple grants from the National Institutes of Health and a VA Merit award. Dr. Wang also serves on many national grant review panels.
- **Madison Brandon** received an F31 fellowship grant entitled "Quantifying the Roles of Positive and Negative Stimulation in T Cell Receptor Signaling (sponsored by Reinhard Laubenbacher).
- **Elissa Chesler** received an R01 grant award from the National Institute of Drug Abuse of the National Institutes of Health for her project entitled "Discovery of Addiction-Related Genes with Advanced Mouse Resources".
- **Jeffrey Chuang** received a two-year R21 grant from the National Cancer Institute division of the National Institutes of Health entitled "Dissection of Tumor Evolution Using Patient-Derived Xenografts.
- **Justin Cotney** received an award from the National Institutes of Health for his project entitled "Identification of Human Orofacial Enhancers and their Role in Orofacial Clefts".
- **Anne Delany** received an award from the National Institute of Arthritis and Musculoskeletal and Skin Diseases of the National Institutes of Health for her project entitled "Role of miR29 in osteoclastogenesis"
- **Christine Endicott** awarded the ASM Robert D. Watkins Graduate Fellowship (Ranjan Srivastava's PhD student).
- **Christopher Heinen** received a Department of Public Health Tobacco Grant to study the DNA mismatch repair pathway in intestinal organoids derived from human ES cells.
- **Marc Lalande and Rachel O'Neill** were awarded a core grant for the UConn Stem Cell Core. Dr. Lalande also received a grant from the Foundation for Prader-Willi Research entitled "Reactivation of the PWS locus via disruption of the ZNF274 silencing complex"
- **Reinhard Laubenbacher** (PI) and **Dr. Paola Vera-Licona** (Co-PI) received an award from the National Science Foundation for his project entitled "REU Site: Modeling and Simulation in Systems Biology".
- **Ranjan Srivastava** received an award from the National Science Foundation for his project entitled "Collaborative Research: Integrating Multiple Omics Analyses to Understand Gene Regulatory Networks".
- **Andrew Wiemer** received an R01 grant award from the National Cancer Institute division of the National Institutes of Health for his project entitled "Regulation of gamma delta T cell immunoeediting by novel phosphoantigens".



Engineering and Science Complex Groundbreaking



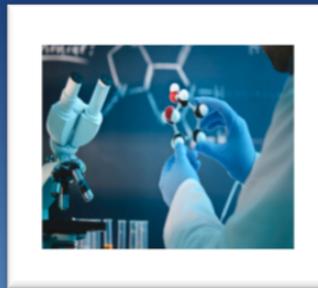
Thanks to Next Generation Connecticut funds, a new Engineering and Science Building will be built on the Storrs campus. A groundbreaking ceremony will be held on Wednesday, September 9. The Engineering and Science Building includes 118,000 square-feet of high-tech laboratory space that will drive innovation, attract top faculty and students, and allow researchers from different disciplines to collaborate. The Institute for Systems Genomics will occupy floors 2 and 3 of the new building (completion 2017).

Research Network Shared Storage

A new Petabyte-scale shared storage service is available to UConn researchers for large capacity and long-term data storage and archival. The Amazon cloud-like system resides on UConn's new Bioscience CT Research Network and is accessible from all computers on the Farmington, Storrs, and regional campuses. For more information and to request private and/or public storage, see <http://hpc.uhc.edu/hpc/> or contact <mailto:researchit@uchc.edu>.

This was made possible by a joint UConn-Storrs/UConn Health-Farmington and NSF Cyberinfrastructure grant and a collaborative effort between the UConn Health High Performance Computing facility, UConn-Storrs and UConn Health Information Technology Services, and the Office of the Vice President for Research.

Institute for Systems Genomics Workshop



The Institute for Systems Genomics held a workshop on Tuesday, June 9, 2015 in the Student Union Ballroom at UConn Storrs. The workshop featured a presentation of UConn's core facility that provides cutting-edge Gene Editing services, as well as an

update on the services offered by the [Center for Genome Innovation](#).

In addition, Dr. Margaret Cartiera, Connecticut Innovations Director of Bioscience Initiatives, provided an overview of the Life Sciences Program ([link to June 9th presentation](#)), which includes the [Connecticut Bioscience Innovation Fund](#) and the [Regenerative Medicine Research Fund](#). Dr. Greg Gallo, Interim Director of Technology Commercialization Services at UConn Health, also gave an update.

Genome Ambassadors: Testing Genomics Learning Activities



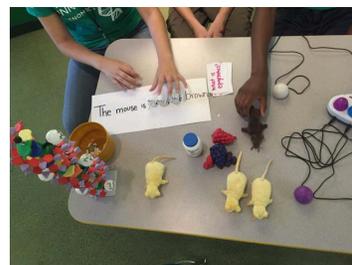
In its second year, this National Science Foundation funded collaboration between Dr. Rachel O'Neill, ISG, and Dr. Hank Gruner, Connecticut Science Center, and the National Center for Science & Civic Engagement supported the *Genome Ambassadors Summer Fellowship* program for graduate students to establish training in research and outreach activities in Genomic Literacy. During the summer of 2015, graduate students worked with Science Center program staff and high school students in the Summer Genomics Teen Innovation program to co-design and test genomics learning activities. The student's led activities with families visiting the Science Center and with adults attending a farmer's market in downtown Hartford, CT.



2015 Teen Genomics Innovators



UConn PhD Students working



DNA: Your Hidden Destiny

One of the Teen Genomics Innovator team's interactive display demonstrating the effects of methyl diet on heritable epigenetic traits

Update on the Center for Genome Innovation

We have been extremely busy since our official opening in January, with faculty, staff and students using the Next Seq, MiSeq, Fluidigm, Affymetrix equipment and our on site training and assistance facility. We have held three workshops (all sold out) in mRNA-seq and RNA-seq Bioinformatics, the latter of which was held in our recently updated computational training facility.

The Center for Genome Innovation's genomics sequencing portfolio is growing! This fall, the CGI will be adding an Oxford Nanopore MinION sequencer as well as the automated library preparation instrument from Illumina, the NeoPrep, to its available instrumentation. Both instruments will be located on the Storrs campus, but will be accessible to all. Through our Academic Plan funded equipment proposal, we will expand our sequencing repertoire, tapping emerging technologies such as 10X Genomics and the Oxford PromethION, as well as expand our computational support for genomics through access to improved computational resources, on site training and data analysis support.

The CGI will be organizing RNA-Seq and ChIP-Seq workshops for the Illumina NextSeq 500 and Illumina MiSeq platforms during the Winter Intersession 2016. Interested participants are asked to email Bo Reese so their names can be added to a waiting list. The CGI is also interested in your suggestions for laboratory-based workshop topics. If you have a suggestion for a workflow, need to work through estimates on your project ideas or need advice on platform applications, please email Bo Reese (bo.reese@uconn.edu).



ISG Membership:

If you are interested in becoming a member of the ISG, please email your NIH Biosketch that includes a brief statement summarizing your expertise in genomics or a related discipline (e.g. ELSI) to Stephanie Holden at sholden@uchc.edu.

JAX News:

Immunogenomics 2015: Microbiome meets Cancer and Immunology Symposium

December 2, 2015

The Jackson Laboratory for Genomic Medicine Auditorium

This symposium will bring together the leaders in Immunology, Cancer Immunology and Microbiome and offer opportunities to discuss emerging and exciting advances in our field. The one-day event will gather prominent scientists in the areas of genomics, tumor immunology, inflammation, and microbiome. Through blending concepts, knowledge and investigations, the event represents fertile ground for the education of the next generation of biomedical scientists and physician-scientists. Follow link for additional information: <http://courses.jax.org/2015/immunogenomics-ct.html>.



Julia Oh joins The Jackson Laboratory for Genomic Medicine as an assistant professor. Dr. Oh received her Ph.D. from Stanford University, and her post-doctoral training at the National Human Genome Research Institute. Dr. Oh's research to date has produced seminal findings on the microbial communities of the human skin. Studying the complex interactions between the host, its immune system and its microbes, her work has important implications for the contribution of the microbiome to disease.

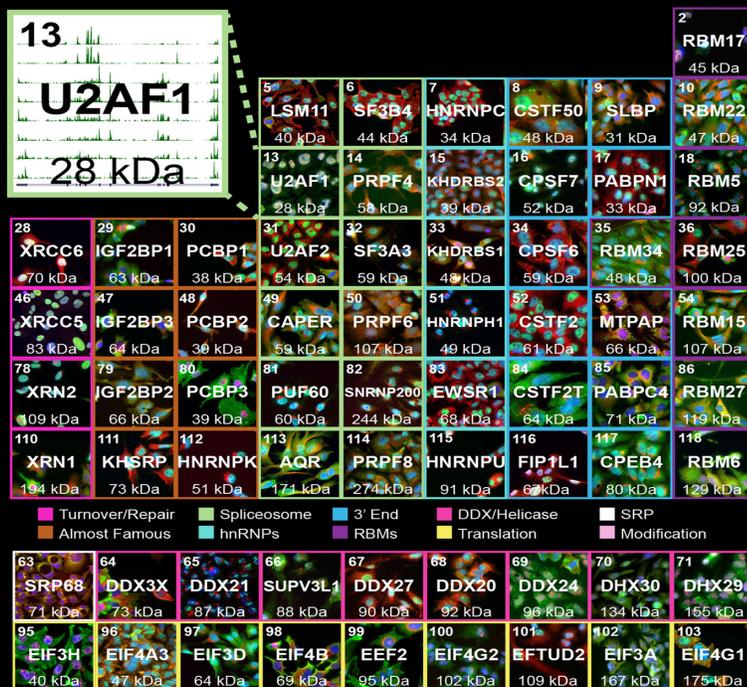
Honors & Awards:

- **Srdjan Antic** received a First-Year Teaching Award at the School of Medicine's Annual Spring Awards ceremony.
- **Stormy Chamberlain** honored by the Connecticut Technology Council as a 2015 Woman of Innovation inductee.
- **Barbara Mellone** received the 2015 Excellence in Research & Creativity: Early Career Award from the American Association of University Professors (AAUP).
- **Rachel O'Neill** was the honoree recipient for the CT Science Center STEM Achievement Award for the State of Connecticut.
- **Linda Pescatello** was inducted into to the Connecticut Academy of Science and Engineering.
- **Li Wang** received a Research Career Enhancement Award from the American Physiology Society.

Abstracts of papers presented
at the 2015 meeting on

EUKARYOTIC mRNA PROCESSING

August 18-August 22, 2015



CSH Cold Spring Harbor Laboratory 1890 125 2015

In 2012, Brenton Graveley, in collaboration with Chris Burge (MIT), Eugene Yeo (UCSD), Xiang-Dong Fu (UCSD) and Eric Lécuyer (IRCM), was awarded a \$9 million dollar grant as part of the National Human Genome Research Institute ENCODE (Encyclopedia of DNA Elements) project to comprehensively study 250 human RNA binding proteins. At the recent Eukaryotic mRNA Processing meeting held at Cold Spring Harbor Laboratory in August, the project was highlighted by being selected for five talks, one poster, and featured prominently on the cover of the abstract book (left). The front cover depicts half of “The Periodic Table of Human RNA Binding Proteins” which conceptually represents the goal of generating comprehensive reference datasets for each human RNA binding protein. For each RNA binding protein, data will be obtained for protein localization, CLIP-Seq, Chip-Seq, RNAi/RNA-Seq, and RNA Bind-N-Seq. To date, the project has completed 480 experiments which are publicly available at <http://www.encodeproject.org>.

Featured Publications:

- [Horizontal gene transfer: building the web of life](#)
- [Establishment of Centromeric Chromatin by the CENP-A Assembly Factor CAL1 Requires FACT-Mediated Transcription.](#)
- [Genome-wide identification of zero nucleotide recursive splicing in *Drosophila*](#)
- [Erosion of X Chromosome Inactivation in Human Pluripotent Stem Cells is initiated with XACT Coating and Depends on a Specific Heterochromatin Landscape.](#)
- [Widespread rescue of Y-linked genes by gene movement to autosomes.](#)
- [TCTEX1D2 mutations underlie Jeune asphyxiating thoracic dystrophy with impaired retrograde intraflagellar transport.](#)
- [Molecular Mechanisms and Evolutionary Processes Contributing to Accelerated Divergence of Gene Expression on the *Drosophila* X Chromosome.](#)
- [Three CRISPR-Cas immune effector complexes coexist in *Pyrococcus furiosus*.](#)
- [Ancient horizontal gene transfer and the last common ancestors.](#)
- [Assessing long-distance RNA sequence connectivity via RNA-templated DNA-DNA ligation.](#)
- [Branch specific and spike-order specific action potential invasion in basal, oblique, and apical dendrites of cortical pyramidal neurons.](#)
- [The role of INDY in metabolism, health and longevity.](#)
- [Recessive nephrocerebellar syndrome on the Galloway-Mowat syndrome spectrum is caused by homozygous protein-truncating mutations of WDR73.](#)
- [DRC3 connects the N-DRC to dynein g to regulate flagellar waveform.](#)
- [The blood pressure response to acute and chronic aerobic exercise: A meta-analysis of candidate gene association studies.](#)
- [Carotenoid composition of the flowers of *Mimulus lewisii* and related species: Implications regarding the prevalence and origin of two unique, allenic pigments.](#)
- [Interactions between Nuclear Receptor SHP and FOXA1 Maintain Oscillatory Homocysteine Homeostasis in Mice.](#)
- [Small heterodimer partner/Neuronal PAS domain protein 2 axis regulates the oscillation of liver lipid metabolism.](#)
- [Matrix Metalloproteinase 2 Is Required for Ovulation and Corpus Luteum Formation in *Drosophila*](#)
- [Kv7 channels in the nucleus accumbens are altered by chronic drinking and are targets for reducing alcohol consumption.](#)
- [Sex and strain influence attribution of incentive salience to reward cues in mice.](#)
- [GeneWeaver: finding consilience in heterogeneous cross-species functional genomics data.](#)
- [Aging research using mouse models.](#)
- [Applying the ARRIVE Guidelines to an In Vivo Database.](#)
- [Early Life Experience and Gut Microbiome: the Brain-Gut-Microbiota Signaling System, Advances in Neonatal Care.](#)
- [Parental Oxytocin Responses during Skin-to-Skin Contact in Preterm Infants.](#)
- [Small heterodimer partner/Neuronal PAS domain protein 2 axis regulates the oscillation of liver lipid metabolism.](#)
- [Interactions between nuclear receptor SHP and FOXA1 maintain oscillatory homocysteine homeostasis in mice.](#)
- [Extensive cross-regulation of post-transcriptional regulatory networks in *Drosophila*.](#)
- [Regulation of alternative splicing in *Drosophila* by 56 RNA binding proteins.](#)
- [Identification of a Recently Active Mammalian SINE Derived from Ribosomal RNA.](#)
- [Four Core Genotypes Mouse Model: Localization of the Sry Transgene and Bioassay for Testicular Hormone Levels.](#)
- [The oligomeric outer dynein arm assembly factor CCDC103 is tightly integrated within the ciliary axoneme and exhibits periodic binding to microtubules.](#)
- [Iron acquisition and oxidative stress response in *Aspergillus fumigatus*.](#)
- [Optimal harvesting for a predator-prey agent-based model using difference equations.](#)