



THE RNA INSTITUTE
COLLEGE OF ARTS & SCIENCES UNIVERSITY AT ALBANY

In the Loop

Sept 2019

RNA Science Training Rewarded by NIH

Success is breeding success for UAlbany's rigorous graduate school training program in RNA science.

A new \$1.1 million grant from the National Institute of General Medical Sciences will provide support for the **RNA Fellows** Program. These funds will enlarge the yearly cohort of new fellows by three additional students for each of the next five years. The award, an NIH T32 instructional grant, expands the scope of the program by adding nanobioscience students to those from the departments of Biological Sciences, Biomedical Sciences and Chemistry. New training tracks are also being created for fellows that involve writing excellence and entrepreneurship through programs with the New York State Writers Institute and the UAlbany Innovation Center (*see page 3 for details*).



RNA Institute biological scientists Thomas Begley, principal investigator on the \$1.1 million T32 grant, and Marlene Belfort, co-PI and Distinguished Professor of Biology



The 2019-2020 cohort of RNA Fellows

Front row (L to R): May Yue Lee (Melendez/Begley), Zhixue Bai (Chen), Anwesha Sarkar (Begley), Kahini Sarkar (Rangan)

Back row (L to R): Tristen Head (Cady), Priyanka Sehta (Fuchs), Nicole Ralbovsky (Lednev), Rachel Fay (Ciota), Jesus Frias (Berglund) **Not present:** Pheonah Badu (Pager), Ya Ying Zheng (Sheng), Ali Ropri (Herschkowitz)

"The T32 program will continue to train graduate students in the principles of RNA and related technologies that have applications in human health and disease, but now supports a truly comprehensive, intellectually rigorous and individualized graduate training experience" said Thomas Begley, professor of biology, director of the RNA Fellows program and co-principal investigator (PI) on the grant. "Our training program will provide a cadre of scientists that can transition to careers in science and technology companies, science communication organizations, public service or academia — all of which provide important components that help ensure the public health."

continued on page 2

in this issue >>>

> T32 Training Grant Awarded

> Upcoming events

>> RNA Café

>> Hudson Valley RNA Club

> RNA Retreat

> Outreach events

> Labs in the spotlight

>> Mindy Larsen's Lab

>> Jia Sheng's lab

> Undergrad Summer Research Fellowships

> Update from the Director

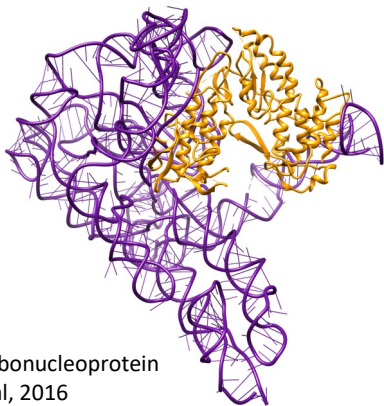
RNA Fellows Program *continued*

Begley pointed to the RNA Fellows' first four years as the key to obtaining the new NIH grant. *"Our RNA Fellows have outstanding records of achievement in class work, research and at national conferences"* he said. *"They are highly competitive for national awards and other training opportunities. The first cohort (2015-16) has begun to graduate and land jobs in academic, government and industrial settings."*

Marlene Belfort, the program's original director, UAlbany Distinguished Professor of Biology and a co-PI on the grant, said, *"We're thrilled to have landed the NIH training grant, in view of strong national competition. There's no question that the excellent track record of our RNA Fellows gave us the competitive edge."* She expressed gratitude for the support the program received over the past four years from Graduate School Dean Kevin Williams and his office, and from the UAlbany departments. *"A worthwhile investment!"* she concluded. *"And I'm also happy to say that there's already a very strong esprit de corps among the new fellows, who gathered recently at an off-campus RNA Institute retreat."* Along with the new T32 grant, the RNA Fellows Program is supported by more than \$1 million in matching funds from academic colleges, departments and offices at UAlbany and SUNY Poly.

Andy Berglund, director of the RNA Institute, noted, *"The vision and hard work of professors Marlene Belfort and Tom Begley in developing the RNA graduate fellows program has been recognized by this prestigious NIH T32 training grant. I am excited to work with the faculty to implement the vision of this innovative program and provide our graduate students with an outstanding training environment to prepare them for successful careers in academia, industry, non-profit and government."* For more information on the RNA Fellows program please visit

<https://www.albany.edu/rna-training/fellows.shtml>



Group II intron ribonucleoprotein
Qu et. al, 2016

Upcoming Events

RNA Café

The RNA Café is an invited seminar series exposing students and postdocs to non-traditional science careers by engaging in a roundtable discussion with credentialed scientists who have pursued careers outside of academia. To be included in the invitation list, or if you would like to be an invited speaker or suggest a speaker, please contact us at rna@albany.edu. Upcoming RNA Café events will include the following speakers: Andy Golden from Instrumentation Laboratory, Frank Rice, President and Chief Scientist from INTiDYN and Lois Culot, MLA, general manager in the genomics and oncology informatics from Philips.

Hudson Valley RNA Club

The Hudson Valley RNA Club (HVRC) seeks to create a community and a scientific forum for students, postdocs and scientists engaged in RNA-related research in the Hudson Valley region and beyond. The Hudson Valley RNA Club meets the **third Tuesday of every month at 4:00 PM in the LSRB, room 1143**. See below for upcoming meetings.



Date: Sept 17th, 2019

Speaker: Kathleen McCann, PhD (NIH)

"Guiding cell fate decisions: Investigating the role of H/ACA snoRNAs in differentiation."

Date: Oct 15th and Nov 19th, 2019

Speakers: Speed talks by RNA Fellows

NYS Writers Institute Events

Date: Sept 17th, 2019

Speaker: Beth Macy

"Dopesick"

SUNY Global Center, 116 E 55th St, New York, NY

Date: Nov 4th, 2019

Speaker: Matt McCarthy, M.D.

"Superbugs: The Race to Stop an Epidemic"

Multi-purpose Room, Campus Center West

Innovate 518 Events

Date: Sept 17th, 2019

SBIR Road Tour-Seeing America's Future Innovations

SUNY Poly Zen Building, 257 Fuller Rd. Albany

Date: Oct 9th, 2019

Technology Innovation Showcase & Matchmaking Event

Multi-Purpose Room, UAlbany Campus Center

RNA Fellows Science Communication Track

Effective communication in science is key to not only conveying a scientist's research discoveries to their colleagues but also in capturing the imagination and sparking interest in science within the general public. Building upon the principle that communication is an important platform of education for students, we aim to provide critical skills for our students to be future leaders. The RNA Fellows **Science Communication track** is a unique training program for the RNA Fellows that focuses on written and oral scientific communication with intensive seminars given by journalists, fiction and science writers, through the acclaimed New York State (NYS) Writers Institute.

Since its creation in 1983 at UAlbany, the Writers Institute, a NYS-supported cultural program, has provided a broad educational base to promote good writing, especially outside the traditional literary fields of fiction, poetry, non-fiction and drama. The T32 program and the NYS Writers Institute share common interdisciplinary goals in promoting creativity and critical thinking and a commitment to creating something new.



The goal of the Writers Institute is to enhance literature, writing, and performance and to recognize writers in the community. As part of its training program, the Writers Institute hosts a Visiting Writers Series that includes book and magazine writers, screenplay writers, journalists, and scientists.

As part of this training track, RNA Fellows will participate in a series of workshops run by Anette Breindl, where they will be required to write a number of pieces including

- A story for an audience with a scientific background
- A story for a lay audience
- A written piece not about molecular or cellular biology

Working together, and with experts in science writing and communication, the RNA Fellows will read and critique each other's work with the goal of improving their general and scientific writing skills. Students will compete at the end of the course for the opportunity for their work to be highlighted in a publication.

"I read science, because to me, that's extremely exciting. It's like a great detective story, and it's happening right in front of us." Alan Alda

RNA Fellows Entrepreneurship Track

Biotechnology startups and technology-driven entrepreneurship account for a large part of the economy and help drive research innovation and drug development. We are not only training the next generation of RNA researchers but we are training the next generation of business and technology leaders. As such, the objective of the **Entrepreneurship track** is to provide students with the business skills necessary to understand the commercialization process so that they might be better equipped in applying their skills amongst the business community.

Working with T32 training mentors with business experience, students will participate in a combination of workshops, one-on-one meetings with local entrepreneurs and events hosted by Innovate 518.

Innovate 518 is a collaborative effort of incubators, accelerators, and entrepreneurial service providers from all around New York's Capital Region managed at the University at Albany. Geared towards innovating a hotbed of entrepreneurial activity, the group provides networking and mentoring, as well as educational and financial resources.

Designated as the Capital Region Innovation Hot Spot, a NYS-TAR initiative, Innovate 518 enables funding and a unique set of tax incentives.

As part of the track, RNA Fellows in this track will attend Innovate 518 sponsored events, such as the IGNITEU Startup Showcase, the SBIR Road Tour, and Technology Accelerator Fund pitch competition. At these events, local startups pitch business and technology leaders for startup funding and provide an excellent real-world learning opportunity for the students.

At the end of the program, students will generate business plans and pitch their science-related business ideas to local entrepreneurs and business leaders.



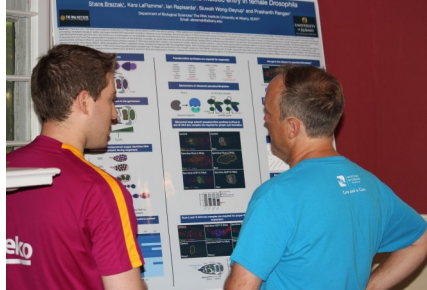
Source: Troy Innovation Garage @TroyInnovation #ingiteushowcase

RNA Institute Summer Collaboration Retreat

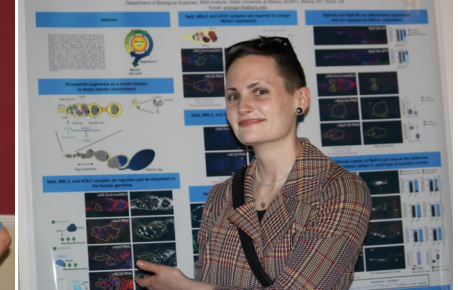
On July 25-26, the RNA Institute held its first Summer Collaboration Retreat at the Carey Institute for Global Good in Rensselaerville, NY. The retreat provided a venue to identify opportunities for collaboration, share recent research and enjoy some time with colleagues and students. It was an enormous success with 90 participants representing 29 labs and 5 institutions.

The first day of the retreat focused on trainees and students with 25 trainees from Institute affiliated labs presenting posters on their recent research. Trainee poster award winners included **Shane Breznak** and **Alicia McCarthy** of the **Rangan Lab**, **May Lee** of the **Melendez and Begley Labs**, and **Alyssa Hoy** of the **Royzen Lab**.

In addition, Dr. Scott Tenenbaum led a career panel of UAlbany faculty and local industry scientists to discuss the wide range of career paths available to students in the life sciences. Drs. Tom Begley and Alex Valm chaired a panel on rigor and reproducibility, a key component of the recently awarded T32 training grant from the National Institutes of Health.

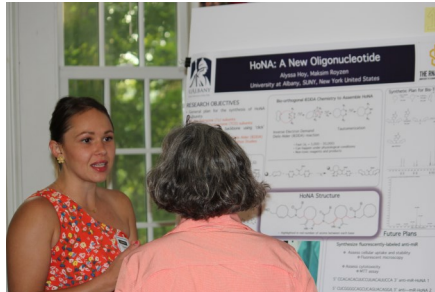


Shane Breznak, poster award winner and Andy Berglund, Director of the RNA Institute

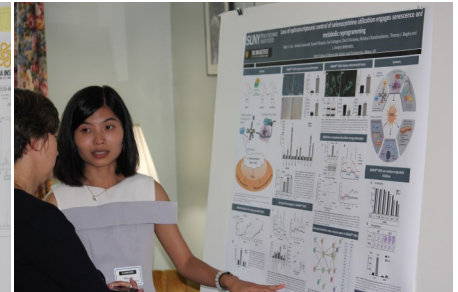


Alicia McCarthy, poster award winner

The second day of the retreat focused on collaboration more widely with 16 additional posters and lighting talks by each of the 29 labs represented at the retreat. These talks provided excellent fodder for identifying opportunities for labs to collaborate. Invited Keynote speaker, Dr. Ailong Ke from Cornell University, joined the retreat on Thursday night and presented his work on Friday afternoon.



Aly Hoy, poster award winner and Janice Pata, Chair Biomedical Sciences



May Lee, poster award winner and Cara Pager, Assistant Professor, Biology

Finally, the RNA Institute's Faculty Advisory Board and Management (Tom Begley, Marlene Belfort, Andy Berglund, Doug Conklin, and Scott Tenenbaum) presented 4 awards to the RNA Institute Community. These included:

Director's Award for Excellence in RNA Research:
Alan Chen

Award for Outstanding Research by an RNA Scientist:
Phensinee Haruehanroengra

RNA Institute Award for Outstanding Mentoring:
Gabriele Fuchs

RNA Citizens Award:
Paul Gumper

In addition to all the science, the retreat was a wonderful opportunity for members of the RNA community to relax and have some fun together. There were spirited games of kickball and badminton as well as plenty of s'mores roasted over the outdoor fireplace. The Carey Institute provided an amazing backdrop for a wonderful retreat.

Andy Berglund, Director of the RNA Institute, was very pleased with the outcome and stated "The retreat was a great opportunity to chat informally with many members of the Institute. I learned about their research and was excited to hear about all the opportunities for collaboration."



RNA Institute members enjoying a spirited game of kickball.



RNA Institute members enjoying games and s'mores around the outdoor fire.

Outreach at the RNA Institute

Representation at the Scientista Conference

Members of the Fuchs lab attended the Scientista conference from March 29th-31st at the Harvard Medical School in Boston, MA. This symposium is an opportunity for female undergraduates, graduate students, and postdocs across the STEM fields to present their research while also hearing panels of more senior scientists from academia, industry and tech.



The Scientista organization is focused on building a community of women in STEM. There is also a career fair for students to talk

about graduate programs and major companies/science organizations. The RNA Institute was represented at this career fair by Clare Miller (PhD Candidate), Diana Nikolyan (Undergraduate), Dr. Sangeetha Selvam (Postdoc), and Hesam Waly (Undergraduate) shown from left to right in the picture above.

Collaboration with the New York Master Teacher Program

The NYS Master Teacher Program is an organization that consists of well qualified public school teachers, from every district in the state, who go through an extensive interview and competitive selection process to become a Master Teacher. Only the best STEM educators in the state are eventually selected for the program. Each Master Teacher commits to an additional 50 hours of professional development each year during their four year tenure and receives a stipend during this time. One of the professional development opportunities available to the Master Teachers are state wide mini-courses. At the RNA Institute, we hosted an interactive discussion with local Master Teachers this summer and discussed topics that they were interested in learning more about and how these could be incorporated into a mini-course. Dr. Andy Berglund, Director of the RNA Institute, will lead three two-hour seminars in November. The title of his mini-course is "Understanding RNA structure and function leads to therapeutic strategies for disease." The course will be offered in the evenings and Master Teachers will be able to attend in person or participate remotely through the live-streaming option. Some of the topics Dr. Berglund will discuss are the forces that drive the formation of RNA structures, techniques to determine the function of RNAs and how the knowledge gained from basic research is used to develop therapeutic strategies for neuromuscular diseases and other diseases. (<https://www.suny.edu/masterteacher/>)

A Day of Discovery at the RNA Institute

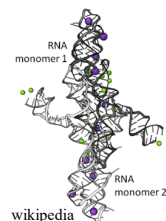
This year the RNA Institute launched a community engagement program entitled "A Day of Discovery", inviting interested groups from the community to visit the RNA Institute and participate in interactive sessions highlighting the interdisciplinary research being done at the Institute. Sessions are tailored for the age groups in attendance and range from very hands on to more observational and informational, but they are all educational.



Our first event was held on May 17th, 2019 and involved students from grades 6 and 7 from **Saint Gregory's School** located here in Albany, NY. Students visited the following five discovery stations:

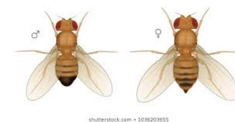
1. RNA Structures and 3D Modeling:

Students learned about the differences between RNA and DNA and why knowing/predicting the structure of RNA is so important in the creation of drugs for the treatment of diseases. They were also able to view a wall sized 3-D image of an RNA molecule using our state of the art 3-D projector.



2. Using Fruit Flies (*Drosophila*) in Biomedical Research:

Students learned how valuable fruit flies are in providing insights into human diseases. They were also able to sort male and female fruit flies using a dissecting microscope.

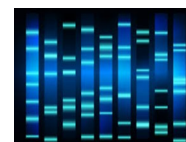


3. Genomic DNA Isolation from Strawberries:

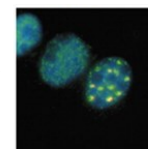
Students performed their own hands on experiment and extracted genomic DNA from strawberries using nothing more than shampoo, salt, a coffee filter and alcohol.



4. Agarose Gel Loading station: Students learned how to visualize fragments of DNA by loading plasmid DNA onto an agarose gel and performing gel electrophoresis.



5. Fluorescent Cell Imaging: Students learned about the various types of microscopes and how they allow scientists to "look" into cells. The students were also able to look at human cells that contained a Green Fluorescent Protein (GFP), making them fluoresce green in their dishes.



(Ho et al. 2005)

In the Spotlight — Melinda Larsen's Lab, University at Albany, SUNY

When most people sit down to eat a meal, they are not thinking about the intricacies of saliva. However, if these glands do not function properly, eating becomes difficult due to lack of saliva production, which occurs in the case of patients suffering from Sjögren's Syndrome. In addition, people diagnosed with this syndrome exhibit fibrosis, or an increase in deposition of the fibrous material of connective tissue called extracellular matrix (ECM). Questions regarding the mechanisms behind salivary gland development and organ regeneration are at the forefront of research in Dr. Larsen's lab here at the University at Albany, SUNY.

An important aspect of proper salivary gland development is the establishment of a network of branched tubular structures that come about through a process called "branching morphogenesis". The Larsen lab (pictured below) is working to understand the molecular requirements between the epithelial cells that form the branched structures and the mesenchymal stem cell-like support cells and endothelial cells within the vasculature that drive the process in salivary glands and other major mammalian organs. The lab is also interested in understanding the cell-cell and cell-extracellular matrix signals that are disrupted in disease. This area of research not only holds potential to address the symptoms Sjögren's Syndrome and other salivary gland related issues, but it can also be applied to other branched organs.

Earlier this year Dr. Larsen, an associate professor of the Department of Biological Sciences, was awarded \$3.4 million from the National Institute of Health's National Institute of Dental and Craniofacial Research (NIDCR) to answer questions regarding fibrosis. With the build-up of ECM proteins in fibrosis, there is a thickening of the affected organ tissue which ultimately restricts normal organ function by interfering with the branched structure of the organ. "Within this field of research, the cell populations that produce excessive ECM deposition are not known, nor are the signals leading to excessive ECM deposition" says Larsen. While ECM deposition is needed transiently during development

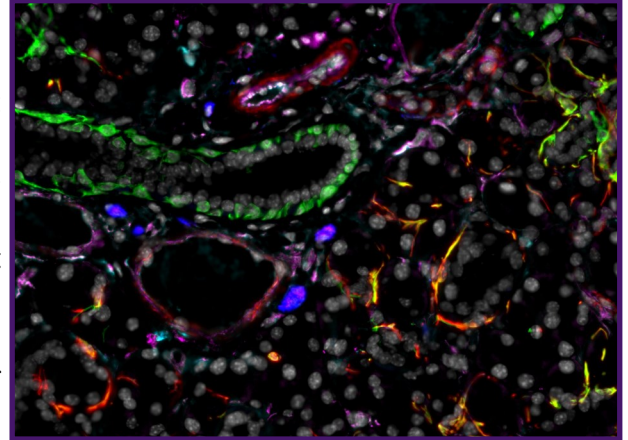


Image courtesy of Kevin O'Keefe and Melinda Larsen. Adult mouse gland multiplex immunostained to detect smooth muscle alpha actin (red), cytokeratin 5 (green), beta III tubulin (blue), retinoic acid receptor alpha (magenta), and vimentin (cyan) with DAPI (gray).



Top: Kevin O'Keefe, Dr. Matthew Koslow, Nicholas Moskwa

Middle: Amber Altrieth, Mary Pham, Rena Collandra, Dr. Deirdre Nelson

Bottom: Dr. Melinda Larsen, Ayma Mahmood, Judy Turieta

Not shown: Jennifer Morrissey, Galeb Bader, Carmalena Cordi, and Sage Feminella

and in wound repair, sustained ECM deposition is detrimental to organ function. How fibrosis leads to decreased saliva production requires further investigation. Larsen and her team plan to study mesenchymal stem cells (MSCs), a type of stromal cell that make up connective tissue within the salivary gland and allow development of the salivary gland. Utilizing RNA sequencing, they aim to profile the transcriptomes of these cells in an effort to identify the underlying molecular cues of fibrosis. Dr. Larsen's lab is working in collaboration with Drs. Yubing Xie and Susan Sharfstein from SUNY Polytechnic to investigate the reduction of fibrosis in diseased glands. Nanofabricated scaffolds created at the neighboring campus will be used to deliver MSCs *in vivo*. Dr. Larsen adds that while the end goal is to identify potential therapeutic targets and find ways to potentially restore function for people suffering from fibrosis, there is also a very real possibility that this will have implications in other organs as well.

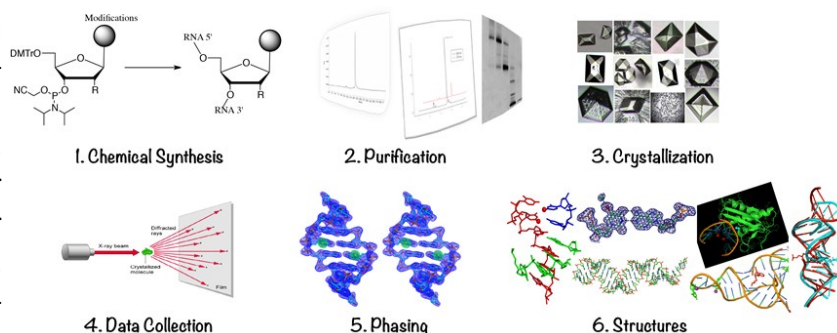


Article written by Clare Miller
(Biology PhD candidate in Dr. Gabriele Fuchs' lab at the University at Albany)

In the Spotlight Jia Sheng's Lab, University at Albany, SUNY

Dr. Jia Sheng received his Ph. D. from Georgia State University with Prof. Zheng Huang. His Ph.D. studies focused on the development of selenium and tellurium derivatizations of nucleic acids for their 3D structural studies. Subsequently, he moved to Boston as a postdoctoral fellow in Prof. Jack Szostak's lab at Harvard Medical School studying RNA chemistry-based evolution.

Dr. Jia Sheng started his independent research career in 2013 as an assistant professor in the department of Chemistry and The RNA Institute at The University at Albany, SUNY. The long-term goal of his research group is to understand nature's strategies to diversify the structures and functions of RNA through chemical modifications and base pairing patterns. In so doing, they want to develop new methods for synthesizing modified RNA molecules as molecular tools for biochemical and biomedical applications. The main approaches in his lab are chemical synthesis and X-ray crystallography.



The past four decades have witnessed the great era of nucleic acids research with the discovery of new functions of RNAs as catalysts and regulators of numerous biochemical reactions, just like protein enzymes. On the other hand, however, in comparison to proteins that contain over 20 different amino acid residues, RNA only contains four types of nucleobases. In order to achieve the structural and functional diversity, nature uses over 150 chemical modifications to decorate RNAs in all three primary domains of life. Many of these modifications have been demonstrated to play critical roles in a variety of human diseases and biological processes. More interestingly, it is believed that these chemical modifications are the most evolutionarily conserved properties of RNAs, and some of the modified nucleobases are relics of the RNA World, where they may have enhanced the chemical diversity of RNA prior to protein. In addition to chemical modifications, both DNA and RNA can further diversify their structures and functions by different folding patterns into well-defined duplex, hairpin, cruciform, triplex and quadruplex etc., which are mainly stabilized by both canonical Watson-Crick pairs and non-canonical Wobble, Hoogsteen, and metal-mediated base pairs, as well as other tertiary interactions. Therefore, studying natural chemical modifications and base-base interactions in DNA/RNA is important for the further elucidation of their biological functions, the development of new therapeutics, and the exploration in the origins of life.

Dr. Sheng's research has been funded by NSF, NIH and Simons Foundation. Very recently, he received an esteemed career award from National Science Foundation (NSF) with the amount of \$600,000 to study the structures and functions of 5-methylcytidine analogs in RNA and develop new molecular tools for gene regulation. The award is designed to support outstanding

junior faculty to develop their careers as researchers and educators who advance teaching, learning and the dissemination of knowledge. This award starts in July 2019 and continues through June 2024. "I am very proud and grateful to receive this award from NSF, which sets a

higher standard and a new start to my lab in pursuing our long-term research goals on RNA," said Sheng.



Article written by Muhan He (Chemistry PhD candidate in Dr. Maksim Royzen's lab at the University at Albany)



Members of the Sheng Lab (from L to R)

Front row : Jia Sheng, Fusheng Sheng, Phensinee Haruehanroengra

Second row: Jinxi Du, Song Mao, Johnsi Mathivanan, Ishmeet Sekhon, Ying Wu, Yaning Tang.

Back row: Vibhav A. Valsangkar, Gohwoon Lee, Yaying Zheng

RNA Institute Undergraduate Summer Fellows Program

Beginning in May 2019, the **RNA Institute Undergraduate Summer Fellows Program** was successfully launched with an inaugural class of ten fellows placed in six labs. This program supports undergraduates pursuing research in labs affiliated with the RNA Institute providing practical research experience while furthering the work of the labs. At the end of the summer, students presented their research to their peers and members of the Institute.

This program is a key component of the RNA Institute's renewed emphasis on training the next generation of RNA scientists as our core mission. Hands on experience in the lab is a crucial part of science training, and the Undergraduate Summer Fellows Program provides an avenue for these first lab experiences while forging relationships with potential mentors.

This year's fellows included:

Cassandra Cavaliere, Halvorsen Lab: Cassandra continued her work on an RNA purification strategy by employing DNA nanoswitches to capture a single, specific RNA of interest.

Eva Clervoyant, Berglund Lab: Eva tested compounds that affect the levels of toxic RNA in DM1 cell models to determine which drugs and cellular targets serve as effective treatment methods for myotonic dystrophy type 1.

Rena Collandra, Larsen Lab: Rena's project involved developing in situ probes to distinguish macrophages, existing in the M1 inflammatory state or the M2 anti-inflammatory state, on resected submandibular salivary gland tissues vs non-manipulated glands. This will allow better characterization of macrophage response during wound repair in a salivary gland disease model.

Emily Davey, Berglund Lab: Emily focused on determining which domains of MBNL1 proteins are necessary for splicing regulation using numerous synthetic MBNL1 proteins. MBNL proteins are master regulators of alternative splicing and are implicated in neurodegenerative disease mechanisms.

David Fast, Fuchs Lab: David investigated the role of the ribosomal protein RACK1 in cell survival in response to cellular stress. Using chemical stressors he measured cell growth and tested if RACK mediates translation of a cellular mRNA that contains an Internal Ribosomal Entry Site.

A special thank you to Neil Eisenband for his donation to the RNA Institute. David Fast, working in Dr. Gaby Fuchs' lab, was awarded the Eisenband Undergraduate Fellowship.

Nicholas Labbe, Dey Lab: The goal of Nicholas's project was to examine the role of microRNA-322 in myogenesis to understand its role in skeletal Muscle Stem Cell (MuSC) differentiation. The outcome of this research may ultimately help better understand muscle degenerative diseases including Duchenne Muscular Dystrophy.

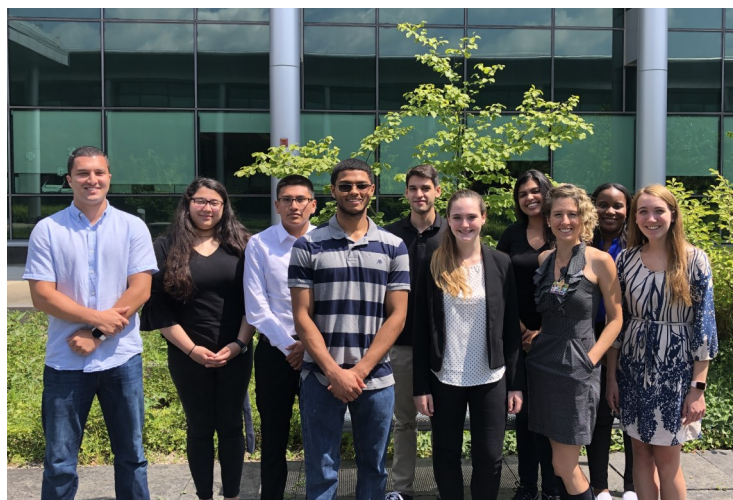
Ian Rapisarda, Rangan Lab: Ian focused on RNA modifications that affect germline stem cell differentiation in fruit fly oogenesis, specifically focusing on an enzyme called dihydrouridine synthase which modifies tRNA.

A special thank you to the Jeffrey S. Sherman '76 RNA Institute Endowment for supporting Ian Rapisarda, working in Dr. Prash Rangan's lab, and awarded the Jeffrey S. Sherman Undergraduate Fellowship.

Ishmeet Sekhon, Sheng Lab: Ishmeet helped to chemically synthesize RNA oligonucleotides that are parts of naturally occurring RNA sequences with cytidine modifications to better understand their structure.

Sharon Shaughnessy, Berglund Lab: Sharon characterized the construct insertional sites in cell line models used in the Berglund lab to study microsatellite repeat expansion diseases, such as Myotonic Dystrophy and ALS.

Javier Vilcapoma, Halvorsen Lab: Javier worked with DNA nanoswitches to detect a panel of microRNAs and lncRNAs and extend the lab's miRacles assay to eventually detect proteins.



RNA Institute Undergraduate Fellowship Awardees

Left to right: Ian Rapisarda (Rangan Lab), Cassandra Cavaliere (Halvorsen Lab), Javier Vilcapoma (Halvorsen Lab), Nicholas Labbe (Dey Lab), David Fast (Fuchs Lab), Rena Collandra (Larsen Lab), Ishmeet Sekhon (Sheng Lab), Sharon Shaughnessy (Berglund Lab), Eva Clervoyant (Berglund Lab), Emily Davey (Berglund Lab)



THE RNA INSTITUTE

COLLEGE OF ARTS & SCIENCES UNIVERSITY AT ALBANY

The 7th Annual RNA Institute Symposium

Wednesday, March 18 to Friday, March 20, 2020
University at Albany

Nobel Laureate and Distinguished Keynote Speaker:

Michael Rosbash

Brandeis University

Thursday, March 19

Keynote Speakers: March 19 and 20, 2020

Sandra Wolin NIH/NIC

Sarah Woodson Johns Hopkins University

Thomas Tuschl The Rockefeller University

Alain Laederach UNC Chapel Hill

Christos Kyratosous Regeneron

Shuling Guo Ionis Pharmaceuticals, Inc.

Miriam Gerospe NIH/NIA

Elisa Franco, UCLA

Victoria D'Souza Harvard University

Christine Chow Wayne State University

Philip Bevilacqua Penn State University

Workshops: Wednesday, March 18

Abstracts for selected talks and posters due on January 24, 2020

For more information visit

<https://www.rna.albany.edu/7th-annual-rna-symposium/>

Recent Awards

Thomas Begley

The President's Award for Excellence in Research and Creative Activities, University at Albany, SUNY in spring 2019. This award is designed to acknowledge and recognize consistently outstanding accomplishments in research and creative activities conducted by the University at Albany faculty.

Marlene Belfort

The University at Albany Foundation "Citizen Laureate Award", honoring outstanding leaders for their extraordinary accomplishments.

Alan Chen

NIH R35 five year award entitled "Thermodynamically Calibrated RNA Simulations to Decode Mechanisms of RNA Molecular Recognition".

NSF three year award entitled "Collaborative research: Uncovering how riboswitches exploit out-of-equilibrium RNA folding pathways to make genetic decisions".

Prashanth Rangan

NIH RO1 renewal entitled "Regulation of stem cell differentiation during Drosophila oogenesis" for five years.

Jia Sheng

National Science Foundation Career Award in summer 2019. The national award recognizes excellence in early career research, scholarship, and leadership in STEM fields.

Carl Shotwell

Awarded a 2 year Myotonic Dystrophy Foundation Fellowship for his graduate work.

Jana Jenquin

Awarded best overall oral platform presentation by the IDMC-12 organizing committee at the recent IDMC-12 meeting (<https://idmc12.org>) held in Gothenburg Sweden.

Clare Miller

Poster Presentation Award, University at Albany-SUNY Polytechnic Institute Combined Symposium, April 5-6, 2019 (Albany, NY).

Rachel Netzbant

American Society for Virology Dalrymple award.

RNA Institute Travel Awards

Marissa Louis

Attended the American Society for Virology, Minneapolis, MN July 20-24, 2019. Oral presentation entitled "*Dumbbell RNA structures in the zika virus 3' untranslated region modulate viral gene expression*".

Rachel Netzbant

Attended the American Society for Virology, Minneapolis, MN July 20-24, 2019. Oral presentation entitled "*- Detection of ZIKV infection in cell types and whole mosquitoes by MS analysis of RNA modifications*".

Justin Waldern

Attended the Mobile Genetic Elements Conference, Woods Hole, MA Aug 29-31, 2019. Oral presentation entitled "*Regulation of group II intron retrotransposition by a ribosomal RNA methyltransferase*".

Olga Novikova

Attended the Mobile Genetic Elements Conference, Woods Hole, MA Aug 29-31, 2019. Oral presentation entitled "*Genomic neighborhood of bacterial group II introns*".

Jibin Abraham Punnoose

Attended the 63rd Biophysical Annual Meeting in Baltimore where he presented a poster entitled "*A Single-Molecule Investigation on Interfacial Base-Stacking Interaction using a Centrifuge Force Microscope*".

Other Travel Awards

Marissa Louis

Travel award from the American Society for Virology, Minneapolis, MN July 20-24, 2019. Oral presentation entitled "*Dumbbell RNA structures in the zika virus 3' untranslated region modulate viral gene expression*".

Ryan Meng

Muscular Dystrophy Association travel award to attend the IDMC-12 meeting (<https://idmc12.org>) held in Gothenburg Sweden.

Carl Shotwell

Muscular Dystrophy Association travel award to attend the IDMC-12 meeting (<https://idmc12.org>) held in Gothenburg Sweden.

Hesan Waly

Scientista Foundation Travel Award, Scientista Symposium, March 29-31, 2019 (Boston, MA).

Recent Publications

- Leonardi, A., Evke, S., M. Lee, **Melendez, JA.**, and **Begley, T.J.** Epitranscriptomic Systems Regulate the Translation of Reactive Oxygen Species Detoxifying and Disease Linked Selenoproteins. 2019 (accepted at Free Radical Biology and Medicine).
- Huber, SM., Leonardi, A., Dedon, PC., and **Begley, T.J.** *The Versatile Roles of the tRNA Epitranscriptome during Cellular Responses to Toxic Exposures and Environmental Stress*. 2019 Toxics. Mar 25;7(1). pii: E17. doi: 10.3390/toxics7010017.
- Green, CM,[†] Li, Z., Smith, AD, Novikova, O, Bacot-Davis, VR, Gao, F, Hu, S, Banavali, NK, Thiele, DJ, **Li, H.** and **Belfort, M.** *Spliceosomal Prp8 intein at the crossroads of protein and RNA splicing* (2019). PLOS Biology. In press
- Lennon CW, Stanger, MJ and **Belfort, M.** *Mechanism of single-stranded DNA activation of recombinase intein splicing*. 2019. Biochemistry doi: 10.1021/acs.biochem.9b00506
- Pearson CS, Nemati R, Liu B, Zhang J, Scalabrin M, Li Z, **Li H, Fabris D, Belfort M,** Belfort G. *Structure of an engineered intein reveals thiazoline ring and provides mechanistic insight*. 2019. Biotechnol. Bioeng. 116 709-721. doi: 10.1002/bit.26875.
- Reddy K, Jenquin JR, Cleary JD, **Berglund JA.** *Mitigating RNA Toxicity in Myotonic Dystrophy using Small Molecules*. 2019. Int J Mol Sci. 2019 Aug 17;20(16). pii: E4017. doi: 10.3390/ijms20164017. Review.
- Jenquin, JR., Yang, H., Huigens, RW, Nakamori, M., **Berglund JA.** *Combination Treatment of Erythromycin and Furamidine Provides Additive and Synergistic Rescue of Mis-splicing in Myotonic Dystrophy Type 1 Models*. 2019. ACS Pharmacol. Transl. Sci.201924247-263. July 17, 2019
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- Kizer ME, Linhardt RJ, **Chandrasekaran AR,** Wang X. *A Molecular Hero Suit for In Vitro and In Vivo DNA Nanostructures*. *Small*. 2019 Jun;15(26):e1805386. doi: 10.1002/smll.201805386. Epub 2019 Apr 15
- Myers, C., D'Esposito, R., **Fabris, D.,** Ranganathan, S. , **Chen, AA.** CoSIMS: An Optimized Trajectory Based Collision Simulator for Ion Mobility Spectrometry. 2019. J. Phys Chem B 123 (20), pp. 4347-4357 doi: 10.1021/acs.jpcc.9b01018
- Ebrahimi, P., Kaur, S., Baronti, L., Petzold, K. and **Chen, AA.** *A Multi-dimensional Hamiltonian Replica-Exchange method for simulating RNA Folding using experimental constraints*. 2019. Methods (162-163) pp. 96-107 10.1016/j.ymeth.2019.05.001
- Chandrasekaran AR, MacIsaac M, Dey P, Levchenko O, Zhou L, Andres M, **Dey BK, Halvorsen K.** Cellular microRNA detection with miRacles: microRNA activated conditional looping of engineered switches. 2019. Science Advances, DOI: 10.1126/sciadv. aau9443.
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- Ralbovsky NM, Egorov V, Moskovets E, Dey P, **Dey BK, Lednev IK** (2019) *Deep-ultraviolet Raman spectroscopy for cancer diagnostics: A feasibility study with cell lines and tissues*. Cancer Studies Molecular Medicine 5(1): 1-10. doi: 10.17140/CSMMOJ-5-126.
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Message from the Director

It has been an exciting summer here at the RNA Institute. In July, following the vision and persistent hard work of Marlene Belfort and Tom Begley, we were awarded over \$1 million through an NIH training grant to expand the RNA Fellows program, which includes a cohort of 12 for the 2019-2020 academic year – the largest cohort yet. This grant will allow us to rigorously train science and engineering graduate students in the principles of RNA science and related technologies, with applications in human health and disease.

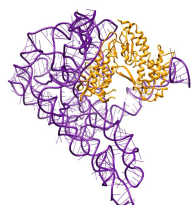
We also had a successful launch of the RNA Institute Undergraduate Summer Fellows Program with an inaugural class of ten fellows placed in six labs. This program supports undergraduates pursuing research in labs affiliated with the RNA Institute, providing practical research experience while furthering the work of the labs. At the end of the summer, students presented their research to their peers and members of the Institute.

In July, we held an RNA Institute Collaboration Retreat at the Carey Institute for Global Good in Rensselaerville, NY. The retreat provided a venue to identify opportunities for collaboration, share recent research and enjoy some time with colleagues and students. The first day of the retreat focused on trainees and students, including a trainee focused poster session and career development session. The second day of the retreat incorporated a broader collaboration agenda, including a poster session focused on collaboration and technology and lighting talks from every lab represented at the retreat.

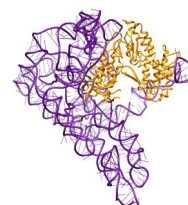
In the coming months, we will be prioritizing student recruitment in the field of RNA science by partnering with affiliated faculty and graduate students and providing financial support to visit Universities and Colleges in the region to present research and recruit outstanding students. This initiative will help provide a robust pool of candidates for all departments affiliated with the RNA Institute, including Biology, Chemistry, Biomedical Sciences and SUNY Poly.

Also a reminder to please save the date for the 7th Annual RNA Symposium, which will be held from March 18-20 and features Nobel Prize winner Michael Rosbash as our Distinguished Keynote speaker. We hope to see you all there!

Sincerely,



Thanks for being
In the Loop!



Qu et. al. 2016
Group II
intron

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