



# The NASA Space Life Sciences Training Program: Accomplishments Since 2013



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# SLSTP History: 1985 to 2005



- Started at **Kennedy Space Center** ~1985
- Six weeks per year
- Up to 40 students participated per year, selected on a competitive basis
- GPA  $\geq$  3.0, must have expressed interest in life sciences
- Students were provided
  - round trip to and from KSC
  - housing, meal allowance, and transportation
  - research and technology development experience
  - lectures, curriculum, and tours



# Space Life Sciences Training Program at Ames



- The primary goal of the program is to train the next generation of scientists and engineers, enabling NASA to meet future research and development challenges in the space life sciences.
- Undergraduate students entering their junior or senior years with professional experience in space life science disciplines.
- Ten-week summer internship program (80% research, 20% group activities)
- Students are provided:
  - mentorship from NASA scientists and engineers
  - stipend, housing covered by NASA
  - transportation (2 vans driven by staffers) on Center and to offsite locations
  - travel support to ASGSR or other professional conference if abstract is accepted

NASA Funding: Space Biology Project

# SLSTP at Ames: 2013 - 2019





# SLSTP at Ames: 2013 - 2019

- Restarted SLSTP at **Ames Research Center** in 2013
  - “Pilot program” of 6 students and 1 staffer
- 71 students from 53 different Universities have completed the program to date
- 29 mentors from Space Biosciences Division
- 13 staffers

Year	Number of female students	Number of male students	Total number of students
2013	1	5	6
2014	4	8	12
2015	4	6	10
2016	4	7	11
2017	7	3	10
2018	10	2	12
2019	6	4	10
Totals	36	35	71

Student Demographics	% of all student respondents
White	52
Asian	28
Hispanic or Latino	10
Black or African American	2
American Indian or Alaskan Native	3
Two or more races	5

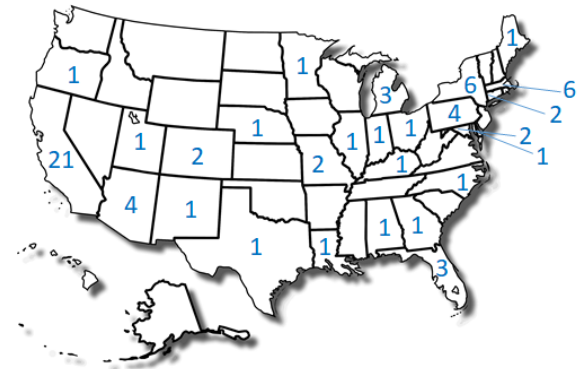


# Universities and Colleges

- 71 students from 52 different Universities in 27 U.S. states

Arizona State University (3)  
Binghamton  
Carnegie Mellon University  
Columbia University  
Cornell University  
CUNY City College, New York  
Embry Riddle Aeronautical University (2)  
Florida State University  
Georgia Institute of Technology  
Harvard University (2)  
Johns Hopkins University  
Kent State University  
Louisiana State University  
Massachusetts Institute of Technology (3)  
Michigan Technological University  
Mitchell Community College  
Oakland University (2)  
Pacific University  
Point Loma Nazarene University  
Pomona College (2)  
Purdue University  
San Diego State University  
San Jose State University (3)  
Santa Clara University  
Stony Brook University  
Temple University  
Tufts University

University of Alabama  
University of Arizona  
University of California Berkeley (5)  
University of California Davis  
University of California San Diego (2)  
University of San Francisco  
University of California Santa Barbara (2)  
University of California Santa Cruz  
University of California Los Angeles  
University of Chicago  
University of Colorado Boulder  
University of Colorado Denver  
University of Houston  
University of Kentucky  
University of Maine  
University of Maryland College Park (2)  
University of Minnesota Twin Cities  
University of Missouri-Columbia  
University of Nebraska  
University of New Mexico  
University of Pennsylvania (2)  
University of Utah  
Washington University  
Wesley College  
Yale University (2)





# SLSTP Process

- SLSTP solicits for project descriptions from prospective mentors in the Space Biosciences Division (**Expected in late November 2019**)
- Project descriptions are selected and posted to <https://www.slstpapp.com/>
  - Application window opens December / January (Closes ~January /February)
  - Prospective students that apply to be a research associate for a project description must:
    - be a US citizen
    - be in high academic standing (GPA of 3.2 or greater)
    - have a minimum age of 18
    - be a junior or senior undergraduate student or 1st year graduate student next fall
    - have a passion for space and a desire to study space life science
- Student Selection:
  - Applications are scored based on written responses, experience, recommendation letters
  - Management team provides multiple highest scoring student applications to mentor for selection
- Two staffers (student alumni) are hired to manage day-to-day activities





# Mentor, Staffer, and Student Responsibilities

## Mentors

- Provide research project, select the student, provide mentorship, and accommodate student in lab/office for 10 weeks.

## Staffers

- ~50% of their time on SLSTP student management, 50% research
- Draft profile books, coordinate speakers, communicate with management
- Drive students from place to place, guide students



## Students

- Live in NASA Ames housing, participate in team building
- Support mentors by performing research tasks related to project description (~80% of their time)
- Group project and group activities (during week, evenings, and on weekends)

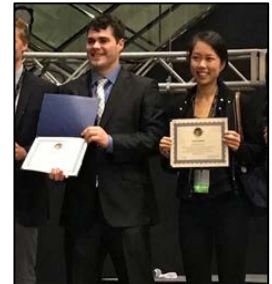
(~20% of their time)

Weekly summaries, lightning talks, mid-term, and final presentations

Presentations to NASA HQ

- Final Paper and Testimonial describing summer experience
- Submit abstracts to ASGSR

**\*\*If accepted, students have the opportunity to attend the ASGSR Conference!\*\***





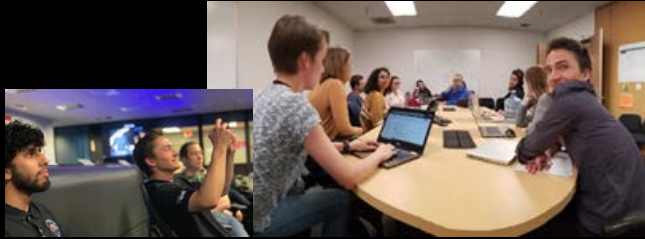
# SLSTP 2019



Project	Mentor	Org Code	Student	University	Major
Omic and Phenotypic Investigations of Microorganisms Exposed to Extreme Stratospheric Conditions	Samantha Waters	SCR	Bianca Serda	University of New Mexico	Biology
Molecular Basis of Resistance to Radiation Damage in Tardigrades	Sigrid Reinsch	SCR	Ben Cooper	Tufts University	Biology
GeneLab: Data Processing and Analysis	Homer Fogel	SCR	Mikayla Buckley	Florida State University	Computational Biology
Metagenomic Sample Processing and Analysis for the GeneLab Project	Valery Boyko	SCR	Taylor Walton	Arizona State University	Biochemistry
Microbial Factories for Solar System Exploration	John Hogan	SCB	Ava Karanjia	Arizona State University	Microbiology / Chemical Engineering
Development and Testing of Biological Sensors for Deep Space Exploration	Sergio Santa Maria	SCR	Elizabeth Hawkins	University of Maryland	Biochemistry and Molecular Biology
WetLab-2 Automation	Macarena Parra	SCR	Gurkaran Singh	Pomona College	Molecular Biology
Screening Putative Countermeasures for Altered Gravity Using the Hypergravity Paradigm	S. Bhattacharya / S. Mhatre / J. Iyer	SCR	Timothy Wiegman	Point Loma Nazarene University	Electrical Engineering
Pathogenesis of Microbes in Simulated Microgravity	S. Bhattacharya / R. Gilbert	SCR	Nicole Tannenbaum	University of Pennsylvania	Cellular and Molecular Biology
The Stress-Inducible Heat Shock Program in Altered Gravity and its Role in Immunity	Amber Paul	SCR	Joe Olivieri	San Diego State University	Biology
Staffer	David Smith Samantha Waters	SCR	Jordan McKaig	University of Michigan	Biology
Staffer	Macarena Parra	SCR	Elizabeth Talburt	Embry-Riddle Aeronautical University	Engineering / Bioengineering



# SLSTP 2019





# Student Quotes

“SLSTP was an experience that I will never forget. My summer at NASA Ames has undoubtedly changed my life and career trajectory for the better.”

“Having the honor to participate in NASA’s Space Life Sciences Training Program was a great experience and a remarkable milestone in my life. Working at NASA has always been a distant dream of mine. It wasn’t until I learned about this program that I found the courage to peruse that dream and make it a reality. The knowledge and experiences gained from this program will reign throughout my life forever.”

“I am very happy with my time in SLSTP. This program taught me a lot not only about myself as a scientist, but also as a person and what I can bring to the table...”

“This program is intense, unique and exciting!”

“This internship experience greatly exceeded all of my expectations.”

“Thank you SLSTP, for this incredibly rewarding experience. I am so lucky...and it still blows my mind that I interned for NASA!”



# Summary

- SLSTP has been successfully run for 7 years at Ames
- 25+ mentors have trained 71 students in space life sciences disciplines and NASA culture
- Supported advancement of Space Biology research and technology development efforts
- Inspired mentors and managers
- Students are coauthors on manuscripts
- Many students have gone to graduate or medical school
- Alums have been employed at a NASA or other government center
- Expanded student involvement in ASGSR
- Students emphasize their experience is
  - challenging, rewarding, inspiring
  - life changing, career defining
  - one that fosters great friendships
  - excellent for networking
  - an outstanding team building and leadership opportunity
- Interested in exploring the possibility of expanding SLSTP to include other centers



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# References

- Biro, R., Munsey, B. and Long, I., 1990. Paper Session III-B-The NASA Space Life Sciences Training Program: Preparing the Way!.
- Coulter, G., Lewis, L. and Atchison, D., 1994. NASA's space life sciences training program. *Advances in Space Research*, 14(8), pp.447-449.
- Biro, R., Munsey, B. and Chamberlin, L., 1994. Paper Session IB-The NASA Space Life Sciences Training Program: Ten Years of Accomplishment.
- Potter, S., 2000. Paper Session IC-Space Life Science Training Program.
- Trotman, A.A., Morris, C.E., Hill, W.A., Buchanan, W.J., Rao, A.M.S., Williams, C.O., Washburn, M.R., Lennard, W.C., Barfus, J.R., Lichtenberger, L.A. and Dreschel, T.W., 2004. *The Spaceflight and Life Sciences Training Program—Developing Human Capital for Space Exploration through Systematic Scholarship* (No. 2004-01-2422). SAE Technical Paper.
- Potter, S., 1998. Paper Session II-D-The Space Life Sciences Training Program, Preparing For Tomorrow Today.
- Schmitt, D.A., Françon, P. and Lee, P.H., 1999. Teaching of Space Life Sciences. *Advances in space biology and medicine*, 7, pp.213-245.