The NASA Space Life Sciences Training Program: Accomplishments Since 2013

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33\textsuperscript{rd} Annual Meeting

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Outline

• Introduction
• SLSTP History
• SLSTP at Ames
• SLSTP Process
• Mentor, Staffer, and Student Responsibilities
• 2017 research projects
• Quotes
• Summary and References

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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 ≥ 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

https://www.nasa.gov/ames/research/space-life-sciences-training-program
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
- housing, a $6K stipend, and $500 travel allowance
- 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

https://www.nasa.gov/ames/research/space-life-sciences-training-program
SLSTP at Ames: 2013 - 2017

- Restarted SLSTP at **Ames Research Center** in 2013
  - “Pilot program” of 6 students and 1 staffer
  - Increased students and staffers in 2014

- 49 students from 41 different Universities have completed the program to date
- 20 + mentors from Space Biosciences Division

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of female students</th>
<th>Number of male students</th>
<th>Total number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>1</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2014</td>
<td>4</td>
<td>8</td>
<td>12</td>
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<tr>
<td>2015</td>
<td>4</td>
<td>6</td>
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<tr>
<td>2016</td>
<td>4</td>
<td>7</td>
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</tr>
<tr>
<td>2017</td>
<td>7</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Totals</td>
<td>20</td>
<td>29</td>
<td>49</td>
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</table>

**Student Demographics**

<table>
<thead>
<tr>
<th>Student Demographics</th>
<th>% of all student respondents</th>
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</thead>
<tbody>
<tr>
<td>White</td>
<td>53</td>
</tr>
<tr>
<td>Asian</td>
<td>21</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>11</td>
</tr>
<tr>
<td>Black or African American</td>
<td>5</td>
</tr>
<tr>
<td>American Indian or Alaskan Native</td>
<td>5</td>
</tr>
<tr>
<td>Two or more races</td>
<td>5</td>
</tr>
</tbody>
</table>

https://www.nasa.gov/ames/research/space-life-sciences-training-program
Universities and Colleges

- 49 students from 41 different Universities in 24 U.S. States

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

University of Alabama
University of Arizona
University of California Berkeley (4)
University of California Davis
University of California San Diego
University of California Santa Barbara (2)
University of California Santa Cruz
University of California Los Angeles
University of Chicago
University of Colorado Denver
University of Houston
University of Kentucky
University of Maine
University of Maryland College Park
University of Minnesota Twin Cities
University of Missouri-Columbia
University of Nebraska
University of Pennsylvania
Washington University
Wesley College
Yale University

https://www.nasa.gov/ames/research/space-life-sciences-training-program
“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!”

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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 attend ASGSR Conference!**

https://www.nasa.gov/ames/research/space-life-sciences-training-program
<table>
<thead>
<tr>
<th>Project</th>
<th>Mentor</th>
<th>Org Code</th>
<th>Student</th>
<th>University</th>
<th>Major</th>
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</thead>
<tbody>
<tr>
<td>Hypergravity exacerbates endoplasmic reticulum (ER) stress in Drosophila melanogaster: an evaluation of countermeasures</td>
<td>Sharmila Bhattacharya</td>
<td>SCR</td>
<td>Andrew Pelos</td>
<td>Pomona College</td>
<td>Molecular Biology</td>
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<tr>
<td>Studies in Bone Biology and Biomechanics</td>
<td>Josh Alwood</td>
<td>SCR</td>
<td>Amee Johnson</td>
<td>University of Colorado Denver</td>
<td>Public Health</td>
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<td>Exposing Microorganisms in the Stratosphere (E-MIST)</td>
<td>David Smith</td>
<td>SCR</td>
<td>Tristan Caro</td>
<td>University of California Berkeley</td>
<td>Cellular Biology</td>
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<td>Development &amp; testing of radiation biosensors for NASA's BioSentinel mission</td>
<td>Sergio Santa Maria (Sharmila Bhattacharya)</td>
<td>SCR</td>
<td>Sawan Dalal</td>
<td>University of Houston</td>
<td>Biology</td>
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<td>Skeletal responses to long-duration simulated weightlessness</td>
<td>Ruth Globus</td>
<td>SCR</td>
<td>Julia Adams</td>
<td>University of California Santa Barbara</td>
<td>Microbiology</td>
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<tr>
<td>Candidate nutritional countermeasure to mitigate adverse effects of spaceflight</td>
<td>Ann-Sofie Schreurs (Ruth Globus)</td>
<td>SCR</td>
<td>Ons M'Saad</td>
<td>Massachusetts Institute of Technology</td>
<td>Bioengineering</td>
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<td>The Influence of Mechanical Unloading on Stem Cell-Based Tissue Regeneration</td>
<td>Elizabeth Blaber (Eduardo Almeida)</td>
<td>SCR</td>
<td>Esther Putman</td>
<td>University of Kentucky</td>
<td>Neuroscience and Biology</td>
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<td>GeneLab Data Curation and Analysis</td>
<td>Homer Fogle (Sylvain Costes)</td>
<td>SCR</td>
<td>Maya Ramachandran</td>
<td>Columbia University</td>
<td>Biology</td>
</tr>
<tr>
<td>Synthetic biology for solar system exploration: How do microbes respond to spaceflight and how can we utilize them for in situ manufacturing?</td>
<td>Jonathan Galazka</td>
<td>SCR</td>
<td>Lily Neff</td>
<td>Wesley College</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Epigenetic Mechanisms and Sex Differences in Prenatal Programming of Adult Brain, Physiology and Behavior</td>
<td>April Ronca</td>
<td>SCR</td>
<td>Sophie Benson</td>
<td>Harvard University</td>
<td>Human Biology</td>
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<tr>
<td>Staffer</td>
<td>John Hogan</td>
<td>SCB</td>
<td>Joseph (Niko) Vlastos</td>
<td>Arizona State University</td>
<td>Biomedical Engineering</td>
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<tr>
<td>Staffer</td>
<td>Rusty Hung, Uland Wong, (Terry Fong)</td>
<td>TI</td>
<td>Onalli Gunasekara</td>
<td>University of California, Irvine</td>
<td>Aerospace Engineering</td>
</tr>
</tbody>
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Summary

- SLSTP has been successfully run for 5 years at Ames
- 20+ mentors have trained 49 students in space life sciences disciplines and NASA culture
- Supported advancement of Space Biology research and technology development efforts
- Inspired mentors and managers
- ~30% of students are coauthors on manuscripts that are in process or will be published
- ~35% of students are now in graduate school
- 2 SLSTP alums are currently employed at a NASA 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

Funding from the Space Biology Project is gratefully acknowledged.

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References