

Annual Report

**BIOBUS**



2019

# Letter from the Founder

11 years ago, observing how excited people got seeing cells crawl around under the microscopes in my Columbia lab, I bought an old transit bus off Craigslist. I equipped that bus with state-of-the-art microscopes. Some of the brightest scientists in NYC jumped on board with me to bring hands-on, research lab experiences to everybody. From those humble beginnings, this year 50,000 students spent 48,000 hours doing science with BioBus.

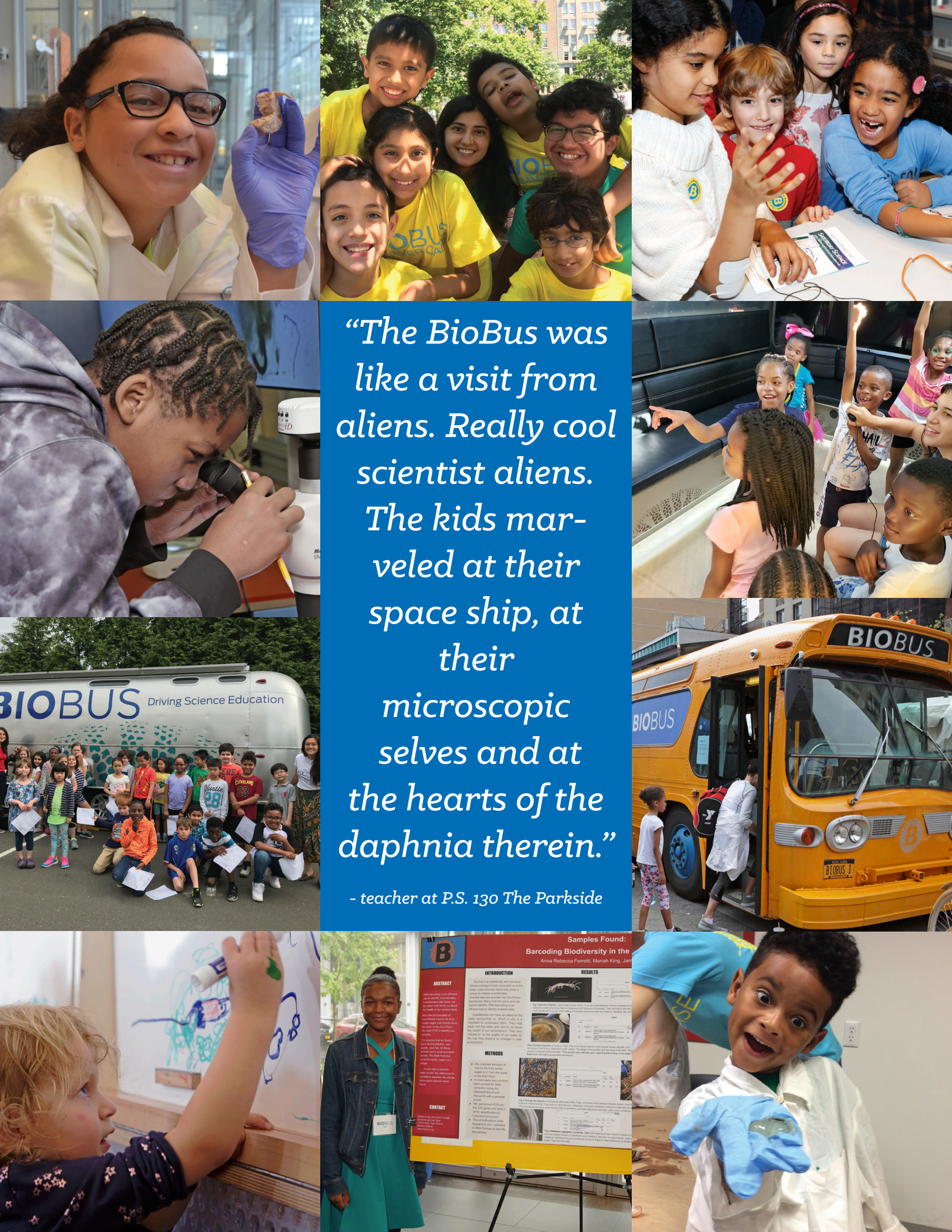
There is no wrong age to address inequities in science careers. 99% of teachers request repeat BioBus visits because of how fun and exciting scientific discovery is aboard our mobile labs, especially for students who have never met a scientist, been to a science museum, or used a research microscope. Many of those students join our afterschool Explorer's Clubs, often their first inquiry-based lab science class. And our paid high school and college Junior Scientists find their first scientific mentors, gaining the skills and developing the scientific identity that lead virtually 100% of them to long-term science career pursuit.

At every age, NYC's young scientists are hungry for opportunities to do more science. The supportive and safe community you help us form around those students is where they can spark, cultivate, and then sustain their love for science. Thank you for being part of this change, this community, and believing, like I do, that this world will be a different, much better place, when everyone can reach their full scientific potential.

*Brian D.S.*

*"The BioBus was like a visit from aliens. Really cool scientist aliens. The kids marveled at their space ship, at their microscopic selves and at the hearts of the daphnia therein."*

*- teacher at P.S. 130 The Parkside*

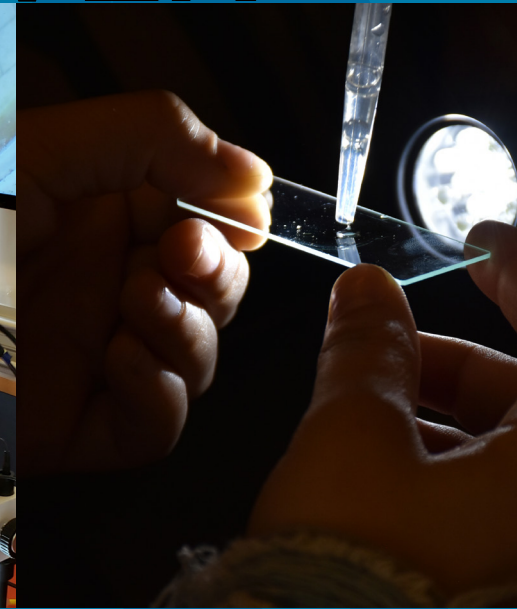
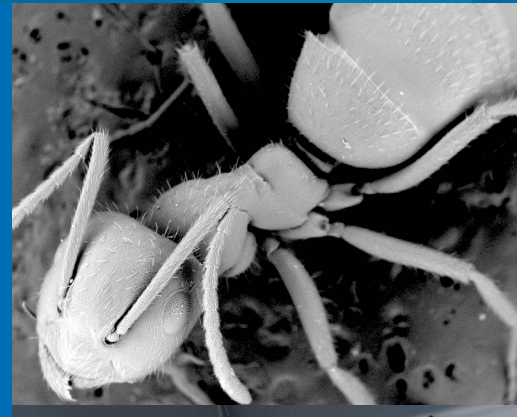
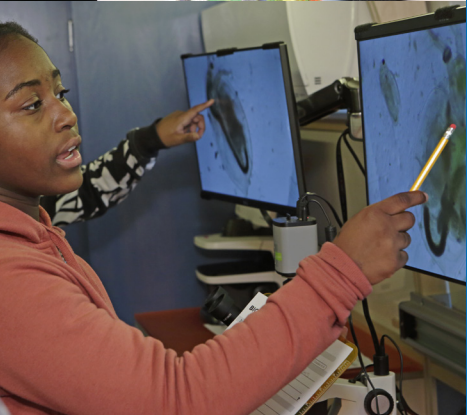


# BIOBUS

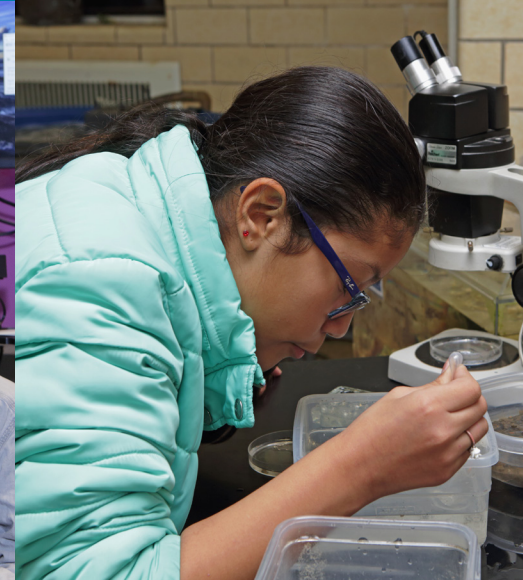
# DISCOVER SPARKING SCIENTIFIC INTEREST

BioBus is on a mission to help minority, female, and low-income K - 12 and college students in New York City discover, explore, and pursue science.

We envision a world where all people can reach their full scientific potential.



# EXPLORE CULTIVATING SCIENCE IDENTITY



# PURSUE SUSTAINING SCIENCE CAREERS



**Antennae Alteration on Ant Behavior**  
By Busayo Oluwabamila

**Question**  
What are the distinct roles do ant antennae play in other ant functions?

**Materials/Methods**

**Antennae Manipulation**

- Using **freezer**, grab 15 ants from nest and place them in a container. Place container in freezer or ice pack for about 10 minutes.
- After 10 mins, take out an ant and cut out the desired antennae using a **scalpel**. After surgery, place ant in a separate jar. Repeat process for remaining ants.

**Experiment**

- Fill a jar halfway with sand.
- Set a timer for desired time frame.
- Prepare Experimental Setup in jar. Gently place ants in jar (15 per group).
- Observe.
- Repeat process for each experimental group.

**Groups**

- Experimental groups: Control, left A, off, Right A, off.
- Both A, off.
- Stimuli: Sand, jelly, sugar, Vinegar, termitic nymph.

**Resources**

Robert Frawley, Ph.D., Barbara Noro, Ph.D.  
Hollubler, Bert, Wilson, Edward. *Journey to the Ant: A Story of Scientific Exploration*. Cambridge: The Belknap Press of Harvard University Press.

**Results**

Control Group	Control (off)	Left Antennae off	Right Antennae off	Both Antennae off
Normal	Normal	Normal	Normal	Normal
Food	Food	Food	Food	Food
Water	Water	Water	Water	Water
Communication	Communication	Communication	Communication	Communication
Navigation	Navigation	Navigation	Navigation	Navigation
Defensive	Defensive	Defensive	Defensive	Defensive
Reproductive	Reproductive	Reproductive	Reproductive	Reproductive

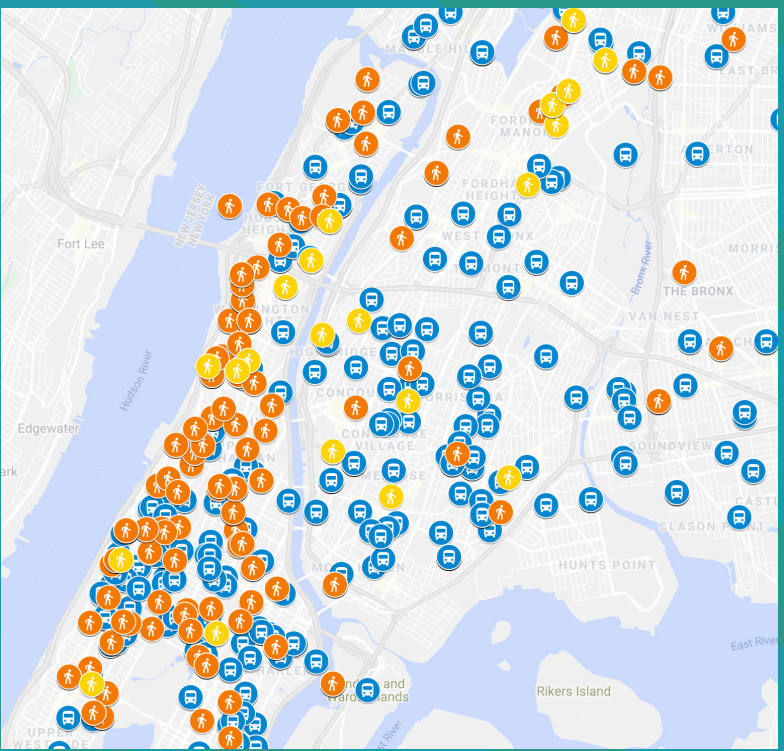
**Discussion/Future Directions**

In the absence of the left antennae, physiological functions were affected. Behaviors such as tunnel digging, sound perception, spatial awareness and identification were lacking. The group with the left antennae intact behaved most similarly to the control group. Without the antennae, insect behavior most notably in the control group, were: right antennae, social functions, including impulsive and wary, were physiological guide to the ant, while the right antennae serves as a sensory peripheral functions. It is also possible that the left antennae plays a more dominant role, while the right antennae serves as a higher order right-hand function in humans. Further research focused on interchanging the left and right antennae, such as by physically cross-linking them, and studying other functions over extended periods, would be helpful in reaching our conclusions.



# BioBus builds science communities ...

## ... in Harlem and the Bronx

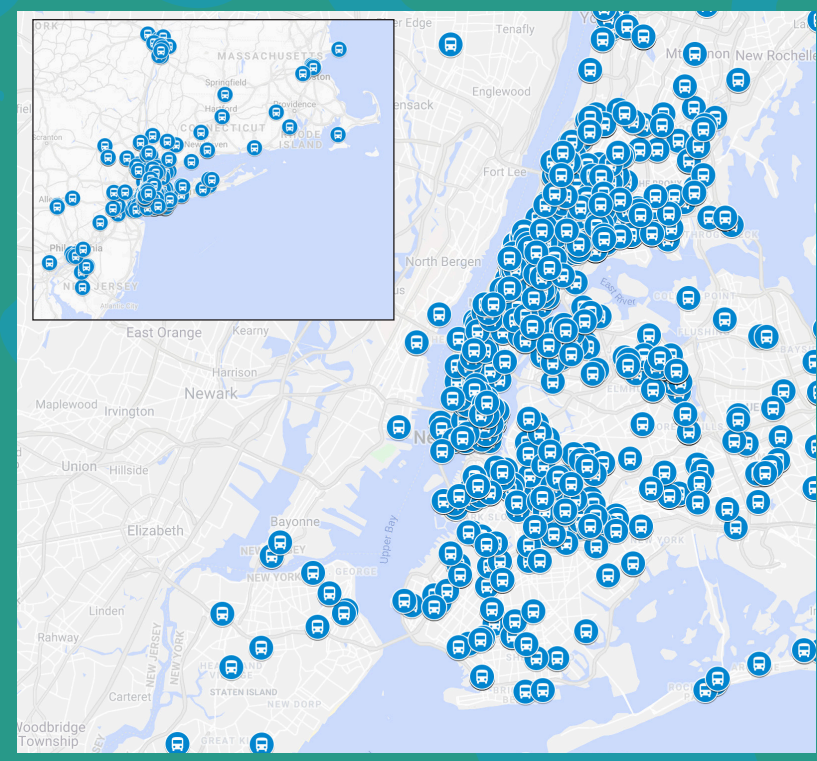


Harlem is a cultural heart of NYC and one of its most marginalized communities, largely excluded from a burgeoning scientific community that includes Nobel prize winners and biotech start-ups. Students connect with science on BioBus Mobile Labs and at BioBase Harlem at Columbia's Zuckerman Institute.

**15k** Discover Students  
**230** Explore Students  
**36** Junior Scientists

- Discover school or event
- Explore student's home
- Pursue intern's home

## ... and all around town

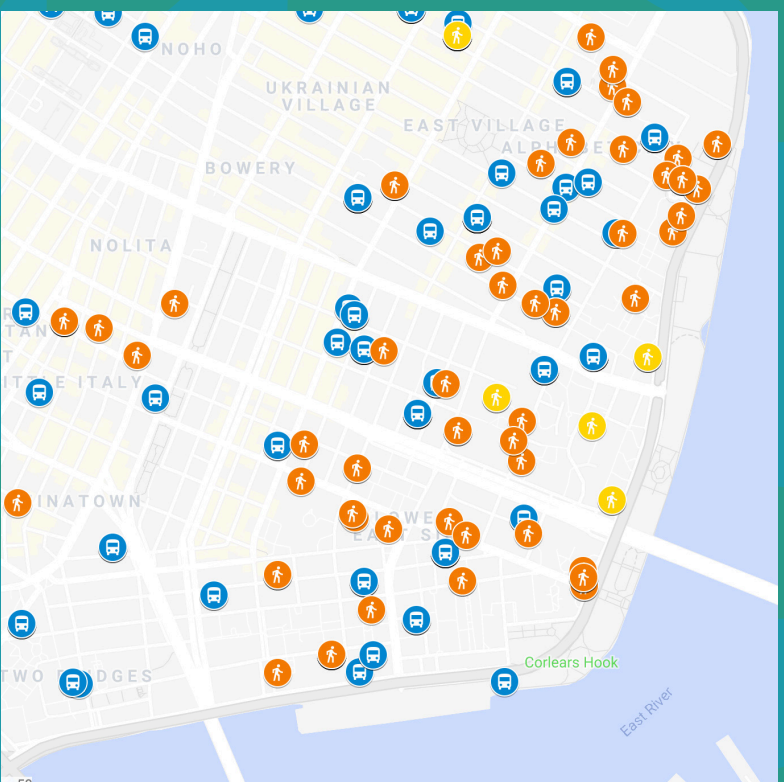


BioBus brings Discover, Explore, and Pursue programs to students all over NYC. Students in all five boroughs have used research tools, worked with scientists, and enrolled in in-depth Explore and Pursue programs. Partners from Queens to Boston and consulting across the country and in Egypt, Jordan, and Rwanda further expand our impact.

**27k** Discover Students  
**170** Junior Scientists

- Discover school or event

## ... on the Lower East Side



The LES is a diverse, dynamic, tight-knit community, and also one of the lowest-income areas of our city. Since 2014, BioBus has worked with almost every school in the neighborhood and established community labs for in-depth programs with our neighborhood partners and inside schools.

**7k** Discover Students  
**150** Explore Students  
**5** Junior Scientists

- Discover school or event
- Explore student's home
- Pursue intern's home

DISCOVER	EXPLORE	PURSUE
<b>School Day</b> 	<b>After School &amp; Weekend</b> 	<b>Junior Scientists</b> 
<b>Events</b> 	<b>Camps</b> 	

# Social Justice Through Scientific Pursuit

BioBus's mission includes the creation of inclusive and accessible scientific communities. We recruit a diverse roster of paid Junior Scientist™ interns to fulfill that mission. BioBus recruits underrepresented students through our permanent presence and strong relationships in Harlem, the Lower East Side, the South Bronx, and other high-poverty neighborhoods. Our students are unlikely to have similar science research opportunities. Our commitment to paying interns opens the program to low-income students. A BioBus internship gives them the chance to follow their interests in science as far as they desire.

## BioBus Pursue Junior Scientist Profiles



Vanessa Akwada became a BioBus summer intern with a love of science but a lack of confidence and no research experience. Her growth as a scientist, communicator, and person was inspiring. "Before I was introduced to BioBus, I was a shy kid who had no idea what career I intended to pursue. But now because of my experience here, I was able to become more comfortable and confident with public speaking which will definitely benefit me in my future endeavors in the science field." So when BioBus created a new 14-month internship, Vanessa was an obvious choice.



Lee-Ashlie Fang joined BioBus as a summer camp counselor and fell in love. "This summer internship was not only a job to work with kids and build communication skills, but an opportunity to practice using microscopes and perfecting this skill, as well as learning alongside the kids... I LOVE THIS INTERNSHIP!" Philanthropic support allowed Lee-Ashlie to move from summer intern to research intern, and she took full advantage. Lee-Ashlie used BioBase Harlem's research-grade tools and some microscopic mutant nematodes to better understand human neurological diseases.



Leya Groysman transformed into a budding scientist thanks to the Paid Pursue Internship. The expert training, direct mentoring, and access to high-tech equipment led Leya down the BioBus Pathway. "I was able to mature as a young scientist by having the daily exposure of working with microscopes and by having discussions with fellow peers and mentors." Leya joined Vanessa to study addiction in fruit flies as a window into human alcoholism and drug abuse. She presented her, "Analysis of *Drosophila melanogaster* Preference for Food-Infused Ethanol," to hundreds of riveted students and scientists at BioBase Harlem.



Emily Eichenholtz seized on the camaraderie and collaboration between BioBus interns and our expert scientists. She worked with fellow Pursue Intern Lee-Ashlie and BioBus Community Scientist Tessa Hirschfeld-Stoler to study neurology via mutant nematodes. Emily explained, "Working with scientists who care about the same topics I do and being able to really drive the process has made me feel more connected to the work and willing to put in the work both on Sundays and during the week to collaborate with my peers and put as much into this project as possible."

# 8000

Hours in the Lab

# 4:1

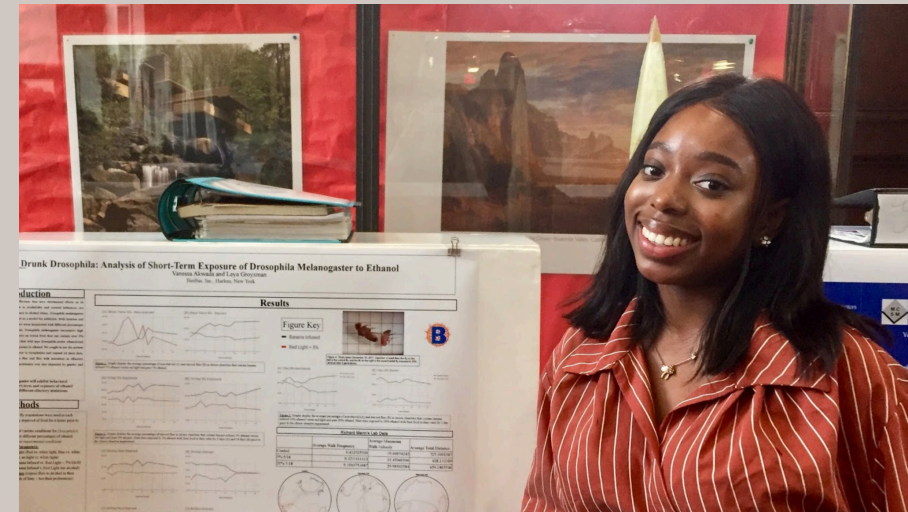
Ratio of Female to Male

# 41

Junior Scientists in 2019

"I was able to work with such amazing mentors such as Latasha, Tessa, and Francesca who gave me such freedom in my work and pushed me to be the best I can be to know that anything is possible in science."

Junior Scientist Vanessa Akwada



"We, as interns, can freely speak our opinions on any adjustments we may see fit within the program. The ability to freely use microscopes when needed is also a huge benefit to me because of my love for science. I LOVE THIS INTERNSHIP!"

Junior Scientist Lee-Ashlie Fang



"As time went on, BioBus became less of a workplace but more of a supportive and loving community where I can come and share ideas as well as take part in impactful projects."

Junior Scientist Leya Groysman



"Beyond the physical space and the students I had the privilege of working with, my fellow interns and mentoring community scientists were what made this experience unforgettable. There is something so special about being in a space full of people who are there for the same reasons you are and are as motivated as you."

Junior Scientist Emily Eichenholtz

# Partnerships

## NYC

Columbia's Zuckerman Institute

NYC Department of Education District 1

Pinkerton Foundation and the Science Research Mentoring Consortium

Purugganan Lab, NYU

Graham-Windham

NYU Materials Research Science and Engineering Center

Variety Boys and Girls Club of Queens

Lower East Side Ecology Center

East Side Community High School

Astoria Houses

NYC Department of Youth and Community Development

Public Prep

## State and National

Harvard Molecular and Cellular Biology Department

Olympus of America

Mobile Laboratory Coalition

Regeneron Pharmaceuticals

Storm King Arts Center

New York State Power Authority

## International

US Forest Service International Programs

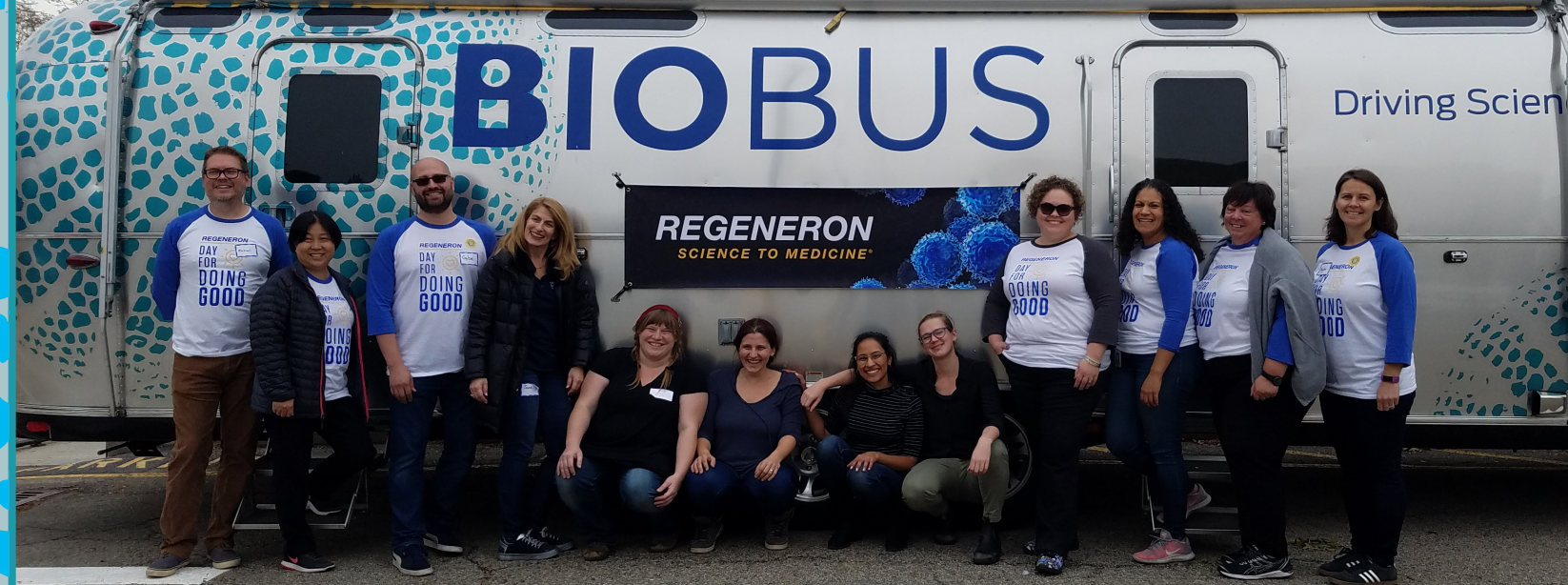
Rwanda Wildlife Conservation Authority

Princess Basma Youth Resource Centers (Jordan)

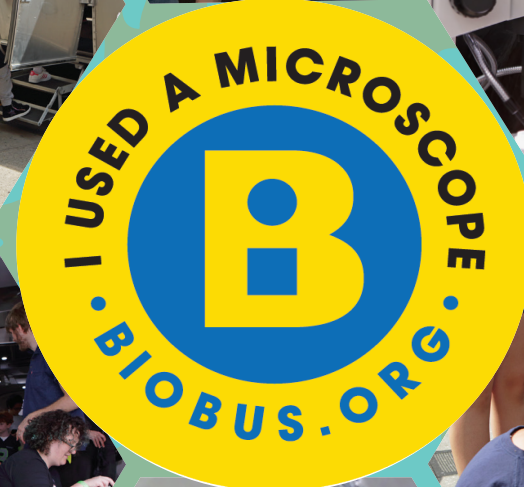
Hurghada Environmental Protection & Conservation Association (Egypt)

“I did not want to be a scientist, but now I want to be a scientist.”

- student after experiencing the BioBus



Thank you teachers, caregivers, and donors for your support throughout the years!



You make science dreams come true for children across the city every single day!

Support a young scientist:  
[donate.biobus.org](https://donate.biobus.org)

# Impact

**50K**  
Total Students

**62%**  
Hispanic/Latino

**28%**  
Black

**8%**  
White

**2%**  
Asian

**48K**  
Hours Students  
Spent in Lab

**36k**  
Discover

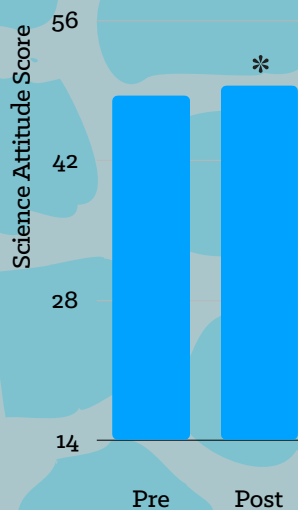
**6k**  
Explore

**6k**  
Pursue

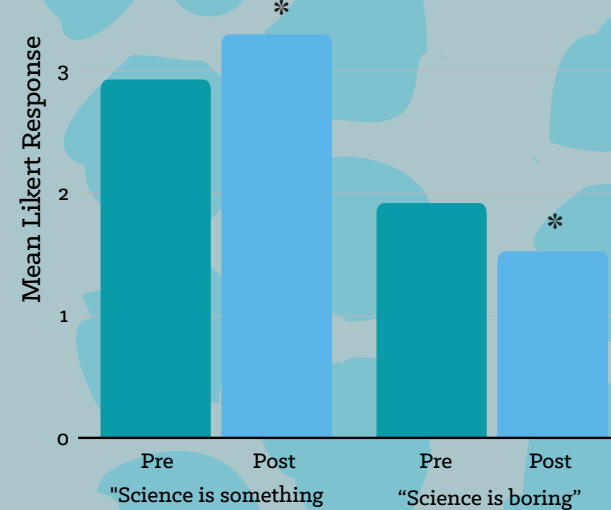
*"Biobus gives me the opportunity to learn about something relevant to my life like the biodiversity of the East River...Biobus allows us to partake in projects that will impact something bigger and more important."*

- Anonymous Feedback from BioBus Pursue Intern

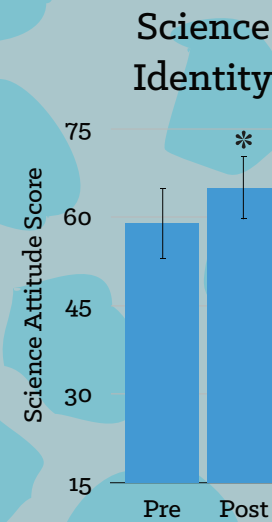
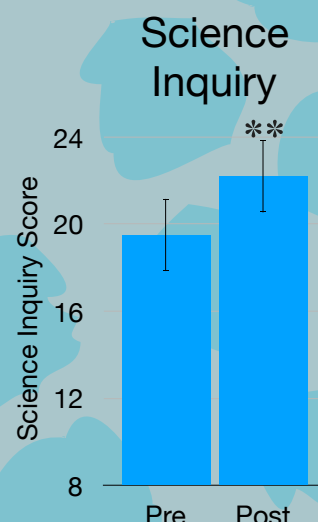
## DISCOVER



## EXPLORE



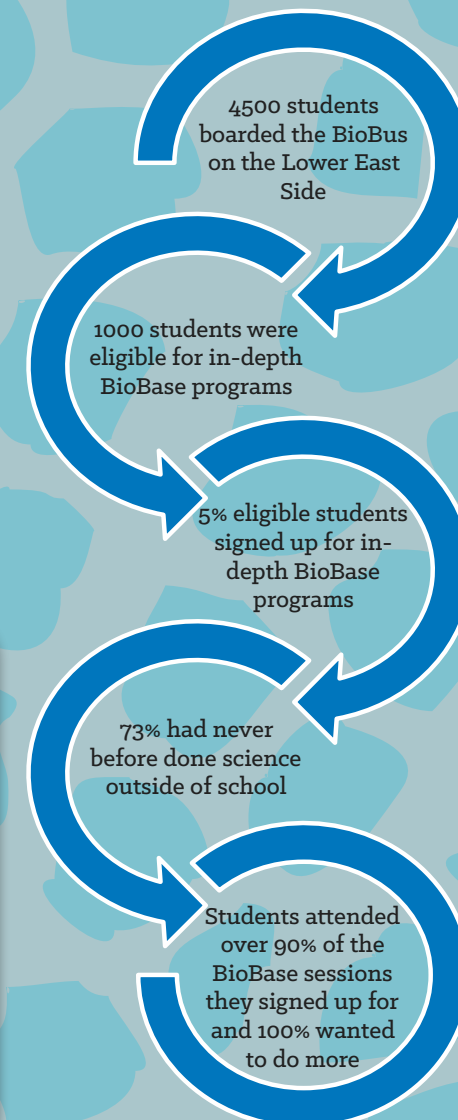
## PURSUE



\* = p < 0.05  
\*\* = p < 0.005

**96%** of BioBus alumni are currently majoring or minoring in science or have science jobs.

## PATHWAY



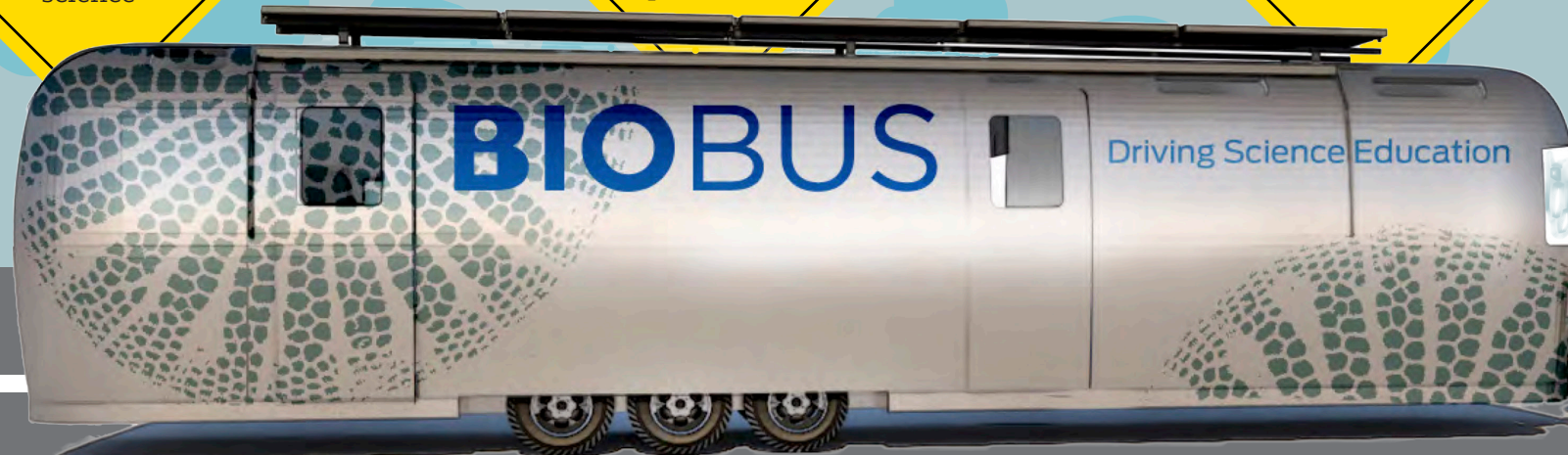
Kids have a blast on the bus and want to do more science

Students get even more excited about science in Explorer's Clubs

Junior Scientist interns identify as scientists and develop skills

Students form a diverse scientific community

Scientific identity is the strongest factor in science career choice

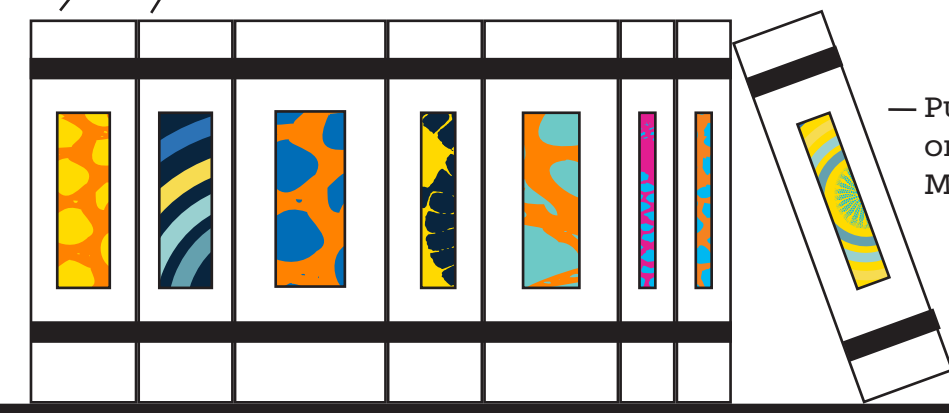


# What we're reading, thinking, and hearing...



TRAVELS IN TROY WITH FREIRE by Paulo Blikstein

OTHER PEOPLE'S CHILDREN: CULTURAL CONFLICT IN THE CLASSROOM by Lisa Delpit



PUSHOUT: THE CRIMINALIZATION OF BLACK GIRLS IN SCHOOLS by Monique Morris

Student driven inquiry

Safe, welcoming space

Democratic

Facilitators are content masters

Relevant to youth experiences

**Student Voices**

"Oh, science is actually really interesting!"

"Can we come back pleeeeeease!"

"Oh... I am so excited! I want to do more science!"

"I'm gonna stay on this bus forever."

"You inspire me. I want to be a scientist."

"Woah I want to work here now. I want to observe worms all day and find out how they make babies!"

"Would it be possible for us to stay here all day?"

"I'm working here when I grow up."

"The power of science is amazing!"

"What you do is really cool."

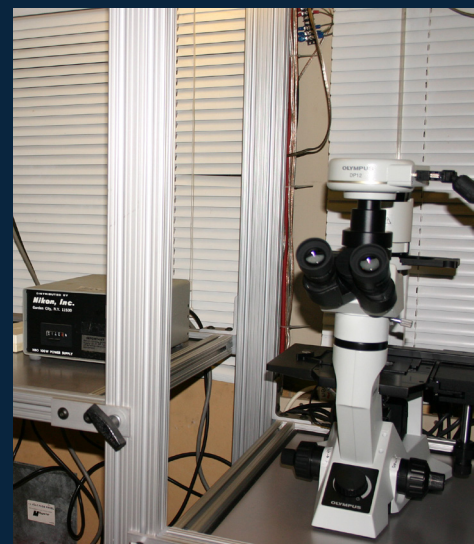
"This is incredible"

"Best bus in US History. It's lit"



# BioBus in 2008

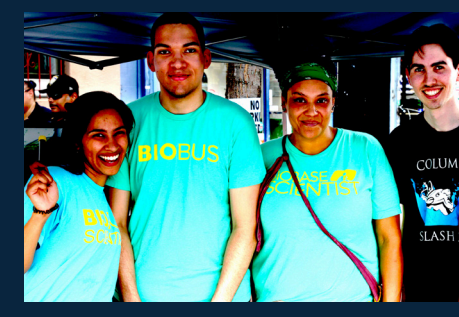
It all began with one bus, two research microscopes, a wood burning stove, and a shared vision of science for all.



# BioBus in 2019

2 Mobile Labs

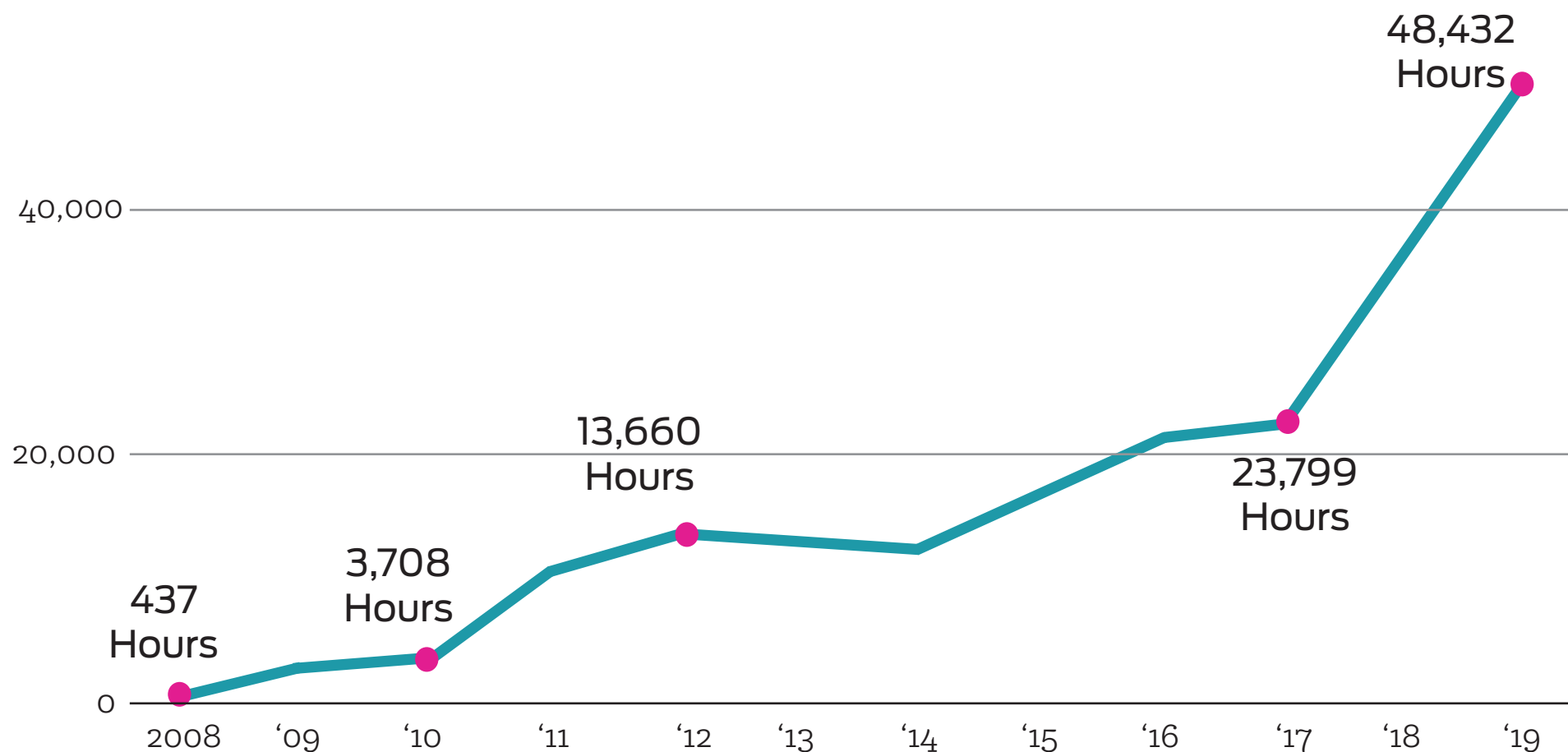
2 Community Lab Sites



30 Research Microscopes

23 Employees

Hours Students Spent in Our Labs



41 Paid Interns

1.6

Megawatts solar power made by our mobile labs

## Statement of Financial Position

<b>ASSETS</b>	
Current Assets	1,609
Fixed Assets	807
Other Assets	12
<b>Total Assets</b>	<b>2,429</b>
<b>LIABILITIES</b>	
Current Liabilities	71
Long Term Liabilities	0
<b>Total Liabilities</b>	<b>71</b>
<b>NET ASSETS</b>	<b>2,357</b>
<b>TOTAL LIABILITIES AND NET ASSETS</b>	<b>2,429</b>

*Dollars in thousands  
Fiscal year ending June 30, 2019 (audited)*

## Statement of Financial Activity

<b>INCOME</b>	
Contributions Revenue	2,740
Earned Revenue	333
Other Income	32
<b>Total Support</b>	<b>3,105</b>
<b>EXPENSE</b>	
Program Services	2,206
Management and General	364
Fundraising	286
<b>Total Expenses</b>	<b>2,856</b>
<b>NET INCOME</b>	<b>249</b>

*Dollars in thousands  
Fiscal year ending June 30, 2019 (audited)*

“I’ve been humbled to see a community of scientists dedicated to changing the face of science grow into a network of scientists, educators, parents, students, and professionals from countless fields -- including you -- who know our future depends on STEM education today.”

Board President Sadia Halim

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Latasha Wright, Ph.D., Chief Scientific Officer, Co-founder

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**Columbia's Zuckerman Institute**

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**Con Edison**  
**Harvard Medical School**

### Silver \$15k+

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**Risë and Quentin Van Doosselaere**  
**Inga Karliner and Jon Thaler**  
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- Nina Panda
- Ronals Schnaar
- Ruth Siekevitz Household
- Soo Nam
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- Angela Armendariz
- Jeffrey Alford
- Michael Dilorenzo
- Mirka Cortes
- Nadiya Kapur
- Andrew Wallace
- Simon M Fischweicher
- Adam Walpert
- Christlynn Rodriguez
- Darcy Peterka
- Disha Srivastava
- Donnie Rotkin
- Elena Ryabova
- Gerard Parkin
- Giovanni Meacci
- Guy De Baere
- Isabelle Giannella
- Jeanette Evans
- Julia Sable
- Kate Bredbenner
- Mehrangez Rahman
- Nevin Martell
- Rita Upmacis
- Tom Rizzo
- Zoe Dyer
- Pam Saletan
- Daniel Keedy
- David Jones
- Katie and Eric Henckels
- Kevin Tang
- Kimberly Briner
- Lynn Chamberlin
- Melinda and Jerve Atsin
- Sam Handelman
- Sharath Koorathota
- Yaniv Kleinman
- Aris Mejia
- Elizabeth DeGear



“It’s like a whole city in that drop of water.”  
 - 8th Grader, Castle Hill Middle School in the Bronx



**Handwritten Student Notes:**

- Biomimicry!**
  - 1# the machine mimics a tree
  - 2# takes in carbon-dioxide gas and releases oxygen.
  - 3# comes in all sizes.
- SCIENCE IS COOL!**
- #BI Forever**
- How old is the bus?**  
ANSWER: I love yaya.
- Shell top:** because colors and design
- Sea weed skirt:** With water it grows. When is dry shrinks
- Goal: feel good**
- To Fish out Pollution From Lakes, Rivers and Ponds**  
Wetted Duck Feet Scissors to Fish out Pollution
- What inspired you to be a scientist?**
- We are mimicing the regenerative limbation of the starfish**  
It works by giving a vaccine to the person it grows back. (demonstration)  
→ ★ → yay  
→ ♀ → yay
- SCIENCE IS COOL!**
- I hope you come visit again P.S. 153 next year. please**
- #Beb + Day ever**
- Bio Bed** (with drawing of a bed)
- bio bus** (with drawing of a bus)
- B.B**
- Love!** (with drawing of a smiley face)

Student voices

# B

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Event

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This annual report was composed by **Eduardo Garcia**, a DePauw University Sophomore, and **Juanny Nunez**, a City College Senior, who interned at BioBus through The LifeSci.NYC Internship Program, **Allan Nacapuy**, a volunteer consultant through Taproot, and **Alia Jamil**, Millburn High School Junior. Photos by **Andrew Cribb** (CribbVisuals.com)