



**BioBuilder**  
Educational Foundation

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# Growing the Future

## IMPACT REPORT 2023





Mission

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# Empowering the Next Generation of Life Scientists

*“The BioBuilder curriculum takes education where it really should be, student centered and project based.”*

- Dave Westenber

Professor of Biological Sciences at Missouri University of Science & Technology



*A message from BioBuilder's founder and executive director*

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Since 2011, BioBuilder has provided transformative life science education and training. We set our sights high and aim to equip all high school students with the skills and knowledge they need to thrive in a future shaped by bioengineering. This field is poised to revolutionize industries, fortify economies, and address global challenges. No one should be left out.

As you'll see here, we have programs such as our High School Apprenticeship Challenge and our BioBuilderClub that ignite a passion for life science in students. Our workshops for professionals renew enthusiasm among educators as well as industry professionals, ensuring that everyone stays at the forefront of innovation.

I invite you to take a look at some notable achievements from 2023, and then preview the ambitious plans we have for the upcoming year. And if you like what you see, **please join us**. Together we can empower the next generation of life scientists to solve some of the world's biggest challenges.

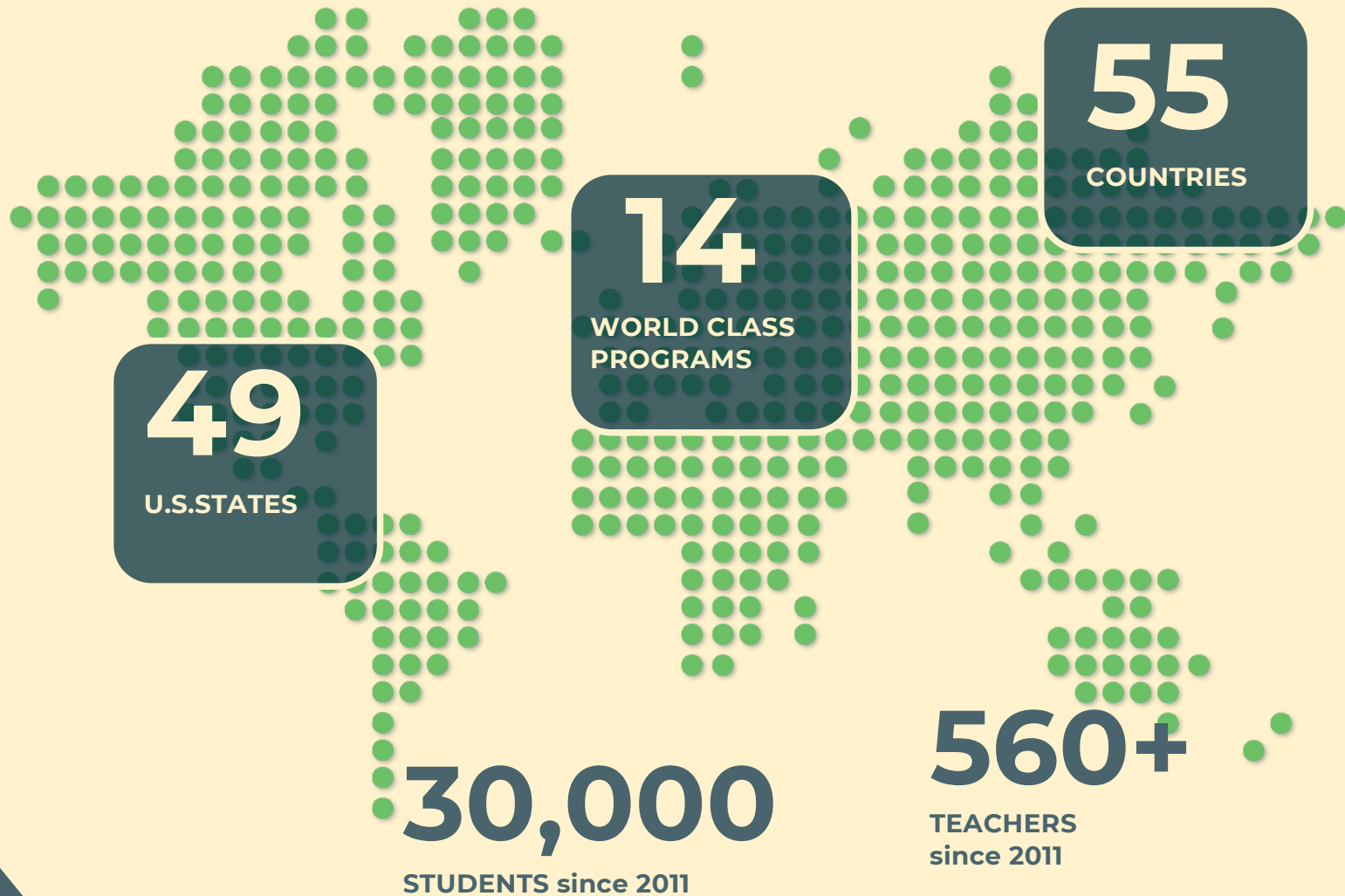
*Natalie Kuddell*





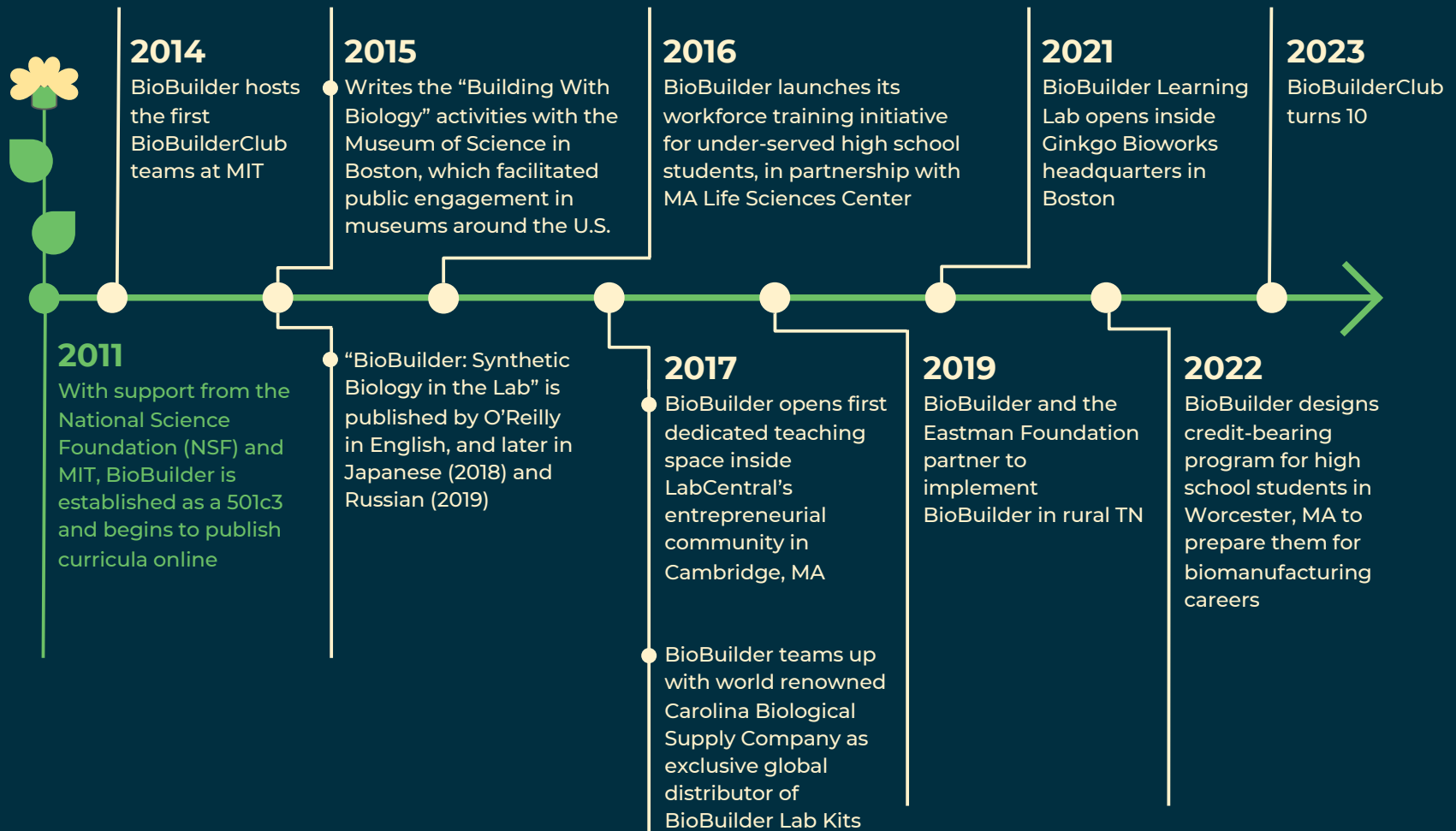
*BioBuilder has a global presence*

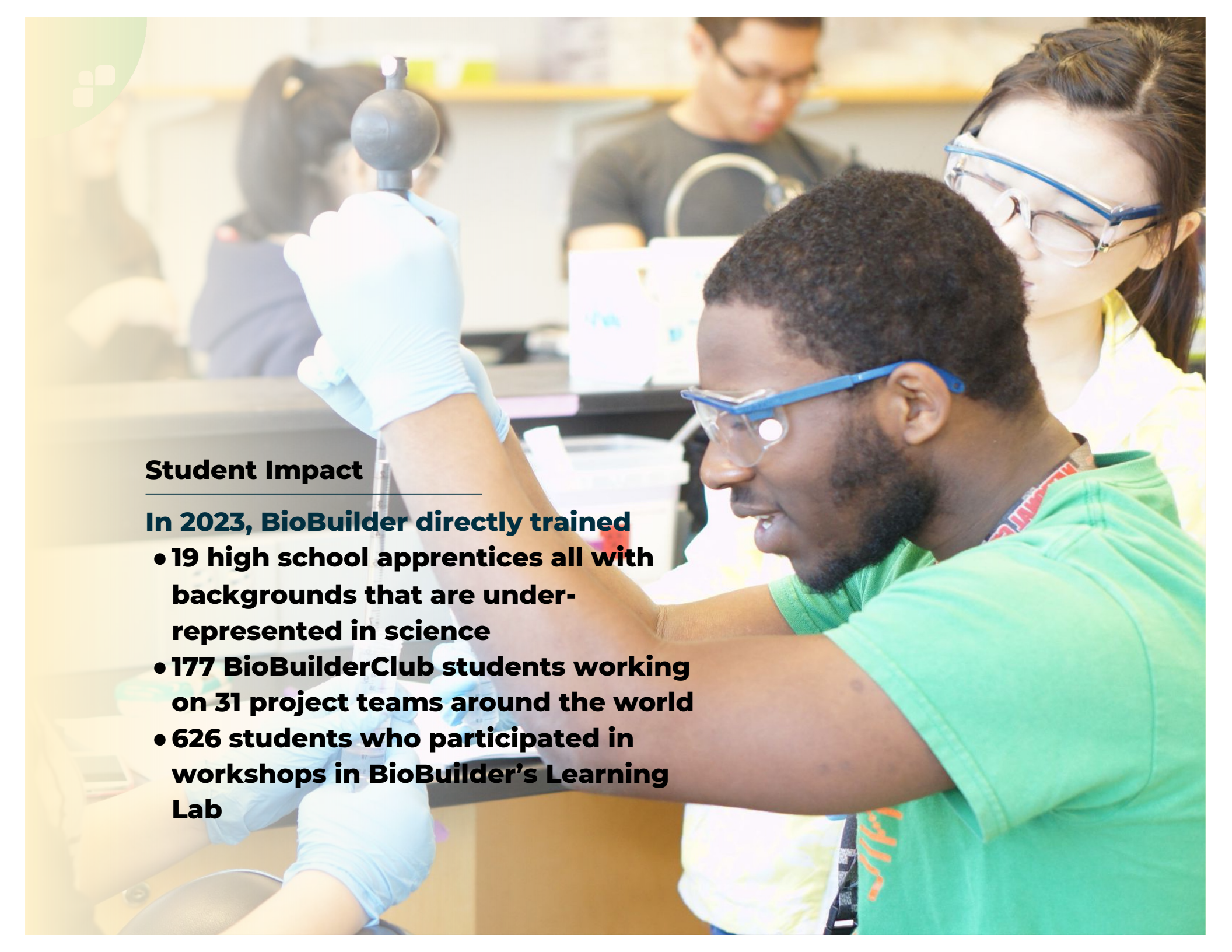
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# Charting Twelve Years of Growth

BioBuilder is a project-based curriculum that has prepared students for college and career for more than a decade.





## **Student Impact**

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**In 2023, BioBuilder directly trained**

- **19 high school apprentices all with backgrounds that are under-represented in science**
- **177 BioBuilderClub students working on 31 project teams around the world**
- **626 students who participated in workshops in BioBuilder's Learning Lab**



Program spotlight

## BioBuilderClub Turns 10

2023 was the 10th anniversary of our BioBuilderClub, a program that has introduced **collaborative biodesign and project development** to students all over the world. To date, the BioBuilderClub has

**Stoked  
scientific  
curiosity**

for 2224 students  
on 256 teams

**Engaged  
participants**

from 84 schools  
25 states  
6 countries

**Published  
articles**

77 peer  
reviewed  
articles about  
their work

**Provided  
mentors**

175 mentors  
guided teams  
and co-developed  
their projects  
ideas



***“My experience in BioBuilder, I'd say was the main driving factor towards me deciding what I wanted to pursue in college.”***

- **Veni Dole**, currently studying **Chemical Engineering at Columbia University**. As a high school student she participated in the 2018 BioBuilderClub at Andover High School.



## Teacher Professional Development

- BioBuilder has directly trained**
- **561 total teachers since 2011**
  - **teachers from 6 states in 2023**
  - **high school educators and college faculty from 34 states and 14 countries since 2011**





## BioBuilder Teachers are Winning Awards



### Evie LaFollette

#### Dobyns-Bennett High School in Kingsport, TN

Winner of the 2023 Robert E. Yager **Exemplary Teaching Award** by the National Science Teaching Association (NSTA), which awards K-12 teachers of science who successfully use innovation and excellence in their classroom. Evie also leads teacher workshops to train teachers across the state how to implement bioengineering at their high school for students of all levels.



### Rebekah Ravgiala

#### Tyngsborough High School in Tyngsborough, MA

2023 MassBioEd Champion for Biotechnology Education and Joshua Boger **Innovative School of the Year Award** which awarded them a grant to do research on bioengineering lavender essential oil as a mosquito repellent.

***“The students design an organism to solve a problem. The directions they go are always so unique and inspiring because it's what they are passionate about – to do their own research outside of class. It's teaching them to find a passion, and follow it.”***

- Evie LaFollette



## Community Outreach

BioBuilder directly provided

- training to 1,147 Learning Lab visitors in 2023
- educational opportunities to 3,206 Learning Lab visitors since 2017
- 99 days of Learning Lab programming in 2023



# Special Connection to Industry: Ginkgo Bioworks

**More than 100 employees** participated in our “BioBuilder For Ginkgo Professionals” workshop this year. Participants expanded on their skills in a multi-day program in the classroom and laboratory, gaining in-depth synthetic biology skills and knowledge that translate to the workplace.

## What they learned:

- Basic lab techniques
- Hands-on approach to complex concepts including cell culturing and measurement
- Technical language for research communication
- Enhanced ways to communicate with clients



**“I learned what we truly do at Ginkgo and was able to practice it so that it wasn't memorizing words, but truly understanding complex concepts.”**

# BioBuilder Community Events in 2023



## Growing the Future A Symposium on Innovation and Education for the Bioeconomy

With the aim of showcasing the region's bioeconomy momentum, **BioBuilder teamed up with the ETSU Research Corporation** to organize a synthetic biology symposium **in Johnson City, Tennessee**. More than 200 community members and speakers attended, including BioBuilder educators, industry representatives from Ginkgo Bioworks and Crown Labs, and government representatives including the Department of Defense and BioMADE.



## The Final Assembly A BioBuilderClub Conference at LabCentral

The BioBuilderClub's 10th season came to a celebratory close when **BioBuilder teams from around the world headlined a biodesign showcase event in Cambridge, Massachusetts**. Students attended in-person and remotely to present short talks and scientific posters about their research and to network. Their projects tackled problem areas in human and environmental health, and offered sustainable solutions to challenges in material and food production. More than 100 scientists, entrepreneurs, educators, and fellow students attended.



Student impact

## BioBuilder Prepares Students for Success



### Nancy Otaluka

- One of the first **BioBuilder Apprentices**
- Summer internship at **Gen9**
- **U Mass Dartmouth**, Class of 2021, Psychology major, minor in Biochemistry
- Now a Clinical Research Assistant at **Beth Israel Deaconess Medical Center**
- Pursuing a Masters Degree in Biomedical Sciences at **Tufts University School of Medicine**, with plans to attend medical school after receiving her degree



### Michael Sheets

- One of the first **BioBuilderClub** members
- **Olin College of Engineering**, Class of 2017, Bioengineering major
- **Boston University**, PhD, graduating in 2023 with a doctorate in Biomedical Engineering
- Now a Scientist at **Sunflower Therapeutics**

“BioBuilder is an amazing organization and I have been so fortunate to learn from everyone involved. Thank you for your encouragement and support from high school all through my PhD!”

- Michael Sheets



# BioBuilder's Executive Board



**Mary Tamer**

Director, DFER Massachusetts  
Board President



**Natalie Kuldell**

Founder, BioBuilder  
Executive Director



**Drew Endy**

Professor, Stanford University



**Kathryn Hart**

Professor, Williams College



**Valerie Tutson**

Storyteller, Providence RI



**Keira Krausz**

Chief Marketing Officer, Purple



**Theresa Lynn**

United Way of Central MA



**Rebekah Ravgiala**

Teacher, Tyngsborough HS



**Don Shobry**

Director, MIT VMS

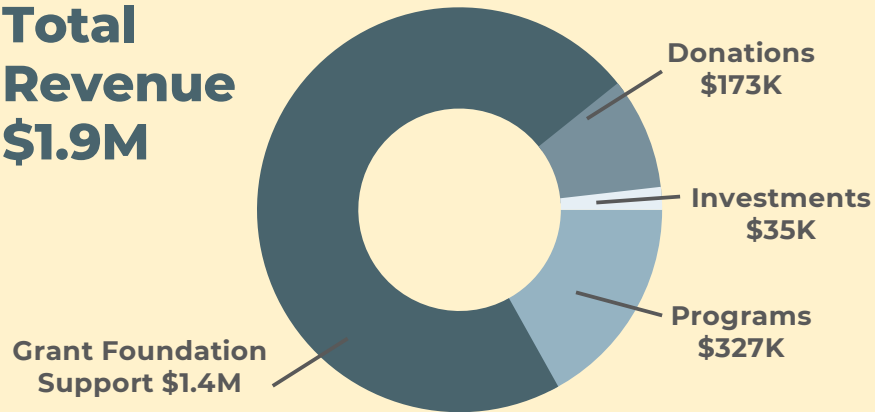


**Josh Zinns**

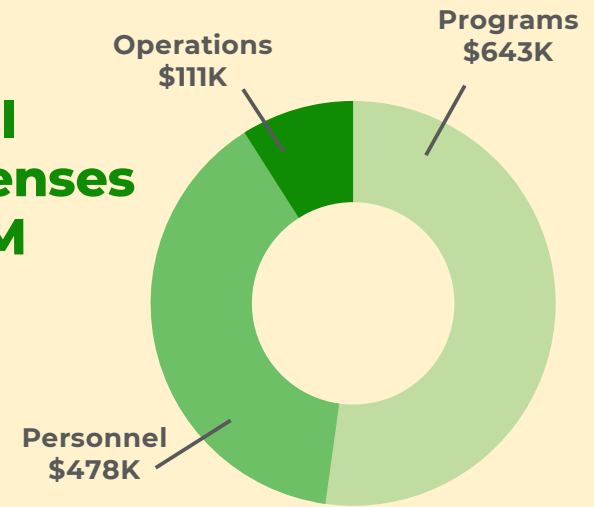
Founder, Botanic Properties

# Fiscal Summary

**Total Revenue**  
**\$1.9M**



**Total Expenses**  
**\$1.2M**



## Key Partners





# BioBuilder

Educational Foundation

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The BioBuilder Educational Foundation is 501(c)3 organization  
TIN: 45-3844761

Website: [BioBuilder.org](http://BioBuilder.org)

Email address: [info@biobuilder.org](mailto:info@biobuilder.org)

Individuals and Foundations are vital partners in BioBuilder's educational mission. To discuss charitable giving, contact our Executive Director:  
[natalie@biobuilder.org](mailto:natalie@biobuilder.org)