

Racially Expansive STEM Histories: Resources

This document was created by the Fall 2018, Spring 2019, Summer 2019, and Fall 2019 Math for America Project Learning Teams, *Scientists and Mathematicians Like Me: Teaching Racially Expansive Histories*

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Scientist and Mathematician Biographies, Interviews, and Blurbs

Websites and Journal Articles:

- Mathematician Databases:
 - [AMS - In Honor of Black History](#)
 - [Five Famous Black Mathematicians Article on mathscareers.org](#)
 - [Five Hispanic and Latinx Mathematicians](#)
 - [Latinxs and Hispanics in Mathematical Sciences](#) (see their [2018 features pdf](#))
 - [Mathematically Gifted and Black](#)
 - [Mathematicians of the African Diaspora](#)
 - [Not Just White Dude Mathematicians \(blog post about it\)](#)

- Specific Mathematician Highlights:
 - [David Harold Blackwell](#) (1919-2010) - game theorist; first black tenured math professor at UC Berkeley, and first inducted into National Academy of Scientists. (Contributor: Scott Matthews; lesson idea: Blackwell's research on Random Walks)
 - See [this video](#) of him giving advice to young mathematicians.
 - [Mona Chalabi](#) - data scientist, regularly featured on the Netflix show "The Fix." This is a link to her Instagram, which contains all kinds of cool, timely data graphics.
 - [Annie Easley](#) - pioneering NASA and NACA mathematician (human computer) and computer scientist for 34 years; researched energy conversion systems that enabled the hybrid car and Centaur project
 - [Gladys West](#) - her computing made GPS possible. Recently inducted into the Air Force Space and Missile Pioneers Hall of Fame.
 - [John Urschel](#) - advanced stats columnist for the Players' Tribune, currently pursuing his PhD in mathematics from MIT; retired NFL player with the Baltimore Ravens
 - See his recent [op-ed](#) on math education

- General Scientist Databases:
 - [7 Latina Scientists Who've Had Incredible Accomplishments](#)
 - [10 Black Scientists that Teachers Should Know About](#)
 - [African American Inventors and Innovators](#) (quick, bulleted blurbs with links to further reading)
 - [BlackandSTEM Environmental Scientists You Should Follow Today](#)
 - [Diversity in Chemistry](#) database with profiles of different chemists from a range of eras and backgrounds (thank you, Sarah Gribbin for contributing)
 - [Journal of Blacks in Higher Education](#)[Latina Women of NASA](#)
 - Also see [Ellen Ochoa](#) (Q&A): astronaut and director of the Johnson Space Center (first Hispanic person and second woman to hold this position)
 - [Los Alamos National Laboratory Career Videos](#)

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- [Math For Science](#) - careers in science- and math-related topics
- [Nova video series on Scientists and Engineers of Color](#)
- [Skype A Scientist](#)
- Specific Biologist and Environmental Scientist Highlights:
 - [Alexa Canady](#) (first black resident in neurosurgery, famous for her patient centered approach) (also: [biography](#))
 - [Jose Celso Barbosa](#) - Politician and physician, one of the founders of Puerto Rican statehood; one of the first people of African descent to earn a medical degree in the U.S.
 - [Jane Cook Wright](#) studied cancer treatments, mother of chemotherapy
 - [Emma Dupree](#) herbalist known for continuing and popularizing folk medicine
 - [Jocelyn Elders](#) - MD, former surgeon general, studied adolescent health
 - [Mae Jemison](#) - astronaut (biological researcher) and medical doctor (first African American woman in space)
 - [Ernest Everett Just](#) pioneering marine biologist and science writer
 - [Melissa Freeman](#) (video) is a 91-year-old medical doctor from the Bronx who is currently still practicing. She graduated from Howard University College of Medicine, and is one of the first doctors to treat women with opioid addiction.
 - [Bianca Jones Marlin](#) - neuroscientist and postdoctoral fellow researching transgenerational epigenetic inheritance (how trauma in parents affect the brain structure and sensory experience of their future offspring).
 - See [her talk at AMNH](#) (video) on the role of oxytocin, the “love drug,” in enhancing maternal instincts and relationships in general.
 - [Rick Kittles](#) scientist who studies and deconstructs race and genetics, health outcome disparity
 - [Bryce Love](#), aspiring pediatrician and Stanford football star
 - [James McCune Smith](#) abolitionist and first university-trained African American physician; posthumously awarded fellowship with New York Academy of Medicine 171 years after denial
 - [Helen O Dickens](#) teen reproductive health educator
 - [Mamie Phipps Clark](#) studied internalised racism, the doll experiment used in Brown v Board
 - [Rene Favaloro](#) - pioneering Argentinian heart surgeon, credited with introducing coronary bypass to the clinical field
 - [Mankombu Sambasivan Swaminathan](#) scientist who started the green revolution, positive benefit of genetic engineering
 - [Daniela Ushizima](#) contemporary cancer researcher; also does science outreach. Note: this article is in Portuguese.
 - The Birders
- Specific Chemist Highlights:
 - [Alice Ball](#) chemist who developed the cure for leprosy but was denied credit due to her untimely death and the dishonesty of her colleague Arthur Dean.
 - Also see [this National Geographic article](#) which provides slightly more context on leprosy
- Specific Engineer and Inventor Highlights (some may be recategorized):
 - [Patricia Era Bath](#) - eye laser probe; also an ophthalmologist; site includes brief interview
 - [Sarah Boone](#) - ironing board
 - [Otis Boykin](#) - IBM computer; pacemaker
 - [Cynthia Breazeal](#) - professor of robotics at MIT
 - [Arthur B.C. Walker](#) - telescope

- [Madame CJ Walker](#) - hair care products; social activist; first black American female self-made millionaire
 - [David Crosthwait](#) - heating and air conditioning systems
 - [Xochitl Guadalupe Cruz](#) - an eight-year-old (!) from Chiapas who invented a solar-powered water heating device made out of recycled materials, intended to help low-income families
 - [Mark Dean](#) - computer developer
 - [Charles Drew](#) - discovered method for preserving and storing blood - responsible for development of blood bank; also a physician and medical researcher
 - [Lisa Gelobter](#) - web designer (invented GIF)
 - [George Franklin Grant](#) - golf tee; previously a dentist
 - [Lewis Howard Latimer](#) invented a vastly superior lightbulb filament to Edison's
 - [Lonnie Johnson](#) - spacecraft control systems for NASA: Super Soaker
 - [Jerry Lawson](#) - video game consoles and cartridges
 - [Marie Van Brittan Brown](#) - home security systems
 - [Benjamin Montgomery](#) - boat propeller; denied patent because invented while a slave
 - [Alice H. Parker](#) - heating furnace system using natural gas, a precursor for the heating systems we use today
 - [Granville Woods](#) mechanical engineer who invented the induction telegraph (allowing improved communication between trains), successfully defending patent battle against Thomas Edison
 - Also see: [NYT Obituary](#)
 - [Seven Black Inventors Whose Patents Helped Shape American Life](#)
 - Garrett Morgan - gas mask
 - Mary Beatrice Kenner - device for making periods more tolerable
 - Dennis Weatherby - chemist, developed solution for non-staining dish detergent
- Specific Physicist Highlights:
 - [Stephon Alexander](#) - astrophysicist and saxophonist; writes on the mathematics of music and how his research on Coltrane contributed to his discoveries in quantum gravity
 - [Jagadish Chandra Bose](#) - Bengali mathematician, physicist, biologist, and early science fiction writer who pioneered the investigation of radio and microwave optics; first to study the effects of microwaves on plant tissue
 - [Hadiyah-Nicole Green](#) - physicist who developed laser technology for killing cancer cells; one of fewer than 100 black female physicists in the U.S.
 - [Ibn Al-Haytham](#) - pioneering physicist from the Islamic Golden Age, specializing in optics, and the developer of what became known as the Scientific Method. An early pioneer of integration.
 - [Warren M Washington](#), winner of the [Tyler Prize for Environmental Achievement](#) ("Enviro Nobel Prize"); pioneering atmospheric physicist, won "environmental science Nobel" for climate change research; adviser to Obama; discusses path to becoming a physicist (see links below)
 - [Washington Post article](#) discussing adversity, discouragement from mentors
 - Also see his book: [The Jazz of Physics: The Secret Link Between Music and the Structure of the Universe](#)

Books (links to previews):

- Individuals:
 - Katherine Johnson: [Counting on Katherine](#) (young readers) - picture book detailing Katherine Johnson's childhood and work on the Apollo 13 project
 - Katherine Johnson: [Reaching for the Moon](#) (middle readers) - Katherine Johnson's autobiography (link includes excerpt)

- Carlos Bueno: [Lauren Ipsum](#) - Stories with math/cs problems embedded. Written by author for his daughter.
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- Collections:
 - [Change Is Possible: Stories of Women and Minorities in Mathematics](#) (available for use within NYPL General Research Division; Nas also has a copy)
 - [Beyond Banneker: Black Mathematicians and the Path to Excellence](#) (available for checkout at multiple NYPL library locations; Nas and Jae also each have a copy)
 - [Little Leaders: Bold Women in Black History](#) by Vashti Harrison (young readers). Not exclusively STEM but includes the stories of several prolific mathematicians and scientists including Alice Ball, Katherine Johnson, Mae Jemison, and others)
 - [The Crest of the Peacock: Non-European Roots of Mathematics](#) (available for free download; thank you for sharing, Larisa Babukalov)

Films:

- [Black Women in Medicine](#) (via The Right to Be)
- [The Birders](#) - Follows an extremely knowledgeable scientist and bird guide through his native Colombia.

Classroom Posters:

- [Eye See Me STEM Poster Sets](#)
- [Nevertheless STEM Role Model Posters](#) - Women of color in STEM; posters are free to download; brief biographies provided for each person featured
- [American Mathematical Society](#) - free posters available for order featuring black mathematicians, Latinx mathematicians

Interrupting students' internalized beliefs about who can be mathematicians / scientists

- [Imposter Syndrome \(TED Talk\)](#) and [Imposter Syndrome \(article\)](#) (the article focuses more in-depth on the specific experience of URM's and is narrated in first person)
- [Gender-based article on students drawings of scientists](#)
- [Opinion piece: Black Panther and thoughts on mainstream presentations of Black female scientists](#)
- ["For a Black Mathematician, What It's Like to Be the Only One"](#) (NYT opinion piece)

Pedagogical Theory

- [Getting Under the Hood: How and for Whom Does Increasing Course Structure Work?](#)
- [Desettling Expectations in Science Education](#)
- [Building Mathematics Learning Communities](#) (book) - Nas has a copy

Lesson Ideas

History-Centered Activity Structures:

- Mathematician of the Month (extra credit assignments exploring mathematician of student's choice)
 - Ex. 1: [Mathematician of the Month](#)
 - Ex. 2: [Mathematician of the Month 2](#)
- Text of the Week (homework assignment introducing content via the historical origins)
 - Ex. 1: [Text of the Week: Ibn al Nafis](#)
 - Ex. 2: [Text of the Week: Lydia Villa-Komaroff](#)
- Classroom visuals for prompting discussion
 - [Classroom Visuals - Historical Figure Blurbs](#)
 - [Periodic Table of Black History](#)

Content-Centered Lesson Resources:

Math:

- [Algebra Resources Google Doc](#) - STEM professionals applying various algebra topics in different fields
- [Algebra Activities from Many Cultures](#) (book) - see google preview for most pages; Nas also has a copy
- [Benjamin Banneker's Almanac](#) (pdfs of actual data tables as well as Banneker's social and political commentary)
- [Geometry Activities from Many Cultures](#) (book) - see, e.g., lesson on Banneker's land surveying methodology; Nas also has a copy
- [Incan Math Knots](#) (also see [this article](#))
- [The Magic of Vedic Math](#) - an ancient Indian technique for mental computations
- [Rethinking Mathematics](#) (book) - see, e.g., lesson on Mayan arithmetic
- [The story of math - al-Khwarizmi's completing the square](#) - original development of the area model
- Wikipedia: [Timeline of Math](#)
- [The Ta Neter Foundation](#) - an organization highlighting the ancient and medieval histories of Africa

Ecology / Environmental Science / Chemistry:

- [Flint Water Crisis and the Chemistry Experts Researching it](#) (also see Sarah Gribbin's lesson PDFs in our shared folder)
 - Some [data](#) on U.S. standards for evaluating lead toxicity (thank you, Megan Wallner)
 - [NPR article](#) on the dangers of even minimal lead exposure (thank you, Megan Wallner)
- [NAACP Environmental Justice Curriculum](#)
- [Water: A First Nations' Spiritual and Ecological Perspective](#)