

CONTRIBUTIONS OF BLACKS TO MODERN SCIENCE AND TECHNOLOGY THROUGHOUT THE AGES

**DEBUNKING THE MYTH THAT SCIENCE IS WHITE, MALE AND
MIDDLECLASS**

EVIDENCE UP TO EARLY 20TH CENTURY
IMPERIAL COLLEGE DEPARTMENT OF CIVIL ENGINEERING
BLACK HISTORY MONTH ADDRESS
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PRESENTATION

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“The nerve of the world has been deadened for centuries to the vibrations of African genius”

Ivan Van Sertima

I. “Science is white”

SCIENCE AND TECHNOLOGY IN ANCIENT AFRICA (MATHS AND ASTRONOMY)

■ MATH

- More than 35,000 years ago, Egyptians scripted textbooks about math;
- Eight thousand years ago, people in present-day Zaire developed their own numeration system, as did Yoruba people in what is now Nigeria.

■ ASTRONOMY

- Egyptians charted the movement of the sun and constellations and the cycles of the moon; Clocks were made with moving water and sundial-like clocks were used;
- A structure known as the African Stonehenge in present-day Kenya (constructed around 300 B.C.) was a remarkably accurate calendar;
- The Dogon people of Mali amassed a wealth of detailed astronomical observations. Many of their discoveries were so advanced that some modern scholars credit their discoveries instead to space aliens or unknown European travelers, even though the Dogon culture is steeped in ceremonial tradition centered on several space events.

SCIENCE AND TECHNOLOGY IN ANCIENT AFRICA (METALLURGY AND TOOLS)

■ METALLURGY AND TOOLS

- Many advances in metallurgy and tool making were made across the entirety of ancient Africa. These include steam engines, metal chisels and saws, copper and iron tools and weapons, nails, glue, carbon steel and bronze weapons and art;
- Advances in Tanzania, Rwanda and Uganda between 1,500 and 2,000 years ago surpassed those of Europeans then and were astonishing to Europeans when they learned of them. Ancient Tanzanian furnaces could reach 1,800°C — 200 to 400°C warmer than those of the Romans. African living in the shores of Lake Victoria had produced steel.

SCIENCE AND TECHNOLOGY IN ANCIENT AFRICA (ARCHITECTURE AND ENGINEERING)

■ ARCHITECTURE AND ENGINEERING

- The engineering feats of the Egyptians: the bafflingly raised obelisks and the more than 80 pyramids; pyramids in Sudan; obelisks in Ethiopia;
- In the 12th century there were hundreds of great cities in Zimbabwe (incl. The Great Zimbabwe) and Mozambique. There, massive stone complexes were the hubs of cities. One included a 250-meter-long, 15,000-ton curved granite wall;
- In the 13th century, the empire of Mali boasted impressive cities, including Timbuktu, with grand palaces, mosques and universities;
- Suspension bridges were built with vines by the Kikuyus

SCIENCE AND TECHNOLOGY IN ANCIENT AFRICA (MEDICINE)

■ MEDICINE

- Many treatments we use today were employed by several ancient peoples throughout Africa. It is believed that before the European came to Africa, medicine in what is now Egypt, Nigeria and South Africa, to name just a few places, was more advanced than medicine in Europe;
- Some of these practices were the use of: plants with **salicylic acid for pain** (as in aspirin), **kaolin for diarrhea** (as in Kaopectate), and extracts that were confirmed in the 20th century to kill gram positive bacteria. Other plants used had **anticancer properties, caused abortion and treated malaria** — and these have been shown to be as effective as many modern-day Western treatments.
- Medical procedures performed in ancient Africa before they were performed in Europe include **vaccination, autopsy, limb traction and broken bone setting, bullet removal, brain surgery, skin grafting, filling of dental cavities, installation of false teeth, what is now known as Caesarean section, anesthesia and tissue cauterization**. In addition, African cultures performed surgeries under antiseptic conditions universally when this concept was only emerging in Europe.

TECHNOLOGY BROUGHT FROM AFRICA TO AMERICA DURING THE SLAVE TRADE

Despite the difficulty of documentation, the extent and quality of the work of skilled enslaved Africans is known to have played a significant role in America's economy and culture:

- **AGRICULTURE**
- **BUILDING**
- **METALWORKING**
- **TEXTILES**

SOME EVIDENCE OF SKILLS BROUGHT FROM AFRICA TO THE AMERICAS

- **Rice planters** in the coastal low country of South Carolina and Georgia, for example, were willing to pay more for enslaved Africans from Africa's Windward Coast (present-day Senegal to Côte d'Ivoire), as these individuals were skilled in rice cultivation and processing. Their skills included the ability to **weave winnowing baskets** and **to carve wooden mortars and pestles for processing the grains of rice**.
- Early **pottery** from South Carolina often revealed a distinct West African form; winnowing or fanning baskets from the Low Country used both the form and technique of baskets made in Senegambia;
- A story is told of an enslaved African Onesimus who when smallpox prevailed in Boston, introduced the treatment of rubbing pus from an infected person into an open wound on the arm of an uninfected person, which resulted in mild symptoms of the disease, but confer immunity.

TWO PROMINENT AFRICAN AMERICAN INVENTORS 18TH CENTURY

- **Benjamin Banneker (1731-1806):** was a self-taught mathematician and surveyor who invented a clock out of wood that kept time to the second and struck a gong on the hour;
- **Thomas L. Jennings (1791-1859):** is considered the first African American patent holder in the United States. He invented a method for dry-cleaning clothes.

SOME PROMINENT INVENTIONS BY AFRICAN AMERICANS 19TH CENTURY

- 1. Frederick McKinley Jones (1893-1961):** mobile refrigeration technology.
- 2. Lewis Latimer (1848-1892):** He was an inventor and draftsman who worked with Alexander Graham Bell and Thomas Edison. He invented a carbon filament for the incandescent light bulb, which made it more efficient and longer lasting.
- 3. Elijah McCoy (1844-1929):** He was an inventor who developed a lubricating cup that fed oil to machine bearings through a small bore tube. His invention was so successful that people started referring to it as the “real McCoy”.

SOME PROMINENT INVENTIONS BY AFRICAN AMERICANS 19TH CENTURY

- 4. Granville T. Woods (1856-1910):** He was an inventor who held more than 60 patents for electrical, mechanical, and communication devices. His most notable inventions include the multiplex telegraph, which allowed messages to be sent between train stations and moving trains, and the automatic air brake, which helped prevent train accidents .
- 5. Daniel Haile Williams (1856-1931):** He is known for having completed the first successful heart surgery

SOME PROMINENT INVENTIONS BY AFRICAN AMERICANS EARLY 20TH CENTURY

- **Otis Boykin (1920-1982):** a machine used to control heart pacemakers, parts for guided missiles and computers, an electronic air filter, and a cash register that thieves could not break into;
- **George Edward Alcorn, Jr. (b. 1940):** physicist and inventor who developed an imaging x-ray spectrometer, which improved the efficiency and accuracy of x-ray imaging.
- **Charles Drew (1904-1950):** developed improved techniques for blood storage, and applied his expert knowledge to develop large-scale blood banks;

PATENTS OF AFRICAN AMERICANS (1870- 1940)

- According to a research paper by economist Lisa Cook, African Americans earned up to **3,000 patents** between **1870 and 1940**. This period is often referred to as the “golden age of innovation”
- The paper also highlights that violence against Black Americans from 1870 to 1940 coincided with a decline in patent filings from that community

CHALLENGES FACED BY AFRICAN AMERICAN INVENTORS

- Black scientists and inventors have faced numerous challenges throughout history, including:
 - unconscious bias;
 - Lack of educational opportunities (18th-19th Centuries);
 - outright discrimination in the high-tech employment sector;
 - persistent difficulties in gaining access to venture capital, intellectual property protection, and commercial networks;
 - being pushed to the margins, refused jobs, and denied credit for their discoveries;
 - Segregation during “Jim Crow” era.

CHALLENGES FACED BY AFRICAN AMERICAN INVENTORS (cont)

- Lack of recognition – indeed some credits given either years after inventions or posthumously:
 - Frederick McKinley Jones who died in 1961, was only granted a National Medal of Honor in 1991 and induction in the National Inventors Hall of Fame in 2007;
 - McCoy died in 1829 but was honored only in 2012 when the US Detroit Patent Office was named after him.
- Disagreement on principles:
 - Drew resigned from the Red Cross over disagreement that white blood recipients should only have bloods from whites and black recipients from blacks.

II. SCIENCE IS MALE

FIVE PROMINENT AFRICAN AMERICAN WOMEN SCIENTISTS

- 1. Dr. Shirley Jackson (1946-present):** Her research led to the development of touch-tone phones, portable fax machines, and fibre optic cables;
- 2. Alice H. Parker (1895-1920):** She designed a natural gas-fueled heating furnace that earned a patent in December 1919 and helped give birth to the thermostat and the familiar forced air furnaces in most homes today;
- 3. Marie Van Brittan Brown (1922-1999):** She filed a patent for a household closed-circuit-television security system with her husband Albert in 1966 when they noticed increasing crime in their New York neighbourhood .

FIVE PROMINENT AFRICAN AMERICAN WOMEN SCIENTISTS

- 4. Valerie Thomas (1943-present):** She was a physicist, inventor, and NASA data analyst who invented the technology which went on to become the premise for more advanced TV screens and modern 3D technology;
- 5. Gladys West (1930 – present)** is a mathematician whose extremely detailed model of the Earth became the foundation of GPS that is used today in countless applications, including navigation and communication.

III. SCIENCE IS MIDDLECLASS

BACKGROUND OF SOME INVENTORS

- **Grandville Woods (1856 – 1910):** self-taught; 1st patent in 1884; developed telegraphy system purchased by Alexander Graham Bell;
- **Frederick McKinley Jones (1893-1961):** little or no formal education
- **George Washington Carver (c1864-1943):** born into slavery; he however later went to university after his positive research results; agricultural scientist and inventor who promoted alternative crops to cotton and methods to prevent soil depletion.

AFRICAN SCIENTISTS IN THE 19th AND 20th CENTURY

Some Africans who shaped European science in colonial and postcolonial contexts:

- **Africanus Beale Horton (c1835-c1883):** tropical medicine; environmental health;
- **Thomas Risley Odhiambo (1931-2003):** insect physiology (desert locust);
- **Jala Makawa (c. 1914 – 1995):** ornithology;
- **Davidson Nicol (1924-1994):** first to analyze the breakdown of insulin in the human body, a discovery which was a breakthrough for the treatment of diabetes.

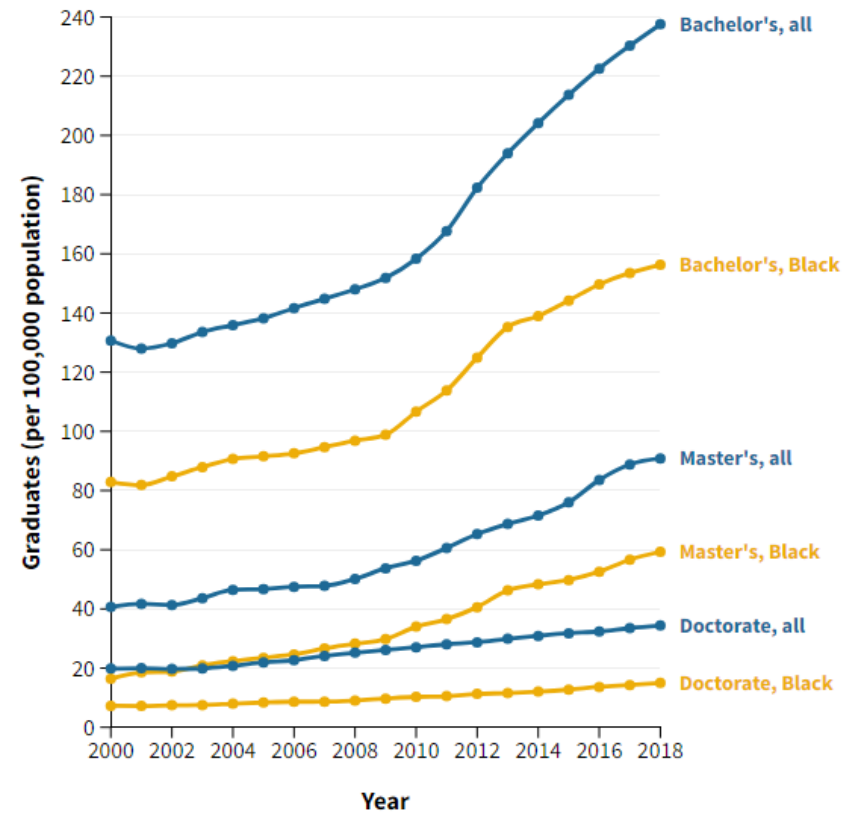
Historically, scientists originating from Africa are relegated to supporting roles, even when they were lead researchers.

BLACK SCIENTISTS IN THE UK

According to a report by the Royal Society:

- black people account **for 1.7%** of research staff in the UK, whereas they make up **3.4%** of the UK population;
- only **65** out of **10,560** science professors in the UK are black.

U.S. BLACK STUDENTS IN STEM, 2000–2018



Source: NCSES/NSF

I have tried to debunk the myth in this presentation that science is white, male and middleclass.

So why are numbers of black scientists in relation to their numbers in the population still lagging behind?

While many of the challenges facing black scientists in the 19th and 20th centuries have been removed, the challenge of funding still remains.

A number of steps are being taken to address the financial constraints experienced by black students and researchers in the UK.

STEPS TO INCREASE NUMBER OF BLACK SCIENCE STUDENTS AT IMPERIAL COLLEGE

Presidential Scholarships for students of Black heritage

Out of more than 10,000 undergraduates at Imperial College in 2021, only 235 were black.

A drive to tackle the under-representation of black students is being launched, in a £5m scholarship and mentoring scheme for Home students of Black heritage applying for undergraduate study in autumn 2024 in:

- Faculty of Engineering
- Faculty of Medicine
- Faculty of Natural Sciences
- Imperial College Business School

STEPS TO INCREASE NUMBER OF BLACK RESEARCHERS IN THE UK: ROYAL SOCIETY

Young black scientists will get sizeable grants towards cutting-edge research in a pilot scheme aimed at increasing their numbers in the field.

- Five scientists a year will get up to £690,000 spread over four years.
- The Royal Society, which represents the UK's leading researchers, hopes its grants increase low numbers of black scientists, particularly in research.
- The fellowships should allow the recipients to work in any of the country's research institutions.

CONCLUDING REMARKS

- Need for inspiration: **Dr. Mark Richards** has dedicated his career to inspiring young people into physics through his science education, outreach and public engagement activities. development of the UK's first network of Black physicists: the Blackett Lab Family. He remarked that he was inspired by Sertima the author of Blacks in Science);
- Studies which seek to understand the proactive roles played by individual African scientists, in the development of Science in Europe and beyond;
- Need for mentoring; **Dr. Anne-Marie Imafidon** is a computer scientist and entrepreneur who founded Stemettes, a social enterprise that encourages girls and young women to pursue careers in STEM;

CONCLUDING REMARKS

- More scholarships and research grants (such as RS and Imperial College initiatives), are required to increase the number of black scientists;
- Greater resources need to be made available for research institutions in Africa, to enable them to undertake pure and applied research on subjects relevant to the continent (with World Bank assistance, 22 Centres of Excellence have been set up in Africa);
- Imperial College should intensify its efforts to document the achievements of its black Alumni;

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