

TiMBUKTU

CELEBRATING THE BLACK CONTRIBUTION TO THE SCIENCES PAST AND PRESENT

I would like to go into space again if there were a mission to Mars. I'd also love to go to a completely different planetary system out of our solar system

MAE C. JEMISON
first Black female astronaut

Supported by



12th - 22nd October 2018

Natty Mark Samuels

iNTRODUCTION

Although The Black contribution to the sciences goes back to ancient Egypt and Sudan, this publication looks at the late medieval era and the modern and contemporary ones.

Apart from the first page, the first part focuses on West Africa, especially Timbuktu, that monumental hub of learning, located in southern Mali. This segment honours Mohammed Bagayogo, one of the leading scholars of Timbuktu, as well as one of his students, Ahmed Baba, the most acclaimed of the scholars of 16th century Timbuktu: its Golden Age. Shame that when the first Europeans entered Timbuktu in the early 19th century, it was a dust-filled apparition of its former importance as a place of learning and trade: hence its association as some fabled "neverland."

Part two looks at the modern and contemporary figures, such as Patricia Bath and William Kamkwamba. The latter used discarded items, to generate electricity in his community; the former used electronics, to improve the eyesight of many.

Using poetry, prose, quotes and excerpts, this is a celebration of the Black contribution to the sciences: past and present.

ACKNOWLEDGEMENTS

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Also, to Anita Shervington aka Sista STEM also; for her initiatives and energy in encouraging more black youth, especially young women, to enter into careers in the sciences and engineering.

And to the FSTC – Foundation for Science, Technology and Civilisation – for their promotions of my writings on sub-Saharan Islamic educators and African School: especially to Khaleel Shaikh, who designed and manages the African School website.

Tales of Mohammed Bagayogo (2015), Song for Ahmed Baba (2009) and Iridesence (2013)© Natty Mark Samuels.

Natty Mark Samuels is the founder of African School and the IZIBONGO art magazine: the pioneering figure of African Studies in Oxfordshire. During the IF Festival, he'll be delivering two interactive workshops...

TIMBUKTU: Celebrating the Black contribution to the sciences, past and present.

Oxford Town Hall – Oct.13th – 12.15 - 2.15

IZIBONGO: Celebrating African and Diasporic Art.

Westgate Library – Oct.20th - 12.30-2.30

MEDUPE

Part of apartheid involved destroying people's aspirations," says **Thebe Medupe**, a South African astronomer. "Imagine being a black child and all the time reading about other people's histories and other people's way of doing things. You start having doubts about whether you played any role in human history...I remember the first night I pointed the telescope toward the Moon," he says. "It was amazing to see the craters, the valleys, and the mountains. Since that time I knew that my career was going to be in astronomy."

from article by Toni Feder - *Physics Today* - April, 2006

He went on to gain a doctorate in astrophysics at the University of Cape Town, and was presenter and associate producer of "Cosmic Africa", a feature documentary about traditional African astronomy released in 2002. He is a researcher at the South African Astronomical Observatory, where he is participating in a programme to encourage black South Africans to take up astronomy. He is writing a book, in the Setswana language, on ethno-astronomy

from *African Renaissance Catalog* - Sep.2013

Africa also has a thriving history of scholarship, where astronomy played an integral role, notably in Timbuktu, Mali, where thousands of scrolls and manuscripts, written in Arabic and other local languages, track scholastic endeavours of three major West African kingdoms: Ghana at around the 11th century; Mali in the 14th century; and Songhai in the 15th century...

When he visited Timbuktu eight years ago, **Medupe** worked with a translator to study a book by Abul Abbas, written in 1732, revealing mathematical algorithms that determined the Islamic calendar. He was able to confirm the scholar's results.

"They knew astronomy very well."

from article by Helen Swingler - *University of Cape Town News* - Dec.2014

Prof Medupe has written and published numerous research papers on astronomy and, in particular, asteroseismology, contributing to national and international journals aimed at advancing the study and research thereof. He has also made research contributions to the book: "African cultural astronomy: Current archaeoastronomy and ethnoastronomy research in Africa"

from *North West University* - May 2017

TALES OF MOHAMMED BAGAYOGO

Tale of The Happy Student

He hasn't stopped beaming. Entranced, blessed by the library of Mohammed Bagayogo. He came to request a recommended literature list, on the study of Islamic history – and got a bonus too! Can't believe he's there, in the research centre of Mohammed Bagayogo! God has certainly watched over him today. Books on subject matter, such as mathematics (riyadhiyat), law (fiqh) and philosophy (falsafa). The poor Mossi student who came to ask a favour, got invited to a place of riches.

While mesmerised by the manuscripts, the great teacher returns, bringing cashew nuts – and a cold lemon drink. He would have liked to have stayed all day, but he knows the great teacher is a busy man. So he gives thanks, clasping his hands and bowing his head, for the magical twenty minutes – and the loan of a book. He can't stop grinning, as he walks down the street. The sand cannot bother him, the wind cannot detain him; he floats on a breeze of happiness.

Tale of Humility and Pride

Sensations run over his face and body, generated by a sense of deep pride; as he shows the visiting Egyptian scholar, around his beloved Timbuktu. Through this quarter and that one; in the compound of the calligrapher, the workshop of the goldsmith. The Egyptian had heard of the three main schools, but was amazed at the amount in total. Seems as if every corner he turned, there was another! His guide informs him, that there are at least a hundred and fifty schools in the city; that a quarter of the population, were either students or teachers. Deep pride; partly because this same scholar, was part of the Al Azhar delegation, that awarded him a doctorate, when passing through Cairo on his way to Mecca.

Mohammed Bagayogo informs the visitor, that the teachers of this region are blessed, to be under the rule of Askia Dawud. A scholar himself, he raised the intellectual potential of this city, by founding public libraries. He set up a royal copying centre, so the master calligraphers, could copy the paramount works. This Songhai ruler recalls for him, the educational triumphs of the Malian monarch, Mansa Musa.

Mohammed Bagayogo, known for his humility, wells up with pride, when showing this Al Azhar scholar around his town: the intellectual heartland, of Islamic West Africa.

Tale of Stars and Men

Mohammed Bagayogo looks up to the starry classroom – the dark lecture hall of night. He thinks of Allah, the Pioneering Physicist, who brought it all to be, in splendid manifestation.

In his mind's eye, Mohammed Bagayogo sees the Yemenite mariner, guided by the North Star, beautiful mentor of the uncertain seas. He sees the Tuareg herder, chaperoned by celestial light – through the bittersweet courting of the desert. As today, he used the sun, aided by gnomon and trigonometry, to inform the muezzin of the time to call.

Leaving the roof, he immediately goes to his writing desk; adding more to his burgeoning treatise, concerning the classification of stars.

MAURiTANIA

AMMS - Arabic Manuscripts Management System

founded in Mauritania 1987

The principal subject categories in AMMS

(with numbers of records, effective 30 September 2003)

Arabic Language (1,258) Belief (1,936) Biography (213) Conduct (105)

Devotional (1,632) Economy (554) Education (174)

Esoteric Sciences (455)

Ethics (424) Geography (20) Hadith (516) History (488)

Jurisprudence (3,934) Literature (1,181) Logic (107) Medicine (99)

Politics (572) Prophet Muhammed (480) Qur'an (854) Reform (44)

Science (231) Social Matters (159) Sufism (731)

from A West African Arabic Manuscript Database - by Charles Stewart

NiGERiA

The collection is unique for two reasons. First, it contains many important items such as the finest illuminations and calligraphy with a variety of scripts of the Holy Qur'an, calligraphic art works and other high-quality copies of many important works. Secondly, the collection is one of the most diverse in terms of the subjects that are covered by it. These include copies of the Holy Qu'ran, works of qur'anic Sciences, hadiths (reports from the Prophet and the Imams), tawheed or theology, Islamic law, prayers and sermons, mysticism, philosophy, ethics and politics, biographies, history, geographical works, Arabic and Fulfude and Hausa grammar, lexicography and philology, poetry and prose, anthologies and other literary works, alchemy, astronomy, traditional medicine, traditional pharmacy and pharmacology....

from the Modibbo Ahmadu Fofure Collection: Arewa House

Centre for Historical Documentation and Research

Ahmadu Bello University

SONG FOR AHMED BABA

1st Voice: Here comes the invader,

With European partner,

Cannon and musketry.

Burnt the books,

Banished the teachers -

The Songhei Tragedy.

2nd Voice: Marrakesh Men,

Didn't come on their own -

Came with mercenary.

Came from Spain

In their thousands -

The latest weaponry.

3rd Voice: All the libraries,

Public and private,

Put to the torch or robbed.

The student howled,

Bookbinder wept,

Professor began to sob.

Wave of invasion,

Rage of destruction,

When ignorance is rife.

The scribe became ill,

Illustrator broke down,

The inkmaker took his life...

This, part of the penultimate segment of *Song for Ahmed Baba*, tells of the 1591 invasion of Timbuktu by Moroccan imperial forces, aided by Spanish mercenaries. It saw the end of the 16th century Golden Age of Timbuktu.

iRiDESCENCE

I imagine you Muhammed; radiant, within the circle of the chosen. Amongst the acclaimed of Al Azhar University. Sitting amongst those of the highest learning – and teaching them.

On your return journey to Katsina, from pilgrimage to Mecca, you passed again through Cairo. Invited there by Hassan al-Jabarti, to join his group of selected brilliance. Stimulated by the discourse, you continued to write. On grammar and logic, as well as subject matter you are most known for, such as mathematics.

You shone amongst the iridescent of Cairo: the alumni of Al Azhar and other great institutions. They basked in your knowledge, as you were warmed by theirs. At the shrine of science, they knelt in homage to the Creator.

Here comes the great scholar,

Hassan al-Jabarti.

Host of bread and bed,

With furrowed head,

Puzzled by astrology.

Last week he came,

Trapped by numerology.

Who better to release him,

Than the Nigerian pilgrim;

Muhammed al-Fulani al-Kishnawi.

Of Sudanese-Egyptian heritage, Hassan al-Jabarti – father of celebrated historian Abd al Rahman – was one of the great polymaths of the 18th Century. Muhammed al-Fulani al-Kishnawi, a master of mathematics and numerology, was a resident of Katsina, one of the great city states of northern Nigeria, renowned as a centre of learning, trade and architecture.

CATARACTS

Patricia Bath, Los Angeles, California, earned a B.A. From Hunter College, New York and a medical degree from Howard University, Washington, DC., developed the Laserphaco probe that could destroy cataracts. She went on to develop eight other devices, including one using ultrasound. Dr Bath has nine patents from 1988-2003 and has been nominated to the National Inventors Hall of Fame.

from Black Inventors: Crafting Over 200 Years of Success - Keith C. Holmes

DIABETES

Albert Ratsimamanga is by far the most renowned scientist from Madagascar. He was made famous by his extensive work on better understanding the healing properties of the unique endemic flora of Madagascar. He is credited with about 350 scientific publications on topics ranging from the function of the adrenal gland to natural remedies for diabetes.

from Global Voices

TUMORS

Abraha Habtemariam, Edinburgh, co-inventor, received two patents for ruthenium anticancer complexes and ruthenium (II) complexes for the treatment of tumors, 2004.

from Black Inventors: Crafting Over 200 Years of Success - Keith C. Holmes

TRYPANOSOMA

Organizing and delivering a course on the molecular cell biology and bioinformatics of two important African pathogens, Plasmodium (malaria) and Trypanosoma (sleeping sickness), kept the authors—ASCB members Keith Gull, Oxford, UK, and Dick McIntosh, University of Colorado—busy last July. We were joined by colleagues Luc Vanhamme, IBMM, Gosselies, Belgium, and **George Lubega**, Kampala, Uganda.

Much of the organization for the course onsite was done by George Lubega, working from the School of Veterinary Medicine at Makerere University. He studies *T. brucei*, the cause of Nagana, which is the animal equivalent of sleeping sickness.

from ASCB Newsletter Article - Jan.2007

OGBALU

"Historically, the participation and contribution of blacks in science programmes and careers cannot be overemphasized despite their initial denial of formal education during slavery. This shuts out many blacks from professional occupations and confined them to menial jobs in industries, farms and manual trades. However, a small number of exceptionally talented were able to obtain quality education and make significant contributions to world civilization. Of notes are mathematician and astronomer Benjamin Banneker and agricultural chemist George Washington Carver. These people have become legendary for their intellect and ingenuity. Rebecca Cole was the second black woman to graduate from medical school, 1867 in New York after Dr Elizabeth Blackwell, the first white woman physician. There were also a number of successful black inventors whose inventions proved useful and important. Thomas Jennings was the first black to hold a patent in America."

Dr David Ogbalu

Royal Society Newton International Fellow

from *The Royal Society* - 2018

SPOEL

"Black History Month is a wonderful time to take a moment to appreciate the contribution black scientists have made to science both at present and in the past. While diversity in science is currently increasing, we may still have some way to go. Therefore, we should remember that increased diversity will bring many benefits to science. Arguably the most important is related to the fact that too many young, bright minds from diverse backgrounds remain undiscovered. Increasing diversity amongst scientists now sends a powerful message to and captures the imagination of next generations: no matter where you are from, what you look like, or who you are, you can pursue a successful career in science and your ideas could help tackle the pressing problems of the world we live in"

Dr Steven H.Spoel

Royal Society Newton International Fellow

from *The Royal Society* - 2018

KAMKWAMBA

On a continent woefully short of electricity, 20-year-old **William Kamkwamba** has a dream: to power up his country one windmill at a time.

So far, he has built three windmills in his yard here, using blue-gum trees and bicycle parts. His tallest, at 39 feet, towers over this windswept village, clattering away as it powers his family's few electrical appliances: 10 six-watt light bulbs, a TV set and a radio. The machine draws in visitors from miles around.

from article by Sarah Childress - *The Wall Street Journal* - Dec.2007

A crippling famine forced **Kamkwamba** to drop out of school, and he was not able to return to school because his family was unable to afford the tuition fee. In a desperate attempt to retain his education, Kamkwamba began to frequently visit the village library. It was there that Kamkwamba discovered his true love for electronics. Before, he had once set up a small business repairing his village's radios, but his work with the radios had not earned him much money.

Kamkwamba, after reading a book called *Using Energy*, decided to create a makeshift wind turbine. He experimented with a small model using a cheap dynamo and eventually made a functioning wind turbine that powered some electrical appliances in his family's house. Local farmers and journalists investigated the spinning device and Kamkwamba's fame in international news skyrocketed. A blog about his accomplishments was written on Hacktivate and Kamkwamba took part in the first event celebrating his particular type of ingenuity called Maker Faire Africa in Ghana in August 2009

from Wikipedia

Last night at SXSW, *William and the Windmill* was awarded one of the festival's top two honors, taking home Grand Jury Award for Documentary. The film tells the story of TED Speaker **William Kamkwamba** who has come to be known by the title of his memoir, *The Boy Who Harnessed the Wind*. At age 14, Kamkwamba built a windmill out of junk parts, adapting a design he saw in a library book in order to provide electricity for his family in rural Malawi. This incredible feat of engineering caught our attention, and he was invited to speak at TED Global 2007. His 6-minute talk, called "How I Harnessed The Wind" was life-changing and catapulted him from regular teenager to international energy superstar.

from article by Kate Torgovnick May - *TED Blog* - May 2013

ENGINEER

Never one to flinch in the face of a challenge, Mary completed the courses, earned the promotion, and in 1958 became NASA's first black female engineer. That same year, she co-authored her first report, Effects of Nose Angle and Mach Number on Transition on Cones at Supersonic Speeds.

Mary Jackson began her engineering career in an era in which female engineers of any background were a rarity; in the 1950s, she very well may have been the only black female aeronautical engineer in the field. For nearly two decades she enjoyed a productive engineering career, authoring or co-authoring a dozen or so research reports, most focused on the behavior of the boundary layer of air around airplanes. As the years progressed, the promotions slowed, and she became frustrated at her inability to break into management-level grades. In 1979, seeing that the glass ceiling was the rule rather than the exception for the center's female professionals, she made a final, dramatic career change, leaving engineering and taking a demotion to fill the open position of Langley's Federal Women's Program Manager. There, she worked hard to impact the hiring and promotion of the next generation of all of NASA's female mathematicians, engineers and scientists.

from NASA

ASTRONAUT

Mae C. Jemison (born October 17, 1956) is an American astronaut and physician who, on June 4, 1992, became the first African-American woman to be admitted into NASA's astronaut training program. On September 12, 1992, Jemison finally flew into space with six other astronauts aboard the *Endeavour* on mission STS-47, becoming the first African-American woman in space. In recognition of her accomplishments, Jemison has received several awards and honorary doctorates.

During her eight days in space, Jemison conducted experiments on weightlessness and motion sickness on the crew and herself. In all, she spent more than 190 hours in space before returning to Earth on September 20, 1992. Following her historic flight, Jemison noted that society should recognize how much both women and members of other minority groups can contribute if given the opportunity.

from *Biography*

iNVENTORS

Some of the companies that own patents by Black inventors

GENERAL ELECTRIC

FORD MOTOR COMPANY

E.i. DU PONT DE NEMOURS AND COMPANY

i.B.M.

JOHNSON RESEARCH AND DEVELOPMENT

MICROSOFT CORPORATION

HOWARD UNiVERSITY

U.S.ARMY

OSAKA BiOSciENCE iNSTiTUTE, JAPAN

CANADA NATURAL RESOURCES

**CENTRE NATiONAL DE LA RECHERCHE
SciENTiFiQUE, FRANCE**

STATE OF NiGER

**NATiONAL iNSTiTUTE FOR PHARMACEUTiCAL RESEARCH,
NiGERiA**

**iNSTiTUT MALAGACHE DE RECHERCHES
APPLiQUES, MADAGASCAR**

from Black Inventors: Crafting Over 200 Years of Success - Keith C. Holmes