

**AFRICAN-AMERICANS IN MATHEMATICAL SCIENCES -
A CHRONOLOGICAL INTRODUCTION**

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ABSTRACT

In this paper, a chronological introduction of African-Americans in the field of Mathematical Sciences is presented.

KEYWORDS

African-Americans, mathematical sciences.

AMS Subject Classification: 01A05; 01A07; 01A70; 01A85

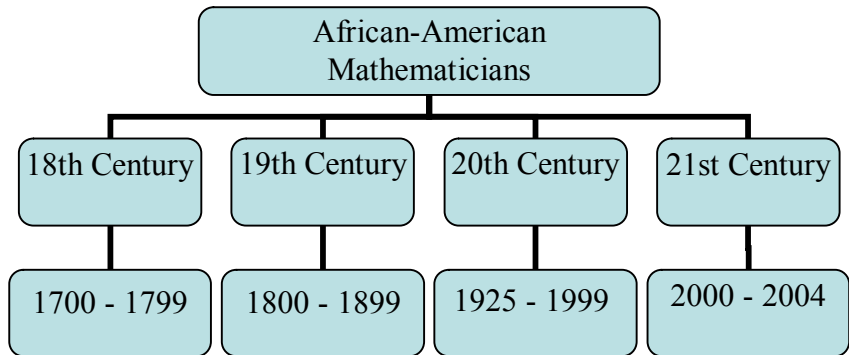
1. INTRODUCTION

The accomplishments of the past and present can serve as pathfinders to present and future mathematicians. African- American mathematicians have contributed in both large and small ways that has been overlooked when chronicling the history of science. By describing the scientific history of selected African-American men and women within mathematical sciences we can see how the efforts of individuals have advanced human understanding in the world around us. The abilities and accomplishments of these Afro-American scholars of science and mathematics cannot be underrated. History bears testimony to their achievements. The purpose of this paper is to highlight and exhibit the accomplishments of African-Americans within the Mathematical Sciences. The materials presented are based on the “*Mathematicians of the African Diaspora*”, (www.math.buffalo.edu/mad/index.html).

The organization of this paper is as follows. Section 2 contains a Tree Diagram of African-Americans in the mathematical sciences by dividing it into four different periods, beginning from 18th century to present. These periods have been further classified indexed by year. In Section 3, a chronology of African-Americans in mathematical sciences is presented. The statistics on the numbers of African-Americans receiving Ph.D.’s in mathematics, during the period 1925 – 2004, have been presented in Section 4. The achievements of African-Americans in the mathematical sciences are highlighted in section 5. The concluding remarks are presented in Section 6.

2. A TREE DIAGRAM

The following is a Tree Diagram depicting the different periods of African-Americans in Mathematical Sciences.



3. A CHRONOLOGY OF AFRICAN-AMERICANS IN MATHEMATICAL SCIENCES

The following is a chronology of African-Americans in mathematical sciences.

3.1 AFRICAN-AMERICAN MATHEMATICIANS OF 18TH CENTURY

The names of the following African-Americans of 18th century are available through historical records, who have contributed in the field of mathematical sciences:

- (i) **Muhammad ibn Muhammad (16?? - 1741)**
- (ii) **Thomas Fuller (1710 - 1790)**
- (iii) **Benjamin Banneker (1731 - 1806)**

Development of African-American influence in mathematical sciences began with the work of Benjamin Banneker, who used the method of doubling sequences to generate an estimate for the method of false position. Benjamin Banneker is often recognized as the first African American mathematician. However, the names of ex-slave Thomas Fuller and the Nigerian Muhammad ibn Muhammad also appear in history, whose mathematical

activities predate Benjamin Banneker. It is interesting to note that none of these men had formal degrees.

3.2 AFRICAN-AMERICAN MATHEMATICIANS OF 19TH CENTURY

Below is the list of three African-American mathematicians of 19th century, who are prominent for their contribution to the knowledge and advancement of mathematical sciences.

(i) Charles Reason (1814 - 1893) is considered to be the first African-American to receive a faculty position in mathematics, in the year 1849, at a predominantly white institution - Central College in Cortland County, New York.

(ii) Edward Alexander Bouchet was the first African-American to earn a Ph.D. in Physics (Science), in the year 1878, from Yale University, and only the sixth American to possess a Ph.D. in Physics. It should be noted that Yale University became the first United States of America institution, in the year 1862, to award a Ph.D. in mathematics.

(iii) Kelly Miller was the first African American to study graduate mathematics, in the year 1886, at Johns Hopkins University. It will be interesting to note that Johns Hopkins University was the first American University to offer a program in graduate mathematics.

3.3 AFRICAN-AMERICAN MATHEMATICIANS OF 20TH CENTURY

The list of African-American mathematicians of 20th century is very exhaustive. In the following paragraph, a chronology of African-Americans, who have excelled and contributed to the knowledge and advancement of mathematical sciences, during the period 1900 – 1999, is presented, (see, for example, the “*Mathematicians of the African Diaspora*” website created and maintained by Professor Dr. Scott W. Williams, Professor of Mathematics University at Buffalo, SUNY, among others).

(1) 1925: Elbert Frank Cox was the first African-American to earn a Ph.D. in Mathematics in 1925 from Cornell University. There were 28 Ph.D.'s awarded in the United States that year.

(2) 1928: Dudley Weldon Woodard was the second African-American to earn a Ph.D. in Mathematics in 1928 from the University of Pennsylvania.

(4) 1933: William Schieffelin Claytor was the third African-American to earn a Ph.D. in Mathematics (University of Pennsylvania). Dr. Claytor had an extraordinary promise as a mathematician.

(5) 1934: Walter R. Talbot was the fourth African-American to earn a Ph.D. in Mathematics (University of Pittsburgh).

(6) 1938: Ruben R. McDaniel (Cornell University), and **Joseph Pierce** (University of Michigan) were the fifth and sixth African-Americans to earn a Ph.D. in Mathematics in the year 1938.

(7) 1941: David Blackwell was the seventh African-American to earn a Ph.D. in Mathematics, in the year 1941, from the University of Illinois. Dr. Blackwell earned his Ph.D. at the age of 22. He is regarded as one of the greatest African-American mathematician of the 20th century. Dr. Blackwell is famous and well-known in the world of mathematics for his seminal “**Rao-Blackwell Theorem**” which gives a technique for obtaining unbiased estimators with minimum variance with the help of sufficient statistics (see, for example, Dudewicz and Mishra (1988), Kapur (1999), and Rohatgi and Saleh (2001), among others). In 1954, Dr. David Blackwell became the first African-American to hold a permanent position at one the major universities, University of California at Berkeley.

(8) 1942: J. Ernest Wilkins became the eighth African-American to earn a Ph.D. in Mathematics, in the year 1942, from the University of Chicago. Dr. Wilkins earned his Ph.D. at the age of 19. He is also regarded as one of the greatest and rarest African-American mathematician of the 20th century

(9) 1943: Euphemia Lofton Haynes (Catholic University), the first African -American woman, and **Clarence F. Stephens** (University of Michigan) were the ninth and tenth African-Americans, respectively, to earn a Ph.D. in Mathematics (see, for example, the websites “*Black Women in Mathematics*” and “*Timeline of African American Ph.D.'s in Mathematics*,” among others). The Morgan-Potsdam Model is the name given to a method of the teaching of mathematics developed by Dr. Clarence F. Stephens at Morgan State University and refined at the State University of New York College at Potsdam. Dr. Clarence F. Stephens also received the Mathematical Association of America Gung-Hu Award for the Pottsdam Miracle. Under the direction of Dr. Clarence Stephens, Morgan State University became the first institution to have three African-Americans of the same graduating class (1964), who obtained a Ph.D. in Mathematics. These people were Dr. Earl Barnes (University of Maryland, 1968), Dr. Arthur Grainger (University of Maryland, 1972), and Dr. Scott Williams (Lehigh University, 1969). This is still a record that stands among all U.S. universities and colleges.

(10) 1944: This is the year when the eleventh, twelfth and thirteenth African- Americans, **Joseph J. Dennis** (from Northwestern University), **Wade Ellis, Sr.** and **Warren Hill Brothers** (both from University of Michigan), respectively, earned a Ph.D. in Mathematics.

(11) 1945: Jeremiah Certaine was the fourteenth African-American to earn a Ph.D. in Mathematics, in the year 1945, from the University of Michigan.

(12) 1949: Evelyn Boyd Granville was the fifteenth African-American and the second African-American Woman to earn a Ph.D. in Mathematics, in the year 1949, from Yale University.

(13) 1950: Marjorie Lee Browne (University of Michigan), the third African-American Woman, and **George H. Butcher** (University of Pennsylvania) were the sixteenth and seventeenth African-Americans, respectively, to earn a Ph.D. in Mathematics, in the year 1950.

(14) 1953: Luna I. Mishoe was the eighteenth African-American to earn a Ph.D. in Mathematics from New York University.

(15) 1954: Charles Bell was the nineteenth African-American to earn a Ph.D. in Mathematics from the University of Notre Dame.

(16) 1955: Vincent McRea (Catholic University) and **Lonnie Cross** (Cornell University) were the twentieth and twenty-first African-Americans to earn a Ph.D. in Mathematics.

(17) 1956: Lloyd K. Williams (University of California at Berkeley) and **Henry M. Elridge** (University of Pittsburgh) were the twenty-second and twenty-third African-Americans to earn a Ph.D. in Mathematics in the year 1956.

(18) 1957: Eugene A. Graham, Jr. (University of Turin in Italy) and **Elgy S. Johnson** (Catholic University) were the twenty-fourth and twenty-fifth African-Americans to earn a Ph.D. in Mathematics in the year 1957. Dr. Graham, probably, was the first African-American earning a Mathematics Ph.D. outside the U.S.

(19) 1959: Laurence Harper, Jr. (University of Chicago) was the twenty-sixth African-American Ph.D. in Mathematics.

(20) 1960 – 1999: Above, we have tried to enlist the African-Americans in the field of mathematical sciences from 1900 to 1959. It is gratifying to note that a number of African-Americans earned their Ph.D.'s in the field of Mathematical Sciences from 1960 to 1999, (see, for example, the website "<http://www.math.buffalo.edu/mad/yearindex.html>," for details). For the interest of the readers, their names are presented below in chronological order.

(i) 1960: Charles G. Costley; Joshua Leslie; Argelia Velez-Rodriguez

(ii) 1961: Jesse P. Clay; Sadie Gasaway; John Gilmore; Rogers Newman

(iii) 1962: Robert O. Abernathy; Joseph Battle; John Henry Bennett; Gloria Conyers Hewitt; Georgia Caldwell Smith; Louise Nixon Sutton; Theodore R. Sykes

- (iv) 1963:** Simmie S. Blakney; Earl O. Embree; William A. McWorter
- (v) 1964:** Louis C. Marshall; Alfred D. Stewart; Mary C. Wardrop-Embry
- (vi) 1965:** James A. Donaldson; Beryl E. Hunte; John H. McAlpin
- (vii) 1966:** John A. Ewell III; William T. Fletcher; Eleanor Dawley Jones; Eugene W. Madison; Vivienne Malone Mayes; Shirley Mathis McBay; Charles E. Morris
- (viii) 1967:** Harvey T. Banks; Llayron L. Clarkson; Geraldine Darden; Samuel H. Douglas; Annie M. Watkins Garraway; Melvin Heard; Percy A. Pierre; Thyrsa Anne Frazier Svager; Ewart A. C. Thomas; Ralph B. Turner; Irving E. Vance
- (ix) 1968:** Earl R. Barnes; Dennis D. Clayton; Mary Deconge-Watson; Lloyd Demetrius; Milton A. Gordon; Velmer Headley; Guy T. Hogan; Phillip E. McNeil; Ronald E. Mickens; Wilbur L. Smith; Donald F. St.Mary; Donald Weddington; James H. White
- (x) 1969:** Boniface Eke; David M. Ellis; Etta Falconer; Fannie Ruth Gee; Raymond L. Johnson; Wendell P. Jones; Benjamin J. Martin; Robert Smith; Scott W. Williams; Vernon Williams
- (xi) 1970:** John C. Amazigo; Dean R. Brown; Japeth Hall, jr.; Lonnie W. Keith; Curtis S. Means; Mutio Nguthu; G. Edward Njock; Sonde Nwankpa; Winston A. Richards; Nathan F. Simms, Jr.; Eddie R. Williams
- (xii) 1971:** Roosevelt Calbert; Joella Hardeman Gipson; Orville Edward Kean; Hugh G.R. Millington; Dolores Spikes
- (xiii) 1972:** Ethelbert Nwakuche Chukwu; Oscar H. Criner, III; Carlos Ford-Livene; Christopher Olutunde Imoru; C. Dwight Lahr; John Nguthu Mutio; James A. White; Floyd L. Williams
- (xiii) 1973:** Annas Aytch; Garth A. Baker; Robert Bozeman; Therese H. Braithwaite; Lloyd Gavin; Seyoum Getu; James E. Ginn; Isom H. Herron; Frank A. James; Manuel Keepler; Clement McCalla; Michael Payne; Evelyn Thornton; Hampton Wright
- (xiv) 1974:** Elayne Arrington; Della D. Bell; Roosevelt Gentry; Tepper L. Gill; Johnny L. Houston; Arthur M. Jones; Nathaniel Knox; Rada Higgins McCreadie; Kevin Osondu; Chester C. Seabury; Willie E. Taylor; Alton S. Wallace; Harriet R. Junior Walton
- (xv) 1975:** Bola Olujide Balogun; Arthur D. Grainger; Roy King; James Nelson, Jr; Wandera Ogana; Osborne Parchment

(xvi) 1976: David I. Adu; James Howard Curry; David Green, Jr; Leon B. Hardy; Salah-Eldin A Mohammed; Lawrence R. Williams

(xvii) 1977: Eddie Boyd Jr.; Gerald R. Chachere; Louis Dale; Ebenezer O. George; Theodore R. Hatcher; David M. James; Carl L. Prather

(xviii) 1978: Reuben O. Ayeni; Clifton Edgar Ealy; Carroll J. Guillory; Fern Y. Hunt; Karolyn Ann Morgan; Jonathan Chukwuemeka Nkwuo; Donald St. P. Richards; Wesley Thompson; Henry N. Tisdale

(xix) 1979: Samuel Omoloye Ajala; Gary S. Anderson; Johnny E. Brown; Emma R. Fenceroy; R. Charles Hagwood; Walker Eugene Hunt; Donald R. King; Keith Mitchell; Claude Packer; George A. Roberts

(xx) 1980: Curtiss A. Barefoot; Robert M. Bell; Ronald Biggers; Sylvia T. Bozeman; Suzanne Craig; Gaston M. N'guérékata; James E. Robinson; Daniel Arthur Williams

(xxi) 1981: Overtoun M. Jenda; Corlis P. Johnson; William A. Massey; David O. Olagunju; Gabriel A. Oyibo

(xxii) 1982: William A. Hawkins jr.; Peter D. Nash; Janice B. Walker

(xxiii) 1983: Melvin R. Currie; Carolyn Mahoney; Bernard A. Mair; Bessie L. Tucker

(xiv) 1984: Abdulkeni Zekeria; Curtis Clark; Carl Graham; Kevin Oden; Alade Tokuda

(xv) 1985: Darry Andrews; Donald Ray Cole; Ibula Ntantu; Ronald Patterson; Bonita V. Saunders; Daphne Letitia Smith

(xvi) 1986: Semere Arai; Stella R. Ashford; Busiso Chisala; Kevin Corlette; Arouna Davies; Lorenzo O. Hilliard; Iris Marie Mack; Walter M. Miller; Denise M. Stephenson-Hawk; James C. Turner

(xvii) 1987: Richard Lance Baker; Shiferaw Berhanu; Dennis Davenport; Nathaniel Dean; George Edmunds; Dawit Getachew; Amos Olagunju; DeJuran Richardson; Hanson Umoh; Nathaniel Whitaker

(xviii) 1988: Emery Neal Brown; Dominic P. Clemence; Vanere Goodwin; Abdulcadir Issa; Amha Tume Lisan; Frank Albert Odoom; Kweku-Muata Agyei Osei (Noel Bryson); Wanda Patterson; Lemuel Riggins; Elaine Smith; Gregory Smith; Vernise Steadman; Leon Woodson; Roselyn Elaine Williams; Leon C. Woodson; Paul E. Wright

(xix) 1989: Tor A. Kwembe; Joan Sterling Langdon; Jean-Bernard Nestor; Abdul-Aziz Yakubu

(xx) 1990: Gideon Abay Asmerom; Teresa Edwards; Rodney Kirby; Janis Oldham; Michael M. Tom

(xxi) 1991: Harun Adongo; Adebisi Agboola; Patricia Beaulieu; Aniekan A. Ebiefung; Jacqueline M. Hughes-Oliver; Sizwe G. Mabizela; Katherine Okikiolu; Yewande Olubummo; Broderick O. Oluyede; Arlie O. Petters; Philippe Rukimbira (FIU)

(xxii) 1992: Evans Afenya; Gerald Yinkefe Agbegha; Donald Martin; Bi Roubolo Vona

(xxiii) 1993: Halima Ali; Danielle Carr; Duane Anthony Cooper; Koffi Fadimba; Stanley Einstein-Matthews; Abba Gumel; Lancelot F. James; Camille A. McKayle; Christine McMillan; Tonya M. Smoot

(xxiv) 1994: Kokou Y. Abalo; Patty Anthony; Ron Buckmire; Dawn Lott; Zephyrinus Okonkwo; Gregory Smith; Frederick J. Semwogerere; Barama Toni

(xxv) 1995: Joseph Apaloo; Gregory Battle; Kossi Edo; Suzanne L. Weekes

(xxvi) 1996: Randolph G. Cooper III; Neil Flowers; Henry Gore; Errol Rowe; Temba Shonhiwa; Aissa Wade

(xxvii) 1997: Afi Davis Harrington; Francis Y. Jackson; Michael Keeve; Tuwaner Lamar; Alfred Noël; Richard F. Patterson; Sonya Stephens; Asamoah Nkwanta; Remi Ombolo; Elaine Terry; Alain Togbe; Enoch Z. Xaba

(xxviii) 1998: Paulette Ceesay; Terrence Edwards; Neal Jeffries; Julie S. Ivy; Trachette Jackson; Mark Lewis; Lemuel Riggins; Rhonda Sharpe; Monica Y. Stephens; Kim Y. Ward; Pamela J. Williams

(xxix) 1999: Garikai Campbell; Gelonia Dent; Berhane T. Ghaim; Edray H. Goins; Daniel Lee Hunt; Anthony D. Jones; Alvina M. Johnson; Chawne Monique Kimber; Kathryn M. Lewis; Cassandra McZeal; Desmond Stephens; Peter Stephens; Shree Whitaker

3.4 AFRICAN-AMERICAN MATHEMATICIANS OF 21ST CENTURY (2000 – 2004)

The names of African-American mathematicians, for the period 2000 - 2004, are presented below in chronological order.

(i) 2000: Kim Woodson Barnette; Serge A. Bernard; Shea Burns; Illya V. Hicks; Keith E. Howard; Tasha Inniss; Otis B. Jennings; Sean Paul; Selemon Getachew; Sherry Scott; Talitha M. Washington; Kimberly Weems

(ii) 2001: Jamylle L. Carter; Naiomi T. Cameron; Shurron M. Farmer; Jeffery Fleming; Russell Goward; Leona Harris; Rudy Horne, Jr.; Clifford Johnson; Daniel R. Krashen;

Lynnell Matthews; Jillian McLeod; Shona Davidson Morgan; Kimberly Flagg Sellers; Idris Stoval; Craig Sutton; Talitha M. Washington

(iii) 2002: Gabriel Ayine; Martial Marie-Paul Agueh; Louis Beaugris; Nancy Glenn; Jean-Michelet Jean-Michel; Djivede A. Kelome; Lynelle Matthews; Jillian McLeod; Iris Gugu Moche; Tolu Okusanya; Jean M. Tchuente; Howard Thompson; Gikiri Thuo; Donald C. Williams

(iv) 2003: Sammani D. Abdullahi; Gerard M. Awanou; Sharon Clarke; Berhane T. Ghaim; Jean-Michelet Jean-Michel; Llolsten Kaonga; Nolan MacMurray; Monica Jackson; Kasso Okoudjou; Miranda I. Teboh-Ewungkem; Archie Wilmer III

(v) 2004: Milton H. Nash; Donald Outing; Rachel E. Vincent

4. STATISTICS OF AFRICAN-AMERICAN Ph.D.'s IN MATHEMATICAL SCIENCES (1925 – 2004)

According to the list as presented in Section 3 above, it is interesting to note that a total of 392 African-Americans had received a Ph.D. in mathematics during the period 1925 – 2004. For the sake of our statistical computations, we have divided this period into four different sub-periods: 1925 – 1944, 1945 – 1964, 1965 – 1984, and 1985 – 2004. Out of 392 African-American Ph.D.'s in mathematics, 3.32 % received their Ph.D.'s during the period 1925 – 1944, 8.42 % received their Ph.D.'s during the period 1945 – 1964, 40.05 % received their Ph.D.'s during the period 1965 – 1984, and 48.21 % received their Ph.D.'s during the period 1985 – 2004. From the analysis presented here, it is easily seen that the maximum number of African-Americans receiving Ph.D.'s in mathematics was during the period 1985 – 2004. The statistics on the numbers of African-Americans receiving Ph.D.'s in mathematics, during the period 1925 – 2004, have been presented in the Figure 4.1 below.

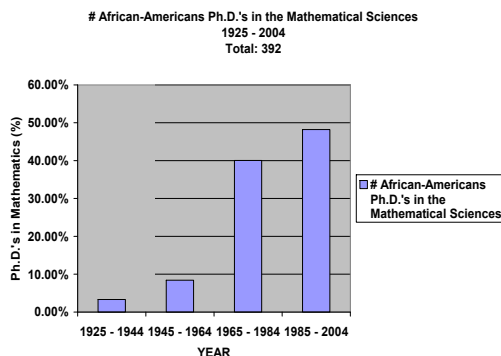


Figure 4.1: African-American Ph.D.'s in Mathematical Sciences (1925 – 2004)

5. HIGHLIGHTS ON THE ACHIEVEMENTS OF AFRICAN-AMERICANS IN MATHEMATICAL SCIENCES

In the following paragraphs, achievements of some African-Americans in the field of mathematical sciences are highlighted.

- It is interesting to note that, during the period 1925 - 1947, 12 African-Americans earned a Ph.D. in Mathematics.
- Furthermore, half of all African-Americans who had earned their Ph.D.'s in Mathematics, by the time of the year 1945, were students of the University of Michigan.
- During the period 1943 - 1969, thirteen African-American women earned a Ph.D. in Mathematics.
- It is also interesting to know that one of the most important landmarks and rarest achievements in the field of mathematical sciences was when three African-American Women, Drs. Tasha Innis, Kimberly Weems, and Sherry Scott, received the Ph.D. in mathematics, in the same year 2000, from the same university, University of Maryland, College Park, Maryland.
- In 1929, **Dr. Dudley Woodard** was the first African-American to publish a research paper in mathematical sciences in an accredited mathematics journal, entitled, "On two dimensional analysis situs with special reference to the Jordan Curve Theorem," *Fundamenta Mathematicae*, 13 (1929), 121-145.
- The first African American publication in a top research journal was Dr. William W. S. Claytor's *Topological Immersion of Peanian Continua in a Spherical Surface*, *Annals of Mathematics*, 35 (1934), 809-835.
- **Dr. Gloria Ford Gilmer** is considered to be the first African-American woman to publish the **first two** (non-Ph.D.-thesis) mathematics research papers, jointly with another African-American, Dr. Luna I. Mishoe, in the year 1956, entitled:
 - (a) "On the limit of the coefficients of the eigenfunction series associated with a certain non-self-adjoint differential system", *Proc. Amer. Math. Soc.* 7 (1956), 260-266.
 - (b) "On the uniform convergence of a certain eigenfunction series", *Pacific J. Math.* 6 (1956), 271-278.

- The second joint research paper by two African-Americans, Charles Bell and David Blackwell, in collaboration with Leo Breiman, was published in the year 1960, entitled “On the completeness of order statistics,” *Ann. Math. Stat.*, 31, 1960, 794-797.
- In 1961, **Dr. Lonnie Cross** shocked the African-American and mathematics community by changing his name to **Abdulalim Shabbazz**, and becoming the first African-American scientist to embrace the followers of Elijah Mohammed, the leader of the African-American Moslem community.
- In 1963, **Dr. Grace Lele Williams** became the first Nigerian woman to earn a Ph.D. in Mathematics from the University of Chicago.
- In 1964, **Dr. David Blackwell** became the first African-American mathematician to Chair a department, Department of Statistics, at one of the major universities, University of California at Berkeley.
- In 1965, **Dr. David Blackwell** became the first African-American named to **The National Academy of Sciences**.
- From 1968 to 1969, **Dr. Percy A. Pierre** was White House Fellow for the Executive Office of the President of the United States.
- In 1969, **Clarence Ellis** became the **first African-American to earn a Ph.D. in Computer Science from the** University of Illinois.
- Two mathematics graduate students, **Johnny Houston** and **Scott Williams**, at the January 1969 Annual Meeting of The American Mathematical Society, called together a group of African-American mathematicians, and begat an adhoc organization, called “Black and Third World Mathematicians,” which, in 1971, changed its name to **The National Association of Mathematicians (NAM)**.
- In 1969, the book “**Negroes in Science - Natural Science Doctorates**” by James M. Jay was published by the Balamp Company.
- In 1972, **Professor Morris Sika Alala** became the first Kenyan African Full Professor of Mathematics at the University of Nairobi.
- In 1974, **Dr. J. Ernest Wilkins, Jr.**, became the President of the American Nuclear Society.
- **Alton Wallace** became the first African-American to earn a Ph.D. in mathematics, in the year 1974, under the direction of an African-American thesis advisor, **Dr. Raymond L. Johnson**, at the University

of Maryland.

- The **African Mathematical Union (AMU)** was founded in Africa In 1975. Its first president was a Cameroonian mathematician, **Professor Henri Hogbe Nlend**.
- The first AMU **Pan-African Congress of Mathematicians** was held in **Rabat, Morocco**, in the year 1976.
- In 1976, **Dr. J. Ernest Wilkins, Jr.**, became a member of **The National Academy of Engineers**.
- **Howard University** established the first Ph.D. program in Mathematics at a Historically Black University and College (HCBU), in the year 1976, under the guidance of **Dr. James Donaldson**, the Chair of its Mathematics Department, and **Dr. J. Ernest Wilkins, Jr.**, then a member of its Physics Department.
- In 1979, **Dr. David Blackwell** won the **von Neumann Theory Prize** of the Operations Research Society of America.
- **The National Association of Mathematicians (NAM)** inaugurated the first **Claytor Lecture**, in 1980, with **Professor James Josephs** as the speaker.
- In 1980, the first book on African American Mathematicians, “**Black Mathematicians and their Works**,” by V. K. Newell, J. H. Gipson, L. W. Rich, and B. Stubblefield, was published by Dorrance & Company.
- The **Southern African Mathematical Sciences Association (SAMSA)** was founded among the 12 countries of Southern Africa in 1980.
- In 1981, **Dr. C. Dwight Lahr** became the first African-American to get tenure in a department of mathematics of an **Ivy League School**.
- In 1984, **Dr. C. Dwight Lahr** became the first African-American to become Full Professor in a department of mathematics of an **Ivy League School**.
- In 1986, the first issue of the **African Mathematical Union's Commission on the History of Mathematics in Africa (AMUCHA)** was presented.
- In 1990, the **African Mathematical Union Commission on Women in Mathematics in Africa (AMUCWMA)** was founded with **Dr.**

Grace Lele Williams as its Chairman.

- In 1992, **Dr. Gloria Gilmer** became the first woman to deliver a major the **National Association of Mathematicians (NAM)** lecture.
- In 1995, the first **Conference for African American Researchers in the Mathematical Sciences (CAARMSI)** was held at the Mathematical Sciences Research Institute (MSRI), University of California, Berkeley. The conference was organized by three prominent African-American mathematicians, **Drs. Raymond Johnson, William Massey, and James Turner**, in collaboration with Dr. William Thurston. Since then CAARMS has been held each year.
- In 1997, **Dr. Katherine Okikiolu** became the first African-American to win Mathematics' most prestigious young person's award, the **Sloan Research Fellowship**. She also was awarded the new \$500,000 **Presidential Early Career Awards for Scientists and Engineers**.
- In 1997, the organization **Council for African American Researchers in the Mathematical Sciences (CAARMS)** was formed to oversee the CAARMS conferences and to aid African Americans interested in research in mathematics.
- Also in 1997, **Nathaniel Dean's** book “**African American Mathematicians**” was published by the American Mathematical Society.
- In 2001, **Dr. William A. Massey** became the first African-American Full Professor (Edwin S. Wilsey Professor) of Operations Research and Financial Engineering at Princeton University.
- The following is the list of some articles published in best and reputed mathematics journals of high quality by African-American mathematicians:
 - ❖ **Schieffelin Claytor**, Topological Immersion of Peanian Continua in a Spherical Surface, The Annals of Mathematics, 2nd Ser. **35** (1934), 809-835.
 - ❖ **Schieffelin Claytor**, Peanian Continua Not Imbeddable in a Spherical Surface, The Annals of Mathematics, 2nd Ser. **38** (1937), 631-646.
 - ❖ **Blackwell, David**, Idempotent Markoff chains, The Annals of Mathematics, 2nd Ser. **43**, (1942). 560–567.

- ❖ **Wilkins, J. Ernest, Jr.** Multiple integral problems in parametric form in the calculus of variations. *The Annals of Mathematics* (2) **45**, (1944). 312--334.
- ❖ **Blackwell, David**, Finite non-homogeneous chains, *The Annals of Mathematics*, 2nd Ser. **46**, (1945). 594--599.
- ❖ **Wilkins, J. Ernest, Jr.** A note on the general summability of functions. *The Annals of Mathematics* (2) **49**, (1948). 189--199.
- ❖ Bellman, Richard; **Blackwell, David** On moment spaces. *The Annals of Mathematics*, 2nd Ser. **54**, (1951). 272--274.
- ❖ **Kevin Corlette**. Archimedean superrigidity and hyperbolic geometry. *Annals of Mathematics* 2nd Series **135** (1992), no. 1, 165-182
- ❖ **Gangbo, Wilfrid**. McCann, Robert J. The geometry of optimal transportation. *Acta Mathematica* **177** (1996), no. 2, 113--161.
- ❖ **Okikiolu, Katherine**. Critical metrics for the determinant of the Laplacian in odd dimensions. *The Annals of Mathematics*, 2nd Ser. **153** (2001), no. 2, 471--531.
- ❖ E. A Carlen and **W. Gangbo**. Constrained steepest descent in the 2-Wassertein metric, *Annals of Math.* **157**, May (2003).

➤ **The First Africans**

- **1947:** The earliest record of a Mathematics Ph. D. by an African appears to be a Ghanaian African, **Dr. A. M. Taylor** from Oxford University, U.K., in 1947.
- **Nigeria:** Indigenous mathematics research activities in Nigeria were pioneered by **Drs. Chike Obi, Adegoke Olubummo (1955)**, and **James Ezeilo**, who obtained their Ph.D.'s in mathematics from British Universities in the 1950's (see, for example, "**Mathematics in Nigeria Today**," among others). **Dr. Grace Lele Williams** became, in 1963, the first Nigerian woman to earn a Ph.D. in mathematics from the University of Chicago.

6. CONCLUDING REMARKS

The purpose of this paper was to present a chronological introduction of African-Americans in the field of Mathematical Sciences. It is evident that these African-American Mathematicians remain as a source of inspiration to us to excel in mathematics and other fields of knowledge, and achieve our goals. The achievements of these African-American Mathematicians, despite the difficulties they had to overcome, stand as a beacon for us. It is hoped that the materials presented in this article will be useful to the practitioners and researchers in various fields of theoretical and applied sciences who are interested in the knowledge of diverse cultures, including global and historical perspectives, with special reference to the field of mathematical sciences.

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REFERENCES

- Allen, J. E. (1971). *Black History, Past and Present*. Exposition Press Inc., Jericho, N. Y.
- Carwell, H. (1977). *Blacks in Science: Astrophysicist to Zoologist*, Exposition Press, Hicksville, N.Y.
- Dudewicz, E. J., and Mishra, S. N. (1988). *Modern Mathematical Statistics*. John Wiley & Sons, New York.
- Kapur, J. N., and Saxena, H. C. (1999), *Mathematical Statistics*. S. Chand & Company Ltd., New Delhi.
- Kenshaft, P. C. (1987). Black Men and Women in Mathematical Research. *Journal of Black Studies*, December, 19:2, 170 - 190.
- Newell, V. K., Gipson, J. H., Rich, L. W., and Stubblefield, B. (1980). *Black Mathematicians and their Works*, Dorrance & Company.
- Rohatgi, V. K., and Saleh, A. K. M. E. (2001). *An Introduction to Probability and Statistics*, John Wiley & Sons, Inc., New York.
- Sammons, V. O. (1989). *Blacks in Science and Education*. Hemisphere Publishers, Washington, D.C.

Sertima, I. V. (1983). *Blacks in Science*. Transactions Books.

Taylor, J., editor (1955). *The Negro in Science*. Morgan State College Press.

Williams, S. W. (1999). Black Research Mathematicians, African Americans in Mathematics II. *Contemporary Math.* 252, 165 - 168.

Williams, S. W. *A Modern History of Blacks in Mathematics*.
www.math.buffalo.edu/mad/madhist.html.

Williams, S. W. *Mathematicians of the African Diaspora*.
www.math.buffalo.edu/mad/index.html

Zaslavsky, C. (1973). *Africa Counts: Number and Pattern in Africa Culture*. Prindle, Weber & Schmidt.