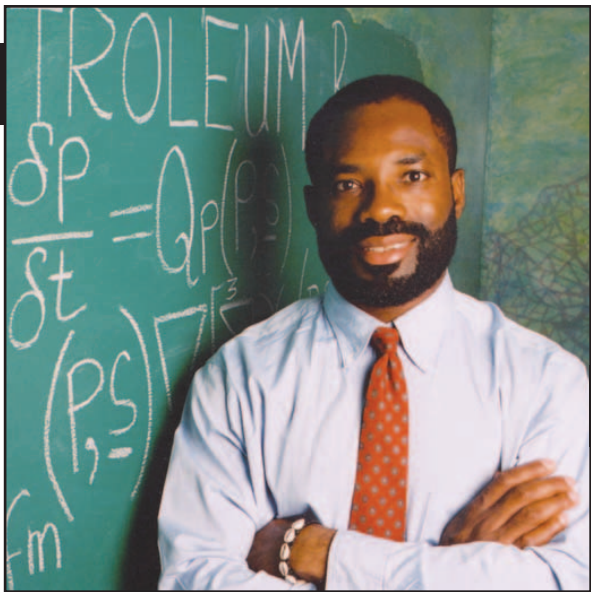


justina ford



philip emeagwali

african americans
who have helped
shape the world



Photo: Black American West
Museum & Heritage Center

TRAILBLAZERS OF SCIENCE AND TECHNOLOGY



bessie
coleman

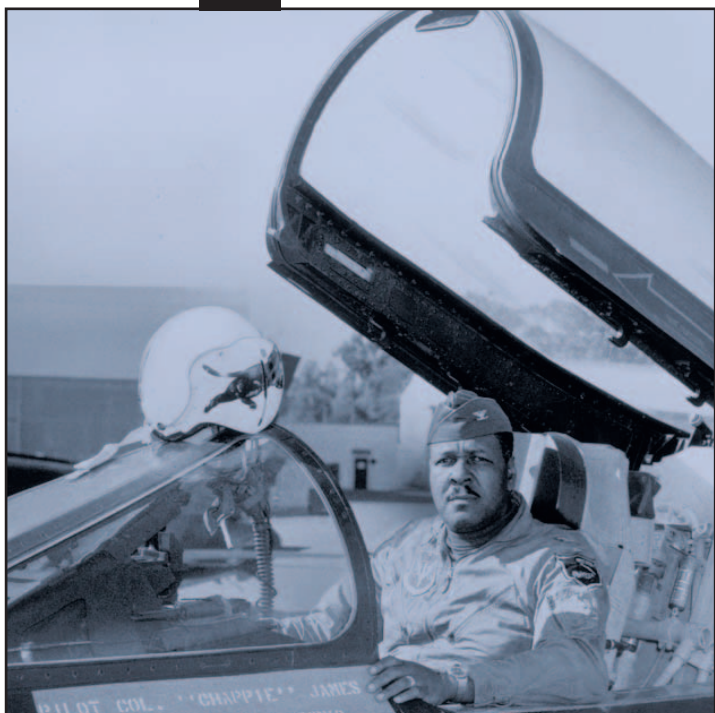


daniel james jr.



Photo Courtesy: NASA

mae jemison



File Photo: The Detroit News



Ford Motor Company Fund

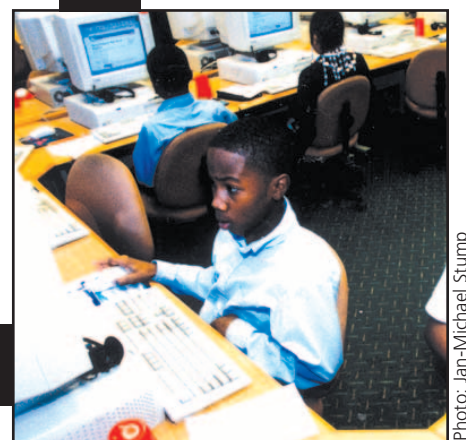


Photo: Jan-Michael Stump

'THE AVIATOR AND THE EXPLORER'

A welcome from Christy Coleman



Christy Coleman is President and CEO of the Charles H. Wright Museum of African American History.

The Charles H. Wright Museum of African American History and Ford Motor Company welcome you to the 2003 Ford Freedom Award. Together, we have designed a program that pays tribute to the lives and legacies of African Americans who have made tremendous contributions while facing often-overwhelming obstacles and challenges. The Ford Freedom Award pays tribute to those leaders who helped shape America.

Since 1999, the Ford Freedom Award program has combined prominent African American historical references with contemporary relevance. The 2003 Ford Freedom Award title is "The Aviator and the Explorer." This year's program

honors the late four-star General Daniel "Chappie" James Jr. as the Ford Freedom Award recipient. General James' achievements are respected around the world. He was one of the great Tuskegee Airmen pilots, and as a fighter pilot in Korea and Vietnam he flew nearly 180 combat missions. He was the first African American four-star general in the history of the U.S. military.

Former NASA astronaut Dr. Mae C. Jemison is the year's Ford Freedom Scholar. Dr. Jemison is an accomplished contemporary in the fields of aviation and science. In 1987 Dr. Jemison became the fifth African American astronaut and the first African American woman astronaut in NASA history. Dr. Jemison will share her perspectives on the challenges, opportunities and accomplishments of African Americans in aviation and science.

The program also recognizes Bessie Coleman, the first African American female international pilot, who was installed in the Museum's Ford Freedom Rotunda's "Ring of Genealogy" when it opened in 1997.

ABOUT THE MUSEUM

The late Dr. Charles H. Wright founded the Museum of African American History in 1965. Dr. Wright's vision was to create an institution dedicated to the African American experience. In addition to the "Ring of Genealogy," the Museum houses more than 20,000 artifacts and pieces of archival material. The Museum also has a research library, a 317-seat theater and the Museum Store, which sells authentic African and African American art, books and other merchandise.

The Museum also produces the annual "African World Festival" that showcases the various cultures of the African Diaspora. Each year, the festival held in Hart Plaza on the Detroit riverfront attracts more than one million people from around the world.

Come visit the Museum and become a member of the largest museum of its kind in the world. As we continue to educate and communicate the rich history of African Americans, we're fortunate to have this esteemed Museum right here in Michigan.



File Photo: The Detroit News

GEN. DANIEL JAMES JR.



Photo Courtesy: NASA

DR. MAE JEMISON

2003 FORD FREEDOM AWARD HONOREES

Science and Leadership

More minorities are entering science fields today than ever before. Yet businesses, government and universities would like to attract even more. As a class, discuss the advantages of careers in science and technology. Then find a science or technology business in the ads or stories of today's newspaper. Alone or in teams draw up a five-point message for a school assembly to attract African American students and others to a career with this business. Explain the importance of each point to the class.

Point 1 _____

Point 2 _____

Point 3 _____

Point 4 _____

Point 5 _____



PIONEER WITH THE TUSKEGEE AIRMEN

By Kathy Dahlstrom

Instead of 10 Commandments, General Daniel “Chappie” James Jr. had 11. He added “Thou Shalt Not Quit” to the list.

His determination helped him rise from pilot with little hope of seeing combat to the nation’s first black four-star general.

“I’ve fought in three wars and three more wouldn’t be too many to defend my country,” the highly decorated Air Force officer said when he received his fourth star as a general. “I love America and as she has weaknesses or ills, I’ll hold her hand.”

Daniel “Chappie” James is the 2003 winner of the Ford Freedom Award for past achievement in the field of aviation and technology.

From childhood, he dreamed of flying.

He grew up in Florida watching planes from Pensacola Naval Air Station fly by. At that time, African Americans served in the military but were not allowed to be military pilots.

Unhappy with Pensacola’s black schools, his mother started her own for children who lived in the neighborhood.

James—who got his nickname from his big brother—graduated from high school during the Great Depression. All his large family chipped in to help him attend Tuskegee Institute (now Tuskegee University) in Alabama.

He became a pilot and flight instructor in a program based at Tuskegee Army Airfield designed to train America’s first black military pilots. He then joined the group, known as the Tuskegee Airmen.

These brave black pilots flew planes alongside American bombers during World War II. They

protected them from German attackers and shot down enemy warplanes, including the world’s first combat jet built by the Germans. They even sank a destroyer.

The pilots were called the “Black Redtail Angels” because of the red paint on their planes’ tails and their reputation for not losing bombers over Europe.

During World War II, James received fighter training at what is now Selfridge Air National Guard Base near Mt. Clemens, Michigan.

Opposed to policies that separated black and white soldiers, he and 100 other officers were arrested in 1945 for demanding service at a whites-only club at an Indiana base. James later called this the first civil rights sit-in.

After President Harry Truman ordered the military integrated in 1948, James’ career took off. He gained a reputation as a fierce combat pilot, flying 101 combat missions in the Korean War and 78 over North Vietnam during the Vietnam War. The F-46 jet fighter he flew in the Bolo MiG sweep that destroyed seven Communist MiG-21s in Vietnam now sits on the Tuskegee University campus.

As commanding officer of the U.S. Air Force base in Libya, he reportedly turned away dictator Muammar Khadafy at the front gate.

In 1975 the commander became the first black four-star general. When he retired in 1978 for health reasons, he was commander-in-chief of North American Aerospace Defense Command (NORAD), which defends U.S. and Canadian air space. He died shortly after retirement of a heart attack.

**GENERAL
DANIEL ‘CHAPPIE’
JAMES JR.**
(1920-1978)



File Photo: The Detroit News

ABOUT THIS SECTION

To celebrate this year’s Ford Freedom honorees and Black History Month, Ford Motor Company, The Detroit News and the Charles H. Wright Museum of African American History present the educational supplement “Trailblazers of Science and Technology.” This special section honors African Americans known for their achievements in science and technology. These are stories to inspire all Americans—stories that enrich our history.

PREVIOUS FORD FREEDOM AWARD WINNERS

Ford Motor Company in cooperation with the Charles H. Wright Museum of African American History in Detroit has honored:

1999 - Former Detroit Mayor COLEMAN YOUNG and ANDREW YOUNG, former Atlanta mayor and U.S. ambassador to the United Nations

2000 - Actor/singer/dancers SAMMY DAVIS JR. and GREGORY HINES

2001 - Writers LANGSTON HUGHES and SONIA SANCHEZ

2002 - Baseball greats JACKIE ROBINSON and REGGIE JACKSON



EXPLORER OF WORLDS AS AN ASTRONAUT

By Kathy Dahlstrom

MAE C. JEMISON (1956-)

Science is all around us, so Mae C. Jemison thinks everyone needs to know more about it.

"At the heart of science are the words 'I think,' 'I wonder' and 'I understand,'" said the former astronaut, who is both a chemical engineer and a physician.

"To me science is the search for understanding. With understanding we can seek solutions to our problems."

Jemison, the 2003 Ford Freedom Award Scholar, is best known as the first woman of color to go into space. She conducted science experiments on weightlessness and motion sickness aboard the space shuttle Endeavor in 1992.

Today she works to improve conditions here on Earth.

Her two companies—The Jemison Group and BioSentient—integrate science and technology in different ways to make life better for people around the world. Their projects range from solar energy and satellite communications to monitoring the body's vital signs for stress.

Jemison also started The Earth We Share, an international science camp at which students ages 12 to 16 try to solve global problems. At this camp teens wrestle with pressing issues such as what to do with garbage, how many people the Earth can hold and how free trade will affect the environment.

Jemison believes it's important to understand how things work in order to make good decisions. "Technology is just a tool," she said, pointing out that chemicals can be combined to either propel bullets or create the beauty of a fireworks display.

"What technology develops depends on the people we are, the society we are. It really is our choice."

At 46, Jemison is a popular speaker who uses her own life as an example of how important choices can be. In her autobiography *Find Where the Wind Goes*, she admits she was afraid of heights as a child. But she controlled her fear to get where she wanted to go—first to dance class, later to space.

Now a Houston, Texas, resident, Jemison encourages youth not to let other people limit them. Instead, she says, they should follow their dreams.

"You get to be part of this world. You don't have to ask permission," Jemison tells student groups. "You're already here."

Born in Decatur, Alabama, and raised in Chicago, the future astronaut was fascinated by the sky from an early age.

Photo: NASA via Reuters



Jemison conducted experiments aboard the space shuttle Endeavor in 1992.

She remembers lying on the ground as a child and staring up at the stars "with all my intensity and wanting to be there."

The fact that it would be hard for a black girl of the 1950s and '60s to make it into space didn't faze her. "I could see myself in space, even though others couldn't," she recalled.

She entered Stanford University at just 16 on a scholarship, graduating with degrees in chemical engineering and African and Afro-American Studies. She earned her doctorate in medicine at Cornell University Medical College.

Before joining the National Aeronautics and Space Administration (NASA), she was a doctor in Los Angeles and a Peace Corps medical officer in West Africa.

A Detroit public school specializing in science and technology—Mae C. Jemison Academy—is named for her.

Among other honors, Jemison was chosen one of People magazine's "World's 50 Most Beautiful People" and was targeted as a potential candidate to be the first woman president by the White House Project of the non-profit Women's Leadership Fund.

Leadership is important to her, and youth should "demand adults do their job now—lead the world."

"Ideas are really wonderful, but nothing will happen until we risk putting them in action," she said.

JEMISON ACADEMY

science with a human face



Students at Jemison Academy use technology in many classes and do a wide range of experiments.

Most kids never get to meet the people for whom their schools are named. But Mae C. Jemison is a living inspiration to students at the Detroit school that bears her name.

The entire school traveled to Lawrence Technological University in Southfield this year to hear the astronaut speak. And fifth-graders met with her at the Detroit Public Library in June.

"They all know who she is," said Principal Sheila Jenkins, who presented Jemison with a school jacket and student art.

The connection between Mae C. Jemison Academy and its namesake is especially important because of the mission of the school.

Students from all over Detroit come to the Academy for education with an extra emphasis on science and technology.

In 2001 this school of choice won a state Golden Apple award for improvement in science scores on the state MEAP tests.



Photo: Jan-Michael Stump

"In today's world, which emphasizes computers and technology, it's important for students to be exposed," Jenkins said. "Our world is a technological world."

All 350 elementary students spend time each week in the school's computer lab. Even preschoolers learn the keyboards.

"They surprise you with what they're able to do," said Leslie Bennett, educational technician. "They don't have the fears some adults have. They like computers."

In the science lab, third- through fifth-graders do a wide range of experiments. This year they are studying the animal kingdom, how to use the metric system and the growth of seeds and plants.

"Science is all around us," said science teacher Angele Maynard, who chose the Detroit school system because of its excellent elementary science program.

"Everywhere we go we bump into it. It's the real world in our classroom."

BESSIE COLEMAN

FLIGHT PIONEER (1893-1926)

Bessie Coleman faced discrimination on two counts when she tried to get her pilot's license in the early 1900s: She was a woman, and she was an African American.

No flight school would accept her. But Coleman would not be stopped in her dream of flying. She saved up the money she earned as a manicurist, learned to speak French and went to Europe, where she learned to fly from French aviators.

Her perseverance paid off. In 1921, she became the first African American in the world to earn an international pilot's license.

Hard work was a way of life for Bessie Coleman. Born in Texas, she picked cotton and did laundry to help her family while growing up. Later, after she moved to Chicago, she trained in a beauty school and got a job as a manicurist.

It wasn't a path that would seem to lead to a career in aviation. But she got the flying bug after reading about the exploits of aviators, and found a way to get to France for training.

When she returned to the United States, Coleman flew in air shows throughout the country, hoping to raise enough money to open a flying school for African Americans. But she died before that dream could be realized, thrown from the cockpit of her plane during a test flight in Jacksonville, Florida.

Her accomplishments were recognized in 1994 by the U.S. Postal Service, which issued a stamp in her honor.

This year, she is being honored as well as part of the Ford Freedom Awards celebration.



Photo: Smithsonian National Air & Space Museum

AWARD

Science and Leadership

Mae Jemison and Bessie Coleman are trailblazers in science and aviation. They are also trailblazers as women and African Americans. More and more women are choosing scientific careers or careers involving aviation or space. In today's newspaper, find a story involving science or aviation. Read the story. Then make a list of jobs connected to the story that more women hold today than 20 years ago. Make a second list of jobs connected for which women are not hired frequently. Write a sentence stating what challenges will need to be overcome for more women to hold those science jobs in the future.



Photo Courtesy: NASA

PATRICIA COWINGS

NASA RESEARCH PSYCHOLOGIST

(1942-)

Research psychologist Patricia Cowings works for NASA, helping astronauts adapt to space using biofeedback, self-hypnosis and desensitization.

Her work has been especially important helping astronauts prevent "space sickness"—and it also can aid cancer patients dealing with chemotherapy.

Cowings has worked for NASA for a long time. She was the first female scientist trained as an astronaut, but as an alternate she never flew a mission.

A professor at UCLA, Cowings concedes, "I was not so good at math as a kid. I learned to use it as a tool.

"But science was always a game," she said. "You run your experiment and then add up your points to see if you won!"

As the director of Psychophysiological Research at Ames Research Center, Cowings knows the worth of aiming high. "I've spent my life studying human potential—and stretching my own."

GUION S. BLUFORD JR.

FIRST BLACK ASTRONAUT

(1942-)

On August 30, 1983, Lt. Colonel Guion S. Bluford, aerospace engineer and U.S. astronaut, became the first African American to travel in space. A Penn State graduate, Bluford is also a veteran of the Vietnam War, in which he flew 144 combat missions as an Air Force pilot. He joined the NASA's space program in 1979. His first flight was on the shuttle Challenger. He flew two other space missions.

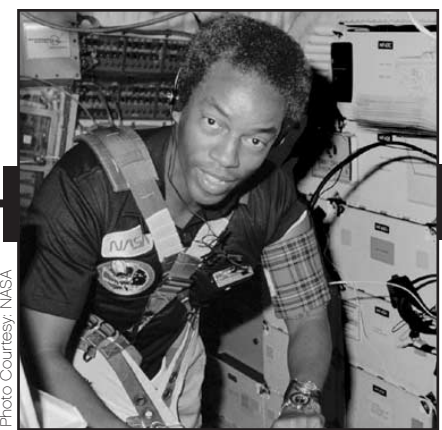


Photo Courtesy: NASA



Photo: U.S. Dept. of Energy

O.S. 'OZZIE' WILLIAMS

ROCKET SCIENTIST

(1921-)

When looking at simple tasks, people often say "it doesn't take a rocket scientist to do that." But at the NASA space agency, it DOES take a rocket scientist to handle many of the challenges.

O.S. "Ozzie" Williams was one of the best among companies assisting NASA.

He was in charge of the team at Grumman International that produced the control systems used in guiding lunar landing modules during NASA's historic Apollo moon landings.

Born in New York and educated at New York University, Williams was the first African American to be hired as an aeronautical engineer by Republic Aviation during World War II. After the war, he went to work for Greer Hydraulics, where he helped develop the first airborne radar beacon, which was used to find crashed aircraft.

Ozzie Williams went on to become a vice president of Grumman International, in charge of trade and industrial relations with emerging African nations. His work included helping Africans harness solar and wind energy.

Science and Leadership

NASA requires many kinds of scientists to plan and run a space mission. Turn to the Help Wanted pages in today's newspaper and pick five jobs from different fields of science. For each one, write a sentence stating what role that field of science could have in planning or running a NASA mission in space. Put a star next to the one you think would be most important to a mission.

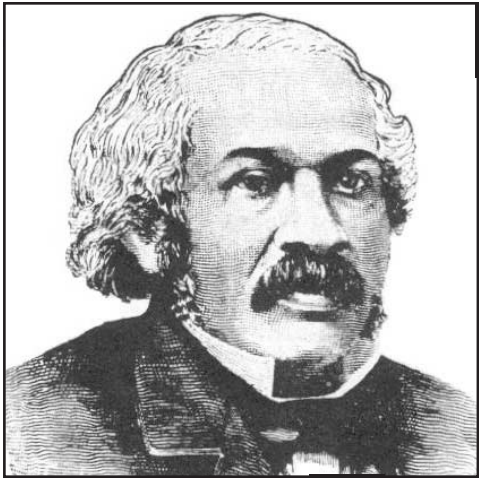


Photo Courtesy: Duke Medical Center

JAMES McCUNE SMITH TRAILBLAZING DOCTOR (1811-1865)

James McCune Smith was the first African American university-trained doctor. Yet because of racist practices in the United States at the time, he had to travel all the way to Scotland to get an education in medicine after he graduated from the New York African Free School.

While in Scotland, he founded the Glasgow Emancipation Society, and when he returned to his home town of New York City in 1837, he continued his dedication to the abolition (outlawing) of slavery.

In New York, Smith ran a successful medical practice. He treated both white and African American patients, which was highly unusual for his time. He also wrote numerous essays supporting abolitionist causes and voting rights for women.



Photo: Black American West Museum & Heritage Center

JUSTINA FORD 'THE LADY DOCTOR' OF COLORADO (1871-1952)

Justina Ford not only was the first African American physician in Colorado, but she remained the only female African American doctor in the state throughout her 50-year career!

After she earned her medical degree in Chicago, she spent a short time in the the southern United States before moving to Denver, where people lovingly called her "The Lady Doctor."

Ford was committed to helping economically disadvantaged people get medical care. In her practice, she specialized in gynecology, obstetrics and pediatrics, and in her career delivered more than 7,000 babies!

After her death, her home became the Black America West Museum and Heritage Center.

PATRICIA E. BATH GROUNDBREAKER IN EYE CARE (1949-)

Patricia E. Bath is a world-famous ophthalmologist (eye doctor). A co-founder of the American Institute for the Prevention of Blindness, she invented the Laserphac Probe, a tool that uses lasers to remove cataracts.

She was born in Harlem and earned her bachelor's degree at Hunter College in New York City. She then earned her medical degree at Howard University. After graduation she became a widely respected expert in eye care.

As a member of the International Women in Medicine Hall of Fame, Bath uses her fame and influence to support telemedicine—the use of electronic communication to give people in remote places medical care.



Patricia Bath won renown advancing eye care through the use of lasers.

Science and Leadership

Medicine is one of the most important fields of science because it touches people of all ethnic groups. For many years in history, few African Americans were allowed to train to be doctors. Today, however, medical schools are making great effort to train doctors of all ethnic backgrounds? Why is it important to have doctors with varied ethnic backgrounds? Discuss as a class and then pair off and write a newspaper editorial giving your view. Remember that editorials need to contain facts that support the opinions stated.

PHILIP EMEAGWALI A FATHER OF THE INTERNET (1954-)

Next time you search the Internet for information for a school report, thank Philip Emeagwali.

Emeagwali was born in southeastern Nigeria. Working with his father, who typically made him do hundreds of calculations a day, Emeagwali became so good at math that his friends called him "Calculus." He had mastered the subject by age 14.

Emeagwali, who now lives in Baltimore, Maryland, did not have an easy childhood. His family spent time in a refugee camp, and he had to drop out of school because his family could not afford to send all eight children. But he

continued to study on his own, eventually winning a scholarship to Oregon State University at age 17.

After graduating, he kept learning, earning master's degrees in civil engineering, marine engineering and mathematics, and a Ph.D. in civil engineering (really scientific computing).

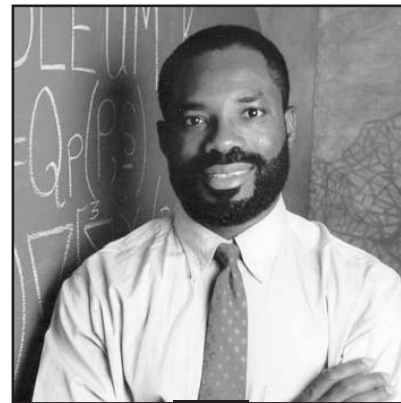
One of Philip Emeagwali's greatest achievements was his creation of the Connection Machine, which linked 65,000 computers to become the fastest computer on Earth: It can perform 3.1 billion calculations per second!

His work on the Connection Machine won him the Gordon Bell Prize, the equivalent of the Nobel Prize for computer science. It also laid the groundwork for the creation of search engines such as yahoo.com, and is one of the reasons that Emeagwali is considered one of the fathers of the Internet.

Working with the supercomputer, he also has designed equations to explain how polluted groundwater flows, how the Earth's interior moves and causes volcanic eruptions, and even how to forecast global warming patterns.

Emeagwali is married to Dale Emeagwali, whose work has led to greater understanding of cancers of the blood.

Photo Courtesy: Philip Emeagwali



MARK DEAN COMPUTER SCIENTIST (1957-)

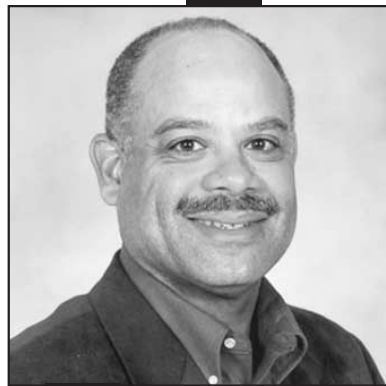


Photo: IBM

Mark Dean grew up in Jefferson City, Tennessee, where he recalls a white friend in sixth grade asking if he was really black. Dean said his friend had concluded he was too smart to be black.

Dean went on to become a star athlete and straight-A student at his high school, and a top graduate of the University of Tennessee. He eventually earned master's and Ph.D. degrees in electrical engineering, and now is director of advanced systems development for IBM Server Group.

At IBM, Dean and colleagues developed a number of the computer components that all PCs are based upon. In 1999, as director of IBM's research lab in Austin, Texas, he led the team that built a gigahertz chip that could do a billion calculations per second.

He is now working on the "electronic tablet," a magazine-sized device that could download any electronic text, as well as be a DVD player, radio and wireless telephone and provide access to the Internet.

With technology, "if you can talk about it, that means it's possible," he said. "A lot of kids growing up today aren't told that you can be whatever you want to be."

MARC HANNAH ENTREPRENEUR (1956-)



Photo: SongPro

You've seen the results of Marc Hannah's work on big movie screens. Soon, you might hold it in your hand. Hannah was one of the original founders of Silicon Graphics Incorporated (SGI), a company famous for its innovations in computer graphics.

SGI designed the computers used to create the special effects for such movies as *Terminator 2*, *Jurassic Park*, *Aladdin*, *The Hunt for Red October*, *Beauty and the Beast* and *Field of Dreams*.

Today, Hannah is the chief technology officer of SongPro, which is making multimedia plug-ins that you can use to listen to music on hand-held videogame players.

A Chicago native, Hannah graduated from the Illinois Institute of Technology with a degree in electrical engineering. He received a fellowship from Bell Laboratories to pursue his doctorate at Stanford University, which he completed in 1985.

Science and Leadership

Technology is changing the way we live, especially computer and information technology. Search the newspaper for a high-tech product you or your family use that you did not use three years ago. Write a declarative sentence stating what made your family decide to use this new technology. Then write a sentence predicting the next high-tech product your family will decide to use, and give a reason.

By Kathy Dahlstrom

BENJAMIN S. CARSON, M.D. NOTED NEUROSURGEON (1951-)

As a child waiting for a doctor at Detroit Receiving Hospital, Ben Carson imagined hearing his own name over the loudspeaker. It sounded so important, he thought, "One day they'll be saying, 'Dr. Carson, Dr. Carson to the operating room.'"

Today, Carson, 51, is known all over the world. He is director of pediatric neurosurgery at the famous Johns Hopkins Hospital in Baltimore, Maryland, treating children for some of the most complicated ailments.

In 1987, for example, he led a 22-hour operation in South Africa that separated conjoined twins who were connected at the head at birth. While performing more than 400 operations a year—mostly brain and spinal surgeries—Dr. Carson spends many hours speaking to students about how he beat the odds to become a doctor.

Growing up in southwest Detroit, he did



Photo: Johns Hopkins Children's Center

so poorly at Higgins Elementary School that classmates called him "dummy."

His mother Sonya, who was raising him and his brother alone, cut down his television and made him give home book reports on his reading. He went on to win honors at Wilson Junior

High and graduated from Southwestern High School, Yale University and the University of Michigan School of Medicine.

Today the father of three teenagers, he has written three best-selling books and has set up his own club to encourage students and families to read more.

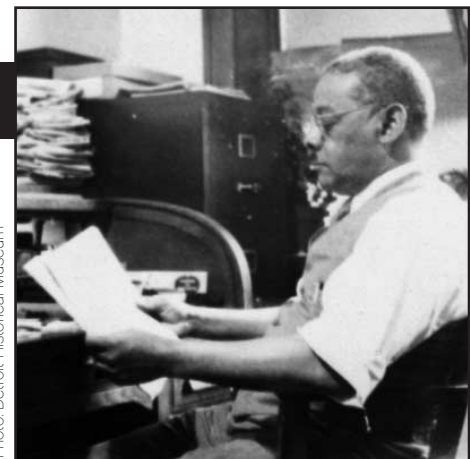


Photo: Detroit Historical Museum

CORNELIUS HENDERSON BUILDER OF BRIDGES (1887/88-1976)

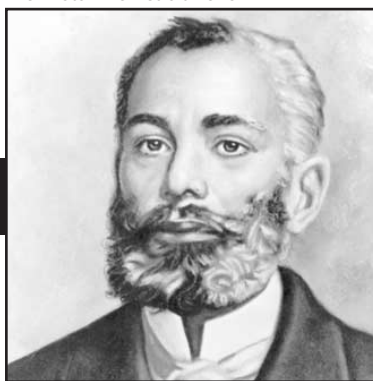
Traffic flows easily between Detroit and Windsor because of Cornelius Henderson's engineering know-how. The University of Michigan graduate helped build both the Ambassador Bridge and Detroit-Windsor tunnel.

Born in 1887 or 1888 in Detroit, he moved to Georgia when his father became president of Morris Brown College. Henderson graduated from Payne University in Alabama, then earned a civil engineering degree from the University of Michigan in 1911.

Although he had returned to Michigan to escape segregation in the South, he had trouble finding work in his field. He eventually obtained a drafting job across the border in Walkerville, Ontario, with the Canadian Bridge Company. During 47 years with the firm, Henderson became a structural steel designer. He worked on the landmark Detroit-Windsor projects, as well as on many other bridges around the world.

He also helped design Detroit Memorial Park, the cemetery where he is now buried.

File Photo: The Detroit News



ELIJAH MCCOY A 'GENUINE' INVENTOR (1843/44-1929)

Many people copied Elijah McCoy's most famous invention. But smart buyers insisted on "the real McCoy" instead of cheap imitations. We use that expression today to mean something that is genuine.

Working out of his own machine shops in Ypsilanti and then Detroit, McCoy patented more than 50 inventions in his career, including a portable ironing board, rubber shoe heels, a lawn sprinkler and tire treads.

He is best known, however, for an automatic oil cup that allowed trains to oil moving parts without stopping.

The son of runaway slaves, McCoy was born in 1843 or 1844 in Ontario, Canada. He grew up taking machines apart and putting them back together.

He studied mechanical engineering in Scotland, but the only job he could find in the United States was as a fireman/oilman on the Michigan Central Railroad. It was there that he developed the automatic oil cup.

LONEY GORDON FIGHTER AGAINST DEADLY DISEASES (1915-1999)

Before two Grand Rapids doctors developed a life-saving vaccine, thousands of children died each year of the dreaded disease pertussis, or whooping cough.

The hard work of Loney Clinton Gordon made much of the doctors' success possible.

It was Gordon who discovered the bacteria that Drs. Grace Elderling and Pearl Kendrick used in their whooping cough research. Their efforts earned all three women a place in the Michigan Women's Hall of Fame.

"There wasn't any fanfare," Gordon said later. "We were just working to get these babies to stay alive, which we did."

Born in Arkansas in 1915, Gordon moved to Michigan as a child. She earned a bachelor's degree in home economics and chemistry from what is now Michigan State University.

Although she wanted to be a hospital dietician, she was told white male chefs wouldn't want to take orders from a black woman. Kendrick asked her to join the pertussis study that she and Elderling were working on after hours. During the day they studied water and milk quality.

After looking at thousands of cultures taken from coughing children, Gordon in 1943 found a pertussis organism strong enough to make people sick. The doctors then worked with that bacteria to develop a vaccine to head off the disease. They later created the DPT (diphtheria, pertussis, tetanus) shot that is given to children today.

In 1944 Gordon took a job at the Michigan Department of Health, and worked there until retiring in 1978.



Photo Courtesy: Marge Hetherington



DOROTHY V. McCLENDON CLEANING UP FOR THE MILITARY (1924-)

Dorothy McClendon studies microorganisms, those living things that are too tiny to be seen by the naked eye. She specializes in bacteria and fungi.

McClendon coordinated microbial research for the U.S. Army Tank Automotive Command (TACOM) in Warren, Michigan.

Her job was to develop methods to prevent microorganisms from contaminating fuel or damaging military storage materials. She worked extensively to develop a fungicide, a chemical that would protect storage materials from fungus or mold and not harm the people who used them.

McClendon is a native of Minden, Louisiana, but moved to Detroit in her early teens. There she attended Cass Technical High School where her interest in science developed. In college, she majored in biology at Tennessee Agricultural and Industrial State University. Later, she took advanced science courses at Wayne State University, the University of Detroit and Purdue University.

Science and Leadership

From the military to industry, jobs involving science and technology are breaking new ground every year. Scientists lead the way with new discoveries and inventions. Find a story in the newspaper about a science breakthrough. Write a short paragraph describing the breakthrough, and whom it will help. Write a second stating what skills a scientist would need to be a leader in this field.

THE TUSKEGEE MUSEUM A PLACE WHERE MILITARY BLACK HISTORY IS ON DISPLAY

Most World War II soldiers fought only foreign enemies. Tuskegee Airmen, though, did battle both overseas and at home.

These pilots protected American bombers from attack during World War II.

But back home, the Tuskegee Airmen battled racism. Despite their achievements in the air, they lived and trained separately from white servicemen on the ground.

The Tuskegee Airmen National Historical Museum, based at historic Fort Wayne in Detroit, tells the story of the famous U.S. Army Air Corps group. Trained mainly at Tuskegee Army Airfield in Tuskegee, Alabama, members included cooks, radio operators and women nurses.

Detroit's Richard Jennings, 79, who gives tours at the small museum, said it is dedicated not to individuals but to the "whole experience."

"We're trying to depict what went on; how the Negro soldier was treated," said the former navigator and bombardier, who retired as a major.

The Tuskegee Airmen project, he said, "was supposed to be an experiment to fail; to prove that the Negro was incapable of fortitude, dexterity and intelligence."

Instead, the Tuskegee Airman achieved amazing success.

While African Americans fought in other wars, they weren't allowed to be military pilots. Black political leaders and newspapers succeeded in getting the ban lifted in 1941. Yet many feel the military did not expect black recruits to pass the U.S. Army Air Corps' tests.



Photo: Jan-Michael Stump

The P-51 was one of several planes used by Tuskegee Airmen.



Photo: Jan-Michael Stump

Alexander Jefferson shows off the features of a model B-25 bomber, a craft used by the Tuskegee Airmen.

Yet almost 1,000 men graduated from the tough program, winning both fame and respect. The pilots earned the nickname "Black Redtail Angels" because of the red paint on their planes' tails and their reputation for not losing bombers over Europe.

While flying propeller driven planes themselves, Tuskegee pilots shot down several of the world's first combat jets developed by the Germans.

Beyond aviation, the Tuskegee Airmen advanced the cause of civil rights in the United States. In one of several protests over their treatment, black aviators objected to segregated quarters and officers' clubs at what is now Selfridge Air National Guard Base near Mt. Clemens.

The attitudes they were up against were summed up in the words of a general who opposed their efforts.

"Gentlemen," the general reportedly said to the black officers, "this is my airfield. As long as I'm in command, there will be no socializing between white and colored officers."

The Tuskegee officers were then moved to another base. After the service was integrated, three Tuskegee Airmen became high-ranking generals—Daniel "Chappie" James Jr., B.O. Davis Jr. and Lucius Theus, who now lives in Bloomfield Hills and gives tours of the Tuskegee Museum. Former Detroit Mayor Coleman Young was a Tuskegee Airmen bombardier.



The Tuskegee Airmen National Historical Museum is open to the public each year from April 1 through Sept. 30. Group tours can be arranged by schools or others at any time of the year by calling 313-843-8849.

EARL LUCAS DESIGNER OF THE NEXT NEW CARS (1970-)

He works 10- to 12-hour days, but never looks at the clock. That's one big reason Earl Lucas designs cars.

"You get paid for sketching," said the Southfield resident, who started drawing at 3 years old. "They actually pay you for coming up with the future."

As a Ford Motor Company design manager, Lucas, 32, works with three or four car designers on the exterior "shape, look and style" of a vehicle. Another team designs the interior.

During the two-year design process, 10 to 20 ideas are narrowed down to one that works.

"There are always manufacturing and packaging restraints," explained Lucas, one of only 25 to 30 black car designers worldwide, according to Black Enterprise magazine. "But I've been very blessed. So far most of my projects have hit the road."

Always fascinated by cars, the Texas-born designer attended the arts program at Booker T. Washington High School with an eye toward "doing something artistic."

Interested in the 3-D process of creating jewelry from metal, he was recruited by the College for Creative Studies in Detroit. After two years, he switched from a crafts major to industrial design with a concentration in transportation design.

In college he helped design a van for elderly riders. That led to a job designing auto seats, door panels and headliners for an auto supplier.

That very practical work led to a "fantasy job" in Texas designing interiors for several planes owned by the wealthy sultan of Brunei. "Talk about decadence," Lucas recalled. "We used gold, platinum, all types of precious jewels."

Always intrigued by cars, Lucas encourages teens to go into the industry he believes "defines the world."

"Cars are really cool products," he said.



Earl Lucas has a collection of 1,000 Hot Wheels cars.

Photo: Jan-Michael Stump



PANDORA ELLISON EXPERT AT THE 'HIDDEN STUFF' (1953-)

Driving a great-looking car is fun. But not if the heater doesn't warm up, the air conditioner won't cool or there's too much noise or vibration.

Pandora Ellison's job is to make sure the important "hidden stuff" on vehicles works well. Ellison and 400 other engineers and managers handle climate control for Ford Motor Company's North American brands. Her department works on heating and air conditioning, keeps engines and transmissions cool, reduces noise and vibration, and improves ride and handling.

While Ellison grew up in an auto family, her first interest was art. A Mumford High School drafting class changed her mind. After two years at the former General Motors Institute in Flint, where she was one of only a handful of women, she dropped out of college.

An engineer inspired her to go back to school and earn a bachelor's degree in mechanical engineering at the University of Detroit.

During 25 years with one automaker, she became director of Brakes and Suspension Design for all its trucks. A "truck girl" who prefers working on whole vehicles, she couldn't resist a chief engineer job with an auto parts supplier.

A Ford job offer in 2001 also was too good to refuse—even though she could have retired in 2003. "My job is so fast," said Ellison, 49. "The auto industry is still a wonderful industry. It's a great business."

AN ENGINEERING SUCCESS STORY

Turning kids on to math and science is the goal of the Detroit Area Pre-College Engineering Program (DAPCEP). And it's so successful that eager students have to be turned away.

Youth and their parents line up to enroll in a wide range of intriguing classes such as Data Detectives, Glow Blue, Forensic Crime Stoppers and Creative Engineering.

More than 6,000 metro-Detroit students take part in free classes through the program dedicated to making a difference in the lives of minority youth. Started in 1976, it offers in-school programs for Detroit middle schoolers, Saturday classes and summer camps on local university campuses.

While adding to their skills, the classes also are designed to spark interest in fields where minorities are still underrepresented. DAPCEP introduces students to role models and helps them learn about scholarships and internship opportunities.

More information about DAPCEP is available by calling 313-831-3050 or logging onto www.dapcep.org.

CHARLES REASON GROUNDBREAKER IN COLLEGE TEACHING (1818-1893)

When Charles Reason was 14, he was so advanced in math that he began teaching at the African Free School in New York City. With the salary he earned he hired tutors to enrich his education further, eventually graduating from McGrawville College.

Reason believed that advanced education was very important for African Americans, preparing them to become "self-providing artisans vindicating their

people from the never-ceasing charge of a fitness for servile positions."

In 1849, Reason became the first African American to hold a professorship at a predominantly white U.S. college—he taught Greek, Latin, French and math at New York Central College.

He left the position to become the first principal of Philadelphia's Institute for Colored Youth. The school is now known as Cheyney University.

In 1855, Reason returned to New York to be a teacher and administrator, where he successfully led a campaign to outlaw school segregation in the city.



Photo: Cheyney University



Photo Courtesy: www.math.buffalo.edu

J. ERNEST WILKINS JR. MANHATTAN PROJECT SCIENTIST (1923-)

Mathematician J. Ernest Wilkins Jr. was a member of the team of elite scientists who worked on the Manhattan Project that enabled the United States to create the first atomic bomb.

Born in Chicago, Wilkins was the genius son of an educator and an assistant U.S. secretary of labor. He earned his Ph.D. in mathematics from the University of Chicago at the age of 19. At the forefront of research in math, physics and engineering, Wilkins has been the president of the American Nuclear Society and a professor at many prestigious schools. He is now the distinguished professor of applied mathematics and mathematical physics at Clark Atlanta University.

Science and Leadership

1. Charles Reason, J. Ernest Wilkins Jr. and Katherine Johnson all have made a mark in mathematics. Math is a science that affects all other fields of science and technology. Find a story about science in today's newspaper. Write a sentence summarizing the scientific development that is making news. Then write three ways math was needed by scientists in the story.
2. The newspaper is a great place to practice work with large numbers. Search the different sections of the newspaper for three numbers in the millions. Write out each number using all the zeroes and commas needed. Then create a math problem for a classmate, using your numbers.

KATHERINE JOHNSON MATH MARVEL FOR NASA (1918-)



Photo Courtesy: Katherine Johnson

Katherine Johnson was an amazing mathematician for NASA. She calculated trajectories for the space flights of Alan Shepard, John Glenn and the Eagle (which landed on the moon)—and she did it all by hand!

She used her knowledge of math to work on interplanetary trajectories, space navigation and spacecraft orbits. Johnson also created star maps for astronauts based on what they would see out of their crafts' little window at any given time. That way they could navigate on their own if something went wrong and they lost contact with Ground Control.

The problems were complex. She says she solved them "with algebraic equations, thousands and thousands of algebraic equations. [And] all the time you have to remember that the Earth is rotating and the moon is moving." She is now retired.

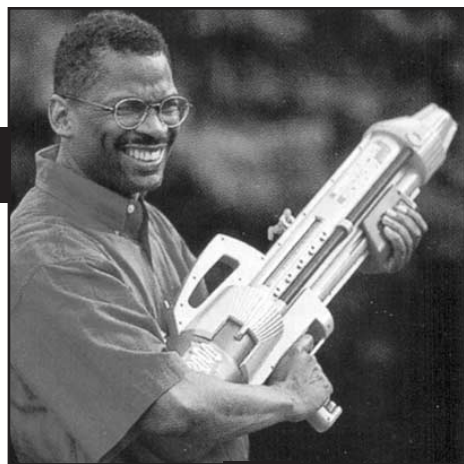


Photo: Johnson Research & Development Co., Inc.

LONNIE JOHNSON AEROSPACE ENGINEER AND INVENTOR (1949-)

You may not have heard of aerospace engineer Lonnie Johnson, but chances are you've seen his most famous invention. In addition to working on big space projects, he created the popular Super Soaker!

Born in Marietta, Georgia, Johnson has been inventing since he was very young. At 18, he won an award for building a remote-controlled robot. After earning his master's degree in nuclear engineering at Tuskegee University, he joined the Air Force and twice won the Air Force Commendation medal.

Eventually he went to work at NASA, where he invented the Johnson Tube. This is a refrigeration system that makes it obsolete to use CFCs (chloro-fluoro-carbons) to cool things down. CFCs are chemicals that many scientist believe deplete the ozone layer of the atmosphere around the Earth.

Though he is now very wealthy—the Super Soaker has generated more than \$200 million in sales—Johnson continues to work. He has more than 40 patents, with 20 more pending.

GRANVILLE T. WOODS RAILROAD INNOVATOR AND MORE (1856-1910)

Granville T. Woods was a mechanical and electrical genius whose work made railroads safer in America. He patented the Synchronous Multiplex Railway Telegraph, a system that allowed communication between moving trains and train stations, thus avoiding accidents.

Thomas Edison sued Woods, saying that he had invented the system first. Yet the world-famous Edison lost to the virtually unknown African American at a time when Woods often had to ask friends to check out books for him because people of color were excluded from many libraries.

After losing the case, Edison tried to hire the mostly self-educated Woods. Woods said no and started his own successful company.

During his life, the inventor held more than 60 patents for a wide range of projects. He improved air brakes and overhead conducting lines for railroads, and even invented an electronic incubator that could take care of 50,000 eggs at once.



Photo Courtesy: Ohio Historical Society

JOSEPH LEE BAKER WITH NEW IDEAS (1849-1905)

Master baker, restaurateur and hotel owner Joseph Lee invented the first bread-crumbling machine and the first bread-making machine.

As a child, he worked in a factory in Boston, and worked his way up through the manufacturing ranks.

His bread-crumbler was a must-have in upscale dining places and hotels. The perfect crumbs were used to make all sorts of foods, including fried cutlets, fried clams, crab cakes, croquettes, cake batter puddings and fried chops.

Lee's bread-maker made dough smoother, whiter and cleaner and could produce hundreds of loaves a day. It remains the basis for present-day bread-making machines.

Science and Leadership

1. Many inventions came about when someone found a way to put science to an everyday use; or someone found a way to put science to a new use. Search the ads in the newspaper for new products that are available this year. Pick five that interest you. For each write down what kind of science might have been used to develop the product, and why.



Photo Courtesy: Mitchell C. Brown

FREDERICK M. JONES REFRIGERATION LEADER (1892-1961)

Sixty years ago, the only way to keep food fresh while it was being shipped was to keep it on blocks of ice—a messy and inconvenient proposition.

Frederick McKinley Jones solved the dilemma with the development of a truck refrigeration unit, an invention that forever changed the country's eating habits. For the first time, anyone in any part of the nation could enjoy fresh fruits, meats and vegetables at any time.

Born in Cincinnati, Ohio, Jones was a World War I veteran who learned by doing. As a mostly self-taught inventor he ended up holding more than 60 patents in a variety of fields over his lifetime, including several inventions to help military medical officers in the field.



Photo: U.S. Dept. of Energy

VIRGIL G. TRICE JR. NUCLEAR WASTE MANAGER (1926-)

Virgil Trice has spent much of his life developing nuclear energy, and now he is devoting his time to finding safe ways to manage the radioactive waste that results from generating nuclear power. Born in Indianapolis, Indiana, he earned college degrees at Purdue University and the Illinois Institute of Technology.

He has been working in the waste management field since 1971, when he joined the Atomic Energy Commission. He also worked for the U.S. Department of Energy, for which he was responsible for radioactive waste management planning, reporting and program control. His field is crucial to the future of nuclear power. He lives in the Washington, D.C., area.

GARRETT A. MORGAN GAS MASKS AND TRAFFIC SIGNALS (1877-1963)

Garrett Morgan certainly helped make this a safer world.

Born in Paris, Kentucky, he went to work as a very young man. His job as a sewing-machine repairman led him to experiment with gadgets and materials in many fields.

Safety was a special interest for Morgan. The safety helmet and gas mask he invented were used by firemen in many cities in the early 1900s. In 1914, he was awarded a gold medal for the invention at the Second International Exposition of Safety and Sanitation in New York.

Two years later, he used the mask himself to rescue men trapped by a gas explosion in a tunnel being constructed under Lake Erie in Ohio. Following the disaster, which claimed 21 lives, the City of Cleveland honored him with a gold medal for his heroic efforts.

In 1923, Morgan received a patent for another new concept—a traffic signal that systematically raised and lowered "Stop" and "Go" signs to bring order out of chaos and improve traffic safety. His device was the forerunner of the traffic light signals in use today.



The safety helmet and gas mask invented by Morgan in the early 1900s broke ground for those used by firemen today.

Science and Leadership

1. Inventions often come about when people see a need to help make a task easier. Search today's newspaper for a photo of someone performing a task or working at something. Brainstorm an idea for a new invention that could make the task easier for the person in the picture. Give your invention a name and draw an ad to promote it to possible customers.
2. Sometimes inventions are created that appeal to specific groups more than others. Think about the needs of African Americans or other minorities in your community. What invention might be important or popular among African Americans in the near future?

WALTER EUGENE MASSEY MOREHOUSE COLLEGE (1938-)

Walter Eugene Massey is the president of Morehouse College, a prestigious institution with an African American tradition. It also is his alma mater—he graduated from Morehouse in 1958.

Born in Hattiesburg, Mississippi, he became one of science's greatest advocates.

He was director of the National Science Foundation, the government's leading science agency. As the president of the American Association for the Advancement of Science, he is working strengthen science and engineering in sub-Saharan Africa—when he's not researching theoretical and solid state physics dealing with many-body problems, quantum liquids and quantum solids!

Photo: Morehouse College

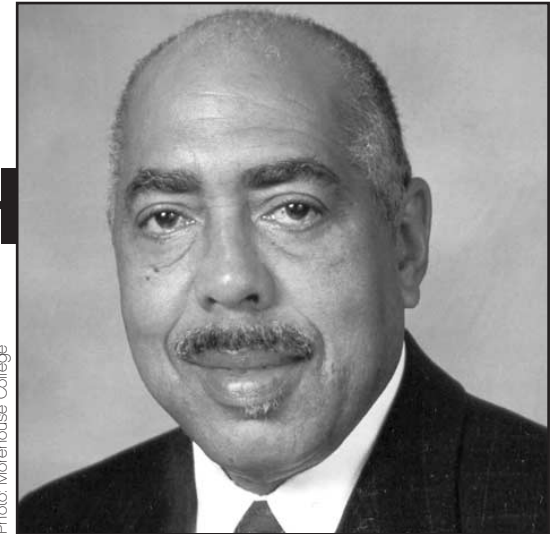


Photo: Marc McCarty,
Rensselaer Polytechnic Institute



SHIRLEY ANN JACKSON FROM LAB RESEARCHER TO COLLEGE PRESIDENT (1946-)

After earning her both bachelor's and doctorate degrees in physics at the world renowned Massachusetts Institute of Technology, Shirley Ann Jackson did research in theoretical physics at many innovative labs before becoming a professor at Rutgers University.

While teaching, this native of Washington, D.C., also found time to be an ATT Bell Lab consultant in semiconductor theory. In 1995, she was appointed chair of the U.S. Nuclear Regulatory Commission by President Bill Clinton. She is now the president of Rensselaer Polytechnic Institute, one of the nation's leading universities in science—and has been elected to the National Women's Hall of Fame.



MEREDITH C. GOURDINE ATHLETE AND PHYSICIST (1929-1998)

Meredith C. Gourdine was good at many different things. He invented devices called electrostatic precipitators that could remove fog from airport runways and smoke from burning buildings. He founded a successful company—Energy Innovation in Houston, Texas. He also is known for his invention of the Focus Flow Heat Sink for cooling computer chips.

He was born in Newark, New Jersey, and grew up to become a leader promoting engineering and science careers for African Americans. And while he was earning his engineering physics degree from Cornell University, he also earned the nickname "Flash" Gourdine, after the comic book hero Flash Gordon.

He got that nickname because he was an amazing athlete as well as a physics scholar. At the 1952 Olympics in Helsinki he competed in track and field and won a silver medal in the long jump—with a distance of 24 feet 8 1/2 inches!

Science and Leadership

1. The science of physics deals with how objects in the world—called "matter"—interact with energy in the world. The sports pages are a great place to see physics at work. Search the sports pages of the newspaper for three examples of athletes using energy to move an object, or another athlete. Rank the examples in order for how much energy is being used.
2. A famous law of physics states that for every action there is an equal and opposite reaction. In teams, search the newspaper for a person or object experiencing the effects of this law at work. Write a sentence describing the action. Write a second describing the reaction.

DALE EMEAGWALI

STANDOUT MICROBIOLOGIST

(1954-)



Photo Courtesy: Dale Emeagwali

Dale Emeagwali is an extraordinary biologist: She has made significant contributions in the fields of microbiology, molecular biology and biochemistry. Her greatest scientific accomplishment is the discovery of an enzyme that could lead to a better understanding of the causes of cancers of the blood, such as leukemia.

Born in Baltimore, Maryland, Emeagwali went on to earn science degrees from Coppin State College and Georgetown University. Now a professor of microbiology at Morgan State University, she feels strongly that science is for everyone who has an interest in it, not just geniuses. She organizes science workshops for fourth and eighth graders in the inner city to kindle their interest.

Professor Emeagwali is married to another renowned scientist, Philip Emeagwali, who is considered one of the fathers of the Internet. They live in Baltimore.

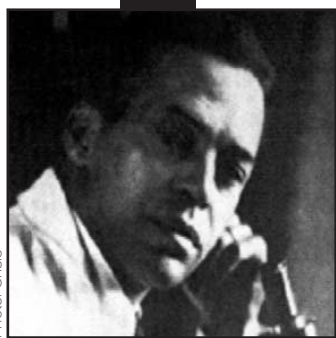


Photo: Crisis

ERNEST EVERETT JUST

BIOLOGIST AND ZOOLOGIST

(1883-1941)

Ernest Everett Just was one of the most prominent zoologists of his time. His research made major contributions to our understandings of the ways animal cells are fertilized and how they divide and develop.

His work was known around the world, and he helped write several major texts in his field.

A native of Charleston, South Carolina, he graduated from Dartmouth College in 1907, the only person to graduate magna cum laude that year. Shortly after graduation, he began to teach at Howard University. In 1916, he earned a Ph.D. from the University of Chicago.

In his work, Just showed all the traits of a true scholar. He was a modest and hard-working man whose creative imagination and strong scientific training made him a giant in his field.

GEORGE WASHINGTON CARVER

BOTANIST AND PEANUT PIONEER

(1864-1943)

George Washington Carver never knew his mother or father and didn't even own a name.

Born into slavery around 1864, he went on to become a respected botanist and educator.

Joining his friend Booker T. Washington at Tuskegee Institute, Carver would later discover more than 300 uses for the peanut, including soap, butter, coffee, dyes, shampoos and make-up.

Science and Leadership

1. Biology is the study of life, but what makes something alive? There are five characteristics of living things. All living things (1) are made up of cells, (2) reproduce, (3) obtain and use energy, (4) grow and develop, and (5) respond to their environment. Discuss the characteristics of living things as a class. Then find a photo of a living thing in the newspaper. Write out how the selected living thing meets each of the five characteristics.
2. Discoveries by leaders in biology involve everything from endangered species to antibiotics fighting disease. Find a story or photo in the newspaper of a plant, animal or habitat. Read the story or photo caption. Then write out two things that biologists would need to know to predict what the future will be like for this living thing or habitat.



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Courtesy: Mitchell C. Brown

IDA STEPHENS OWENS

BIOCHEMIST AND POISON EXPERT (1929-)

Ida Owens, who received a Ph.D. in biology-physiology from Duke University in 1967, is researching how the human body defends itself against poison. Born in Newark, New York, she now is working on the genetics of detoxification enzymes for a division of the National Institutes of Health.

DONALD COTTON

ENERGY DEPARTMENT RESEARCH LEADER (1939-)

Donald Cotton leads nuclear chemistry research and development at the U.S. Department of Energy. He plans, manages and evaluates research on nuclear reactor materials and helps less-developed nations analyze their needs for nuclear reactors for generating electrical power.

Cotton's work has also extended beyond the laboratory. He has served as an editor of books that present scientific and technical subjects to non-scientists.

His degrees in physical chemistry include a master's degree from Yale University and a Ph.D. from Howard.

He has lectured at universities in Africa and South America.

JAMES ANDREW HARRIS

NUCLEAR CHEMIST (1932-)

James Andrew Harris conducts nuclear chemistry research at the Lawrence Berkeley Laboratory in Berkeley, California.

He was born in Waco, Texas, and earned his bachelor's degree from Houston-Tillotson College in Austin, Texas.

He was part of the team that discovered the 104th and 105th elements of the periodic table. The elements were eventually named Rutherfordium and Hahnium, in honor of atomic pioneers Ernest Rutherford and George Hahn.

In 1973 Houston-Tillotson awarded him an honorary Ph.D.

Donald Cotton's specialty is to evaluate nuclear reactor materials and assess needs for nuclear power.

Science and Leadership

1. Chemistry is the study of the properties and reactions of substances when they are created or act on each other. Chemical reactions can affect everything from the way medicines are made to how we cook food. In teams, find an example of a chemical reaction in today's newspaper. Write a description of what happens in the reaction, and how, as if it were the opening paragraph of a newspaper story.
2. More minorities are entering science fields today than ever before. Yet universities and businesses would like to attract even more. As a class, discuss the advantages of careers in science and technology. Then design a recruiting ad that would attract African American students and others to choose scientific careers. Be sure your ad has an eye-catching headline to get readers' attention.
3. Find a story or photo in the newspaper about a company that is a major business in your city or state. Read the story and research more about the company online. Then draw up a Top 10 list of science and technology careers people could pursue if they went to work for this company. Write a business letter to the company asking what training or education is required for one of these careers. Make sure your letter is in the proper form for a business letter.

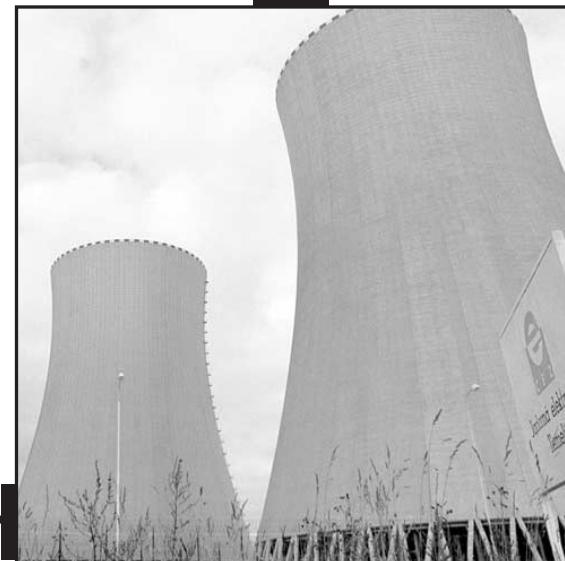




Photo: Bureau of Meteorology

FREDERICK DOUGLASS PATTERSON VETERINARIAN AND EDUCATOR (1901-1988)

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Named for the nation's most famous abolitionist, Frederick Douglass Patterson founded the only black School of Veterinary Medicine in the United States, at Tuskegee Institute in Alabama in 1945. He served as president of the Tuskegee Institute for 25 years.

Born in Washington, D.C., he received college and advanced degrees at Prairie View State College in Texas, Iowa State University and Cornell University.

In 1944, he established the United Negro College Fund, which supports excellence at America's historically black colleges.

In 1987 he was awarded the Presidential Medal of Freedom for his work with the United Negro College Fund.

CREDITS

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- The manager of Detroit Newspapers in Education is Sharon Martin.
- The project manager was Jeanette Stump.

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