

## Diversity in STEM Study Guide for Quiz Bowl 2021 *High School*

### **Black and African American Scientists and Engineers**

George Washington Carver

An American agricultural scientist and inventor who promoted alternative crops to cotton and methods to prevent soil depletion. He was the most prominent black scientist of the early 20th century. While a professor at Tuskegee Institute, Carver developed techniques to improve soils depleted by repeated plantings of cotton. He wanted poor farmers to grow other crops, such as peanuts and sweet potatoes, as a source of their own food and to improve their quality of life. The most popular of his 44 practical bulletins for farmers contained 105 food recipes using peanuts. Although he spent years developing and promoting numerous products made from peanuts, none became commercially successful.

Percy Julian

An American research chemist and a pioneer in the chemical synthesis of medicinal drugs from plants. He was the first to synthesize the natural product physostigmine and was a pioneer in the industrial large-scale chemical synthesis of the human hormones progesterone and testosterone from plant sterols such as stigmasterol and sitosterol. His work laid the foundation for the steroid drug industry's production of cortisone, other corticosteroids, and birth control pills. He later started his own company to synthesize steroid intermediates from the wild Mexican yam. His work helped greatly reduce the cost of steroid intermediates to large multinational pharmaceutical companies, helping to significantly expand the use of several important drugs.

Mae Carol Jemison

An American engineer, physician, and former NASA astronaut. She became the first black woman to travel into space when she served as a mission specialist aboard the Space Shuttle *Endeavour*. Jemison joined NASA's astronaut corps in 1987 and was selected to serve for the STS-47 mission, during which she orbited the Earth for nearly eight days on September 12–20, 1992. Jemison left NASA in 1993 and founded a technology research company. She later formed a non-profit educational foundation and through the foundation is the principal of the 100 Year Starship project funded by DARPA. Jemison also wrote several books for children and appeared on television several times.

Gladys West

An American mathematician known for her contributions to the mathematical modeling of the shape of the Earth, and her work on the development of the satellite geodesy models that were eventually incorporated into the Global Positioning System (GPS). West was inducted into the United States Air Force Hall of Fame in 2018.

#### Marie M. Daly

An American biochemist. She was the first African-American woman in the United States to earn a Ph.D. in chemistry (awarded by Columbia University in 1947). Daly made important contributions in four areas of research: the chemistry of histones, protein synthesis, the relationships between cholesterol and hypertension, and creatine's uptake by muscle cells. A member of the prestigious board of governors of the New York Academy of Sciences for two years and awarded an American Cancer Society grant to support her postdoctoral research.

#### Edward Bouchet

An American physicist and educator and was the first African American to earn a Ph.D. from any American university and the sixth to earn a Ph.D in physics from Yale, completing his dissertation in physics at Yale in 1876. On the basis of his academic record he was elected to the Phi Beta Kappa Society. In 1874, he had become one of the first African Americans to graduate from Yale College. The American Physical Society (APS Physics) confers the Edward A. Bouchet Award on some of the nation's outstanding physicists for their contribution to physics.

#### Annie Easley

An American computer scientist, mathematician, and rocket scientist. She worked for the Lewis Research Center (now Glenn Research Center) of the National Aeronautics and Space Administration (NASA) and its predecessor, the National Advisory Committee for Aeronautics (NACA). She was a leading member of the team which developed software for the Centaur rocket stage, and was one of the first African-Americans to work at NASA. After receiving her degree Easley also had to complete specialization courses at NASA in order to be considered a professional at NASA. Easley was posthumously inducted into the Glenn Research Hall of Fame in 2015. On February 1, 2021, a crater on the moon was named after Easley by the IAU.

#### Walter Lincoln Hawkins

An American chemist and engineer widely regarded as a pioneer of polymer chemistry. For thirty-four years he worked at Bell Laboratories, where he was instrumental in designing a long-lasting plastic to sheath telephone cables,

enabling the introduction of telephone services to thousands of Americans, especially those in rural communities. In addition to his pioneering research, Hawkins is also known for his advocacy efforts for minority students. He also served as the chairman of Montclair State University in 1973. Amongst his many awards, Hawkins was the first African-American to be elected to the National Academy of Engineering (1975), and, shortly before his death in 1992, he was awarded the National Medal of Technology by then-U.S. president, George H. W. Bush.

#### Alexa Canady

A retired American medical doctor specializing in pediatric neurosurgery and chief of neurosurgery at the Children's Hospital in Michigan. She was born in Lansing, Michigan and earned both her bachelors and medical degree from the University of Michigan. After completing her residency at the University of Minnesota in 1981, she became the first black woman to become a neurosurgeon. This came after Ruth Kerr Jakoby became the first American woman to be board certified in neurosurgery in 1961.

#### Benjamin Banneker

A free African-American almanac author, surveyor, landowner and farmer who had knowledge of mathematics and natural history. Born in Baltimore County, Maryland, to a free African-American woman and a former slave, Banneker had little or no formal education and was largely self-taught. He became known for assisting Major Andrew Ellicott in a survey that established the original borders of the District of Columbia, the federal capital district of the United States.

#### Fern Hunt

An American mathematician known for her work in applied mathematics and mathematical biology. Hunt received the Arthur S. Flemming Award for her contributions to probability and stochastic modeling, mathematical biology, computational geometry, nonlinear dynamics, computer graphics, and parallel computing. She was included in the 2019 class of fellows of the American Mathematical Society "for outstanding applications of mathematics to science and technology, exceptional service to the US government, and for outreach and mentoring".

#### Mark Dean

An inventor and computer engineer. He developed the industry standard architecture (ISA) bus, which enables multiple devices, such as modems and printers, to be connected to personal computers. He led a design team for making

a one-gigahertz computer processor chip. He holds three of nine PC patents for being the co-creator of the IBM personal computer released in 1981. In 1995, Dean was named the first ever African-American IBM Fellow. Dean was elected as a member into the National Academy of Engineering in 2001 for innovative and pioneering contributions to personal computer development.

#### Elbert Frank Cox

An American mathematician. He was the first Black person in the world to receive a PhD in mathematics - which he earned at Cornell University in 1925. The National Association of Mathematicians established the Cox-Talbot Address in his honor, which is annually delivered at the NAM's national meetings. The Elbert F. Cox Scholarship Fund, which is used to help black students pursue studies, is also named after him.

#### Valerie Thomas

An American scientist and inventor. She invented the illusion transmitter, for which she received a patent in 1980.<sup>[2]</sup> She was responsible for developing the digital media formats image processing systems used in the early years of the Landsat program. She developed real-time computer data systems to support satellite operations control centers (1964–1970) and oversaw the creation of the Landsat program (1970–1981), becoming an international expert in Landsat data products. Thomas held high-level positions at NASA including heading the Large Area Crop Inventory Experiment (LACIE) collaboration between NASA, NOAA, and USDA in 1974, serving as assistant program manager for Landsat/Nimbus (1975–1976), managing the NSSDC Computer Facility (1985), managing the Space Physics Analysis Network project (1986–1990), and serving as associate chief of the Space Science Data Operations Office. She authored many scientific papers and holds a patent for the illusion transmitter. For her achievements, Thomas has received numerous awards including the Goddard Space Flight Center Award of Merit and NASA's Equal Opportunity Medal.

#### Euphemia Lofton Haynes

An American mathematician and educator. She was the first African-American woman to earn a PhD in mathematics. She had set up a trust fund to support a professorial chair and student loan fund in the School of Education, giving \$700,000 to Catholic University. Pope John XXIII awarded her the Papal decoration of honor, *Pro Ecclesia et Pontifice*, in 1959. She was named a Fellow of the American Association for the Advancement of Science in 1998.

#### Rebecca Cole

**Rebecca J. Cole** (March 16, 1846 – August 14, 1922) was an American physician, organization founder and social reformer. In 1867, she became the second African-American woman to become a doctor in the United States after Rebecca Lee Crumpler's achievement three years earlier. Dr Cole was born in Philadelphia on March 16, 1846; the second of five children and throughout her life would overcome racial and gender barriers to medical education by training in all-female institutions run by women who had been part of the first generation of female physicians graduating mid-century. Dr Cole attended high school at the Institute for Colored Youth, where she completed a rigorous curriculum that included Latin, Greek, and mathematics and later graduating in 1863. She then went on to graduate from the Woman's Medical College of Pennsylvania in 1867, under the supervision of Ann Preston; the first woman dean of the school. The Women's Medical College was founded by Quaker abolitionists and temperance reformers in 1850 under the name of the Female Medical College of Pennsylvania and was the world's first medical school for women. Her graduate medical thesis was titled *The Eye and Its Appendages*. Rebecca's roommates in her senior year were Odelia Blinn and Martha E. Hutchings. Nearly thirty years later Dr. Blinn wrote an article about how crossing the 'color line' in Philadelphia nearly derailed Rebecca's studies at the college and her plans for a medical career.

Neil deGrasse Tyson

**Neil deGrasse Tyson** (US: /dəˈɡræs/ or UK: /dəˈɡrɑːs/; born October 5, 1958) is an American astrophysicist, planetary scientist, author, and science communicator. Tyson studied at Harvard University, the University of Texas at Austin, and Columbia University. From 1991 to 1994, he was a postdoctoral research associate at Princeton University. In 1994, he joined the Hayden Planetarium as a staff scientist and the Princeton faculty as a visiting research scientist and lecturer. In 1996, he became director of the planetarium and oversaw its \$210 million reconstruction project, which was completed in 2000. Since 1996, he has been the director of the Hayden Planetarium at the Rose Center for Earth and Space in New York City. The center is part of the American Museum of Natural History, where Tyson founded the Department of Astrophysics in 1997 and has been a research associate in the department since 2003.

Otis Boykin

**Otis Frank Boykin** (August 29, 1920 – March 26, 1982) was an American inventor and engineer.<sup>[1]</sup> His inventions include electrical resistors used in computing, missile guidance, and pacemakers. Otis Boykin was born on August 29, 1920, in Dallas, Texas.<sup>[2][3]</sup> His father, Walter B. Boykin, was a carpenter, and later became a preacher. His mother, Sarah, was a maid, who died of heart failure

when Otis was a year old. This inspired him to help improve the pacemaker.<sup>[4]</sup> Boykin attended Booker T. Washington High School in Dallas, where he was the valedictorian, graduating in 1938.<sup>[5]</sup> He attended Fisk University<sup>[3]</sup> on a scholarship, worked as a laboratory assistant at the university's nearby aerospace laboratory, and left in 1941.

## Alice Ball

**Alice Augusta Ball** (July 24, 1892 – December 31, 1916) was an American chemist who developed the "Ball Method", the most effective treatment for leprosy during the early 20th century.<sup>[1]</sup> She was the first woman and first African American to receive a master's degree from the University of Hawaii, and was also the university's first female and African American chemistry professor.<sup>[2]</sup> Alice Augusta Ball was born on July 24, 1892, in Seattle, Washington, to James Presley and Laura Louise (Howard) Ball.<sup>[3]</sup> She was one of four children, with two older brothers, William and Robert, and a younger sister, Addie.<sup>[4]</sup> Her family was middle-class and well off, as Ball's father was a newspaper editor of the *Colored Citizen*, photographer, and lawyer. Her mother also worked as a photographer.<sup>[2]</sup> Her grandfather, James Ball Sr., was a photographer, and one of the first Black Americans to make use of daguerreotypy, the process of printing photographs onto metal plates. Some researchers have suggested that her parents' and grandfather's love for photography may have played a role in her love for chemistry, as they worked with mercury vapors and iodine sensitized silver plates to develop photos. Despite being prominent members and advocates of the African American community, both of Ball's parents are listed as "White" on her birth certificate. This may have been an attempt to reduce the prejudice and racism their daughter would face and help her "pass" in white society.

## Ernest Everett Just

**Ernest Everett Just** (August 14, 1883 – October 27, 1941) was a pioneering African-American biologist, academic and science writer. Just's primary legacy is his recognition of the fundamental role of the cell surface in the development of organisms. In his work within marine biology, cytology and parthenogenesis, he advocated the study of whole cells under normal conditions, rather than simply breaking them apart in a laboratory setting. On November 17, 1911, Ernest Just and three Howard University students (Edgar Amos Love, Oscar James Cooper, and Frank Coleman), established the Omega Psi Phi fraternity on the campus of Howard. Love, Cooper, and Coleman had approached Just about establishing the first black fraternity on campus. Howard's faculty and administration initially opposed the idea of establishing the fraternity, fearing that it could pose a political threat to Howard's white administration. However, Just worked to mediate the

controversy and, despite the initial doubts, Omega Psi Phi, Alpha Chapter, was chartered on Howard's campus on December 15, 1911.

#### Katherine Johnson

**Creola Katherine Johnson** (née **Coleman**; August 26, 1918 – February 24, 2020) was an American mathematician whose calculations of orbital mechanics as a NASA employee were critical to the success of the first and subsequent U.S. crewed spaceflights.<sup>[1]</sup> During her 33-year career at NASA and its predecessor, she earned a reputation for mastering complex manual calculations and helped pioneer the use of computers to perform the tasks. The space agency noted her "historical role as one of the first African-American women to work as a NASA scientist". Johnson's work included calculating trajectories, launch windows, and emergency return paths for Project Mercury spaceflights, including those for astronauts Alan Shepard, the first American in space, and John Glenn, the first American in orbit, and rendezvous paths for the Apollo Lunar Module and command module on flights to the Moon. Her calculations were also essential to the beginning of the Space Shuttle program, and she worked on plans for a mission to Mars.

#### Andrew J Beard

**Andrew Jackson Beard** (1849–1921) was an African American inventor, who introduced two improvements to the automatic railroad car coupler in 1897 and 1899, and was inducted into the National Inventors Hall of Fame in Akron, Ohio in 2006 for this achievement.<sup>[1]</sup> Born in 1849, Andrew Beard spent the first fifteen years of his life as a slave on a small farm in Eastlake, Alabama.<sup>[2]</sup> A year after he was emancipated, he married and became a farmer in Pinson, a city just outside Birmingham, Alabama.

#### Charles R Drew

**Charles Richard Drew** (June 3, 1904 – April 1, 1950) was an American surgeon and medical researcher. He researched in the field of blood transfusions, developing improved techniques for blood storage, and applied his expert knowledge to developing large-scale blood banks early in World War II. This allowed medics to save thousands of Allied forces' lives during the war.<sup>[1]</sup> As the most prominent African American in the field, Drew protested against the practice of racial segregation in the donation of blood, as it lacked scientific foundation, and resigned his position with the American Red Cross, which maintained the policy until 1950.

#### Lloyd A. Hall

**Lloyd Augustus Hall** (June 20, 1894 – January 2, 1971<sup>[1]</sup>) was an American chemist, who contributed to the science of food preservation. By the end of his career, Hall had amassed 59 United States patents, and a number of his inventions were also patented in other countries.

Frederick M. Jones

**Frederick McKinley Jones** (May 17, 1893 – February 21, 1961) was an American inventor, entrepreneur, winner of the National Medal of Technology, and an inductee of the National Inventors Hall of Fame.<sup>[1]</sup> His innovations in refrigeration brought great improvement to the long-haul transportation of perishable goods.<sup>[2]</sup> He co-founded Thermo King.<sup>[1]</sup> Jones was born in Cincinnati, Ohio on May 17, 1893<sup>[2][3]</sup> to an Irish father and African-American mother.<sup>[3]</sup> His mother deserted him when he was a child. His father struggled to raise him on his own.<sup>[4]</sup> After he was virtually orphaned at the age of seven, he was raised by a priest at a Catholic rectory in Cincinnati.<sup>[5]</sup> Jones left school after 6th grade and left the rectory to return to Cincinnati at age 11, where he got a job first as a cleaning boy and by age 14 he was working as an automobile mechanic. Jones was largely self taught.<sup>[6]</sup> He boosted his natural mechanical ability and inventive mind with independent reading and study and the willingness to seek new pastures in his search for advancement, against the odds.

Amos Harold

**Harold Amos** (September 7, 1918<sup>[1]</sup> – February 26, 2003<sup>[2]</sup>) was an African American microbiologist and professor. He taught at Harvard Medical School for nearly fifty years and was the first African-American department chair of the school. Harold Amos was the first Black American microbiologist and the first to become the chair of the Harvard Medical School. Also Harold Amos is known as a great teacher, researcher, and amazing mentor that pushed the historical idea of individuals and communities that want to pursue the fields of medicine and science.

Janet Bashen

**Janet Rita Emerson Bashen** (née **Emerson**; born February 12, 1957) is an American entrepreneur, business consultant, and software inventor who is best known for patenting a web-based EEO software application, LinkLine, to assist with equal employment opportunity investigations and claims tracking. Bashen is regarded as the first African American woman to obtain a web-based software patent.<sup>[1]</sup> As a result of her work with equal employment opportunity and diversity and inclusion, Bashen is regarded as a social justice advocate.

Patricia Bath

**Patricia Era Bath** (November 4, 1942 – May 30, 2019) was an American ophthalmologist, inventor, humanitarian, and academic. She was the inventor of laser cataract surgery. Her invention was called Laserphaco Probe.<sup>[1]</sup> She also became the first woman member of the Jules Stein Eye Institute, first woman to lead a post-graduate training program in ophthalmology, and first woman elected to the honorary staff of the UCLA Medical Center. Bath was the first African-American person to serve as a resident in ophthalmology at New York University. She was also the first African-American woman to serve on staff as a surgeon at the UCLA Medical Center. Bath was the first African-American woman doctor to receive a patent for a medical purpose. The holder of five patents,<sup>[2]</sup> she also founded the non-profit American Institute for the Prevention of Blindness in Washington, D.C.

Miriam Benjamin

**Miriam E. Benjamin** (September 16, 1861 – 1947) was an American schoolteacher and inventor. In 1888, she obtained a patent for the Gong and Signal Chair for Hotels, becoming the second African-American woman to receive a patent. Benjamin attended Howard University's medical school between 1894 and 1895,<sup>[2][5]</sup> but after passing a competitive civil service examination and working as a government clerk in a number of federal departments,<sup>[6]</sup> she obtained legal training, possibly by reading law under the instruction of an attorney, or by attending law school, and became an attorney.

## Hispanic and Latino Scientists and Engineers

Carlos Juan Finlay

A Cuban epidemiologist recognized as a pioneer in the research of yellow fever, determining that it was transmitted through mosquitoes *Aedes aegypti*. In 1928, President Gerardo Machado established the National Order of Merit Carlos J. Finlay, rewarding contributions to healthcare and medicine. It is the highest scientific decoration awarded by the Cuban Council of State. The order was discontinued between 1959 and 1981. The Finlay Institute for Vaccines (Instituto Finlay de vacunas, in Spanish), created in 1991, is named after him.

Bernardo Alberto Houssay

An Argentine physiologist who, in 1947, was a co-recipient of a Nobel Prize for Physiology or Medicine, which was on the experimental investigation of the role of the anterior hypophysis gland in the metabolism of carbohydrates, particularly in diabetes mellitus. Houssay demonstrated in the 1930s the diabetogenic effect

anterior hypophysis extracts and the decrease in diabetes severity with anterior hypophysectomy. These discoveries stimulated the study of hormonal feedback control mechanisms which are central to all aspects of modern endocrinology. He was the first Argentine Nobel laureate in the sciences. He shared the prize with Carl Ferdinand Cori and Gerty Cori, who won for their discoveries regarding the role of glucose in carbohydrate metabolism).

#### Alfonso Caso y Andrade

an archaeologist who made important contributions to pre-Columbian studies in his native Mexico. Caso believed that the systematic study of ancient Mexican civilizations was an important way to understand Mexican cultural roots. As a university student, he was part of a group of young intellectuals known as Los Siete Sabios de México ("The Seven Sages of Mexico") who founded Mexico City's "Society for Conferences and Concerts", which promoted cultural activity among the student population. His notable discoveries include the excavations at Monte Albán, in particular "Tomb Seven", in which several gold pieces and offerings were found (now shown in the Regional Museum of Oaxaca). He also discovered many sites in the Mixteca (a region in the state of Oaxaca), such as Yucuita, Yucuñudahui and Monte Negro. As well as discovering new sites Caso also sought to interpret them, establishing the chronology of Monte Albán history, and deciphering Mixtec codices.

#### Luis Federico Leloir

An Argentine physician and biochemist who received the 1970 Nobel Prize in Chemistry for his discovery of the metabolic pathways in lactose, becoming only the third Argentine to receive the prestigious honor in any field at the time.. His research into sugar nucleotides, carbohydrate metabolism, and renal hypertension garnered international attention and led to significant progress in understanding, diagnosing and treating the congenital disease galactosemia. With his research in dire financial straits, Leloir often resorted to homemade gadgets and contraptions to continue his work in the laboratory. The Fundación Instituto Campomar has since been renamed Fundación Instituto Leloir, and has grown to become a 21,000 sq ft (2,000 m<sup>2</sup>) building with 20 senior researchers, 42 technicians and administrative personnel, 8 post doctorate fellows, and 20 Ph.D. candidates. The Institute conducts research in a variety of fields, including Alzheimer's disease, Parkinson's disease, and multiple sclerosis

#### Jacinto Convit

A Venezuelan physician and scientist, known for developing a vaccine to prevent leprosy and his studies to treat cancer. He played a role in founding Venezuela's

National Institute of Biomedicine and held many leprosy-related positions. Among Convit's many honors for his work on leprosy and tropical diseases was Spain's Prince of Asturias Award in the Scientific and Technical Research category and France's Legion of Honor. In 1988, Convit was nominated for a Nobel Prize in Medicine for his experimental anti-leprosy vaccine. A vaccine for leishmaniasis was later developed using Convit's method.<sup>1</sup> He also worked on onchocerciasis, mycosis, and other tropical diseases.

#### Baruj Benacerraf

A Venezuelan-American immunologist, who shared the 1980 Nobel Prize in Physiology or Medicine for the "discovery of the major histocompatibility complex genes which encode cell surface protein molecules important for the immune system's distinction between self and non-self. His colleagues and shared recipients were Jean Dausset and George Davis Snell. He noticed that if antigens (something that causes a reaction with the immune system) were injected into animals with a similar heredity, two groups emerged: responders and non-responders. He then conducted further study and found that the dominant autosomal genes, termed the immune response genes, determined the response to certain antigens. This complex process would lead to the understanding of how these genes would determine immune responses. His discovery still holds true, and more has been discovered over the last century. More than 30 genes have been discovered in a gene complex called the major histocompatibility complex. The histocompatibility complex is a complex part of DNA that controls the immune response. This research has also led to clarify autoimmune diseases such as multiple sclerosis and rheumatoid arthritis. He was elected a Fellow of the American Academy of Arts and Sciences in 1971.

#### César Milstein

An Argentine biochemist in the field of antibody research. Milstein shared the Nobel Prize in Physiology or Medicine in 1984 with Niels Kaj Jerne and Georges J. F. Köhler for developing the hybridoma technique for the production of monoclonal antibodies. In addition to the Nobel Prize 1984, Milstein was elected a Fellow of the Royal Society (FRS) in 1975, was a fellow of Darwin College, Cambridge from 1980 to 2002, awarded the Louisa Gross Horwitz Prize from Columbia University in 1980, won the Copley Medal in 1989, and became a Companion of Honour in 1995. In 1993, the Argentinian Konex Foundation granted him the Diamond Konex Award, one of the most prestigious cultural awards of Argentina, as the most important scientist in the last decade of his country.

### Mario J. Molina

A Mexican chemist. He played a pivotal role in the discovery of the Antarctic ozone hole, and was a co-recipient of the 1995 Nobel Prize in Chemistry for his role in discovering the threat to the Earth's ozone layer from chlorofluorocarbon (CFC) gases. He was the first Mexican-born scientist to receive a Nobel Prize in Chemistry and the third Mexican born person to receive the Nobel award. Molina was also Director of the Mario Molina Center for Energy and Environment in Mexico City. Molina was a climate policy advisor to the President of Mexico, Enrique Peña Nieto.

### Franklin Chang-Díaz

A Costa Rican American mechanical engineer, physicist and former NASA astronaut. He is the sole founder and CEO of Ad Astra Rocket Company as well as a member of Cummins' board of directors. He became an American citizen in 1977. In 1986, Franklin Chang Díaz was one of twelve recipients of the Medal of Liberty. He is of Costa Rican Spanish (maternal side) and Chinese (paternal side) descent. He is a veteran of seven Space Shuttle missions, tying the record, as of 2021 for the most spaceflights (a record set by Jerry L. Ross). He was the third Latin American, but the first Latin American immigrant NASA Astronaut selected to go into space. Chang Díaz is a member of the NASA Astronaut Hall of Fame.

### Ellen Ochoa

An American engineer, former astronaut and former director of the Johnson Space Center. In 1993, Ochoa became the first Hispanic woman to go to space when she served on a nine-day mission aboard the Space Shuttle *Discovery*. Ochoa became director of the center upon the retirement of the previous director, Michael Coats, on December 31, 2012. She was the first Hispanic director and the second female director of Johnson Space Center. Ochoa has received many awards among which are NASA's Distinguished Service Medal (2015),<sup>[26]</sup> Exceptional Service Medal (1997), Outstanding Leadership Medal (1995) and Space Flight Medals (2002, 1999, 1994, 1993).<sup>[1]</sup> Ochoa and Michael Foale were announced as the 2017 class of the United States Astronaut Hall of Fame.<sup>[27]</sup>

### Guillermo Gonzalez Camarena

A Mexican electrical engineer who was the inventor of a color-wheel type of color television, and who also introduced color television to the world. González Camarena invented the "Chromoscopy Adapter for Television Equipment", an early color television transmission system. He was only 17. A U.S. patent application (2,296,019) states, "My invention relates to the transmission and

reception of colored pictures or images by wire or wireless..." The invention was designed to be easy to adapt to black-and-white television equipment. González Camarena applied for this patent August 14, 1940, and obtained the patent September 15, 1942. He also filed for additional patents for color television systems in 1960 and 1962. He sold his first set in 1954 for about \$1,450. On August 31, 1946, González Camarena sent his first color transmission from his lab in the offices of The Mexican League of Radio Experiments, at Lucerna St. #1, in Mexico City. The video signal was transmitted at a frequency of 115 MHz. and the audio in the 40-meter band. He obtained authorization to make the first publicly announced color broadcast in Mexico, on February 8, 1963, *Paraíso Infantil*, on Mexico City's XHGC-TV, a station that he established in 1952. By that time, the government had adopted NTSC as the television color system.

#### Luis von Ahn

**Luis von Ahn** born 19 August 1978 is a Guatemalan entrepreneur and a Consulting Professor in the Computer Science Department at Carnegie Mellon University in Pittsburgh, Pennsylvania.<sup>[2]</sup> He is known as one of the pioneers of crowdsourcing. He is the founder of the company reCAPTCHA, which was sold to Google in 2009,<sup>[3]</sup> and the co-founder and CEO of Duolingo, the world's most popular language-learning platform.<sup>[4]</sup> Luis von Ahn was born in and grew up in Guatemala City. Von Ahn grew up in an upper-middle class household with both of his parents working as physicians. He attended a private English language school in Guatemala City, an experience he cites as a great privilege.<sup>[5][6]</sup> When von Ahn was eight years old, his mother bought him a Commodore 64 computer, beginning his fascination with technology and computer science.<sup>[7]</sup> He is of German Guatemalan descent.

#### Alejandro Zaffaroni

**Alejandro Zaffaroni** (February 27, 1923 – March 1, 2014) was a serial entrepreneur who was responsible for founding several biotechnology companies in Silicon Valley.<sup>[1][2][3]</sup> Products that he was involved in developing include the birth control pill, the nicotine patch, corticosteroids, and the DNA microarray.<sup>[4]</sup> Zaffaroni was born on February 27, 1923 in Montevideo. Zaffaroni was of Italian descent, as his grandfather migrated from Italy to Uruguay at the age of 16. Both of Zaffaroni's parents passed away early in his life; his mother when he was 12 and his father when he was 18. His father was in the banking business. Zaffaroni received his Bachelor of Science degree from the University of the Republic in 1945, and his Ph.D. in biochemistry from the University of Rochester in 1949.<sup>[5]</sup>

#### Domingo Liotta

**Domingo Santo Liotta** (born November 29, 1924) is a pioneer of heart surgery, creator of multiple cardiac prostheses including the first total artificial heart used in a human being. Domingo Santo Liotta, son of Italian immigrants, was born in the city of Diamante, Entre Rios, Argentina on November 29, 1924. He completed his primary education at his hometown at "Independencia School", and his secondary education at the "Justo Jose de Urquiza School" in Concepcion del Uruguay, Entre Rios.

Helia Bravo Hollis

**Helia Bravo Hollis** (30 September 1901 – 26 September 2001) was a Mexican botanist who did research in the Faculty of Science at UNAM.<sup>[1]</sup> She made contributions to the area of floriculture, although in the arid regions of eastern Mexico, she focused on the taxonomy of cactaceae. She organized a collection of live cactaceae and other succulent plants in order to observe their development and evaluate morphological characteristics.

France Cordova

**France Anne-Dominic Córdova** (born August 5, 1947) is an American astrophysicist and administrator who was the fourteenth director of the National Science Foundation.<sup>[1]</sup> Previously, she was the eleventh President of Purdue University from 2007 to 2012.<sup>[2]</sup> She now serves as President of the Science Philanthropy Alliance.<sup>[3]</sup> Córdova's scientific career contributions have been in the areas of observational and experimental astrophysics, multi-spectral research on x-ray and gamma ray sources, and space-borne instrumentation. She has published more than 150 scientific papers, most recently in 2007. In September 2007, she was appointed to the board of directors of BioCrossroads, Indiana's initiative to grow the life sciences through a public-private collaboration that supports the region's research and corporate strengths while encouraging new business development.

Nicole Hernandez

**Nicole Hernandez Hammer** is a Guatemalan-American climate scientist and activist studying sea-level rise and the disproportionate impacts of climate change on communities of color. She is a climate advocate for the Union of Concerned Scientists and former deputy director of the Florida Center for Environmental Studies. Hammer's research is focused on how climate change is affecting communities of color and low-income communities.<sup>[6][7][8]</sup> Hammer made the connection that Latino populations were the most vulnerable to sea level rise compared to other populations.<sup>[6]</sup> With this information, she was determined to spread the message through outreach and further research. In 2013, Hammer was

a part of the 2013 Climate Assessment of Southeast US to further assess the damage of infrastructure due to sea level rise and has done many interviews and publications on the effects of sea level rise on communities of color.

#### Scarlin Hernandez

Scarlin Hernandez was born in 1991, in the Dominican Republic and moved to Brooklyn, NY at the age of 4. She graduated with a degree in computer engineering from Capitol Technology University in Laurel, Maryland in 2013. She is a spacecraft engineer for NASA's signature space mission, the James Webb Space Telescope. As a spacecraft engineer an important part of her work is to test the ground systems that will command and control the telescope after it has been launched into space. The telescope is set to launch in 2021 and will be used to discover new planets and the first stars after the dark ages. The National Science Foundation awarded her a full college scholarship to the Capitol Technology University (CTU) in Laurel, MD. Scarlin completed a internship at NASA's Goddard Space Flight Center, and by the age of 20, she was part of the ground control system team for the Tropical Rainfall Measuring Mission (TRMM) satellite. In 2013, she earned a Bachelor's degree in Computer Engineering, but she found her real niche in Astronautical Engineering. After graduation, Scarlin was the mission planning lead for the TRMM mission before transferring to work on the James Webb Space Telescope mission.

#### Cesare Lattes

**Cesare Mansueto Giulio Lattes** (11 July 1924 – 8 March 2005), also known as **César Lattes**, was a Brazilian experimental physicist, one of the discoverers of the pion, a composite subatomic particle made of a quark and an antiquark. Lattes is one of the most distinguished and honored Brazilian physicists, and his work was fundamental for the development of atomic physics. He was also a great scientific leader of Brazilian Physics and was one of the main personalities behind the creation of the important Brazilian National Research Council (*Conselho Nacional de Desenvolvimento Científico e Tecnológico*). Due to his contribution in this process, the Brazilian national science data-base, Lattes Platform was named after him.

#### Susana Lopez Charreton

**Susana López Charretón** (born 19 June 1957 in Mexico City) is a Mexican virologist specialized in understanding the mechanisms of infection of rotavirus. López Charretón has led a research program as principal investigator at the Biotechnology Institute (UNAM) in Cuernavaca, Mexico for over 25 years.<sup>[2]</sup>

From 2000 to 2010, she was a Howard Hughes Medical Institute International Research Scholar.<sup>[3]</sup>In 2012, López Charretón received the L'Oréal-UNESCO Award for Women in Science – Latin America "for identifying how rotaviruses cause the death of 600,000 children each year".<sup>[4]</sup>

#### Ynes Mexia

**Ynés Henriquetta Julietta Mexía** (May 24, 1870 – July 12, 1938) was a Mexican-American botanist notable for her extensive collection of novel specimens of flora and plants originating from sites in Colombia, Mexico, and Peru. She discovered a new genus of *Asteraceae*, known after her as *Mexianthus*, and accumulated over 150,000 specimens for botanical study<sup>[1]</sup> over the course of a career spanning 16 years braving ecologic challenges such as poisonous berries, dangerous terrain, bogs and earthquakes for the sake of her research.

#### Adriana Ocampo

**Adriana C. Ocampo Uria** (born January 5, 1955) is a Colombian planetary geologist and a Science Program Manager at NASA Headquarters. In 1970, Ocampo emigrated to California and completed her Master in Sciences at California State University, Northridge and finished her PhD at the Vrije Universiteit in the Netherlands.<sup>[1]</sup> During high school and graduate studies she worked that the Jet Propulsion Laboratory, where she serves as the science coordinator for many planetary missions ( Viking, Mars Observer, Voyager, Galileo *Galileo* Mission, etc.). She was the first to recognized, using satellite images, that a ring of cenotes or sinkholes, is the only surface impression of the buried Chicxulub crater.

#### Severo Ochoa

**Severo Ochoa de Albornoz** (Spanish: [seˈβero oˈtʃoa ðe alβorˈnoθ]; 24 September 1905 – 1 November 1993) was a Spanish physician and biochemist, and joint winner of the 1959 Nobel Prize in Physiology or Medicine with Arthur Kornberg. He then began postdoctoral study at the National Institute for Medical Research in London, where he worked with Henry Hallett Dale. His London research involved the enzyme glyoxalase and was an important departure in Ochoa's career in two respects. First, the work marked the beginning of Ochoa's lifelong interest in enzymes. Second, the project was at the cutting edge of the rapidly evolving study of intermediary metabolism.

#### Sabrina Gonzalez

**Sabrina Gonzalez Pasterski** (born June 3, 1993) is an American theoretical physicist from Chicago who studies high energy physics.<sup>[9][10]</sup> She describes

herself as "a proud first-generation Cuban-American and Chicago Public Schools alumna".<sup>[7]</sup> She completed her undergraduate studies at the Massachusetts Institute of Technology (MIT), earned her PhD from Harvard University and is a PCTS Postdoctoral Fellow at Princeton University.<sup>[11]</sup> As a sophomore at MIT, Pasterski was part of the Compact Muon Solenoid experiment at the Large Hadron Collider.<sup>[8]</sup> While a graduate student at Harvard, she worked with Andrew Strominger.<sup>[20]</sup> Her early work resulted in discovery of the "spin memory effect" which may be used to detect or verify the net effects of gravitational waves.<sup>[21]</sup> She then completed the Pasterski–Strominger–Zhiboedov Triangle for electromagnetic memory in a 2015 solo paper<sup>[22]</sup> that Stephen Hawking cited in early 2016.<sup>[23]</sup> She earned her PhD in Physics from Harvard University in May 2019.<sup>[24]</sup> She is a postdoc at Princeton University's Princeton Center for Theoretical Science.

#### Sarah Stewart

**Sarah E. Stewart** (August 16, 1905 – November 27, 1976) was a Mexican American researcher who pioneered the field of viral oncology research, the first to show that cancer-causing viruses can spread from animal to animal. She and Bernice Eddy co-discovered the first polyoma virus, and Stewart-Eddy polyoma virus is named after them.<sup>[1]</sup> Stewart joined the National Institutes of Health (NIH) from 1935-1944 while completing her PhD at the University of Chicago.<sup>[1]</sup> During her time there, she took part in developing a vaccine for gangrene, which helped many soldiers during the second world war.

#### Lydia Villa-Komaroff

**Lydia Villa-Komaroff** (born August 7, 1947) is a molecular and cellular biologist who has been an academic laboratory scientist, a university administrator, and a business woman. She was the third<sup>[1]</sup> Mexican American woman in the United States to receive a doctorate degree in the sciences (1975) and is a co-founding member of The Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS).<sup>[2]</sup> Her most notable discovery was in 1978 during her post-doctoral research, when she was part of a team that discovered how bacterial cells could be used to generate insulin

#### Evangelina Villegas

**Evangelina Villegas** (October 24, 1924 – April 24, 2017<sup>[1]</sup>) was a Mexican cereal biochemist whose work with maize led to the development of quality protein maize (QPM). She and her colleague<sup>[2]</sup> from the International Maize and Wheat Improvement Center (CIMMYT), Surinder Vasal, shared the 2000 World Food Prize for this achievement.<sup>[3]</sup> Villegas was the first woman to ever receive the

World Food Prize.<sup>[4]</sup> Villegas did a B.A. chemistry and biology at the National Polytechnic Institute of Mexico and earned a M.Sc. on cereal technology from Kansas State University.<sup>[1]</sup> She also earned a Ph.D. in cereal chemistry from the North Dakota State University.

Luis Walter Alvarez

**Luis Walter Alvarez** (June 13, 1911 – September 1, 1988) was an American experimental physicist, inventor, and professor who was awarded the Nobel Prize in Physics in 1968 for development of the hydrogen bubble chamber enabling discovery of resonance states in particle physics. The *American Journal of Physics* commented, "Luis Alvarez was one of the most brilliant and productive experimental physicists of the twentieth century."

## **Asian and Asian America Scientists and Engineers**

Josephine Santiago-Bond

“I was born when my parents were working on their PhDs in the United States, giving me the great gift of being an American citizen by birth and a Filipino by ethnicity. I grew up in the Philippines, a country that I dearly love as much as I’ve come to love the United States which I now call my home. “ “As a systems engineer, my duties involve constant communication with various discipline engineers, and integration of ground system development activities. I recently graduated from the Systems Engineering Leadership Development Program, which enabled me to close some gaps in my NASA systems engineering experience by providing me with a year-long developmental assignment at Ames Research Center working on LADEE, a lunar mission. I am now back at KSC, working on another lunar mission called RESOLVE.”

**Taken from [Women@NASA](#) » Josephine Santiago-Bond**

Lucille V. Abad

Meet Dr. Lucille V. Abad of the Philippine Nuclear Research Institute (PNRI) who was featured by the Philippine Commission on Women (PCW) in the Juana Says series for International Women’s Day 2019. Dr. Abad is a scientist with a Ph.D. in Nuclear Engineering and Management from the University of Tokyo and an innovator famous in the chemistry industry. With her passion and devotion towards her profession, she and her research team were able to produce Radiation-Modified Carrageenan as Plant Food Supplement and they have also proven its effectiveness.

**Taken from [MEET: Dr. Lucille Abad, promoter of peaceful use for nuclear technology - Good News Pilipinas](#)**

Chang Meemann

**Meemann Chang** (Chinese: 张弥曼; born 17 April 1936) also known as **Zhang Miman**, is a Chinese paleontologist at the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP). She completed her undergraduate studies at Moscow University and completed her PhD thesis entitled 'The braincase of *Youngolepis*, a Lower Devonian crossopterygian from Yunnan, south-western China' at Stockholm University.<sup>1</sup> She was the first woman to become head of IVPP in 1983. Later in 2011 she also received an honorary degree from the University of Chicago for her many career achievements.

Pimchai Chaiyen

Dr. Pimchai Chaiyen is Professor and Dean of School of Biomolecular Science and Engineering, Vidyasirimedhi Institute of Science and Technology (VISTEC), Thailand. She is passionate about science and believes that science and technology are vital for the development of Thai economy and society. Dr. Chaiyen is one of the most accomplished researchers in Thailand. She has received numerous awards including the L'oreal-Unesco Fellowship for Woman in Science in Thailand (2003), Young Scientist Award (2005) and Young Biochemist and Molecular Biologist Award from The Science Society of Thailand (2008), Taguchi Prize for Outstanding Research Achievement in Biotechnology (2010), TRF-CHE-Scopus Researcher Award from The Thailand Research Fund (2010), Outstanding Researcher Award (Chemical Science and Pharmacy) from the National Research Council of Thailand (2012), and Outstanding Scientist of Thailand (2015), the country's highest honor in science. Other recent awards include BioTalk Plenary Award from Biotechnology and Biochemical Engineering Society of Taiwan (BEST) and the first place in business pitching competition from "Leaders in Innovation Fellowship" by Royal Academy of Engineering and Newton Fund, UK.

Napida Hinchiranan

Napida Hinchiranan has joined a faculty member of Department of Chemical Technology, Faculty of Science, Chulalongkorn University since 2005. She is a lecturer in the class of Bachelor degree and Graduate programs (Department of Chemical Technology and Program in Petrochemistry and Polymer Science) for teaching Thermodynamics for Chemical Engineering, Separation Operations (Adsorption process) and fundamental in Catalyst Technology. Her research expertise is based on the chemical modification of polymers, especially, natural rubber for applying as compatibilizers or impact modifier via graft copolymerization. Some reaction such as catalytic hydrogenation for improving the properties of unsaturated elastomers is also in her expertise area as well as the heterogeneous catalytic process for upgrading the alternative liquid fuels.

V. Narry Kim

**V. Narry Kim** is a South Korean biochemist and microbiologist, best known for her work on microRNA biogenesis. Her pioneering studies have laid the groundwork for the biology of microRNA and contributed to the improvement of RNA interference technologies. Kim was born in South Korea in 1969. Kim first became interested in science as a high school student. When asked why she chose science as a lifelong career, she said, “I was charmed by the simplicity of the principles underlying the complexity of life.”

Marisa Ponpuak

Dr. Ponpuak received a National Scholarship for studying abroad from The Development and Promotion of Science and Technology Talent Project (DPST) of Thailand to pursue her study in the U.S.A. She attended University of Wisconsin-Madison and obtained her Bachelor's degree in Molecular Biology with honors in 2001. She then went on to study her Ph.D. at Washington University, School of Medicine and joined the lab of Prof. Daniel E. Goldberg, Howard Huges Medical Institute and the Department of Molecular Microbiology, Washington University. Her Ph.D. work was focused on the biology of the human malarial parasite *Plasmodium falciparum*, the causative agent of Malaria. This work was published in Molecular Microbiology journal in which a new function/location of a food vacuole enzyme named falcilysin was discovered and characterized. A commentary on this article was published in the same issue.

Felycia Edi Soetaredjo

Dr. Felycia Edi Soetaredjo obtained her master degree by research in The University of Queensland sponsored by Australian Development Scholarship. Her major was in Chemical Engineering in which she graduated in 2005. She continued her studies at the National Taiwan University of Science and Technology and got her degree in 2013. As a Chemical Engineer, Felycia is especially interested in waste water research, having conducted several research projects related to waste water research in general and particularly in adsorption of hazardous compound. Her research was funded by IFS, a research grant from Indonesian government through competition and also industries. Her concern about environmental questions keeps her in this research area, where she also published various scientific articles.

Tu Youyou

**Tu Youyou** (Chinese: 屠呦呦; pinyin: *Tú Yōuyōu*; born 30 December 1930) is a Chinese pharmaceutical chemist and malariologist. She discovered artemisinin (also known as *qīnghāosù* 青蒿素) and dihydroartemisinin, used to treat malaria, a breakthrough in twentieth-century tropical medicine, saving millions of

lives in South China, Southeast Asia, Africa, and South America. For her work, Tu received the 2011 Lasker Award in clinical medicine and the 2015 Nobel Prize in Physiology or Medicine jointly with William C. Campbell and Satoshi Ōmura. Tu is the first Chinese Nobel laureate in physiology or medicine and the first female citizen of the People's Republic of China to receive a Nobel Prize in any category. She is also the first Chinese person to receive the Lasker Award. Tu was born, educated and carried out her research exclusively in China.

Jackie Y. Ying

**Jackie Yi-Ru Ying** (born 1966) is an American nanotechnology scientist and the founding executive director of the Institute of Bioengineering and Nanotechnology in Singapore. Ying was born in Taipei in 1966. She moved to Singapore with her family in 1973 where she was a student at Rulang Primary School<sup>1</sup> and Raffles Girls' School. Her family moved to New York when she was 15. She earned a B.Eng. degree, graduating summa cum laude from Cooper Union in 1987. She then attended Princeton University, receiving her MA in 1988 and her PhD in 1991, both in chemical engineering. She spent a year as a Humboldt Fellow at the Institute for New Materials in Saarbrücken and researched nanocrystalline materials with Herbert Gleiter. In 2008, Ying was named one of the "100 Engineers of the Modern Era" by the American Institute of Chemical Engineers. Ying was elected to the Singapore Women's Hall of Fame in 2014. In December 2015, it was announced that she was one of the recipients of the inaugural 2015 Mustafa Prize awarded by the Mustafa Science and Technology Foundation. She was awarded the "Top Scientific Achievement" award for "her great scientific and technological contributions and achievements to the synthesis of well-designed advanced nanostructured materials and systems, nanostructured biomaterials and miniaturised biosystems for various interesting applications". In 2016, she was elected to the Cooper Union Hall of Fame for her achievements.

Sanghamitra Bandyopadhyay

**Sanghamitra Bandyopadhyay** (born 1968) is an Indian computer scientist specializing in computational biology. A professor at the Indian Statistical Institute, Kolkata, she is a Shanti Swarup Bhatnagar Prize winner in Engineering Science for 2010 and an Infosys Prize 2017 laureate in the Engineering and Computer Science category. Her research is mainly in the areas of evolutionary computation, pattern recognition, machine learning and bioinformatics.

Tanzima Hashem

**Tanzima Hashem**, a Bangladeshi professor at BUET, is one of the five women scientists from the developing world who won Elsevier Foundation Awards in

2017. Her research focuses on maintaining user privacy while location-based services are being accessed. She is also noted for organizing the first workshop in Bangladesh on women in computing in 2014. Hashem graduated in computer science and engineering at BUET in 2004, earning a master's degree in 2006. She went on to obtain a doctorate from the University of Melbourne, Australia, in 2011. She has also spent short periods in Melbourne from 2012 to 2017, working as an academic research visitor.

#### Akbar Adibi

**Akbar Adibi** (Persian: اکبر ادیبی *Akbar Adībī*) (1939–2000) was an Iranian electronic engineer, VLSI researcher, and university engineering professor. His notable achievements are: The creation of Iran's first Solar Cell in 1978, creation of Amirkabir University's Graduate Studies in 1984, supervising Hassan Kaatuzian, who became Iran's first Ph.D. graduated in electronics in 1994, publishing more than 100 internal and international publications, earning the title of Full Professor in year 1995, earning the respected Kharazmi National Prize for his contribution as one of the best projects in 1995, earning the respected title of "The Most Recognized and Elite University Professor of Iran" in 1996, where he was awarded a prize from the hand of the President of Islamic Republic of Iran in 1996, becoming a senior member of IEEE in 1996, and earning the respected title of "The Father of Electronics and VLSI in Iran" by the Iranian academia and the media.

#### Nasir Gebelli

**Nasir Gebelli** (Persian: ناصر جبلی, also **Nasser Gebelli**, born 1957) is an Iranian-American programmer and video game designer usually credited in his games as simply **Nasir**. Gebelli wrote Apple II games for Sirius Software, created his own company Gebelli Software, and worked for Squaresoft (now Square Enix). He became known in the early 1980s for producing fast action games for the Apple II, including 3D shooters.

#### Aletta Concepcion T. Yñiguez

Dr Yñiguez is a marine biologist and ecological modeler who graduated from the Division of Marine Biology and Fisheries, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Florida, USA in 2007. She was on a Fulbright Scholarship and a Maytag Fellowship during her Ph.D. at Miami. Her general research interest lies in population and ecosystem dynamics, and capturing these dynamics in models particularly to link individual or lower level characteristics to higher level properties of the system. She is interested in applying these models for scenario-testing and management issues. She is

currently an Assistant Professor at the Marine Science Institute (MSI), University of the Philippines and is heading projects on developing early-warning systems for harmful algal blooms in the Philippines, and modeling the linkages between fisheries and primary production.

Irene Au

As former head of the design teams for Google and Yahoo, I have been one of the biggest employers of UX talent. I have led design and user experience at Google, Yahoo, Netscape, and Udacity.

Jane X. Luu

Dr. **Jane X. Luu** (Vietnamese: **Luu Lê Hằng**,<sup>[3]</sup> born July 1963) is a Vietnamese American astronomer and defense systems engineer. She was awarded the Kavli Prize (shared with David C. Jewitt and Michael Brown) for 2012 "for discovering and characterizing the Kuiper Belt and its largest members, work that led to a major advance in the understanding of the history of our planetary system". As a graduate student at the University of California at Berkeley<sup>[8]</sup> and the Massachusetts Institute of Technology, she looked at links between asteroids and comets for her main PhD project.<sup>[9]</sup> She also worked with David C. Jewitt to discover the Kuiper Belt,<sup>[5]</sup> an area previously believed to contain no objects. In 1992, after five years of observation, they found the first known Kuiper Belt object other than Pluto and its largest moon Charon, using the University of Hawaii's 2.2 meter telescope on Mauna Kea.

Diosdado Banatao

**Diosdado P. Banatao** (born May 23, 1946 in the small barrio of Malabbac in the town of Iguig, Cagayan, Philippines) is a Filipino entrepreneur and engineer working in the high-tech industry,<sup>[2]</sup> credited with having developed the first 10-Mbit Ethernet CMOS with silicon coupler data-link control and transceiver chip, the first system logic chip set for IBM's PC-XT and the PC-AT, and the local bus concept and the first Windows Graphics accelerator chip for personal computers.<sup>[3]</sup> A three-time start-up veteran, he co-founded Mostron, Chips and Technologies, and S3 Graphics.<sup>[4]</sup> His father, Salvador Banatao, was a rice farmer. His mother, Rosita Banatao, was a housekeeper.<sup>[2]</sup>

Robert Cornelius Murphy

**Robert Cornelius Murphy** (born July 19, 1988) is an American Internet entrepreneur and software engineer. He is the co-founder and the CTO of the American multinational technology and social media company Snap Inc., which

he created (as Snapchat Inc.) with Evan Spiegel and Reggie Brown while they were students at Stanford University.

He was named as one of "100 Most Influential People in 2014" by Time. In 2015, Murphy was first listed and became the second-youngest billionaire in the world by Forbes. Murphy was born on July 19, 1988,<sup>[2]</sup> in Berkeley, California.<sup>[3]</sup> His mother grew up in the Philippines, and emigrated to the United States.<sup>[4]</sup>

Lourdes J. Cruz

**Lourdes J. Cruz** (born May 19, 1942) is a Filipino biochemist whose research has contributed to the understanding of the biochemistry of toxic peptides from the venom of fish-hunting *Conus* marine snails.<sup>[1]</sup> Throughout the Philippines, she is known as the *Sea Snail Venom Specialist*.<sup>[2]</sup> The characterization of over 50 biologically active peptides from the snail's venom had been made possible, in part, by her studies. Scientific findings regarding the peptides found in snails have applications in diagnostic tools for cancers and the development of drugs for the treatment of neurological disorders.<sup>[3]</sup> She has also contributed to the development of conotoxins as tools for examining the activity of the human brain. Her contributions to science have earned her several awards and acknowledgements including being named a National Scientist of the Philippines in 2006.

Bui Tuong Phong

**Bui Tuong Phong** (December 14, 1942 – July 1975) was a Vietnamese-born computer graphics researcher and pioneer. He invented the widely used Phong shading algorithm and Phong reflection model. Phong was the inventor of the Phong reflection model and the Phong shading interpolation method, techniques widely used in computer graphics. He published the description of the algorithms in his 1973 PhD dissertation<sup>[3]</sup> and a 1975 paper. He developed the first algorithm for simulating specular phenomena

Eugene H. Trinh

**Eugene Huu-Chau "Gene" Trinh** (Vietnamese: Trịnh Hữu Châu, born September 14, 1950) is a Vietnamese American biochemist who flew aboard NASA Space Shuttle mission STS-50<sup>[1]</sup> as a Payload Specialist, becoming the first Vietnamese American astronaut in space<sup>[2][3]</sup> and the second Vietnamese in space (after cosmonaut Phạm Tuân). Trinh is currently the Director of the Physical Sciences Research Division in the Biological and Physical Research Enterprise at NASA headquarters. He started with NASA in 1979, as a Senior Research Scientist at the Jet Propulsion Laboratory. He conducted experimental and theoretical research in Fluid Dynamics, Fundamental Materials Science, and Levitation Technology for 20 years. He performed hands-on experimental

investigations in laboratories aboard the NASA KC-135 aircraft, and on the Space Shuttle Columbia.

Trinh was a Payload Specialist crew member on the STS-50/United States Microgravity Lab-1 Space Shuttle flight in 1992.

Roseli Ocampo-Friedmann

**Roseli Ocampo-Friedmann** (November 23, 1937 – September 4, 2005) was a Filipino-American microbiologist and botanist who specialized in the study of cyanobacteria and extremophiles. Her work has been cited in work exploring the terraforming of Mars. She earned a degree in botany from the University of the Philippines in 1958. After completing her master's at Hebrew University in Jerusalem in 1966, she returned to the Philippines to work for Manila's National Institute of Science and Technology.<sup>[2]</sup> In 1968, she joined Dr. Imre Friedmann at Florida State University where she received her PhD in 1973.

Kathy Pham

**Kathy Pham** is a Vietnamese American computer scientist and product management executive. She has held roles in leadership, engineering, product management, and data science at Google, IBM, the Georgia Tech Research Institute, Harris Healthcare,<sup>[1][2][3]</sup> and served as a founding product and engineering member of the United States Digital Service (USDS) in the Executive Office of the President of the United States at The White House.

Tuan Vo-Dinh

**Tuan Vo-Dinh** (Vietnamese: **Võ Đình Tuấn**) (Nha Trang, 11 April 1948) is R. Eugene and Susie E. Goodson Professor of Biomedical Engineering at the Duke University Pratt School of Engineering and professor of Chemistry and director of the Fitzpatrick Institute for Photonics at Duke. He specializes in photonics, the physical science of light. He pioneered the development of a new generation of gene probes using surface-enhanced Raman scattering (SERS) detection with 'Molecular Sentinels' and Plasmonic Coupling Interference (PCI) molecular probes for multiplex and label-free detection of nucleic acid biomarkers (DNA, mRNA, microRNA) in early detection of cancer.

Han T. Dinh

**Han T. Dinh** is director of vehicle engineering for the United States Postal Service.<sup>[1]</sup> He was the winner of the 2006 White House, Closing the Circle Award in Transportation from President George W. Bush.<sup>[2]</sup> In 2006, he was selected by *Public Works* magazine as one of the 50 Trendsetters of the Year. He received his masters of science in mechanical engineering from the University of Wisconsin at Madison and completed his doctoral study program at George Washington

University. From 1982 to 1988, he was senior project engineer at General Motors Corporation in Detroit, Michigan. Based on his work in alternative fuels, he was selected among the hundreds of participants as the first winner of the 2006 White House, Closing the Circle Award in Transportation.

### Kalpana Chawla

**Kalpana Chawla** (17 March 1962 – 1 February 2003) was an American astronaut and engineer who was the first woman of Indian origin to go to space.<sup>[3][4]</sup> She first flew on Space Shuttle *Columbia* in 1997 as a mission specialist and primary robotic arm operator. Her second flight was on STS-107, the final flight of Space Shuttle *Columbia* in 2003. Chawla was one of the seven crew members who died in the Space Shuttle *Columbia* disaster when the spacecraft disintegrated during its re-entry into the Earth's atmosphere.<sup>[5]</sup> Chawla was posthumously awarded the Congressional Space Medal of Honor,<sup>[6]</sup> and several streets, universities, and institutions have been named in her honor.<sup>[7][8][9]</sup> She is regarded as a national hero in India.<sup>[10]</sup>

### Yasaman Farzan

**Yasaman Farzan** (Persian: یاسمن فرزان was born 1977 in Tabriz) is an Iranian researcher. She is a faculty member of Institute for Research in Fundamental Sciences and researcher of International Centre for Theoretical Physics.<sup>[3][4]</sup>

### Uma Chowdhry

**Uma Chowdhry** is an American chemist whose career has been spent in research and management positions with E. I. du Pont de Nemours and Company.<sup>[1][2]</sup> She has specialized in the science of ceramic materials, including catalysts,<sup>[3][4]</sup> proton conductors,<sup>[5]</sup> superconductors<sup>[6][7][8]</sup> and ceramic packaging for microelectronics.<sup>[9][10]</sup> Chowdhry was born in Mumbai, India in 1947. She received a Bachelor's degree in physics from the University of Bombay (now Mumbai University) in 1968 before coming to the United States. She received a Master of Science degree from the California Institute of Technology (Caltech) in engineering science in 1970. After two years with Ford Motor Company, she entered the Massachusetts Institute of Technology (MIT) where she earned a Ph.D. in materials science in 1976.<sup>[11][1][2]</sup>

### Kamaloddin Jenab

**Kamaloddin Jenab** (كمال الدين جناب) was an Iranian pioneer physicist. He is often credited for founding academic experimental science in Iranian universities.<sup>[1]</sup>

He was the first Iranian to obtain a PhD in nuclear physics, and is often credited for laying the foundations of that science in Iran.<sup>[1]</sup>

Born in 1908 in Isfahan, he earned a scholarship to study abroad, taking him to France where he studied physics at Nancy-Université, chemistry at Sorbonne University, and finally culminating in a PhD from California Institute of Technology in the U.S.

Jenab studied under Robert Millikan at Caltech where he completed his PhD in Nuclear Physics in 1936. He also participated in the 1936 student Olympics, and being an avid swimmer, swam across the English Channel at the age of 25.

#### Faiza Mohammed al-Kharafi

**Faiza Mohammed Al-Kharafi** (Arabic: فائزة الخرافي *Fāyazah al-Kharāfī*; born 1946) is a Kuwaiti chemist and academic. She was the president of Kuwait University from 1993 to 2002, and the first woman to head a major university in the Middle East.<sup>[1]</sup> She is the vice president of the World Academy of Sciences. Faiza Al-Kharafi was born to a wealthy family in Kuwait in 1946 and developed an interest in science from a young age.<sup>[2]</sup> She attended Al Merkab High School. She received her BSc from Ain Shams University in Cairo in 1967. She then attended Kuwait University where she founded the Corrosion and Electrochemistry Research Laboratory while in graduate school. She received her master's in 1972 and her PhD in 1975.<sup>[3]</sup>

#### Caro Lucas

**Caro Lucas Ghukasian** (Armenian: Կարո Լուկաս Դուկասեան); (Persian: کارو لوکاس قوکاسیان; September 4, 1949 – July 8, 2010) was an Iranian Armenian scientist. His many areas of contribution to Iranian scientific society include biological computing, computational intelligence, uncertain systems, intelligent control, fuzzy systems, neural networks, multiagent systems, swarm intelligence, data mining, business intelligence, financial modeling, knowledge management, systems science, and general design theory. He was honored as an Eternal Figure (Persian: chehreye mandegar چهره ماندگار) by the Iranian Science and Culture Hall of Fame, which is a distinguishing honor offered to prominent Iranian chancellor scholars.<sup>[citation needed]</sup>.

### Indigenous Scientists and Engineers

#### Mary Golda Ross

A NASA mathematician and engineer who played a pivotal role in sending Apollo astronauts into space. For Lockheed Martin, she helped develop plans for the P-38 Lightning fighter plane and was one of just two women on the original

Skunk Works team. Much of her work in the research, evaluation, and testing of top secret rocket and missile systems is still classified. Ross also helped write NASA's Planetary Flight Handbook, the agency's guide to space travel.

#### John Herrington

The first Native American to go to and walk in space and was part of the 16th shuttle mission to the International Space Station in 2002. To commemorate his heritage, he carried six eagle feathers, a braid of sweet grass, two arrowheads, and the Chickasaw Nation's flag, according to the American Indian Education Fund.

#### Susan Le Flesche Picote

The first Native American to earn a medical degree. She studied at the Women's Medical College of Pennsylvania in Philadelphia, and graduated first in her class in 1889. She soon returned to the Omaha Reservation, where she went on to treat thousands of people. She's credited with building the first private hospital on a Native American reservation.

#### Aaron Yazzie

A mechanical engineer who works at NASA's Jet Propulsion Laboratory in Pasadena, California. He has developed mechanical systems that help analyze Mars' atmosphere and Martian soil samples. His technology worked on the Mars Insight Lander.

#### Thomas David Petite

Contributed technology to the development of the "smart grid," which harnesses the power of and monitors wireless-enabled devices at a specific location. He has over 50 U.S. patents, founded the Native American Inventors Association, and works to support Native American inventors throughout the country.

#### Jani Ingram

A Professor of Chemistry and Biochemistry at Northern Arizona University. Ingram researches the chemistry and health impacts of environmental pollutants, especially uranium and arsenic. Ingram is a member of the Navajo tribe, and the Naneesht'ezhi clan.<sup>[1]</sup> She leads the Bridging Arizona Native American to Bachelor Degrees (NIH Bridges to Baccalaureate) program and the Native American Cancer Prevention Program. She promotes educational and professional opportunities for Native American students in Chemistry through a number of initiatives and for this work was awarded the 2018 American Chemical Society Award for Encouraging Disadvantaged Students into Careers in the Chemical Sciences.

