SAWD TV: 10/17/19

**Did you Know?**

Researchers at Purdue University have developed a 3D printed cement paste that gets stronger when it cracks. This first-ever bioinspired technique could contribute to making infrastructures more resilient. The idea for the design is based on the exoskeleton of arthropods, such as lobsters and beetles. By re-creating the shell of an arthropod, researchers are attempting to control how damage spreads between the printed layers of a material. Like trying to break a bunch of uncooked spaghetti noodles as opposed to a single noodle. The creation of more 3D printed cement-based materials, such as cement paste, mortar and concrete, will likely lead to an increase in structural elements that can sustain damage.

Source: <https://www.sciencedaily.com/releases/2018/10/181003162712.htm>

**Famous Scientist**

Dr. Frances Arnold, a former ORISE peer reviewer, received the 2018 Nobel Prize in Chemistry for her work conducting the directed evolution of enzymes. Her enzymes have been used to make biofuels, medicines and laundry detergent, among other things. She is the first American female to win this prize in Chemistry in its 117 year history and the fifth female ever to win it. Dr. Arnold, 62, is an American professor of chemical engineering, bioengineering and biochemistry at the California Institute of Technology in Pasadena. However, this award has not stumped her scientific mind. Now, Dr. Arnold has another list containing some of the questions she would like to answer: “How do you evolve innovation? How do you get a whole new chemical activity that you don’t know already existed? How can I evolve a whole new species of enzymes?”

Source: <https://www.nytimes.com/2018/10/03/science/frances-arnold-nobel-prize-chemistry.html?platform=hootsuite>

SAWD TV: 10/31/18

**Did you Know?**

Though it may not be the most popular means of getting around, high-speed rail travel technology has advanced greatly in the last decade, with many experts citing it’s ability to provide fast, relatively cheap, transportation. High-speed rail is very popular in Europe and East Asia, and is gaining popularity in the United States. Though rail travel offers slower travel speeds than aircraft, often times it offers faster total trip time because of the briefer boarding process and the ability to deliver passengers directly into city centers, rather than to airports that are often outside of cities. Additionally, rail travel is far cheaper than air travel, up to 90% more energy efficient, and is less susceptible to weather delays. Against car travel, rail can service far more passengers at a much faster speed, while being more fuel efficient per mile and per passenger. It’s also cheaper, faster, and requires less land and labor to install high-speed track than to construct new roads.

**Famous Scientist**

Katarzyna Sokół may seem young, but this scientist and her team at St. Johns College recently discovered a new way to turn sunlight into energy using photosynthesis, and it could mean big changes to our energy future. The primary principle behind this is harnessing the hydrogen left behind from the photosynthetic process, which could offer an unlimited supply of free, green energy. Sokół and her colleagues are working to create “artificial photosynthesis” by manipulating enzymes to affect the natural photosynthetic habits in algae. She says that the work that she and her team are doing “opens up a toolbox for developing future systems for solar energy conversion.”

Source: <https://scitechdaily.com/scientists-develop-a-new-way-to-turn-sunlight-into-fuel/>

SAWD TV: 11/14/18 (Thanksgiving Edition)

**Did you Know?**

The latest collection at the Smithsonian American Art Museum is unlike any other. The curator’s here, along with a team of VR specialists, have transformed the Renwick Gallery into a new way to experience art - with virtual reality. Prepare yourself for a sense free from the constraints of time and space. The art of photogrammetry combined with the superior power of the Intel Core i9 processor allows users to be transported to virtually anywhere in the world. These awe-inspiring installations are going to challenge the mind and the eyes with detail, color and scale, making for a spellbinding museum experience that you will not forget.

Top 3 Reasons to Visit:

1. This is one of the most highly anticipated exhibits of the year
2. Artists debut new work
3. The exhibit takes up two floors and extends outdoors into the surrounding neighborhood

The gallery will be open through January 21, 2019.

Source: <https://www.intel.com/content/www/us/en/virtual-reality/smithsonian-experience.html>

**Famous Scientist**

Linda Buck, born 1947, won the 2004 Nobel Prize in Physiology or Medicine with her colleague Richard Axel for discovering the details of how we smell things. Buck wanted to discover how our brain differentiates between the thousands of different odors we come in contact with. It was apparent to the scientist the first step to solving the puzzle was to determine how odors are initially detected in the nose. This meant finding odorant receptors, a class of molecules that had been proposed to exist, but had not yet been found. Buck’s discovery of odorant receptors explained how the olfactory system detects and discerns the assortment of odors. Think about it this way… a single smell recognized by our brains, for example apple pie, is generally made up of many different odor molecules. These individual molecules are recognized by different odor receptors. Our brains recognize the smell using messages sent by combinations of receptors, like how a specific set of numbers form the combination to unlock a safe. Thank you Linda Buck.

Source: <https://www.nobelprize.org/prizes/medicine/2004/buck/auto-biography/>

SAWD TV: 11/28/18

**Did you Know?**

Just a tenth of the Great Wall built during the Ming dynasty has been repaired. To combat this nearly impossible challenge, Intel is partnering with the China Foundation for Cultural Heritage Conservation to launch an innovative new approach to its restoration, **artificial intelligence (AI)** and **drones**. This expedition combines AI and deep learning technology like 3D modeling to collect more accurate data. The Intel® Falcon™ 8+ drone’s will need to capture about 10,000 high-resolution, close-distance images to detect the damaged areas. This data-driven model will take about 3 days to solve a problem compared to the months of work it used to take for a team. The entire workflow is powered by an Intel® Xeon® processor because it is the only choice that can support the copious amount of different algorithms.

Source: <https://www.intel.com/content/www/us/en/technology-innovation/restoring-great-wall.html>

**Famous Scientist**

British-American astronomer(1900-1979) who discovered that stars are composed almost entirely of hydrogen and helium, the two lightest chemical elements. Today, we know that **91%** of the atoms in the sun are hydrogen and **8.87%** are helium. The atoms of other elements make up only **0.13%**. Her findings and observations were published in several books: *Stellar Atmospheres, Stars of High Luminosity, Variable Stars and Galactic Structure*. Her other accomplishments include being the first woman appointed full professor at Harvard University and the first woman to chair a department.

Growing up, Cecilia attended several schools that allowed her to succeed in science and mathematics. At the age of seventeen, her school told her it could do no more for her and asked her to leave. Gifted with a scientific spirit and determined to become a scientist, she won the only available scholarship and began studying at Cambridge’s Newnham College in 1919. While carrying out this work, she learned never to be ashamed of admitting to not understanding something.

“The reward of the young scientist is the emotional thrill of being the first person in the history of the world to see something or understand something.” - Cecilia Payne-Gaposchkin

Source: <https://www.famousscientists.org/cecilia-payne-gaposchkin/>

SAWD TV: 12/12/18

**Did you Know?**

The Girl Scouts recently began awarding 23 new STEM badges. These badges cover topics like engineering, computer science, space science, robotics and mechanical engineering.

Girl Scouts have always had a reputation of pushing the boundaries and learning as they go. This "fun with purpose" K–12 curriculum is designed to inspire young girls to embrace and celebrate scientific discoveries in their lives. Girl Scouts who participate in STEM programs will become better problem-solvers, have the chance to earn scholarships, and begin building a foundation for a successful future. The possibilities are truly endless.

Source: <https://www.girlscouts.org/en/our-program/our-program/stem.html>

**Famous Scientist**

Dr. Sally Ride, (1951-2012) an American astronaut, physicist, and engineer became the first American woman in space in 1983 at the age of 32. Her first spaceflight experience was as a mission specialist on STS-7, NASA's seventh shuttle mission, aboard the space shuttle Challenger. During the flight, Ride became the first woman to operate the shuttle's robotic arm.

Among her many accolades: Ride directed NASA’s first strategic planning effort, and founded and served as the first Director of NASA’s Office of Exploration. She is the only person to have served on the both the Presidential Commission investigating the Challenger accident and the Columbia Accident Investigation Board. She is an inductee into the Astronaut Hall of Fame and the California Hall of Fame.

#SallyRideForever and #AstronautStamps

Source: <https://www.nasa.gov/offices/hsf/members/ride-bio.html>

<https://www.space.com/16756-sally-ride-biography.html>

SAWD TV: 1/2/19

**Did you Know?**

STEAM (STEM + arts) is a movement that is driving innovation and transforming the 21st century, just as STEM did in the last century. There are naturally-aligned standards between the Arts and Science, Technology, Engineering and Math content areas. Arts, in this case, includes design, language communication, creative planning, physical sciences, performing arts, etc. Companies such as IBM, Crayola, and General Electric have identified creativity as the number one leadership competency of the future. These top companies have already seen the economic progress and breakthrough innovation that comes from adding art and design to STEM. It’s not about STEM vs. STEAM, it’s about making every student a fully-literate 21st century citizen. According to the National Governors Association, only three out of every ten eighth graders are proficient readers, and struggling readers are more likely to drop out of high school, much less take advanced math and science classes.

Source: <http://stemtosteam.org/resources/>, <https://www.nms.org/News-and-Views/Blog/2013/December-2013/ELA-STEM-Developing-Literacy-with-Math-and-Scienc.aspx>

**Famous Scientist**

Steven Paul Jobs (1955-2011), while brilliant when it came to technology, also saw things from a creative perspective. He envisioned products and constructed a strategy that appealed to people’s hopes, dreams and experiences. Apple's revolutionary products, which include the iPod, iPhone and iPad, are now seen as dictating the evolution of modern technology. Steve Jobs' accomplishments can be held on a pedestal with the likes of Microsoft’s Bill Gates, Google’s Larry Page and Sergey Brin, and Facebook’s Mark Zuckerberg. The aforementioned names are all highly regarded within technology for transforming consumerism and the accessibility of information. The next time you're in an Apple Store, take a look at that constantly shrinking product packaging, the evidence is in the design.

Fun fact: One of Jobs' first jobs was with Atari as a video game designer.

Source: <https://www.wired.com/2011/10/steve-jobs-1955-2011/>

SAWD TV: 1/16/19

**Did you Know?**

When people say snowflake, they often mean snow crystal. The latter is a single crystal of ice, formed from water vapor that condenses into ice inside of clouds. A snowflake, on the other hand, is a more general term. It can mean an individual snow crystal, but it can also mean just about anything that falls from the winter clouds.

A snow crystal begins with the formation of a small hexagonal plate, and branches, or “arms”, sprout from the six corners when the crystal grows. As it tumbles through the clouds, the crystal undergoes ever-changing temperatures and humidity's, and each change makes the “arms” grow a bit differently. The exact shape of the final snow crystal is determined by the precise path it took through the clouds.

According to [Guinness World Records](http://www.guinnessworldrecords.com/), the largest aggregate snowflake ever reported fell in Fort Keogh, Montana in January of 1887 and measured 15 inches wide!

Source: <https://ed.ted.com/lessons/the-science-of-snowflakes-marusa-bradac>

**Famous Scientist**

Lynn Conway is an American electrical engineer, inventor, computer science expert and transgender activist. She is renowned for her pioneering work in microelectronic chip design. She is credited with the invention of generalized dynamic instruction handling, an execution used by computer processors to improve performance. After a lifetime struggling as living as a man, Conway made the decision to undergo gender reassignment surgery to become a woman, resulting in IBM firing her for her choices. In 2009, the LGBT rights charity Stonewall named her as one of the Stonewall 40 Trans Heroes.

She has also worked for Computer Applications, Inc., Memorex, Xerox Palo Alto Research Center (PARC) and the U.S. Department of Defense (DOD) Defense Advanced Research Projects Agency (DARPA).

Conway went on to win many awards and high honors, including election as a Member of the National Academy of Engineering, the highest professional recognition an engineer can receive.

Source: <http://ai.eecs.umich.edu/people/conway/conway.html>

SAWD TV: 1/30/19

**Did you Know?**

iLuminate is a company based on the fusion of technology and dance. Audiences will see dancers in electrified glow-in-the-dark suits performing dynamic routines and illusions on a pitch black stage. It’s a show that is completely unique and incomparable to any other dance performance.

The electrified glow-in-the-dark suits are actually made of high-quality LED and Tungsten Halogen light sources. Also, fiber optics and an innovative photonic design enables all the dancers wearing synchronized suits to display various effects.

The brain behind the operation is software engineer Miral Kotb who patented iLuminate Technology, the tool that enables performers, choreographers, engineers, technicians, stylists and artistic directors to produce explosive performances with customized wireless lighting.

Source: <http://www.iluminate.com/>

**Famous Scientist**

The winners of the 2018 Nobel Prize for Economics are William Nordhaus or Paul Romer, who are being recognized for taking macroeconomics to a global scale to combat some of the world’s biggest problems.

William Nordhaus, Yale, works primarily in the field of environmental economics. In his book, *The Climate Casino*, he compared regulations that require efficient products to those that require cars to include airbags.

Paul Romer of the Stern School of Business at New York University, was concerned with how economic decisions and market conditions determine the creation of new technologies. He solved this problem by demonstrating how economic forces govern the willingness of firms to produce new ideas and innovations. His idea is based on how ideas are different to other goods and require specific conditions to thrive in a market.

Source: <https://www.economist.com/finance-and-economics/2018/10/13/paul-romer-and-william-nordhaus-win-the-economics-nobel?fsrc=rss%7Cfec>

SAWD TV: 2/13/19

**Did you Know?**

In our solar system, there is a region beyond Neptune called the Kuiper Belt. The Kuiper Belt is composed of trillions of small terrestrial bodies, such as dwarf planets and comets. As a matter of fact, our former solar-sibling Pluto is in this belt, where it’s currently the largest known body. This is how Pluto lost the distinction of “Planet” - When it was first discovered, scientists had no knowledge of the Kuiper Belt. Later on however, many other icy dwarf planets were discovered and that’s when the idea of the belt came to be. Upon further research, it became clear that there were billions, if not trillions, of these small planetoids orbiting the sun in the Kuiper Belt, of which Pluto was just one (albeit the largest known to exist). Since then, Pluto has not been regarded as a planet in our solar system. It’s ok Pluto, none of us are planets either.

**Famous Scientist**

Clyde Tombaugh (1906-1997) was an American astronomer who is best known for his discovery of the dwarf planet Pluto. As the son of poor Illinois farmers, he spent his teen years building telescopes and lenses. By himself, he discovered Pluto before he had even completed his bachelor’s degree in astronomy. Tombaugh also discovered hundreds of asteroids and at least 14 other minor planets, mostly on accident during his research of Pluto. During his career, Tombaugh also reported seeing several UFOs. In his later life, he urged fellow astronomers to come forward with their experiences concerning UFOs, and for them to take seriously the existence of extraterrestrial life.

SAWD TV: 2/27/19

**Did you Know?**

Researchers at Purdue University have developed a sticker solution that is turning dreams into reality. The solution, also called smart stickers, are made of cellulose, which is both biocompatible and breathable. The simple sticker is applied to your body and can be used to monitor heart activity and other vitals, and even alert a wearer about possible health risks in real time. The stickers are made out of paper coated with molecules that repel water, oil, dust and bacteria. Each sticker costs about a nickel to produce and can be made using similar printing and manufacturing technologies like those used to print books on a large-scale. These wearable smart stickers could save lives and lower medical costs for families.

Source: <https://www.purdue.edu/newsroom/releases/2018/Q4/simple-stickers-may-save-lives-of-heart-patients,-athletes-and-lower-medical-costs-for-families.html>

**Famous Scientist**

Dr. Charles Townes (1915-2015) was an American physicist and inventor of the maser/laser. Townes conceived the idea of the maser, an acronym for "microwave amplification by stimulated emission of radiation", during his research in microwave physics.

Townes received the 1964 Nobel Prize in Physics for his work on masers. More than a dozen subsequent Nobel Prizes have depended on the existence of lasers.

He served as the Vice President and Director of Research of the Institute for Defense Analyses (IDA) in Washington, D.C. He directed the U.S. government Science and Technology Advisory Committee for the Apollo lunar landing program and served as chairman of the Defense Department’s Committee on the MX missile. He also served on the boards of General Motors and of the Perkins Elmer Corporations.

Other Accolades:

**1958**-Comstock Prize in Physics

**1963**-Young Medal and Prize

**1979**-Niels Bohr International Medal

**1982**-National Medal of Science

**1996**-Frederic Ives Medal

**2012**-Golden Goose Award

*Townes receiving the Vannevar Bush Award for Lifetime Contributions and Statesmanship to Science.*

Source: <https://www.famousscientists.org/charles-townes/>

SAWD TV: 3/13/19

**Did you Know?**

Origami is becoming widely popular as a STEAM tool for teaching problem solving, thinking skills, geometry, fractions and fun science. Paper-folding activities provide hands-on learning and enable you to construct a model that you can be satisfied with. Studies suggest this engaging art form helps to enhance understanding, critical thinking, creativity, reasoning power, achievement, enjoyment, confidence, attitude, motivation and reduces anxiety. Ideas for practical use range from medical forceps to foldable plastic solar panels to finding the right folds for an airbag to be stored in a small space, so that it can be deployed in a fraction of a second.

“Many beetles have wings that are bigger than their bodies. In fact they can be as much as two or three times as large. How are they able to do that? Their wings unfold in origami patterns. Insects are not alone. Leaf buds are folded in intricate ways that resemble origami art, too.”

Sources: <https://www.edutopia.org/blog/why-origami-improves-students-skills-ainissa-ramirez>

<https://search.proquest.com/docview/2121528179/97172F15C7E5418BPQ/2?accountid=56891>

**Famous Scientist**

Dr. Linda Liau, an internationally renowned neurosurgeon-scientist, has devoted the past 25 years to developing and refining treatment strategies for glioblastoma, the most deadly form of a brain tumor. Liau is a scientist in the University of California at Los Angeles’s (UCLA) Jonsson Comprehensive Cancer Center and has been elected to the National Academy of Medicine, one of the highest honors in the fields of health and medicine.

Liau is a trailblazer in her specialty: Just six percent of licensed neurosurgeons in the U.S. are female, and Liau is only the second woman in the nation — and the first Asian-American woman — to lead an academic department of neurosurgery.

Source: <http://newsroom.ucla.edu/releases/linda-liau-ucla-neurosurgeon-national-academy-of-medicine>

SAWD TV: 3/27/19

**Did you Know?**

Many emerging jobs in STEAM fields have a heavy emphasis on writing code. Here are a few languages you can learn at home:

JavaScript – One of the most recognized languages out there, can be worked into any type of web page

*Great for: beginners, aspiring software engineers*

Ruby – Introduces the basics of programming for a more structured approach to coding

*Great for: beginners, aspiring software engineers*

Python – Has a diversified application such as in gaming, web frameworks and applications, language development, prototyping, graphic design applications, etc. Includes versatile features and fewer programming codes

*Great for: budding data scientists*

Swift – On track to become the dominant language for iOS development and beyond

*Great for: mobile developers, developers breaking out of their comfort zone*

C++ - Uses shorter code, making it faster than JavaScript but is difficult to grasp for first time programmers

*Great for: code gurus*

Source: <https://www.diversityinsteam.com/2018/10/coding-language-learn/>

**Famous Scientist**

Dr. Mark Dean, born 1957 in Jefferson City, TN, is a computer scientist, engineer and inventor. He helped develop a number of landmark technologies for IBM, including the color PC monitor and the first gigahertz chip. He holds three of the company's original nine patents and, in total, has more than forty patents associated with his name.

Growing up, Dean excelled in many different areas, standing out as a gifted athlete and an extremely smart student who graduated with straight A's from Jefferson City High School. In 1979, he graduated at the top of his class at the University of Tennessee, where he studied engineering. He earned his master's degree in electrical engineering from Florida Atlantic University in 1982, and completed his doctoral degree in the same field from Stanford University in 1992.

He was elected into the National Academy of Engineering, the most prestigious professional society for engineers in the country.

Source: <https://blackpast.org/aah/dean-mark-1957>

SAWD TV: 4/10/19

**Did you Know?**

You can now connect with food on a whole new level. SMARTGarden by SproutsIO can reliably grow fresh fruits and vegetables indoors, year-round, soil-free, using an app-controlled system that learns from your preferences. With the app, you can dive into real time data about your plant’s growth and the best part is, you just have to water it once every month! The microgarden is equipped with WiFi connectivity, environmental sensors for monitoring both plant and ambient conditions, camera, high efficiency LED lighting and an electronic mister.

SproutsIO is changing our relationship to food by connecting people to the source of their produce and allowing them to experience the joy of growing their own.

“When you grow your own food, you care more about what happens to it. You’re not going to throw it away, you’re going to know exactly what’s going into your plants, you’re going to share your food with friends and family. It gives a new meaning to produce.” –Jennifer Farah, CEO and co-founder of SproutsIO

Source: <https://www.diversityinsteam.com/2018/03/smartgarden-smart-phone-app-sproutsio/>

**Famous Scientist**

Margaret Conkey, born 1943, is the Director of the Archaeological Research Facility at the University of California at Berkeley. She specializes in the Magdalenian period of the Upper Paleolithic in the French Pyrenees mountains. Her research focuses on cave art produced during this period. She heads a team that surveys the landscape in southern France, searching for traces of the day-to-day lives of the cave painters.

“There has long been a heavy bias toward seeing the whole human past in terms of male action," says Conkey. "I have been trying to convince people that we can't explain 20,000 years of material by saying it was all magic for the hunt."

Source: <https://anthropology.berkeley.edu/margaret-w-conkey>

SAWD TV: 4/24/19

**Did you Know?**

Tarjimly: Connecting Refugees with Translators

Tarjimly is a first-class language translation facilitator. This mobile app connects the world’s 3 billion bilingual speakers to more than 65 million refugees, asylum seekers and immigrants, allowing bilingual users to translate 16 different languages for refugees around the world. Tarjimly solves a major problem by mobilizing the world’s bilingual speakers to accurately translate for those who would otherwise not have access. Not only does this tool improve the lives of users but it eliminates language barriers with technology and human kindness.

Source: <https://tarjim.ly/en>

**Famous Scientist**

Dr. Katherine Louise Bouman, age 29, is a postdoctoral researcher and graduate student at Massachusetts Institute of Technology (MIT). She just achieved one of the greatest scientific explorations of our time.

On April 10, 2019, Dr. Bouman played a crucial role in creating the first-ever image of a Black Hole. A Black Hole is an object in space with a firm gravitational pull, and nothing can get a high enough escape velocity to get away from it. She helped write the algorithm that decoded the first image of a Black Hole mankind has ever seen. Dr. Bouman worked as part of the Event Horizon Telescope collaboration along with an international team of 200 plus researchers. “We have exposed a part of our universe, we have seen what we thought was unseeable,” said Director of the effort to capture the image, Shep Doeleman.

Dr. Bouman has always had an aptitude for STEM and her success was fueled by the possibility of creating the first image of a Black Hole. Dr. Bouman was awarded the Ernst A. Guillemin Award for her achievement and continues her research on new computer imaging systems.

Source: <https://www.nytimes.com/2019/04/10/science/black-hole-picture.html>

SAWD TV: 5/8/19

**Did you Know?**

Diatoms are microscopic, photosynthesizing algae living in tiny, jewel-like glass shells. There are hundreds of thousands of varieties of diatoms, all with unique forms. They are mostly found in oceans, fresh water, soils and other areas of high moisture. The first diatom arrangements date back to the early 1800s, but the art form reached its peak in the latter part of the century. It was a period of intense interest in the natural world and also a time when the arts and sciences were more closely aligned. Diatom arrangements are a stunning example of the Victorians’ era desire to bring order to the world and to display nature in a rational way.

These arrangements cannot be seen with the naked eye, so pieces were typically made by professional microscopists. They were sold to wealthy amateur naturalists alongside other miniature curiosities, including microscopic photographs.

Sources: <https://ideas2live4.com/2015/10/13/diatom-art-nature-under-the-microscope/>

<https://diatoms.org/what-are-diatoms>

**Famous Scientist**

Jane Goodall, born 1934, is recognized for her ground-breaking discoveries about the behavior of chimpanzees. Throughout her life, Goodall uncovered evidence of behavioral similarities in humans and chimpanzees. During her research in Africa, Goodall noticed the animals making and using tools, patrolling the borders of their territory and hunting for food in packs. Goodall also recorded chimps hugging and kissing each other, developing strong mother and child bonds and using their wits to out-think social rivals. Her findings prove that the chimpanzee is our nearest living animal relative and that we share a common ancestor dating back about 7 million years.

In 1977, she founded the Jane Goodall Institute to support the research at the Gombe Reserve, a National Park in Tanzania, and protect chimpanzees in their habitats. She has published numerous books, and is now a strong advocate for sustainable development and the conservation of natural habitats.

Source: <https://www.famousscientists.org/jane-goodall/>

SAWD TV: 5/22/19

**Did you Know?**

Hidden in many of the famous Vincent van Gogh paintings is a distinct turbulent fluid pattern. The concept of turbulence represents one of the most difficult natural phenomena’s to understand. However, scientists have found that his technique mirrors natural turbulence down to mathematical precision. They found what is called a *scaling law*, when the same patterns are repeated at different spatial scales. Scaling laws have a typical power associated with them, usually given by an integer or a fraction.

Van Gogh’s brushwork made use of a property known as *luminance*, which is a measure of the relative brightness between different points. The human eye is more sensitive to luminance change than to color change, meaning we respond more promptly to changes in brightness than in colors.

*Road with Cypress and Star*, 1890

*The Starry Night*, 1889

Source: <https://www.brainpickings.org/2014/11/13/van-gogh-starry-night-fluid-dynamics-animation/>

**Famous Scientist**

Marie Sophie Germain (1776 – 1831) was a self-taught French mathematician who began her career pretending to be a man, because the social conventions of her time prevented women from pursuing intellectual careers.

Her theory of elasticity and surface vibrations brought her the prestigious Paris Academy of Sciences Prize in 1816, the first ever won by a woman. Later, the Academy of Sciences established the Sophie Germain Prize in her honor.

She made some of the most significant progress on proving Fermat’s Last Theorem and proposed her own called “Sophie Germain’s Theorem.”

Source: <http://famous-mathematicians.org/sophie-germain/>

SAWD TV: 6/5/19

**Did you Know?**

Photography has barely celebrated its 200th birthday, yet for decades, even those who appreciate the qualities of a photograph are not entirely convinced whether photography is – or could be – an art. Many people consider photography an art form because it allows for an expression of emotion. Many other people consider photography as science because it applies to the camera, its lenses, the physical operation of the camera, the electronic internals and the process of developing film in order to make pictures properly visible. Photography is considered the most transparent of the art mediums, making it difficult to transcend its almost inevitable function as a document and act as a work of art as well. Is it Art or Science that claims the world of photography? Here’s my short answer: There are many genres of photography but they all involve the capturing of light to generate an image of a moment in time.

Source: <https://theconversation.com/how-photography-evolved-from-science-to-art-37146>

**Famous Scientist**

You might already know the official history of the invention of photography – In the early 1800s, Nicéphore Niépce created what is considered the world’s first photograph. Unofficially, French expatriate Hercules Florence had begun working on a process to print photographic images using silver-nitrate, and to develop them with urine. Florence referred to his process, in French, as photographie, meaning light writing, at least four years before the English word photography was coined.

Florence’s invention was the result of an accidental experiment and consequently, a century passed before his remarkable achievements were discovered. More recently, contemporary artists have found Florence as a source of inspiration.

Source: <https://aperture.org/blog/light-writing-tropics/>

SAWD TV: 6/19/19

**Did you Know?**

A paleontologist at the University of Utah, named Mark Loewen, took the liberty of deconstructing the 2015 movie, *Jurassic World*, looking for scientific shortcomings. The following were his findings on velociraptors, more commonly known as Raptors:

1. Raptors did in fact have feathers.

2. In the movie, raptors appeared to be as tall as humans. In reality, they were about the size of turkeys.

3. Raptors could not snarl, because like birds, they do not have the facial muscles required to move their faces.

4. Throughout the movie, the raptors’ tails move like a cat’s tail. According to the fossil record, raptors did not have the bones required for flexible tail movement.

Sources: <http://www.nytimes.com/interactive/2015/06/12/science/jurassic-world-deconstructed-by-paleontologist.html?_r=0>

<https://www.amnh.org/our-research/science-news/2007/velociraptor-had-feathers>

**Famous Scientist**

Dong Zhiming, born in 1937, is a Chinese paleontologist and one of the most prolific fossil hunters of our modern time. Zhiming has led numerous expeditions inside China from his position at the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP) in Beijing and personally named over 20 types of dinosaurs. One of his main accomplishments has been to spearhead paleontological research in China's northwest and the Gobi Desert in Mongolia. To date, Zhiming's most enduring legacy is his discovery of the Dashanpu Formation in China's Sichuan province, which has yielded a huge number of remains dating to the middle Jurassic period, about 170 to 160 million years ago. This is not a well-known stretch of geologic history, and Zhiming’s discovery has helped to fill in this ten-million-year stretch of time.

Sources: <https://www.thoughtco.com/most-influential-paleontologists-1092057>, <http://www.drmartinwilliams.com/dongzhiming/dongzhiming.html>

SAWD TV: 7/3/19

**Did you Know?**

If you look up *steam* in the dictionary, your result is this “n. 1.the vapor into which water is converted when heated, forming a white mist of minute water droplets in the air.” But *steam* may also refer to:

**Science and Technology**

[Steam](https://download.cnet.com/Steam/3000-2121_4-97526.html) (software), a software distribution platform by Valve

[STEAM Magazine](http://www.steammagazine.com/), reports on the foundations of industry and commerce world wide

**Arts and Entertainment**

[Code Name: S.T.E.A.M.](https://www.gamespot.com/code-name-steam/), a 2015 video game

[Steam](https://en.wikipedia.org/wiki/Steam_(band)) (band), an American pop-rock group

**Film**

[Steam](https://www.imdb.com/title/tt1403246/) (film), a 2007 American film

**Sports**

[Summerland Steam](http://www.summerlandsteam.com/leagues/newsletter.cfm?clientID=6209&leagueID=26209), a Canadian ice hockey team in Summerland, British Columbia

**Organizations**

[STEAM – Museum of the Great Western Railway](https://www.steam-museum.org.uk/Pages/Home.aspx), Swindon, England

[Steam Brewing Company](http://steambrewing.co.nz/), a New Zealand microbrewery

**Other verbiage**

[Steam](https://en.wikipedia.org/wiki/Poker) (poker), a mental state that adversely affects one's play

[STEAM fields](https://en.wikipedia.org/wiki/STEAM_fields) (science, technology, engineering, arts, and mathematics), as collective fields of study

[Steaming](https://www.bing.com/search?q=steaming&src=IE-SearchBox&FORM=IESR4A), a cooking method

Source:

**Famous Scientist**

James Fitzgerald, born 1953, is an American criminal profiler, author and forensic linguist. Linguistics is the scientific study of language, and linguists are scientists who apply the scientific method to questions about the nature and function of language. Now retired, Fitzgerald previously worked in the FBI’s Behavioral Analysis Unit (BAU) and is known for his role in the investigation and manhunt of a terrorist called the Unabomber. When you study linguistics at any level, you gain insight into one of the most fundamental parts of being human- the ability to communicate. Fitzgerald was able to apply his knowledge and convince the Bureau that the letters and manifesto written by the terrorist were an integral part of how to catch him. It was the first time ever that text analysis evidence was used in U.S. federal courts, for the purpose of a search warrant.

He recently published the third book in his four-part memoir, *A Journey to the Center of the Mind, Book III: The First Ten FBI Years, 1987-1997.*

Source: <https://www.linguisticsociety.org/resource/science-linguistics>

SAWD TV: 7/17/19

**Did you Know?**

The world’s tallest state, the Statue of Unity, was unveiled in fall 2018 in the western state of Gujarat, India. The bronze statue is almost twice the height of the Statue of Liberty. You would have to climb about 600 feet to reach the top and his big toe is roughly the height of a basketball hoop. It’s the equivalent of almost two American football fields stacked vertically, minus the end zones.

The statue was designed by Ram V. Sutar, 93, who is among history’s most prolific monumental sculptors and had a $400 million price tag. The Statue of Unity weighs about 67,000 tons, and more than 2,000 workers along with several hundred laborers from China contributed to the efforts.

Gravity is the main obstacle for building anything upward. To combat this, architects must understand the science lies in the foundation. A strong foundation made of solid iron and steel beams will support much more weight and allow us to reach new heights, literally!

Source: <https://www.bbc.com/news/world-asia-india-46028342>

**Famous Scientist**

Fatima Al-Fihri was an Arab Muslim woman who founded Al-Qayrawan Mosque and University in Fes, Morocco, which is considered by many historians as the world’s oldest university and library that is still running today. Yes, it was a Muslim woman who pioneered a model of higher learning coupled with the issuance of degrees of various levels. Almost 1,200 years have passed since the founding of the University of Al-Qayrawan, and it continues to this day to graduate students in the various religious and physical sciences. This esteemed institution is central to the legacy of Fatima Al-Fihri. Her name represents sustainability, women’s contribution to the knowledge in society and a bridge between different cultures through education.

Source: <https://www.alfihri.org/>

SAWD TV: 7/31/19

**Did you Know?**

The first U.S. astronauts were selected in 1959, before human spaceflight operations began. NASA asked the military to provide a list of personnel who met specific qualifications. After stringent screening, NASA announced its selection of seven men, all pilots, as the first American astronauts. NASA has selected 21 more groups of astronauts since the “Original Seven.” The backgrounds of NASA’s latest group of Astronaut Candidates include schoolteachers, doctors, scientists and engineers.

NASA selects astronauts from a diverse pool of applicants with a wide variety of backgrounds. From the thousands of applications received, only a few are chosen for the intensive Astronaut Candidate training program. Including the “Original Seven”, only 350 astronauts have been selected to date. NASA is not currently accepting applications for the Astronaut Candidate Program. Sorry to burst your bubble.

Source: <https://www.nasa.gov/content/astronaut-selection-program>

**Famous Scientist**

NASA astronaut Anne McClain was hand selected by NASA in 2013. She earned a Bachelor of Science in Mechanical/Aeronautical Engineering from West Point, a Master of Science in Aerospace Engineering from the University of Bath in Bath, England and a Master of Science in International Relations from the University of Bristol in Bristol, England. Lieutenant Colonel McClain is a Senior Army Aviator with over 2,000 flight hours in 20 different aircrafts. “A combination of the teamwork, the exploration and being somewhere no one else has ever been has always fascinated me,” said McClain. “I think exploration unifies people. It gives people promise that there is something more out there. It satisfies the collective curiosity that we all have. The idea of discovery is magical.”

Source: <https://www.nasa.gov/astronauts/biographies/anne-c-mcclain>

SAWD TV: 8/14/19

**Did you Know?**

A wolf population unique to Michigan’s Isle Royale National Park, an island in Lake Superior, almost went extinct. A few years ago, only three wolves remained on the island; the youngest of which was reported to be deformed and unhealthy – a product of inbreeding. Researchers, in collaboration with The National Park Service (NPS), introduced two new wolves to the remote park last September: a four-year-old female and five-year-old male. NPS hopes the relocation of new wolves into the environment will help grow the existing wolf population and restore predator-prey balance.

Source: <https://www.upi.com/Science_News/2018/09/28/National-Park-Service-to-replenish-Isle-Royales-wolf-population/9541538147186/>

**Famous Scientist**

Hedy Lamarr (1914 – 2000) was an Austrian-born American film actress and inventor of frequency hopping, the forerunner of Bluetooth, Wi-Fi connections and GPS.

The original idea was meant to solve the problem of enemies blocking signals from radio-controlled missiles during World War II (WWII). The device used 88 piano keys to randomly change the signals within the range of 88 frequencies. In 1942 the patent for her invention was granted.

The invention was used to aid the U.S.’s efforts during WWII and became the crutch of both secure military communications and mobile phone technology.

Her profound work in wireless communication led to her induction into the National Inventors Hall of Fame in 2014. She was also given a star on the Hollywood Walk of Fame for her contributions in the entertainment industry.

Sources:<https://www.famousscientists.org/hedy-lamarr/>, <https://www.hedylamarr.com/>

SAWD TV: 8/28/19

**Did you Know?**

The Impossible Burger. The what now…? The Impossible Burger is a plant-based alternative to a hamburger. Scientists have discovered a molecule, called heme, that gives the hamburger its unique crave able, beefy flavor. Heme is found in every living being – both plants and animals. By utilizing heme from plants, this process allows the iron rich protein molecule to be harvested at scale with the lowest achievable environmental impact. Consumers who choose this meatless option over a burger from a cow avoid the destructive environmental impact of animal agriculture, for example saving 95% of the farmland used while most importantly producing 1/8 of the greenhouse gases.

Companies like Beyond Meat and Impossible Foods are revolutionizing the meat industry. The substitute meat market is expected to grow 8.4% annually over the next three years, and is expected to be a more than $5 billion industry by 2020. After a successful test run in Burger King, Impossible Foods is going nationwide at the fast food giant later this year with its Impossible Whopper.

Source: <https://www.cbsnews.com/news/impossible-foods-beyond-meat-and-the-growth-of-the-meatless-meat-market/>

**Famous Scientist**

Physicist Dr. Chien Shiung Wu (1912-1997) was a Chinese immigrant to America, where her biggest contribution was to the Manhattan Project and the development of the atomic bomb. She is best known for conducting the Wu experiment where she proposed a theory that would disprove the law known as ‘The Principle of Conservation of Parity’, which is basically a very complicated way of proving the idea of symmetry, where particles that are mirror images of each other will act in identical ways.

Wu’s accolades include the John Price Wetherill Medal of the Franklin Institute (1962), the Comstock Prize in Physics (1964), the Bonner Prize (1975), the National Medal of Science (1975), and the Wolf Prize in Physics (1978). Her book Beta Decay, 1965, remains a standard reference for nuclear physicists. She was the first woman to serve as president of the American Physical Society.

She has been dubbed "First Lady of Physics", "Queen of Nuclear Research", and "the Chinese Madame Curie."

Source: <https://www.biography.com/people/chien-shiung-wu-053116>

SAWD TV: 9/11/19

**Did you Know?**

Scientists have discovered the presence of pollution in some of the deepest parts of the ocean. The levels of contamination found are dangerous and may be pervasive even in the most remote places. Concentrations tended to be somewhat higher in the Mariana Trench which is located in the Western Pacific, near the Mariana Islands. They also have a tendency to “bio accumulate,” meaning they can build up in marine organisms over time. Researchers suspect that the chemicals in the Mariana Trench originated around the “Great Pacific Garbage Patch.” Chemical pollutants in that region start out on the surface of the ocean and cling to plastic waste as it drops through the water column toward the bottom of the ocean, never to be seen again.

Source: <https://www.washingtonpost.com/news/energy-environment/wp/2017/02/13/not-even-the-worlds-deepest-ocean-trenches-are-free-of-pollution-scientists-discover/?noredirect=on&utm_term=.c4c4a652d827>

**Famous Scientist**

Dr. Robert Ballard, born 1942, is an American oceanographer, explorer, geologist and underwater archaeologist. He is noted for his work in underwater archaeology and archaeology of shipwrecks, and is most known for the discovery of the famous wreck of the RMS Titanic in 1985. During later expeditions, he discovered other famous shipwrecks including the German battleship *Bismarck* and the passenger liner *Lusitania*. He also located the wrecks of John F. Kennedy's PT-109 and the *Yorktown*.

Ballard earned degrees in chemistry and geology, and he received his Master's degree in geophysics from the University of Hawaii's Institute of Geophysics. In 1989 Ballard established the JASON project, an education program designed to allow students to follow underwater expeditions. Ballard is a retired United States Navy officer and is now a professor of oceanography at the University of Rhode Island.

Ballard helped to develop the now-famous *Alvin*, a deep-sea submersible, and he created *Argo*, a robotic sub that can transmit live video and be controlled remotely.

Source: <http://www.seasky.org/ocean-exploration/ocean-explorers-robert-ballard.html>

SAWD TV: 9/25/19

**Did you Know?**

The Enigma refers to an optical illusion in which still images appear to move. For years, scientists have tried to understand this phenomenon. Recent studies reveal that rapid, unconscious eye movements (REM) help explain the alluring illusions. Many optical illusions are designed to trick the eye and in the case of the enigma, create the false perception of motion. This art form combines and layers shapes, patterns or lines and builds critical thinking skills.

Sources: <https://www.wired.com/2008/11/eye-flicker-exp/>, <https://ourfamilycode.com/optical-illusions-exploration/>

**Famous Scientist**

Caroline Herschel (1750 – 1848) was born the eighth out of ten children and is known for being the first woman to discover a comet.

In the history of astronomy, Herschel was the first ever American woman who worked as a professional astronomer. She personally discovered five comets and rediscovered Comet Encke (pictured below at right). She also discovered an open cluster known today as NGC 2360, 14 new nebulae – including NGC 205, the companion to the Andromeda Galaxy.

Several of the comets she discovered bear her name. She even has an asteroid named after her – Lucretia.

In 1781, her brother and fellow astronomer, William Herschel, discovered the seventh planet from the sun, Uranus.

Source: <https://www.famousscientists.org/caroline-herschel/>

SAWD TV: 10/9/19

**Did you Know?**

Sociology is a STEAM (STEM + arts) discipline.

Sociology is a branch of the social sciences that seeks to examine and analyze the social aspects of science both within the scientific community and within society as a whole. Sociologists, those who study sociology, attempt to answer questions that we think we know the answers to already.

To answer these questions, sociologists, just like a scientist, use the Scientific Method:

**Form a question Collect data Analyze that and a hypothesis data to contribute to our theories about society**

Our national policymakers’ recognize that funding STEAM research can improve our national security, create jobs and enhance our economic competitiveness.

Source: <https://www.merriam-webster.com/dictionary/sociology>

**Famous Scientist**

W.E.B. (William Edward Burghardt) Du Bois (1868 – 1963) was an American sociologist, historian, civil rights activist and author.

Du Bois was the first African American to earn a doctorate degree from Harvard University. He became a professor in history and economics at the historically black Atlanta University in Georgia.

He was the best-known spokesperson for African American rights during the first half of the 20th century. Du Bois co-founded the National Association for the Advancement of Colored People (NAACP) in 1909.

“Ignorance is a cure for nothing.” -W.E.B. Du Bois

Source: <http://webdubois.org/>

SAWD TV: 10/23/19

**Did you Know?**

On October 10, 2019, NASA successfully launched the Ionospheric Connection Explorer (ICON) spacecraft into orbit from Cape Canaveral Air Force Station. ICON, pictured below, has been cast into space for a first-of-its-kind mission to study the ever-changing region where Earth meets the beyond.

The beyond, more specifically the ionosphere, is defined as the dynamic zone high in our atmosphere where Earth’s weather meets space weather. This is also the area through which radio communications and GPS signals travel.

ICON will give us a better understanding of the ionosphere by helping to determine the physics of our space environment and pave the way for mitigating its effects on our technology, communications systems and society.

**Fun Fact:** ICON weighs nearly 650 pounds or about as much as a vending machine.

Source: <https://www.nasa.gov/icon>

**Famous Scientist**

Born in 1952, Celina Maria Turchi Martelli is a Brazilian epidemiologist and physician. She is best known for discovering the link between the zika virus and microcephaly in newborn babies during the 2015 disease outbreak. Zika was a mosquito-borne virus new to Latin America. Pregnant women were at the greatest risk, because if contracted, could cause a condition called microcephaly, where babies are born with abnormalities including brain damage and a small, deformed head.

Martelli is now a researcher at the Aggeu Magalhães Research Center, Oswaldo Cruz Foundation (FioCruz) – Pernambuco where she continues to study babies born with microcephaly.

Sources: <http://www.pbs.org/spillover-zika-ebola-beyond/about/featured-scientists/>; <https://www.who.int/emergencies/zika-virus/situation-report/Brazil_microcephaly_20160310ForWeb.jpg>

SAWD TV: 11/6/19

**Did you Know?**

More than 90 percent of bull kelp and 96 percent of red abalone were lost along 217 miles of northern California coastline between 2013 and 2017. Decades of data on kelp ecosystems allowed researchers to chronicle the shift. Studies show how bull kelp deforestation triggered the closure of a $44 million recreational abalone fishery and the collapse of a commercial red sea urchin fishery. First, purple urchins took over, eating and eating until the bull kelp forests were gone. The red abalone starved. Their fishery closed. Red sea urchins starved. Their fishery collapsed.

Bull kelp are one of the fastest-growing plants on Earth, capable of growing two feet in just a day. If cooler water temperatures return, kelp could likely regrow, the study said. But with ravenous purple sea urchins constantly scraping the bottom of the sea floor, the kelp cannot catch a break.

Source: <https://www.eurekalert.org/pub_releases/2019-10/uoc--cck101819.php>

**Famous Scientist**

Born in 1964, conservation biologist Gretchen Daily's rigorous assessments of ecosystems and economics offers a simple example of what can happen without her kind of analysis:

*In one region of Australia, farmers cleared thousands of acres of trees, arguing the crops they could grow on the land would more than make up for the environmental damage. But afterward, the water table rose. It turned out to be salty and ruined all the croplands.*

"The fact is, we're devastating life on the planet," said Daily. "It's far too late to save everything. We can either continue what we're doing, blindly, and at a great cost to both the environment and society, or we can start figuring out how we depend on particular ecosystems and plan our use of them accordingly.”

Daily received her doctorate degree from Stanford University and continues to support her alma mater from her position as the Bing Professor of Environmental Science in the Department of Biology.

Source: <http://discovermagazine.com/2000/oct/featwatch>

SAWD TV: 11/20/19

**Did you Know?**

Ceramicists, like Ryan Hammerly, create useful objects that beg to be picked up, using 3D ceramic pottery. Ceramic 3D printed-objects originated not long ago and have come to represent the meeting point of modern technology and age old techniques.

As shown in the process below, ceramic 3D printers generate green parts, which still need to undergo firing the ceramic part in a high-temperature kiln.

There is a lot of math and computer science that goes into the programming and printing of the form. There also a lot of chemistry, with the molecular changes of the clay as it is fired, and of course the chemistry that goes into glazing.

Sources: <https://www.aniwaa.com/ceramic-3d-printer/>; <https://www.hammerlyceramics.com/>

**Famous Scientist**

Dutch-born theoretical seismologist Jereon Tromp, 34, traded his job at Harvard for one at CalTech (California Institute of Technology) so he could be closer to the action. California has experienced ~277 earthquakes in the last 7 days1. Many seismologists focus on what past earthquakes did to the surface of Earth — what moved, where and by how much. Tromp goes further, using the data to derive complex mathematical equations and rules that he hopes will express how the earth might behave during the next earthquake. With enough data, he says, he might even be able to predict how individual neighborhoods in a city will shake in a specific type of earthquake. That sort of early-warning map would give building engineers, city planners and rescue teams what they really need to know to prevent tragedy.

He co-authored, Theoretical Global Seismology, a collection of theories in global seismology that it is going to be the primary reference for many decades.

Sources: 1. <https://earthquaketrack.com/p/united-states/california/recent>; <https://honors.agu.org/winners/jeroen-tromp/>

SAWD TV: 12/4/19

**Did you Know?**

**COMPONENTS OF** **HOMEMADE SLIME:**

•White glue (ie: Elmer’s)

•Water

•Borax soap

•Food coloring (optional)

**WHAT YOU DO:**

Mix together **2 cups of white glue** with **1 1/2 cup water**. Stir thoroughly. In another bowl, mix together **1/3 cup warm water** and **2 tsp Borax soap**. Pour the Borax/water mixture into the glue mixture and stir. Pull out the “slime” as it coagulates. Mix another solution of **water and Borax** and pour into the remaining glue mixture. Let sit. Drain off any excess water. You may want to add **food coloring** to the mixture. Do not put on paper towels. Store in a sealable plastic bag.

You can squeeze it, roll it, cut it with scissors, color on it with markers, drape it over anything and it will take that shape (fun with plastic animals). Just put it away for another fun day when you are done. Be sure and seal the bag or it will slither out. It comes out of hair and off carpets. The older it gets, the harder it becomes.

Source: <https://kinderart.com/art-lessons/crafts/glurch/>

**Famous Scientist**

Jadav Molai Payeng, at the age of 16, started planting trees on a sandbar of the Bramhaputra River and created a 1360 acre forest reserve all by himself. He spent 36 years of his life on this without seeking the limelight, a prize or salary. His forest is now the habitat of 90-100 elephants, 3-5 Royal Bengal Tigers, one horned Rhino and other species.

His story has now been made into a film, *Forest Man*, by Canadian film-maker Will McMaster.

Source: <https://prepareforchange.net/2016/06/18/jadav-molai-payeng-forest-man/>

SAWD TV: 12/18/19

**Did you Know?**

The University of Houston recently unveiled a fleet of food delivery robots. The new program, in partnership with Starship Technologies, is an autonomous food delivery service that can bring students food in just a matter of minutes. The robots can cross streets, climb curbs, travel at night and operate in both rain and snow.

The university didn't have to spend any money on purchasing the technology, as it is paid for by the customers through a $1.99 delivery fee. Click [here](https://abc13.com/technology/fleet-of-food-delivery-robots-launched-at-university-of-houston/5690163/) to watch a video of the food delivery service robot in action on campus!

Other universities including Purdue and Northern Arizona have adapted similar programs

Source: <https://abc13.com/technology/fleet-of-food-delivery-robots-launched-at-university-of-houston/5690163/>

**Famous Scientist**

Diane Linda Linne, 36, is an engineer at the NASA Glenn Research Center in Ohio. Her primary focus is figuring out how to build a gas station on Mars.

Long-distance space travel creates a fueling problem. If scientists pack a rocket with enough fuel for a manned voyage to Mars and back, the engines would have to be made bigger, which would make them heavier, thus requiring more fuel, which in turn would require bigger rockets and so on. Linne's solution to this catch-22 is to build a rocket powered by carbon monoxide, which can be obtained by splitting apart carbon dioxide, a gas that happens to be abundant in Mars's atmosphere.

Source: <https://www.nasa.gov/feature/gardens-and-red-planet-soil-meet-maker-diane-linne>

SAWD TV: 1/8/20

**Did you Know?**

Eviation's Alice aircraft, pictured at right, is on schedule to be the world's first commercially available electric commuter aircraft in 2021.

Electric and hybrid-electric airplanes, which use a mix of battery and conventional power, promise some big advantages over jets and fuel-powered propeller airplanes. They’ll be much quieter for passengers and people who live near airports, and their computer-controlled, electrically driven propellers will make for smoother, more comfortable flights.

Also, electric motors cost less to operate and maintain than fuel-powered aircraft engines, so this could mean lower costs for airlines and perhaps cheaper airfares for passengers.

Source: <https://www.nbcnews.com/mach/science/electric-planes-promise-big-benefits-air-passengers-planet-ncna862001>

**Famous Scientist**

Young-Kee Kim, 37, is a South Korea-born American physicist who fell in love with math at a very early age.

Kim has made it her goal to understand the origins of mass. Like many particle physicists, she bemoans the loss of the U.S. Supercollider once under construction in Texas, a 54-mile-long machine that would have made her work much easier. Congress cut off funds for the project in 1993. Rather than wait for one to be built, she is making do with the existing collider at DOE's Fermilab. With it, she has been able to provide a more precise measure of the subatomic particle "W vector boson." Now her energies are aimed at proving the existence of the elusive Higgs particle, which scientists believe is the basis of mass.

Sources: <https://hep.uchicago.edu/~ykkim/research/index.shtml>; <https://www.scientificamerican.com/article/the-supercollider-that-never-was/>