



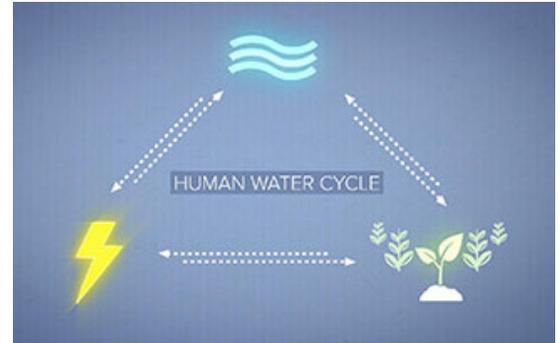
10 Quick Reads From NSF.gov

February 14, 2017

01

Exploring the “Human Water Cycle”

Water is an essential building block of life. It’s constantly moving in a hydrologic cycle that flows in a continuous loop above, across and even below the Earth’s surface. But water is also constantly moving through another cycle -- the human water cycle -- that powers our homes, hydrates our bodies, irrigates our crops and processes our waste. The tight connection between water, food and energy makes them dependent on one another. The increasing need for these three vital resources is forcing us to rethink how we manage and use our water supply. Learn more about the connections between food, energy and water in this video [special report](#) from NSF and NBC Learn, the educational arm of NBC News. You can also read about the project in this [press release](#).



02

“Women, Minorities, and Persons with Disabilities in Science and Engineering” report now available

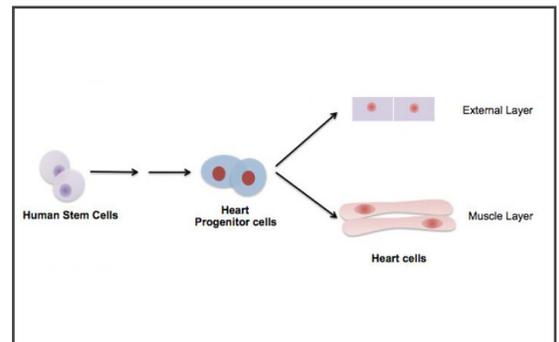
The National Center for Science and Engineering Statistics (NCSES) has published its 2017 “Women, Minorities, and Persons with Disabilities in Science and Engineering” report. Mandated by Congress, the biennial report is the federal government’s most comprehensive look at the participation of these three demographic groups in science and engineering (S&E) education and employment. Among the findings, the NCSES report shows that women have reached parity with men in educational attainment but not in S&E employment, and that underrepresented minorities account for disproportionately smaller percentages in both S&E education and employment. Read more about the report in this [press release](#) and check out the [report](#).



03

Repairing damaged hearts?

A heart attack. Inside the body, a blood vessel blockage is preventing oxygen from reaching the heart muscle. Cells die. Damaged muscle tissue can’t regenerate, and the damage is permanent. In 2012, a team at Penn State University and the University of Wisconsin discovered a way to treat stem cells with chemicals that manipulate signaling information, so the stem cells become myocardium cells -- the cells of the heart wall’s thick, muscular middle layer. The heart wall consists of three layers. The researchers knew they needed additional information to signal stem cells to generate into epicardium cells -- the heart wall’s outer layer. But the researchers didn’t know what that information was. Now, they do. And they’ve successfully generated epicardium cells similar to those in living humans. Hear all about it in this “Discovery Files” [podcast](#).



04

Scientists to present El Niño, other long-term ecological research results at annual aquatic sciences meeting

The ecological effects of the strong 2015-2016 El Niño, carbon burial in aquatic ecosystems, and the presence of pharmaceuticals in streams are just a few of the topics scientists affiliated with the NSF Long-Term Ecological Research (LTER) Network will discuss at the upcoming Association for the Sciences of Limnology and Oceanography (ASLO) annual meeting, Feb. 27 to March 3. Researchers funded by NSF's Division of Ocean Sciences, Division of Environmental Biology and Office of Polar Programs conduct research at 25 NSF LTER sites around the world, including in aquatic ecosystems such as coral reefs, seagrass beds and salt marshes. LTER scientists study the factors driving environmental change and map the potential ecosystem responses that could result. Find out more in this NSF [press release](#).



05

Reducing structural vibrations with groundbreaking device

A Virginia Tech architecture professor, with help from students, has invented a device that promises to make structural vibration reducing technology universally accessible. The portable tuned mass damper (PTMD) significantly improves on existing technology by making it more compact, affordable, simple to set up and tune, and easy to integrate into a structure's design. Professor Mehdi Setareh began working on the PTMD in 2014 as part of an NSF-supported project. Find out more in this News From the Field [brief](#) that links to the university press release.



06

Cotton candy machine used to re-grow human tissue

Researchers are working on a novel approach to creating fibers the size of capillaries. NSF-supported engineers Hak-Joon Sung and Leon Bellan, and their team at Vanderbilt University, are working to re-grow body tissue that has been damaged by trauma or disease. But, regenerating tissue needs blood to survive. In living systems, that's done by capillaries, branching networks of tiny blood vessels--each 10 times thinner than a human hair. That's where the cotton candy machine comes in. The size of the fibers it produces are very close to the size of capillaries. Find out about the research in this "Science Nation" [episode](#).



07

NSF Director marks the 60th anniversary of U.S. scientific research stations at the South Pole

In the January 2017 issue of the [Director's Notes](#) newsletter, NSF Director France Córdova marked the 60th anniversary of the establishment of a U.S. scientific research station at the South Pole, expressing appreciation for "the researchers and staff who brave the elements each year to explore the frontiers of knowledge in the most challenging environment on Earth." The Director highlighted the range of cutting-edge research that is conducted at NSF's Amundsen-Scott South Pole Station, including detecting neutrinos, looking for clues about how the universe formed in the light left over after the Big Bang, and making important observations of space weather events that can impact our daily lives. The newsletter's [infographic](#) shows how NSF's polar programs provide valuable opportunities for researchers.



08

Fossilized skull reveals origins of shark-like fish

High definition computerized tomography (CT) scans of the fossilized skull of a 250-million-year-old fish revealed the origins of chimaeras, a group of vertebrate fish related to sharks, and where they fit in the tree of life. According to Michael Coates, the University of Chicago professor who led the study, chimaeras represent “a valuable and unique archive of information on biodiversity.” The chimaeras have long been difficult to place deep in the tree of life because they are so highly specialized. The fossil is now found to be a chimaeroid shark, a bizarre group of 300-plus-million-year-old sharks, known for their unusual dorsal fin spines. Learn more about the discovery, one of several fascinating stories covered in this [episode](#) of the video series, “NSF Science Now.”



09

10 “Big Ideas” for future NSF investments

NSF has played a critical role in establishing U.S. leadership in science and engineering (S&E), creating innovations that drive the nation’s economy and educating the next generation of scientists and engineers. As we look ahead, we must envision bold questions that will drive NSF’s long-term research agenda--questions that will ensure future generations continue to reap the benefits of fundamental S&E research. This is the reason behind the 10 “big ideas.” They capitalize on what NSF does best: catalyze interest and investment in fundamental research, which is the basis for discovery, invention and innovation. The [report](#), “10 Big Ideas for Future NSF Investments” is just one of the important overviews available for viewing or downloading from NSF’s [Toolkit](#) website.



10

Students talk engineering and the future

Today’s students have big dreams for the future: flying cars, Earth-sized atmospheric filters, quick access to clean water, phones with holograms, and more. Who can make these things happen? Engineers. The technology around us was imagined, designed and built by engineers. Engineers solve problems and make our lives better and more enjoyable. From fundamental research to everyday technology, engineers create incredible new solutions and discoveries to improve society and spur the imagination. Learn what it takes to be an engineer from real-life engineering students in this 2016 [video](#), “What is engineering?”

