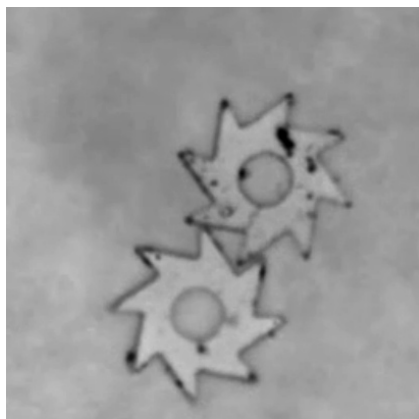




Westinghouse Electric Corp.

*The foundation for the Sanmen nuclear plant Unit 2 (top), and the containment vessel bottom head for Unit 1.*



Argonne National Laboratory

*Bacteria working to turn microgears. Click for a video. <http://www.flickr.com/photos/argonne/4185312325/>*

**CHINA POURS CONCRETE FOR SECOND WESTINGHOUSE NUKE PLANT**

Concrete was poured in December for the foundation structure of the Unit 2 nuclear plant at the Sanmen nuclear site in China, a 1,000-megawatt pressurized water reactor plant designed by Westinghouse. Unit 1 at the site awaits placement of the huge 700-ton Containment Vessel Bottom Head, which was assembled at an on-site facility and will be put in place by crane. Westinghouse senior vice president Ric Pèrez stated, “We remain committed to safely bringing the first AP1000 plant online in 2013, on time and within budget.”

The contract for the two Sanmen plants and two others to be built at Haiyang, China, was signed in 2007, and discussions are ongoing for more AP1000 plants to be built in China’s interior. The consortium team for the Sanmen plant includes the Sanmen Nuclear Power Company of China and the National Nuclear Corporation. Westinghouse also has contracts to build six AP1000 reactors in the United States.

**NORMAN BORLAUG, FATHER OF ‘GREEN REVOLUTION,’ DIES AT 95**

Norman Borlaug, the man who fed the world, died at age 95 on September 12, 2009. He leaves an unmatched legacy of using scientific advances to develop high-yield crops to provide for growing world populations. His work, initially in Mexico, then India and Pakistan in the 1960s, and later in Asia and Africa, doubled and tripled grain yields, saving millions of lives from starvation, in what became known as the “Green Revolution.” Borlaug’s success proved that the Malthusians (most notably Paul “Population Bomb” Ehrlich), were dead wrong, and that with determination, education, and advanced science and technology, man could provide for increasing population—and the environment. In his later years, Borlaug chastised his environmentalist critics, saying, “If they lived just one month amid the misery of the developing world, as I have for 50 years, they’d be crying out for tractors and fertilizer and irrigation canals and be outraged that fashionable elitists back home were trying to deny them these things.”

Borlaug’s children issued a statement after his death which serves as a challenge to scientists and others: “We would like his life to be a model for making a difference in the lives of others and to bring about efforts to end human misery for all mankind.”

For more about this remarkable man, see a short documentary: “A lifetime fighting hunger” [www.youtube.com/watch?v=m2TmEdiXTvc&NR=1](http://www.youtube.com/watch?v=m2TmEdiXTvc&NR=1) and the trailer to a full length documentary on Borlaug’s life, released in 2009, “Freedom from Famine,” [www.youtube.com/watch?v=LRPibWf3wN8](http://www.youtube.com/watch?v=LRPibWf3wN8). See also a book review of the authorized Borlaug biography *The Man Who Fed the World*, [www.21stcenturysciencetech.com/Subscriptions/Spring%202008%20ONLINE/Borlaug.pdf](http://www.21stcenturysciencetech.com/Subscriptions/Spring%202008%20ONLINE/Borlaug.pdf)

**ARGONNE SCIENTISTS HARNESS BACTERIA TO TURN MICROGEARS**

Scientists at the Argonne National Laboratory and Northwestern University, have discovered that common bacteria can turn microgears when suspended in a solution. The researchers observed that although the bacteria appear to swim around the solution randomly, they occasionally collide with the gear spokes, turning it in a definite direction. A few hundred bacteria work together to turn the gears. The Argonne work lays the basis for future biomechanical systems driven by microorganisms.

Igor Aronson, the principal investigator in the work, said: “Our discovery demonstrates how microscopic swimming agents, such as bacteria or man-made nanorobots, in combination with hard materials can constitute a smart material which can dynamically alter its microstructures, repair damage, or power microdevices.” The speed of the gears can be controlled by manipulating the amount of oxygen in the suspended liquid. The bacteria slow down when less oxygen is available.

**EVIDENCE OF LIQUID WATER FOUND ON SATURN’S MOON ENCELADUS**

The Ion and Neutral Mass Spectrometer on NASA’s Cassini mission collected data on five fly-bys of Saturn’s moon Enceladus from plumes of gas and other particles

escaping from cracks in the surface near the moon's south pole. A team of researchers then analyzed these data from and compared it to known compounds, identifying several. One of them, radiogenic argon, is a product of decaying potassium, which indicates interactions between water and rock underneath the moon's icy shell. They also found ammonia, which scientists think works like antifreeze, to lower the temperature at which liquid will freeze. Water made up more than 90 percent of the vapor, followed by carbon dioxide at 5 percent. Methane and many more complex organic molecules were also seen. Two of the team from the University of Texas at San Antonio, Joseph Westlake, a physics Ph.D. student and his advisor, Adjunct Professor J. Hunter Waite, published their analysis of the data in the Aug. 25 issue of *Nature*.

### VISTA TELESCOPE'S SPECTACULAR IMAGE OF THE FLAME NEBULA

The new telescope VISTA (the Visible and Infrared Survey Telescope for Astronomy) released its first images from the European Southern Observatory's Paranal Observatory in northern Chile. VISTA is a survey telescope working at infrared wavelengths and is the world's largest telescope dedicated to mapping the sky. Its large mirror (4.1 meters), wide field of view, and very sensitive detectors are able to reveal completely new views.

### DEUTERON THEORY OF COLD FUSION PROPOSED AT ICCF-15 ROME CONFERENCE

Radiochemist and materials expert Dr. Edmund Storms reported to 21st Century his new theory of cold fusion, which he presented at the international conference on condensed matter and nuclear science in Rome, Oct. 5-9. Storms believes that clusters of deuterons (the nuclei of the naturally occurring isotope of hydrogen) are able to penetrate the nucleus of palladium, transmuting it into a heavier element and releasing energy in the form of heat. The deuteron clusters, perhaps similar to Rydberg clusters, are charge-free configurations that are not repelled by the positive charge of the palladium nucleus. Storms's research shows that the reaction occurs not within the palladium crystal lattice, but in nanoparticles of palladium mixed with other elements that form at the surface of the palladium cathode.

There is no unstable intermediate nucleus, and thus no radioactivity, released in the reaction. The absorption of deuterons produces an element of higher atomic number and mass, each deuteron releasing about 12 MeV of energy because of the mass defect.

According to Storms, who has been pursuing cold fusion since his retirement from Los Alamos National Laboratory in the early 1990s, his theory can explain all the known phenomena reported in cold fusion experiments to date. He believes it may also be the explanation for nuclear transmutation in biological systems, first documented by Louis Kervran and subsequently pursued by researchers in Japan and Russia. Recently the Japanese have detected biological transmutation using nuclear magnetic resonance (NMR) techniques that are more reliable than chemical analysis, Storms says. Russian researchers have shown transmutation by bacteria capable of reproducing in 100 percent heavy water, which has deuterium in place of the hydrogen.

### LASER PROCESSES PROMISE BETTER ARTIFICIAL JOINTS

Researchers at Purdue University's Center for Laser-Based Manufacturing are developing laser technologies that create longer-lasting artificial joints and arterial stents, which can be manufactured 10 times faster and less expensively than present processes. One technique works by depositing layers of a powdered mixture of metal and ceramic materials, melting the powder with a laser and then immediately solidifying each layer to form parts. This enables parts to be formed one layer at a time, making it ideal for coating titanium implants with ceramic materials that mimic the characteristics of natural bone. The laser deposition technique also makes it possible to design each implant specifically for each patient.



European Southern Observatory

*VISTA's large mirror, wide field of view, and sensitive detectors revealed this image of the Flame Nebula in Orion in December. For more information, see [www.eso.org/public/news/eso0949/](http://www.eso.org/public/news/eso0949/)*



Andrew Hancock/Purdue News Service

*Engineering doctoral student Shaoyi Wen (left) and technician Andrew Hecht review data for the "laser deposition" system. The technology is expected to help meet the increasing need for artificial hips and knees, as the population ages.*