

**Special Report:** Headline Discoveries now published four times a year

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Education

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# HEADLINE DISCOVERIES

Jan/Feb 2011; Issue 1

## **K'NEX CHALLENGE WINNERS REVEALED**

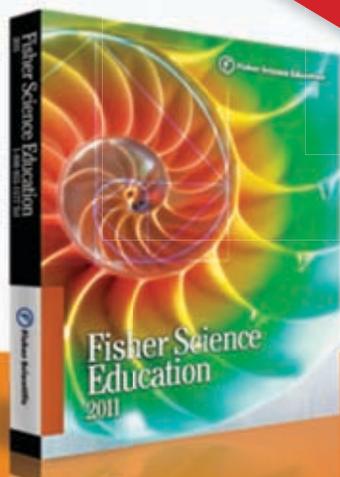
**THE NSTA CONFERENCE  
NOT TO MISS**

**BIONIC EYE TAKES SIGHT**

**GAMING SYSTEMS GO  
HEAD-TO-HEAD**

**VIRTUAL DEVICES OF THE  
FUTURE?**

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- **Product Showcase Catalog Section:** Features all of the latest and most desired products for the year

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# K'NEX CHALLENGE RESULTS

By: Gwen Myslinski

The Allegheny Intermediate Unit (AIU), a division of the Department of Education, hosted the first annual K'NEX Challenge at their facility in Pittsburgh, PA on December 6, 2010. A total of 43, four-member teams representing 35 school districts, participated in the challenge. "It's a wonderful opportunity for kids from multiple school districts to compete in a fun, creative educational activity," K'NEX education consultant Bob Jesberg said.

Each team had an opportunity to use their STEM (science, technology, engineering and math) skills to design and build a structure using only K'NEX pieces, including using at least one motor, which moved a standard ping pong ball across the span of a 5' table. Teams were separated into two categories: grades 4-5 and grades 6-8 for judging; however, the judging criteria were the same for both categories. Students had two hours to build their structure and present it to a panel of 15 judges who rated the design, creativity, teamwork, blueprint and narrative, which outlined the design process.

"It's an engineering competition," said Amy Cribbs, exploration and academic events coordinator for the AIU. "They use science principles, math and a lot of creativity. They've been working on this in the classroom since October, and K'NEX said this is the first time something like this has been done in the U.S."

Bobbie Cegelski from Montour School District said that their school district currently has a STEM program for grades 9-12, but wants to include STEM as a component of the K-8 curriculum, and thought K'NEX would be a great way to introduce and educate students in these fields.



Winners from the challenge include the following schools:

## Grades 4-5:

**First place:** Mt. Vernon Elementary, Elizabeth Forward School District

**Second place:** Montour Lower Middle School, Montour School District

**Third place:** Jefferson Elementary, West Jefferson School District

**Honorable Mention:** Avalon Elementary, Northgate School District

## Grades 6-8:

**First place:** Woodland Hills Jr. High, Woodland Hills School District

**Second place:** Pleasant Hills Middle School, West Jefferson Hills School District

**Third place:** Marshall Middle School, North Allegheny School District

**Honorable Mention (Design):** Brentwood Middle School, Brentwood School District

**Honorable Mention (Teamwork):** Woodland Hills Jr. High, Woodland Hills School District

# BURJ KHALIFA – THE TOWERING WONDER

By: Madhura Puttaswamy

Where is the world's tallest skyscraper? Many guess it is in Malaysia, Taiwan or New York, but are incorrect. Instead, look to the shores of the Persian Gulf, more specifically, the United Arab Emirates port city of Dubai. This is where the Burj Khalifa, the world's newest man-made pinnacle, resides.

The Burj Khalifa is an architectural marvel, the world's tallest free-standing structure that opened in January 2010. At over 2717', the Burj Khalifa is 63 percent taller than the former record holder, Taipei 101 in Taiwan, and 86 percent taller than Chicago's Sears Tower.

## THE FLOWER CONNECTION

The Burj Khalifa, with its Y-shaped design, draws inspiration from the desert flower, *hymenocallis*. Its triple-lobed design closely



resembles this flower with its petals around the central stem. As the tower moves skyward, it narrows in a spiral pattern to reduce the cross-sectional area for maximum wind resistance and stability.

## MINDBOGGLING MAGNUM OPUS

When fully operational, the tower will consume 250,000 gallons of water daily. In summer, a cooling system, equivalent to 10,000 tons of ice, keeps this towering furnace apt for human living. The 36 million watts of electricity that light up the entire tower could brighten 3.6 million 100-watt light bulbs.

The building's 57 elevators and eight escalators, each traveling at a speed of 59 feet per second, transport people and equipment throughout its expanse. Burj Khalifa also features 27 terraces and an observation deck affording visitors views of Dubai, the Gulf and the skies.

## BURJ KHALIFA QUICK FACTS

- **Cost:** \$1.5 billion
- **Tallest man-made structure ever, with 209 stories**
- **Total floor area is five million square feet**
- **Exterior contains 28,261 glass panels**
- **Construction took an estimated 22 million man-hours**
- **More than 110,000 tons of concrete were used in construction**
- **Khalifa means "tower" in Arabic**

# MOTION-CONTROL SHOWDOWN

By: Gwen Myslinski

Technology is ever-changing, and it couldn't be truer than with gaming consoles that are constantly competing for an edge in the marketplace. Now, the latest systems are in a battle for the best motion-control technology. Each brings a slightly different user experience, but all are able to offer hours of enjoyment.

Currently, there are three different motion-control gaming consoles on the market: Nintendo's\* Wii\*, Sony's\* PlayStation\*Move for PlayStation 3\* and the most recently introduced, Microsoft's\* Xbox\* Kinect\*. Each works slightly different from the next. For example, the Wii uses the Wiimote\*MotionPlus\* to enhance the functionality of an accelerometer with a gyroscope sensor that tracks movements more accurately, and an IR sensor monitors the positioning of lights emitted by the sensor bar; the Kinect only uses a depth-sensing camera (actually a single color camera for image recognition and two

monochrome cameras placed a few inches apart to complete the 3-D graphic); and finally the PlayStation Move is a combination of the two because it uses a video camera along with a physical controller that has motion-sensing electronics.

The gaming technology varies, but there are other differences that could help a person decide which console is better for his/her needs.



|  | Xbox Kinect           | PlayStation Move              | Nintendo Wii              |
|--|-----------------------|-------------------------------|---------------------------|
| Cost Range (from pieces to packages)     | \$150 to \$449        | \$50 to \$400                 | \$20 to \$200             |
| Additional Controllers for Extra Players | No                    | Yes                           | Yes                       |
| Motion Sensing Accuracy                  | Most of Three Systems | In the Middle                 | Least of Three Systems    |
| Motion-Based Games Available             | 17                    | In the Middle                 | Largest Available Library |
| Online Streaming of Netflix*             | Yes                   | Yes                           | Yes                       |
| Plays DVDs and/or Blue-Ray Discs         | Only DVDs             | DVDs and Blue-Ray Discs       | No                        |
| High-Definition                          | Yes                   | Yes                           | No                        |
| Controller                               | Unnecessary           | Move Motion Controller Needed | Wiimote Needed            |

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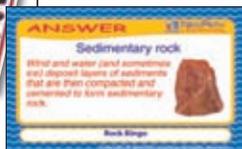
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A rock type created by the deposition of sediments by wind or water is called what?



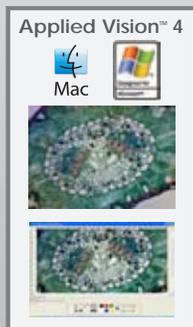
Introduce or review standards-based topics on Minerals, Rocks, Rock Cycle and Energy. Each game includes:

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# FIVE TASTY TIDBITS ABOUT THE TONGUE

By: Valinda Huckabay

Surprisingly, the tongue is one of the most-used muscles we have. It's also the only muscle connected at just one end. But how much do we really know about this amazing part of our body?

## 1. WHAT ROLE DOES THE TONGUE PLAY IN OUR DAILY LIVES?

Eating, your tongue moves the food around in your mouth so you can chew and swallow. While you sleep, your tongue constantly pushes saliva down your throat. It also plays a critical part in helping us form sounds. It's so important for speech, in fact, that in Portuguese, Russian, Persian, Greek, Spanish, Polish, Armenian, Finnish, Irish, Latin and Turkish, "tongue" and "language" are the same word.

## 2. HOW DOES "TASTE" WORK?

The surface of the human tongue is covered with 10,000 special cells called taste buds that allow us to distinguish between sweet, sour, salty, bitter and savory flavors. When you eat, flavor particles contact these taste buds, causing a chemical reaction that your brain interprets as a particular flavor.

## 3. WHY DOES YOUR TONGUE HEAL SO FAST?

Constantly bombarded with bacteria and viruses, the mouth incorporates enhanced recuperative powers to combat infection. With more blood vessels than other body parts, greater blood flow clears damaged tissue and promotes faster healing. Taste bud cells have a life span of only about ten days, so they regenerate quickly.



## 4. ARE ALL TONGUES THE SAME?

Many characteristics are the same for all tongues — about 85 percent of people can roll their tongues, for instance. Similar to fingerprints, though, every person's tongue-print is completely unique, and some people have much more sensitive tongues than the general population. A typical person can detect a drop of lemon juice diluted in a gallon of water, but there are "super tasters" that can distinguish individual ingredients in prepared food or wine.

## 5. WHAT'S THE RECORD FOR THE LONGEST TONGUE?

According to the Guinness Book of World Records, the longest tongue currently belongs to Stephen Taylor (England) measuring 3.74 inches from tip to top. Before Mr. Taylor, the record holder was Annika Irmiler (Germany), who still holds the record for a female. Her tongue measures 2.76 inches, a difference of almost one full inch.

# LUNG REGENERATION, AN ALTERNATIVE TO TRANSPLANTS

By: Joy Jones

Historically, people with failing lungs due to diseases such as emphysema and cystic fibrosis face a grim prognosis: only 10 to 20 percent of lung transplant patients survive for 10 years. And until now, progress in creating lungs in the lab has been thwarted due to the organ's complex structure and multiple cell types, according to biomedical engineer Laura Niklason of Yale University.

Thanks to a new technique called decellularization, lab rats are now able to breathe using lungs "grown" in the lab, a significant breakthrough in the initiative to develop replacement lungs for humans. In decellularization, detergent is used to remove all of the cells from an organ, leaving a scaffold consisting of the fibrous material between cells to serve as a template for new cell growth. In the rat study, lung cells from a newborn rat were then introduced, which migrated to the right places and grew air sacs, airways and blood vessels, resulting in a rebuilt organ. In a short-term trial of four rats in which a regenerated lung replaced one of the animal's original lungs, the new lung proved 95 percent as efficient in exchanging oxygen and carbon dioxide.



According to Niklason, the crucial step was nurturing the lung scaffolding in a bioreactor (incubator) that circulates fluid, in order to simulate the environment in which fetal lungs develop. After eight days in the bioreactor, researchers identified the presence of functional lung tissue.

## THE FUTURE LIES IN STEM CELL RESEARCH

Niklason cautions that it may be 20-25 years before regenerated organs are available for people. In order to prevent tissue rejection, a major obstacle for current transplant patients, the recipients' own cells would need to be used in the procedure. This, however, would involve major advances in stem cell research, as no such method of culling personalized stem cells exists today.

# SCIFI EYE COMES INTO FOCUS

By: April Bailey

In the early 1970s, *The Six Million Dollar Man* (based on *Cyborg*, a science fiction novel by Martin Caidin) first debuted on television. The show followed the life of astronaut Steve Austin who, having been severely injured in a crash, lost functionality in two limbs and one eye. The show's opening credits said: "Gentlemen, we can rebuild him. We have the technology." With that, viewers got the first glimpse of a bionic man. While a far-fetched idea at the time, the state-of-the-art technology featured in the television program has come to be a reality, including the "bionic" eye, a new and quickly advancing frontier in bionic medical devices.

## HOW DOES IT WORK?

- A camera is built into a pair of glasses
- An implant is surgically placed behind the patient's retina
- The camera captures images and converts them into an electric signal
- The signal is transmitted wirelessly to an implant behind the retina
- Electrodes in the implant unscramble the signal and create a crude black and white image
- The image is relayed along the optic nerve to the brain

To put the technicalities of a bionic eye into perspective, consider seeing something made of pixels (the small boxes used to make images on a computer monitor). The more pixels used in an image, the better the image definition. Early versions of the bionic eye used only four electrodes (representing a 2" x 2" pixel image), while current implants feature 60



electrodes. Scientists and engineers are working towards implants with 1000 electrodes, which they hope will allow facial recognition. Further down the road, scientists plan to introduce electrodes that will allow recipients to see color as well.



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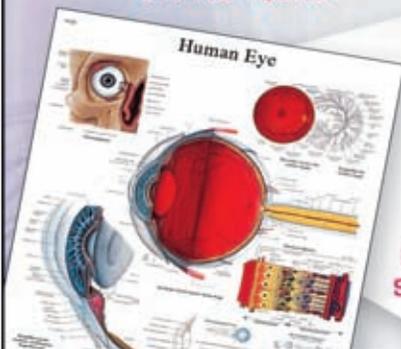
| Cat. No. | Price    |
|----------|----------|
| S02131   | \$404.00 |



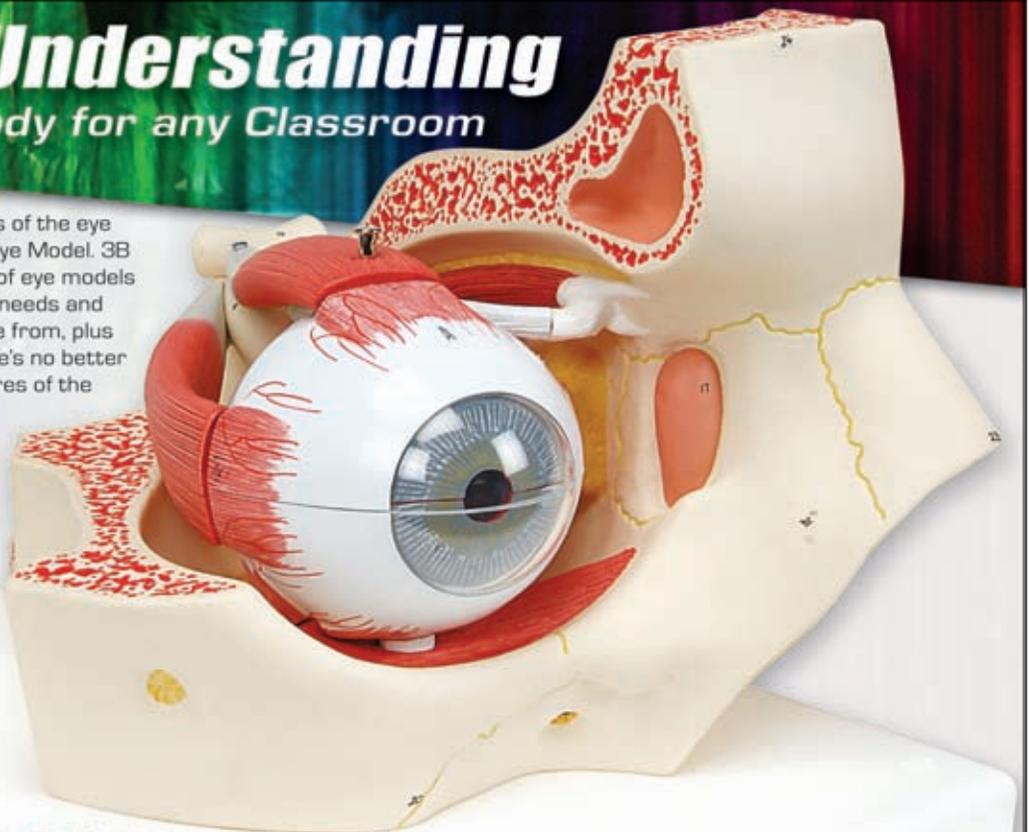
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# CANCER-FIGHTING PROTEIN FOUND IN COMMON PARASITE

By: Joy Jones

Researchers in Brazil have found promise in the saliva of a tick as a new weapon against cancer. A saliva protein in the *amblyomma cajennense*, or cayenne tick, has proven effective in reducing or even eradicating cancer cells in laboratory rats, while leaving healthy cells undamaged. The cayenne tick, an indigenous species from the southern U.S. to Argentina, including parts of the Caribbean, is currently targeted for cancers of the skin, liver and pancreas.

The lead researcher, Anna Marisa Chudzinski-Tavassi, reports serendipitously discovering the cancer-fighting properties of the protein, dubbed Factor X active, while studying its anti-coagulative properties — those that prevent clotting and allow the tick to gorge itself on the blood of its host. Previous research had uncovered the growth-limiting ability of a common anti-coagulant whose characteristics are similar to those of the protein. The logical next step was to determine if the growth-inhibiting properties could be applied to cancer cells.

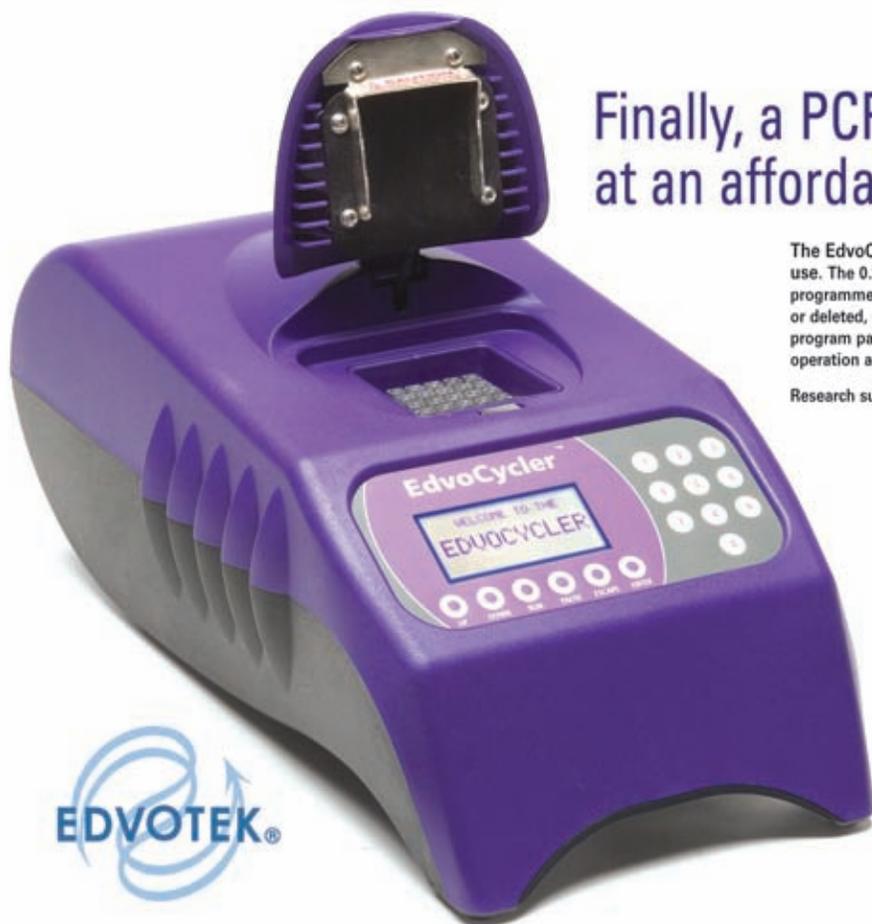
## KILLS CANCER CELLS, BYPASSES HEALTHY CELLS

Not only did the protein slow or stop the growth of the cancer cells, it bypassed healthy cells, which most traditional cancer treatments fail to do. When tumors were treated with the protein for 14 days, growth was stopped or even reversed. A 42-day treatment resulted in complete destruction of the tumors.

Chudzinski-Tavassi expressed frustration over the cumbersome process involved in transforming her discovery into an approved cancer treatment drug, which entails years of clinical trials and significant outlays of research dollars.



So you may need to look no farther than your backyard for the next cancer-fighting substance. If only bringing it to market were that simple.



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Research supported in part by NIH SBIR NCRR Grant #5R44RR18670.

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## ANTIBIOTICS ALTER BACTERIAL BALANCE OF POWER

By: Joy Jones

According to research, the most beneficial bacteria in a person's intestine will promptly recover after being collateral damage in an antibiotic attack. However, several types have been known to be greatly reduced in numbers, if not decimated, by a course of certain antibiotics. Les Deflesten, a Stanford researcher, reports: "...about 30 percent of the bacterial types found in the intestine showed dramatic population changes after a course of ciprofloxacin (Cipro). The majority rebounded four weeks later," but the long-term effects are not known.

The intestine's microbial ecosystem performs a great many useful functions: extracting nutrients from food, protecting against infection, regulating the immune system and more. Not surprisingly, the consequences of tampering with the balance in this thriving bacterial community can be dangerous, ranging from a short bout of diarrhea to a life-threatening infection from the virulent bacteria *Clostridium difficile*, to which patients treated with certain antibiotics seem to be predisposed. According to Dr. Marya Zilberberg at the University of Massachusetts, *C. difficile* infections are becoming more common — and more deadly — in the U.S. The toxin that *C. difficile* releases attacks the lining of the bowel, producing watery diarrhea and turning the lining into an "inflamed rag."

Besides prior antibiotic use, other risk factors for *C. difficile* include extremes of age, and use of immuno-compromising drugs or acid reducers (Nexium, Prilosec). Ironically, another antibiotic, vancomycin, usually effects a cure.



### THE NEW MRSA?

In a study of 28 hospitals in the Southeast, *C. difficile* was found to surpass MRSA as the leading hospital-acquired infection. Because *C. difficile* spores can survive on contaminated surfaces for years, the best defense includes isolation of patients in single rooms, room cleaning after patient discharge and "compulsive" hand washing by visitors and staff.

Perhaps most important is Dr. Zilberberg's advice: be "educated consumer[s]" when it comes to antibiotics. "Don't say yes to a prescription" unless you're convinced you really need it.



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## New Forensics Kits from The Mystery of Lyle and Louise

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Bullet Striations is one of the new kits to join The Mystery of Lyle and Louise in 2011. In this unique hands-on forensics kit, your students must examine a bullet that was found at the scene of the crime to discover more details about the events surrounding the murder!

Outside the cabin crime scene, there is evidence of a struggle. A bullet was found lodged in the mud. At a separate crime scene, investigators have found an unloaded gun that was presumed to have been left behind by two of the suspects. Students need to compare bullet striations to see if the bullet found outside the cabin was fired by the gun found by the police.

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| S02171   | \$139.95 |



**Available through Fisher Science Education**

# 2011: THE INTERNATIONAL YEAR OF CHEMISTRY

By: Joe Giacobello

It's hard to imagine what the modern world would be like without the wondrous science of chemistry, and the many industries that are based on the chemical sciences. It is this complex and ever-changing field that has enabled the production of medicines, foods, preservatives, clean water, plastics, metals, fuels, paints, glues, weapons and a wide range of manufactured products.

## A YEAR OF CELEBRATION

In December 2008, the United Nations decided to recognize the achievements of chemistry and its contributions to mankind, by naming 2011 as the International Year of Chemistry (IYC2011). With the unifying theme of "Chemistry — our life, our future," the year-long celebration hopes to raise global awareness of chemistry and to attract young people to the field, as well as to explore the role of chemistry in solving global problems.

A variety of events are slated to take place throughout the year at locations around the world, beginning with the opening ceremony at the UNESCO headquarters in Paris on January 27-28. The events, which range from a "Nature and Chemistry Fair" in Jalandhar to an International Plastic and Rubber Exhibition in Barcelona, all emphasize that chemistry is a creative science that is essential to sustain and maintain our way of life.

Other activities, including lectures, exhibits and interactive hands-on experiments, will explore how chemical research is critical for solving our most complex global concerns involving food, water, energy, transportation, medical/health and other issues.



## INTERNATIONAL SCIENTIFIC COLLABORATION

The year 2011 is also the 100th anniversary of the International Association of Chemical Societies. This is especially appropriate, since the Year of Chemistry is also hoping to encourage and enhance international cooperation, serving as a central information point for activities by national chemical societies, educational institutions and other organizations.

As the Year of Chemistry reaches across the globe, it will be sure to educate, inspire and entertain a diverse range of individuals, with public participation at local, regional and national levels. When all is said and done, it hopes to increase public appreciation of chemistry, and attract new, fresh talent to a fascinating field that has contributed so much to our modern lifestyle.

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## BLOOD REVEALS AGE IN FORENSIC INVESTIGATIONS

By: Pam Sherwood

Blood is one of the most crucial forms of evidence available to forensic scientists. Blood samples routinely provide extensive information to investigators, including blood type, gender and DNA profiles. Scientists from the Erasmus MC University Medical Center Rotterdam in the Netherlands have recently revealed a new profiling method of blood analysis. "We demonstrate that human age can be estimated from blood with reasonable accuracy using a simple, robust and sensitive test assay," said Manfred Kayser.

Existing methods for age estimation cannot be utilized in the large proportion of investigations for which only bloodstains are available because these methods depend on the availability of teeth, bones or other identifiable body parts having physical features.

### METHOD EXPLOITS FUNDAMENTAL CHARACTERISTIC OF T CELLS

This new method takes advantage of a fundamental characteristic of immune cells known as T cells, which decline at a constant rate with age. Researchers report that the approach allows accurate estimation of age, give or take nine years, suggesting that it would be highly accurate in placing unknown persons into generational categories spanning about 20 years. This will make the new technique especially useful in forensic cases in which age information could provide investigative leads for finding unknown persons.



This approach offers an advantage for forensic applications over conventional DNA profiling, which is completely comparative. Solving cases through the use of current techniques requires the obtained DNA profile from evidence to match that of a known suspect of someone in the criminal DNA database. In contrast, this new, T cell-based approach can be utilized in cases that involve unknown persons.



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| S02262   | 3200g x 0.2g / 6.4 lb x 0.0005 lb | \$386      |
| S02263   | 6400g x 0.5g / 16 lb x 0.001 lb   | \$371      |
| S02264   | 10,000g x 0.5g / 22 lb x 0.002 lb | \$386      |
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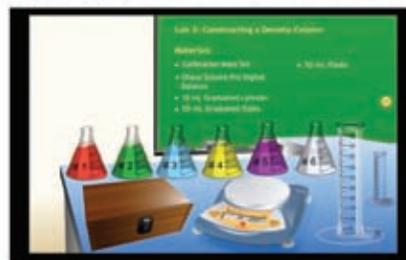


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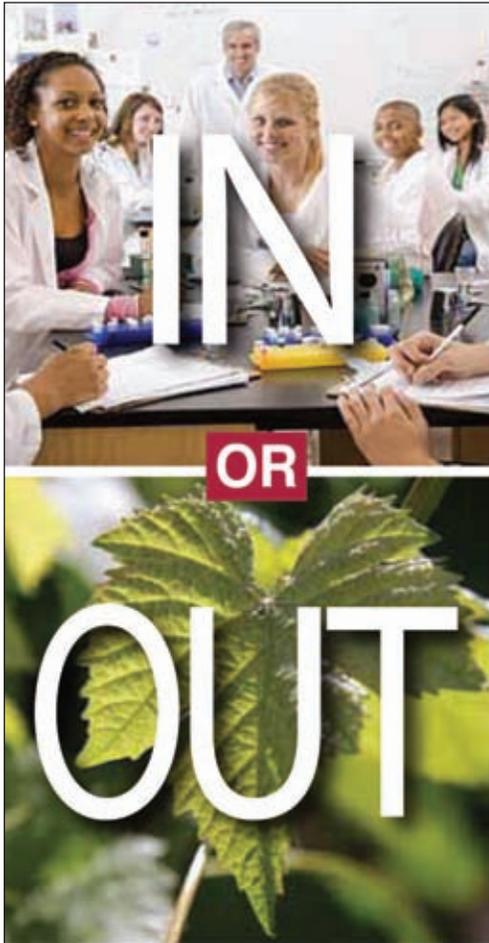
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# SCIENCE OF COFFEE RINGS

By: April Bailey

**Ever notice that when you spill coffee over the edge of your cup it always produces a ring under the bottom edge?**

There is a rather complex reason for this, but it can be summed up somewhat easily. Two main factors are at play: surface tension of the molecules of the liquid and the temperature of the surrounding environment.

When a drop of coffee is splashed outside of the cup, it has an initial "pinned" spot, and from there the surface tension within the liquid causes the molecules to spread and draw more liquid away from it.

The temperature of the surrounding area then comes into play as a difference in temperature between the liquid and the air causes evaporation to begin. When an evaporating drop is checked under a microscope, there is a strong outward flow of material as the particles stream toward the edge, rather than moving around randomly. As the process continues, the molecules of the liquid continue to draw towards the edge and, because of their surface tension, they continue to draw more molecules towards them to replace liquid that has already evaporated. This continuous flow piles the material up at the edges, where it eventually dries and forms a ring.

No matter what type of liquid or different types of surface on which the liquid is spilled, all combinations still produce rings.

Scientists who have recently studied this phenomenon believe it has implications for industries that rely on the uniform deposition of solids suspended in liquid media (i.e., paints) and that dispersed solids could be deposited in a controlled fashion such as by creating tiny electronic circuits or providing a means of high-density information storage.

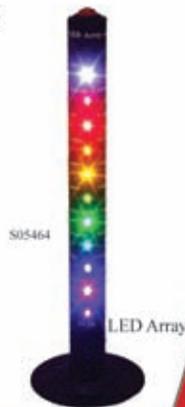


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# EDWARD A. BOUCHET: BREAKING THE COLOR BARRIER

By Debbie Kopyta

Edward Alexander Bouchet made history in 1876 by becoming the first African-American to receive a Ph.D. in physics, and the first to earn a doctorate from an American university. Also the first African-American to graduate from Yale University, Bouchet spent the majority of his professional life educating and mentoring students at the Institute for Colored Youth (ICY) in Philadelphia, Pa.

## LIFELONG FOCUS ON EDUCATION

Bouchet was born in 1852, in New Haven, Conn. His parents, William and Susan, were active in the community and encouraged Edward and his three sisters to pursue an education. He began his studies at the Artisan Street Colored School, with one teacher for the 30 students in all grade levels. He was valedictorian of his preparatory school, Hopkins Grammar, where he received a classical education prior to his admission to Yale.

His abilities in science caught the attention of a local philanthropist who paid for Bouchet's



graduate work, including his research on geometrical optics. Limited by a segregated society, Bouchet was unable to secure a university position. He instead became head of a new science department at ICY, teaching for 26 years while advocating for improved academic opportunities for black youth.

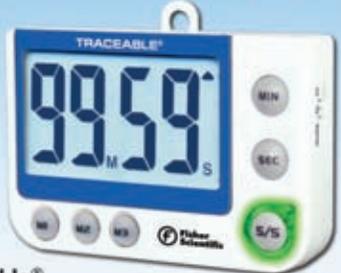
Bouchet lost his job in 1902 as ICY's focus shifted from a collegiate to an industrial curriculum, at the height of the country's debate over the best educational approach for black students. He held a variety of teaching jobs around the country until illness forced him to retire in 1916.

Although Bouchet never married and had no children, his dedication to teaching is said to have inspired both black and white youth to pursue advanced degrees. Bouchet died in 1918, the same year in which Elmer Imes became the second African-American to receive a Ph.D. in physics.

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# PARALLEL UNIVERSES EXIST

By: Samba Lampich

A parallel universe is a theoretical twin universe that coexists at the same exact time as our own. It is a distinct universe within the multiverse theory (many universes existing parallel to each other). And there may not be just one parallel universe, but multiple, possibly infinite parallel universes.

## THE PREMISE

The most basic idea of parallel universes is that because the universe is infinite, so are the possibilities of anything happening in the present, past and future. For example, at this very moment, a person could be doing an infinite number of things in these different universes; reading the newspaper, skiing, sleeping, etc. These universes are related to ours with similar events happening, but have different outcomes. Indeed, to those in another universe, maybe the one we know is "different."

## WHERE, HOW MANY AND HOW?

There is no definitive answer as to where and how parallel universes exist. Some people say parallel universes exist past the farthest galaxies, while others conclude they exist as near as a few millimeters. There is also a theory that every decision we make (Should I have tuna or a burger for lunch?) creates a new universe resulting in an infinite number of universes.

## DO THEY REALLY EXIST?

Parallel universes have been the source of heated debate in the science community, exciting plots for movies and thrilling narratives for novels. It has even been theorized that the Big Bang occurred when parallel universes



collided into each other. However, the notion of parallel universes is not based on any known scientific fact, and many scientists don't believe it would ever be possible to contact these parallel universes.

# EIGHTH WONDER OF THE MODERN WORLD?

By: April Bailey

The seven wonders of the modern world have one thing in common—size. From the Channel Tunnel to the Itaipu Dam, being the biggest has gotten them on this list. Next up for consideration on this list is a "joint venture"—the Nubian Sandstone Aquifer System (NSAS) and the Great Man-made River Project (GMRP).

Discovered by companies drilling for oil in the Sahara Desert, the NSAS consists of three large bodies of water lying underground in strata of saturated sandstone and limestone. The NSAS crosses into four countries (Egypt, Libya, Sudan and Chad) and is the world's largest source of "fossil water." Fossil water is groundwater that has remained sealed underground because of changes in surrounding geology over time and has had little to no natural replenishment from new precipitation. While this is a great scientific discovery, its importance is being overshadowed because of the huge need for water to nations in the Sahara Desert.

## FROM DESERT TO SAVANNAH

The Nubian Sandstone Aquifer System is being tapped to bring water to regions in the Sahara primarily for irrigation purposes. In order to get water to more remote desert locales, one nation, Libya, has developed the Great Man-made River Project.

The GMRP is the world's largest irrigation project, consisting of the largest underground network of pipes and aqueducts ever put together. Its more than 1300 wells provide 6.5 million cubic meters of water per day to Libyan cities. This water allows desert residents to more readily grow cereal crops and maintain livestock.



As great of a feat as this is, it is expected that, due to the limited amount of water, and the area's arid climate and increased consumption causing huge evaporation losses, all the water in the Nubian Sandstone Aquifer System will eventually be gone in the near future. This means the desert nations will again need to find new ways of bringing water to their citizens.

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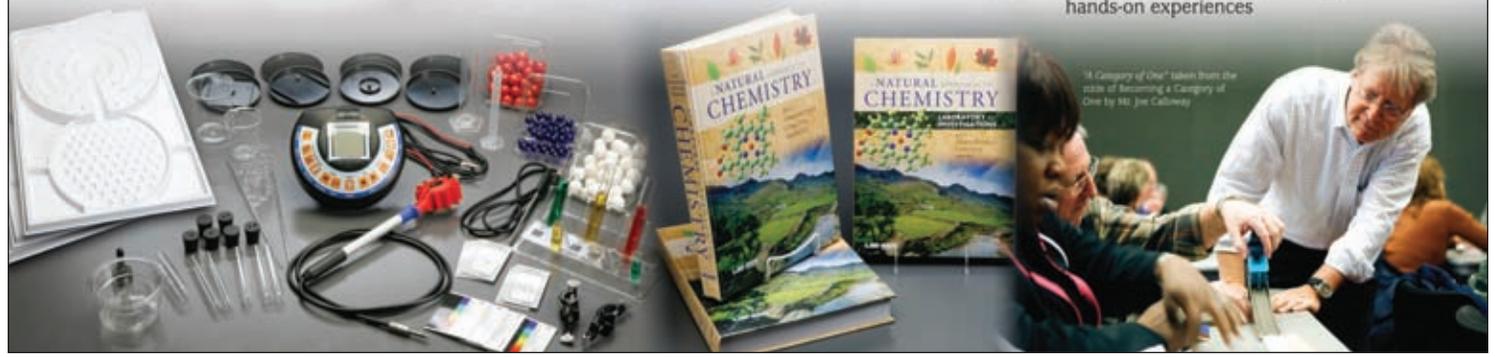


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## TRICKLE DOWN EFFECTS

By: Terri Sota

Could our neighbors to the north hold the key to U.S. energy independence? Definitely not, but Canada – the United States’ largest supplier of crude oil – may be of assistance. Currently, much attention is focused on the oil or tar sands of Alberta, which contain upwards of 175 billion barrels of recoverable oil reserves. This regional repository is a sludgy mixture of bitumen (a tar-like form of petroleum), water and minerals. Before the bitumen can be refined, it must be chemically “upgraded.” This process and the resulting toxic waste are a source of great debate between environmentalists and the U.S. Department of Energy. Still, approval to complete the 2000-mile TransCanada Keystone XL pipeline – from Alberta to the Gulf Coast – is imminent.

### WIN-WIN OR NO-WIN

For every pipeline argument, there is a counterargument. Proponents point to increased energy security – more oil from a stable political and economic partner. Projections show a doubling of oil sands production by 2015 – to 2.8 million barrels per day. Less risky than offshore drilling, advocates contend that reclamation efforts can mitigate much of the negative effects on the environment. Opponents argue that greenhouse gas (GHG) emissions are three to seven times higher for a barrel of sands-based oil than for conventional crude. Increased production will fail to lower gas prices due to built-in cleanup costs, and the potential for toxic wastewater leakage is too great. The drain on water resources is another concern: 2.5 to 6.5 gallons of water are required to extract and process one gallon of tar sands oil.

Despite the contentiousness, both sides agree that more oil from Canada can only be part of a rational energy plan, not the plan. And, the consumption of



oil creates far more greenhouse gases than the extraction and refinement of that oil.

# ACTIVE HURRICANE SEASON A 'GENTLE GIANT'

By: Patricia Rogler

The Atlantic hurricane season of 2010 was an extremely active one—just as the, National Oceanic and Atmospheric Administration (NOAA) predicted it would be. Luckily, due to short-term weather patterns, most of the storms stayed in open water and away from the U.S. For this reason, the NOAA is calling the season a "Gentle Giant."

## ONE OF THE BUSIEST SEASONS ON RECORD

The Atlantic Basin had 19 named storms, the third highest on record, tied with 1887 and 1995. Twelve of those storms became hurricanes, tying 1969 for the second highest on record. Five of those hurricanes reached major hurricane status, Category 3 or higher. An average Atlantic hurricane season has only 11 named storms and six hurricanes, two of which are major hurricanes.

Large-scale weather patterns, such as La Niña, helped create record warm waters, favorable winds and weak wind shear that strengthened developing storms. However, short-term weather patterns dictated where the storms would travel. This season the jet stream acted as a barrier, keeping most of the storms over open water.

## INACTIVE NORTH PACIFIC SEASON

While the Atlantic had one of the busiest hurricane seasons on record, the North Pacific had the fewest hurricanes on record since the NOAA started satellite tracking in the mid-1960's. There were only seven named storms and three hurricanes, two of which were major hurricanes. The average for the Pacific is 15 named storms and nine hurricanes, including four major ones. While La Niña helped to enhance the Atlantic hurricane season, in the Pacific Basin it



helped to suppress storms with cooler waters, a strong easterly wind shear and drier-than-normal air.

Although the Atlantic had one of the top five most active hurricane seasons on record, the U.S. was spared most damaging storms because of the jet stream, which helped to keep the hurricanes away from land.

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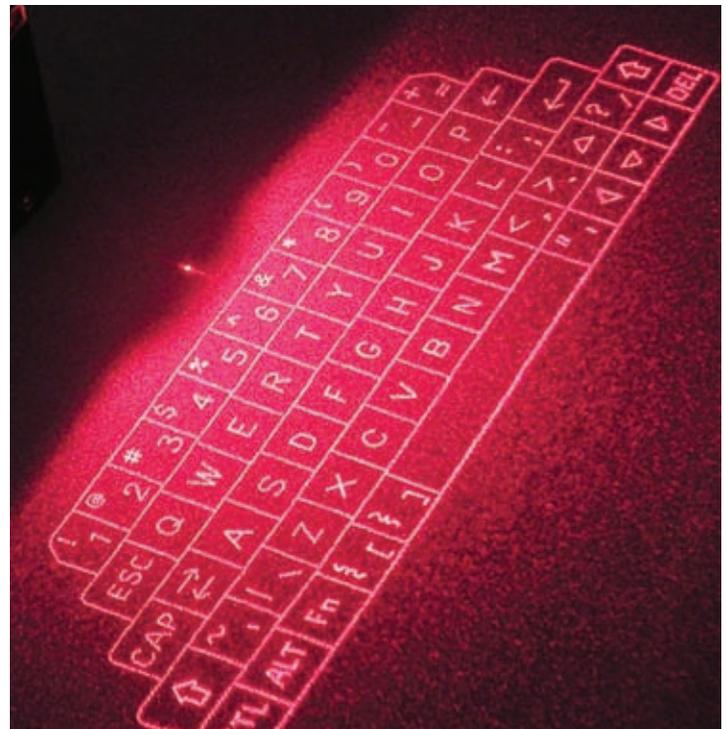
# VIRTUAL DEVICES—SOMETHING TO LOOK FORWARD TO?

By: Sarah McGann

Imagine a world in which your keyboard doesn't actually exist, but is projected onto your desk, where you are able to use it as if it is a keyboard made of plastic and wires. Virtual keyboards have broken into the Smartphone market so that users can have a full-size keyboard at their disposal at any time. Answering e-mails and creating documents on a phone can be a tedious process with only the built-in or digital keyboards that come with the phones. Many of these devices are no bigger than a deck of cards, and some are Bluetooth-enabled, which means they can connect to a Bluetooth-enabled Smartphone, and other handheld devices, wirelessly. Because they are projected onto a flat surface with light, some of them can be used in complete darkness.

One type of virtual keyboard on the market projects light with a laser onto a flat surface to create the key shapes and characters. When the user begins to type on the keyboard, a camera or a sensor, depending on the model, in the device detects finger movements that read the coordinates of the movements. The device then tells the Smartphone which letter to insert into the e-mail or document on the screen. Other types of virtual keyboards use infrared light. These devices have a sensor that reflects the light, and when a user's finger breaks it, the sensor can determine where the beam was interrupted and identify which virtual key the user pressed.

While virtual keyboards are the first device of their kind to reach consumers, the technology has opened the door for future virtual devices to be created and brought into the ever-expanding technology market.





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# THE 3-D REVOLUTION

By: Gwen Myslinski



Three-dimension movies have recently had a major impact at the box office and now at home with the invention of high definition (HD), 3-DTVs (and potentially soon to appear in mobile devices, gaming systems and more). But what makes this experience better than the movies produced in the 1950's and the 1980's?

Most associate 3-D movies with the cardboard glasses that have the red and blue (or green) lenses so that moviegoers can view the enhanced production. The two polarized colors were necessary to allow each eye to see the two superimposed images on the same screen, thus allowing the 3-D effect. However, times have changed, enhancing the 3-D experience.

There are three different 3-D technology options that can create a deep and immersive production. The first, and oldest, is IMAX 3-D, which still relies on polarized lenses set in proprietary goggles to separate the images between both eyes. These goggles are slightly tinted, not blue and red, making the movie less bright than the 2-D counterpart. The second, and most commonly used, option in the U.S., is RealD. It too requires the use of tinted polarized glasses, but they fit normally and are much more comfortable, even though the tinting does dull the brightness of the picture. Finally, the newest 3-D technology is Dolby 3-D. It uses a color wheel to split the images between the two eyes. The viewing glasses are clear with a slight red or green tint, meaning there is no noticeable difference in the movie's brightness.

Developers are in the process of creating 3-D viewing systems without having to wear any type of special viewing glasses, but it has yet to be determined when that will be available for market.

# FACTS ABOUT THE MAN WHO COINED THE TERM "GRAVITY"

By: Gwen Myslinski



In 1687, Sir Isaac Newton discovered the Universal Law of Gravitation, which is deemed by many to be one of the most important historical scientific discoveries of all time. The general concept is that gravity is the force holding the universe together and there is a gravitational force between any two objects in the universe. But here are some interesting facts about the scientist that some don't know:

- Isaac Newton almost became a farmer, which was the family business; his uncle encouraged him to attend Trinity College in Cambridge
- Newton discovered many of his findings in his early to mid-twenties, but didn't publish them until later in his life
- The common tale of Newton discovering the universal law of gravitation tells he was in his garden when he saw a falling apple (or in some cases the apple hit him on the head); however, Newton claimed he was in his house looking out of a window when he saw the apple fall from the tree
- He secretly practiced alchemy (the making of gold and silver from a base metal) because it was considered a crime under the Act of 1404
- Newton served as a Member of Parliament for one year (1689 - 1690), and only spoke once, asking a nearby person to close a window
- The first flight to the moon was possible, only because of Newton's discoveries about the movement of planets and the speed of light
- Newton was a religious man and wrote more about his faith than math and science

## 2011 NSTA CONFERENCE

By: Gwen Myslinski

"Celebrating the Joy of Science: Imagine and Create" is this year's National Science Teachers Association (NSTA) conference theme, which will be held in San Francisco, CA on March 10-13 at the Hilton San Francisco Union Square and the Marriott San Francisco Marquis. Programming will focus on STEM (science, technology, engineering, math) education.

Fisher Science Education will be attending the event, and will be located at booth #1915, offering several STEM-focused workshops including "Learn How to Develop a STEM Challenge Competition Using K'NEX" brand building pieces and "Art vs. Science - The Role of Science in the Winemaking Process."

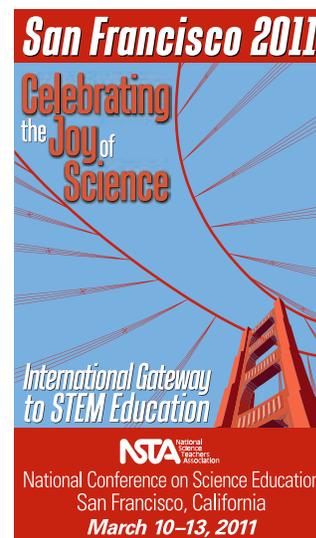
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To register for these and other Fisher Science Education workshops that will be presented at NSTA, San Francisco, please visit [www.fisheredu.com](http://www.fisheredu.com) and click on Workshops and Events. For more information about the conference, visit <http://www.nsta.org>.



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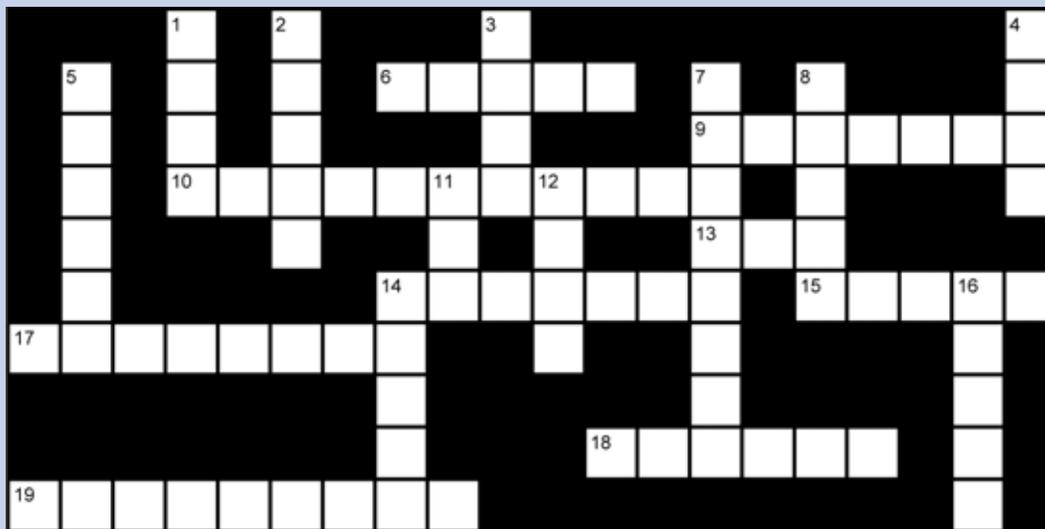
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| Corning Graduated Beakers with Handle and Spout, PP                     | 1015P    | S02293          |
| Corning Single Metric Scale, Graduated Cylinder, PP, TC with Funnel Top | 3022P    | S02290          |
| Corning Volumetric Flasks, PMP, Class A                                 | 5640P    | S02288          |
| Corning Volumetric Flasks, PP, Class B                                  | 5641P    | S02287          |
| Corning Volumetric Flasks, PFA, Class A                                 | 5650P    | S02289          |

**CORNING**

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| <p><b>Across</b></p> <p>6. IYC2011 opening ceremony location. (p. 11)</p> <p>9. Celebrating the Joy of Science: _____ and Create is this year's NSTA theme. (p. 22)</p> <p>10. In 1687, Sir Isaac Newton discovered the Universal Law of _____. (p. 22)</p> <p>13. What body part is deemed to be a new and quickly advancing frontier in bionic medical devices? (p. 6)</p> <p>14. Who was the first African-American Ph.D. in physics? (p. 15)</p> <p>15. What 3-D technology is most commonly used in the U.S.? (p. 21)</p> <p>17. Another word for side-by-side. (p. 16)</p> <p>18. What is the newest gaming console on the market? (p. 4)</p> <p>19. What cells on the tongue are responsible for the flavors we experience? (p. 5)</p> | <p><b>Down</b></p> <p>1. What organ was regenerated as a potential alternate to transplants? (p. 6)</p> <p>2. Where is the Burj Khalifa located? (p. 3)</p> <p>3. Previous leading cause of hospital-acquired infection. (p. 9)</p> <p>4. What is the acronym for science, technology, engineering and math? (p. 3)</p> <p>5. Largest exporter of oil to the U.S. (p. 18)</p> <p>7. How many named storms formed in the Atlantic in 2010? (p. 19)</p> <p>8. One type of virtual keyboard uses a _____ to create the key shapes and characters. (p. 20)</p> <p>11. How many factors can define the reason for coffee rings? (p. 14)</p> <p>12. Source of the new cancer-fighting protein. (p. 8)</p> <p>14. Crucial form of forensic evidence. (p. 11)</p> <p>16. What country has developed the Great Man-made River Project? (p. 16)</p> |
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