GETTING KIDS *excited* ABOUT S.T.E.M.

ScienceMatters!

The Health Innovation Issue

LIFE IS SCIENCE IS LIFE

Be a zoologist > and other cool careers.

You can do anything! >

fun tricks to amaze your family

SPECIAL SECTION PRODUCED BY MPLS.ST.PAUL MAGAZINE WITH SPONSORSHIP ASSISTANCE FROM

Medtronic

HAVE YOU EVER BUILT SOMETHING AT SCHOOL, AT HOME, OR ANYWHERE ELSE?

When I was growing up, I wanted to be a veterinarian. In elementary school, I built an incubator and hatched a flock of chickens…in our living room! My four siblings and I quickly learned that chickens don't make great indoor pets, especially in upstate New York.

Here in Minnesota, a boy named Earl Bakken was interested in electricity when he was in elementary school. He used to build medical devices in his garage, which is how he started Medtronic, a company that helps people who are living with heart disease, diabetes, and neurological and spinal disorders to feel better and live longer lives.

Now that I'm an adult, I see myself as a global citizen. I have a large family of people from all over the world who I also call my brothers and sisters, and we all visit and talk to each other as often as we can.

Working at Medtronic is like being part of a family, because we all share common values about helping others. My colleagues used to be kids just like you. They took science, math, languages, gym, and other classes, but most importantly, they were curious, smart, creative, and inventive. Now, they're using their talents to help people improve their health, which in turn, helps create a healthier world for all of us.

> **"Working at Medtronic** is like being part of a family, because we all share common values about helping others."

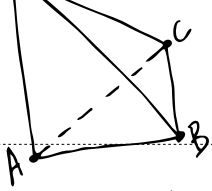
As I look to the future, I know that Medtronic—and the world—needs more builders, inventors, and innovators. Whether you choose to work in health, medicine, zoology, biology, engineering, chemistry, or other fields, I want you to know that your interest in science will always help you to accomplish extraordinary things.

Sincerely,

JACOB A. GAYLE, PH.D.
VICE PRESIDENT, MEDTRONIC COMMUNITY AFFAIRS
EXECUTIVE DIRECTOR, MEDTRONIC FOUNDATION

Click to hear a message from Jacob.

GAYLE PORTRAIT BY STEVE HENKE



Get to Know Medtronic

As the world's largest medical technology company, Medtronic is committed to improving the way we treat some of the world's most challenging diseases, including heart disease, diabetes, chronic pain, and neurological conditions such as Parkinson's disease. More than 9,000 Medtronic scientists, engineers, and doctors develop high-tech therapies including pacemakers, stents, insulin pumps, and brain stimulators. In addition, the Medtronic Foundation uses philanthropy to help improve the health of people with chronic diseases, in part, by educating future generations of science innovators—just like you!

SHOUT-OUT TO OUR SCIENCE PARTNERS!

A big thank you to parents, caregivers, teachers, and our friends and colleagues at Science Buddies, the Society of Hispanic Professional Engineers, the Society of Women Engineers, the National Society of Black Engineers, and the American Indian Science and Engineering Society, and other partners. We couldn't share our vision and accomplish our mission without you!

Meet Science Buddies

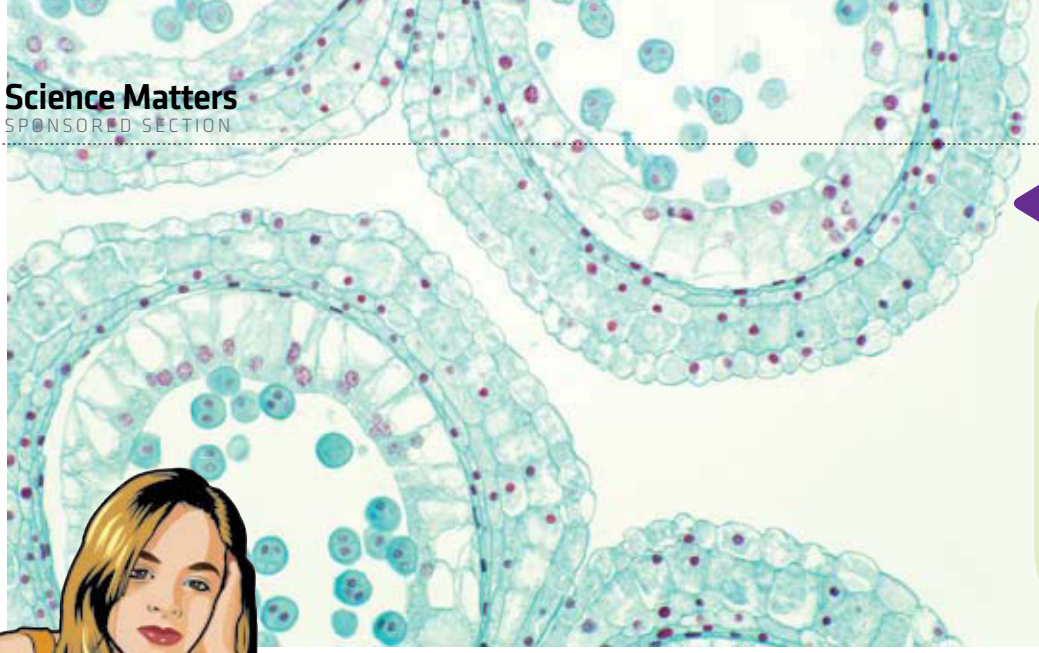
SCIENCE TEACHERS AND STUDENTS LIKELY KNOW ALL ABOUT **SCIENCE BUDDIES,** BUT JUST IN CASE PARENTS OR CAREGIVERS AREN'T FAMILIAR WITH THIS EXTRAORDINARY ORGANIZATION, HERE'S A LITTLE BIT ABOUT WHO THEY ARE AND WHAT THEY DO. SCIENCE BUDDIES IS AN ***award-winning, nonprofit website*** THAT HELPS KIDS FROM ALL WALKS OF LIFE BECOME LITERATE IN SCIENCE AND TECHNOLOGY SO THAT THEY CAN BECOME ENGAGED CITIZENS IN THE 21ST CENTURY. VISIT **sciencebuddies.org** TO FIND MORE THAN

1,000 project ideas, A PROJECT GUIDE, ONLINE ADVICE, CAREER INFORMATION, TEACHER RESOURCES, AND MUCH MORE.

MEET 7 YOUNG HEALTH INNOVATORS!

In this issue of *Science Matters*, you'll meet some interesting people who are doing cool things in science, technology, engineering, and math (S.T.E.M.), including seven students who have been honored by the **National Gallery for America's Young Inventors**. As you'll see, their big ideas have big titles and big promise for the future of health, but don't let that intimidate you. These young health innovators are kids just like you, and we hope they inspire you to make your own unique discoveries. Learn more at nmoe.org.

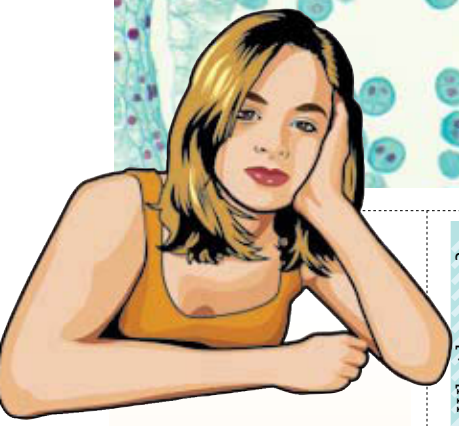
STUDENT ILLUSTRATION BY WARREN BECKER



what is that?

A Lily Anther

This is a close-up of a lily anther, the part of the flower that produces pollen. If you have a cat, be sure to remove the anthers from your flowers because the pollen is poisonous.



MEET A YOUNG HEALTH INNOVATOR

Designing a New Way to Heal the Body

SAMANTHA MARQUEZ
MIDLOTHIAN, VIRGINIA

When Samantha Marquez was in seventh grade, she was doing research for a science project when she learned about **colloidosomes**, which are spherical crystal structures that deliver flavors into foods and drugs into the body. She asked her dad, a chemist and researcher, if living cells could be used instead of artificial structures, and he thought her idea had merit. Samantha came up with the name "**celloidosomes**" and patented her idea. Samantha hopes that celloidosomes will be used to repair damaged organs, burned tissue, and broken bones. Learn more about Samantha's work at nmoe.org.

Try This: Put a white lily in a vase with water and some blue food coloring. ✷ Watch the flower every day. ✷ What happens?

SCIENCE IS LIFE // LIFE IS SCIENCE

Intrigued by Biology?

Biology is one of the great building blocks of science, because it's used in virtually everything from chemistry to zoology. Biology takes its name from the ancient Greek word *bio*, meaning "life," and *logia*, which means "study of."

By learning about life from the smallest cell to the world's largest African elephant, you can become anything you want to be, from a biomedical engineer to a zookeeper or even the next Willy Wonka!

DIY SCIENCE

ARE FINGERPRINT PATTERNS INHERITED?

When it comes to fingerprints, every person is unique. Some people have whorls, some have loops, and some have arches. Where do these patterns come from? Are they influenced by genetics? If so, then siblings are more likely to share patterns than two unrelated individuals. •To test the role of genetics in fingerprints, ask an adult to help you collect fingerprints from at least fifteeen sibling pairs and fifteen unrelated pairs. •Get their permission and then roll his or her right index finger on a black ink pad and then roll the finger onto white paper. •Do a higher percentage of the sibling pairs share the same fingerprint patterns? Learn more at sciencebuddies.org.

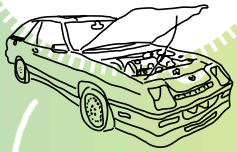
MARQUEZ ILLUSTRATION BY WARREN BECKER

ENGINEERING + MEDICINE:

Barry Cordero

BIOMEDICAL ENGINEER, MEDTRONIC, AND NATIONAL VICE PRESIDENT, SOCIETY OF HISPANIC PROFESSIONAL ENGINEERS

When Barry Cordero was ten years old, he loved working on his brother's red '87 Dodge Shelby Charger. "I liked solving problems and fixing things. I just didn't realize it was engineering."



"My high school counselor said I wasn't cut out for college, which really had an impact on me. It made me want to do it. I'm always going after the challenge."

Barry joined the U.S. Navy and worked on the **USS Nimitz** aircraft carrier. He then went to community college and the University of California, San Diego. He also joined the Society of Hispanic Professional Engineers.

At Medtronic, Barry and his team make batteries for pacemakers and defibrillators for chronic heart conditions and neurostimulators to help manage chronic pain.

"When I was growing up, I didn't even know what an engineer was–I thought it was someone who worked on a train. I love showing kids that science and engineering are cool careers."

"With engineering, you can be creative, explore new ideas, and turn your dreams into reality. You can do things that no one has ever done before."

"Don't believe anybody who tells you that you can't do something."

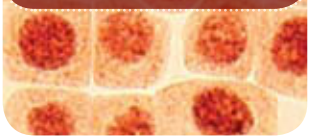
Looking Back: WHEN MARY ANNING (1799-1847) WAS 12 YEARS OLD, SHE FOUND THE FIRST COMPLETE ICHTHYOSAUR FOSSIL IN HER HOMETOWN OF LYME REGIS, ENGLAND.

IMAGINE YOURSELF *in* BIOLOGY!

In addition to being a biomedical engineer like Barry Cordero, **YOU CAN BE A:**

Biochemical Engineer

Figures out how to grow batches of cells for use in cancer-drug testing.



Bioinformatics Scientist

Designs computer tools to track and analyze flu outbreaks around the world.

Nutritionist

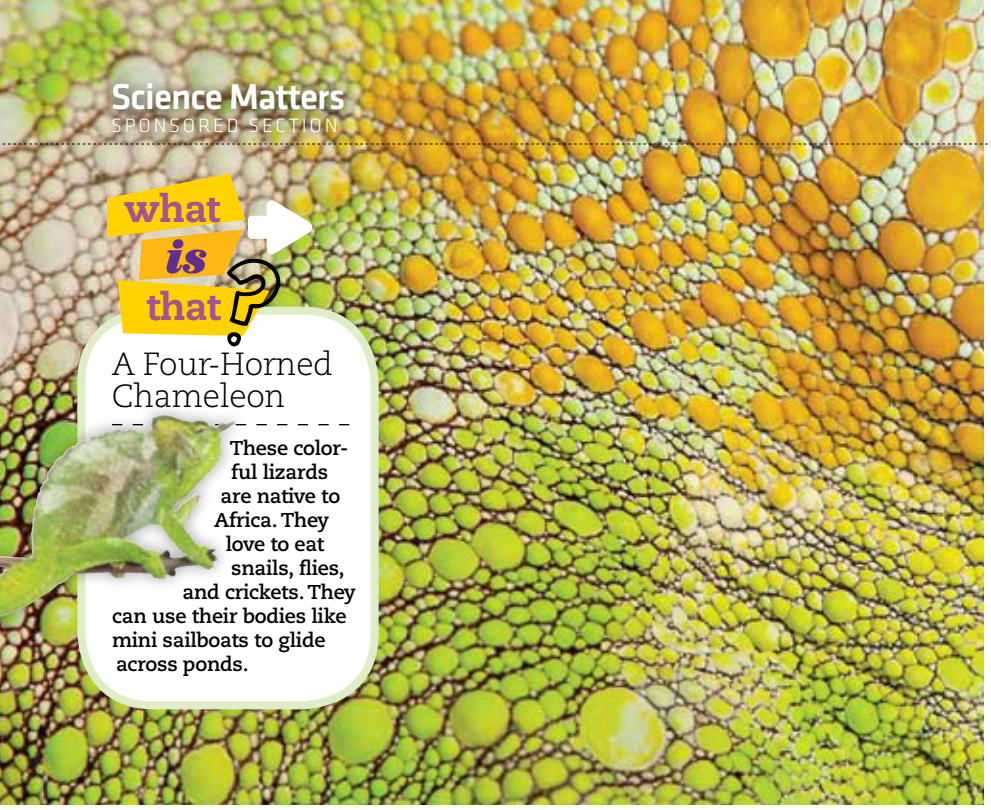
Develops healthy, delicious meals for schools, colleges, and hospitals.

Biochemist

Develops candy and other sweet treats that are good for kids' teeth.

> FIND MORE CAREER IDEAS AT **sciencebuddies.org**

CORDERO PORTRAIT BY STEVE HENKE



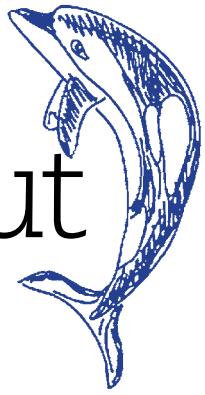
what is that?

A Four-Horned Chameleon

These colorful lizards are native to Africa. They love to eat snails, flies, and crickets. They can use their bodies like mini sailboats to glide across ponds.

SCIENCE IS LIFE // LIFE IS SCIENCE

Zealous about Zoology?



Zoology is the family tree of the animal world. Imagine a family of monkeys sitting on a tree branch and you get the idea. On one branch, there's anthropology, or the study of humankind. On another branch is ornithology, or the study of birds, and on another, cetology, or the study of whales, porpoises, and dolphins. The list of animal families goes on. By learning about the animal world, you can become anything from a zookeeper to a veterinarian or even a dinosaur fossil hunter!

SUPER SNOUT: DISCOVER THE POWERFUL NOSE OF MAN'S BEST FRIEND

A dog's sense of smell can be more than 1,000 times more sensitive than a human's! Here's how to find out what kind of smells dogs like the most. ✸ Ask an adult to help you recruit a selection of friendly dogs and their owners. ✸ Choose three different fruits, meats, and animal/people scents such as the dog's toy or owner's clothes. ✸ Be sure to avoid foods toxic to dogs. ✸ Make a list of behaviors to watch for as each dog encounters each different scent. For example, does the dog bark or back away? ✸ With the dogs' owners present, take each dog separately into a room with the scents from one category (i.e., fruits, meats, or animal/people scents) for one minute. ✸ Record your observations. ✸ Repeat for each category. Which scent was each dog's favorite? Did all dogs favor the same scent? **Learn more at sciencebuddies.org.**

DIY SCIENCE

Try This: Be a beluga! ✸ Cover one finger with shortening, dip it in ice water, and then dip another finger. ✸ Do they feel different?

MEET THREE YOUNG HEALTH INNOVATORS

Eliminating Some of the Dangers of Diabetes

MICHAEL VAWTER, MICHELLE VAWTER, AND MARK D. WRIGHT, WESTERVILLE, OHIO

Diabetes is a life-threatening disease that affects the body's ability to use glucose, a sugar that provides energy for all the cells in the body. People with diabetes need a constant supply of insulin to help maintain healthy blood glucose levels. The brother-and-sister team of Michael and Michelle Vawter and friend Mark D. Wright developed **Nano Mist,** a patented nasal inhalant smartdrug that releases precise doses of insulin as the body needs it. Learn more about the trio's invention at nmoe.org.

ILLUSTRATION BY WARREN BECKER

ENGINEERING + ZOOLOGY:

Lars Erdahl

EDUCATION DIRECTOR, MINNESOTA ZOO

Lars Erdahl's first job at the zoo was driving the monorail. "It's not hard. It goes slow, medium, and fast, and you don't have to steer. You just have to keep your eyes open and teach people about the animals."

One day, Lars slowed the monorail so his passengers could see a camel giving birth. Afterwards, many people told him how lucky they felt to have seen the event.

Lars and his team love having kids out to the zoo for sleepovers at the dolphin aquarium. "The dolphins enjoy it as much as the kids," Lars says.

At the zoo, S.T.E.M. students learn how to calculate average weights of animals, plan diets, and other daily zoo tasks. They also practice planning exhibits, such as *Russia's Grizzly Coast*.

"People might think that engineering is a nerdy or boring endeavor, but when they see how it's used in the zoo environment, they realize how interesting and important it really is."

"I love using languages, math, science, technology, engineering, and geography to help kids and adults see that we're all part of the same ecosystem," Lars says.

"My other favorite part of the job is visiting the grizzlies on my lunch hour. How cool is that?"

"I feel so lucky to be able to connect people with animals and nature."

ERDAHL PORTRAIT BY STEVE HENKE

IMAGINE YOURSELF *in* ZOOLOGY!

In addition to working at a zoo like Lars Erdahl, **YOU CAN BE A:**

Aquarist

Creates and manages aquarium exhibits featuring tropical fish, dolphins, and other marine life.

Zoologist

Helps create safer communities by monitoring levels of rabies and other diseases in wild animals.

Veterinarian

Helps families take care of their kitten, puppy, hamster, guinea pig, or other pet.

Wildlife Biologist

Tracks whales as they migrate to understand the size of their population.

FIND MORE CAREER IDEAS AT **sciencebuddies.org**

what is that?

Citric Acid Microcrystals

These dazzling, jewel-like crystals (photographed here with polarized light) are so incredibly tiny that they look like powdered sugar, unless they are viewed through a microscope.

MEET A YOUNG HEALTH INNOVATOR

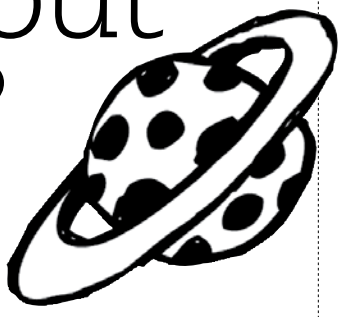
Helping People with Coronary Heart Disease

SIDDHARTHA GAUTAMA JENA, BLOOMFIELD HILLS, MICHIGAN

Coronary heart disease kills more than seven million people around the world every year. The disease results primarily from high blood cholesterol, which impairs the transport of life-sustaining molecules into the red blood cells. Siddhartha **discovered two compounds** that can reduce the effects of cholesterol on red blood cell function. He hopes that his work will help patients with elevated cholesterol levels get the early diagnosis and treatment they need. Learn more about Siddhartha's work at nmoe.org.

SCIENCE IS LIFE // LIFE IS SCIENCE

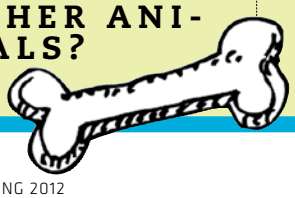
Curious about Chemistry?



Chemistry is the big laboratory of science, because it combines biology, geology, physics, and other sciences to create extraordinary results. The word chemistry is derived from the word *alchemy*, which was the ancient belief that magicians could turn metals into gold. Like magicians, chemists create chemical reactions that result in new ideas and new discoveries. By studying chemistry, you could create a new celebrity perfume, develop the next flavor of Pop Rocks, or even discover the next planet!

Try This: Make raisins dance! ✸ Pour a can of Sprite into a tall, clear glass. ✸ Add six or seven fresh raisins. ✸ Watch the fun!

OUR BONES AND TEETH ARE MADE OUT OF CALCIUM, BUT WHAT ABOUT OTHER ANIMALS?



DIY SCIENCE

Bones and teeth, which are the hardest parts of our bodies, contain calcium. This is true for dogs, cats, and other animals with bones and teeth, but what about creatures with shells, such as crabs, clams, and shrimp? Do you think their shells contain calcium? ✸ Find out by using vinegar, which reacts with calcium. ✸ Gather as many different kinds of hard animal parts as possible—chicken bones, fish bones, egg shells, crab claws, and clam shells. ✸ Put bones and shells in separate glass bowls and cover with white vinegar. ✸ After five days, compare the bones to the shells. ✸ Do you see or feel a difference? ✸ Can you tell which bones and shells contain calcium? Learn more at sciencebuddies.org.

JENA ILLUSTRATION BY WARREN BECKER

IMAGINE YOURSELF *in* CHEMISTRY!

In addition to being a museum director like Liesl Chatman, **YOU CAN BE A:**

Chemist

Develops the world's most beautiful perfumes and other scents.

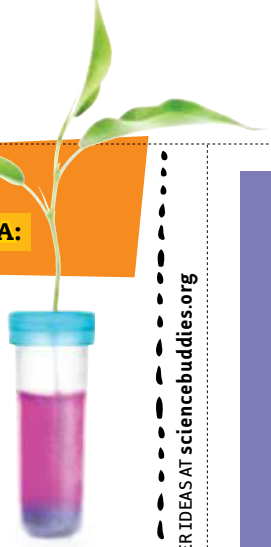
Geoscientist

Saves lives by predicting tsunamis, earthquakes, and other disasters.

Environmental Scientist

Keeps cities clean by discovering and eliminating sources of air and water pollution.

Plant Scientist



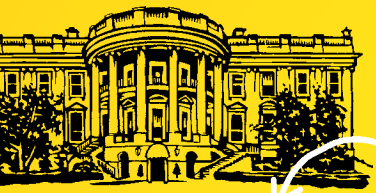
Develops new techniques for growing food on board space stations.

FIND MORE CAREER IDEAS AT **sciencebuddies.org**

Looking Back: JERRY BUSS, OWNER OF THE LOS ANGELES LAKERS BASKETBALL TEAM AND OTHER SPORTS FRANCHISES, EARNED HIS MASTER'S AND PH.D. IN PHYSICAL CHEMISTRY BY AGE 24.

EDUCATION + SCIENCE:
Liesl Chatman

DIRECTOR, PROFESSIONAL DEVELOPMENT, SCIENCE LEARNING DIVISION, SCIENCE MUSEUM OF MINNESOTA



When Liesl Chatman received an email from the White House saying that she was named a Champion of Change, she thought it was spam. Then she realized it was true.

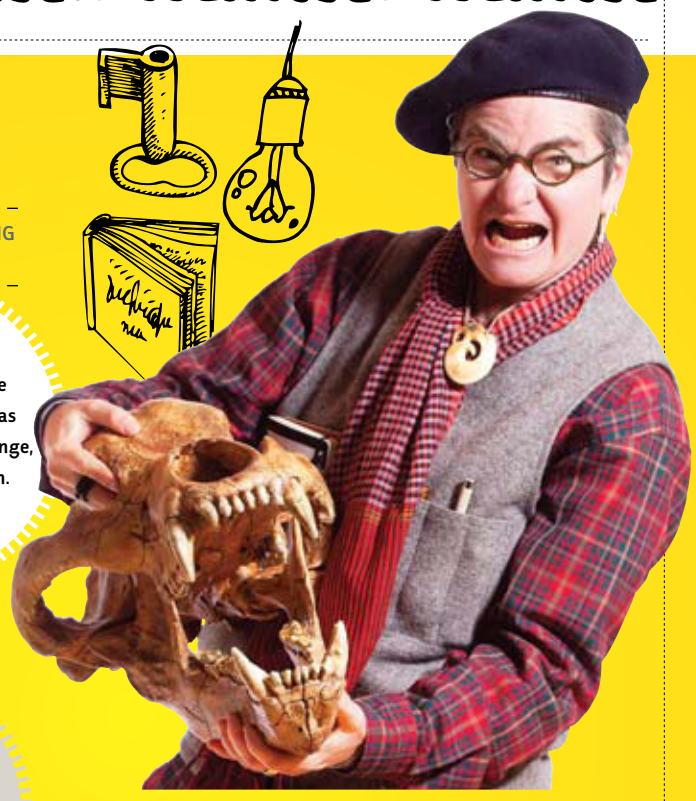
When Liesl went to the White House for the ceremony, she didn't know if security would let her wear a hat. Then she learned hats were okay.

Liesl was honored as a community hero for her efforts to help girls and women achieve highly rewarding careers as innovators.

"I'd never been to the White House before, so it was really exciting. I'm humbled and happy because it brings attention to our work at Science House, which is like a toy store for science teachers."

"Museums are fantastic. Here, I can be myself, wear all my different hats, explore new ideas, and help teachers and students use science to understand the world around them."

"You're never too young or too old to figure out what's really important to you, whether that's health, pollution, energy, computer games, or environmental issues."



"Your dream job is anything that's in your heart."

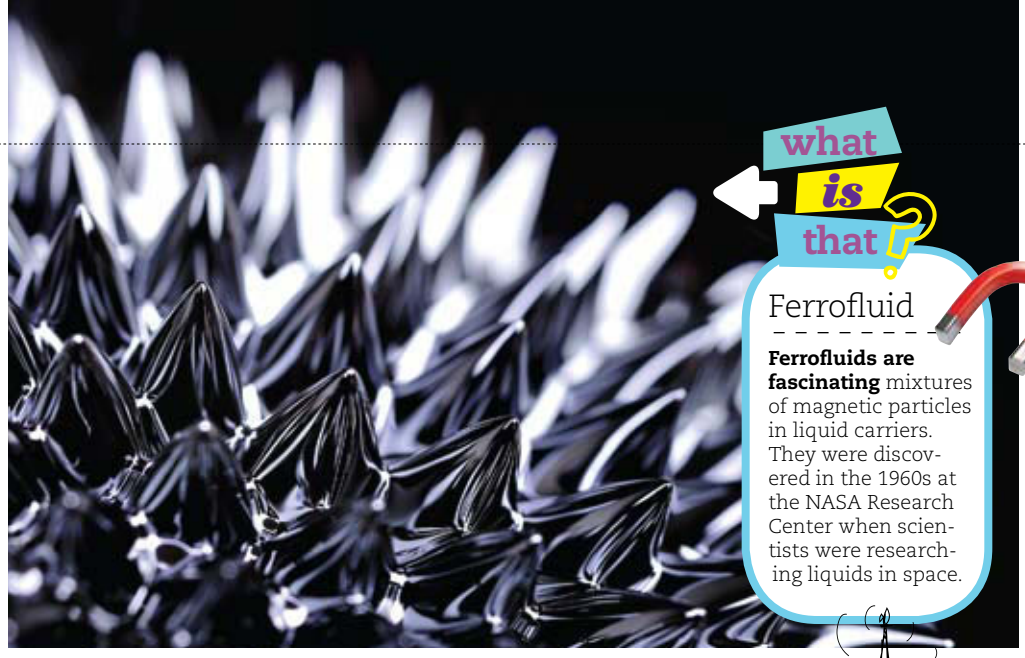
CHATMAN PORTRAIT BY STEVE HENKE

MEET A YOUNG HEALTH INNOVATOR

Using the Body's Own Immune System to Fight Cancer

RILEY CHARLES ENNIS, MCLEAN, VIRGINIA

Our bodies have the ability to target and kill many disease-causing cells. Many scientists believe that if we harness the power of the body's immune system, we may be able to develop systemic and highly effective cancer therapies. When Riley Charles Ennis was in high school, he developed a unique **nanoparticle-based therapy** that helps the body create a powerful, anti-tumor response. He also designed a vaccine to be biologically specific to a patient's genetic information. Learn more about Riley's work at nmoe.org.



what is that?

Ferrofluid

Ferrofluids are fascinating mixtures of magnetic particles in liquid carriers. They were discovered in the 1960s at the NASA Research Center when scientists were researching liquids in space.

SCIENCE IS LIFE // LIFE IS SCIENCE

Excited by Engineering?

Look closely at the word "engineering" and you'll find genius. Engineering takes its name from the Latin word *ingenium*, meaning clever or having mental power. This is where the words "genius" and "genie" come from. Engineers are like genies because they solve problems, invent solutions, and create extraordinary things. If you become an engineer, you can do virtually anything you want to do, from building skyscrapers and developing medical devices to designing the world's gnarliest snowboard.

DIY SCIENCE

BE A BUBBLE-OLOGY EXPERT!

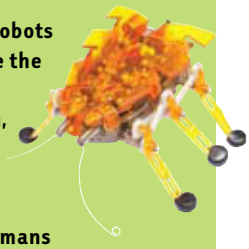
Have you ever seen those huge, beautiful, long-lasting bubbles? Virtually anyone can make ordinary bubbles with soap and water, but with a few extra ingredients, you can create your own "ultimate" bubble-making solution and become a Bubble-ology expert. ✷ First, create three basic solutions, each with one cup of water and two tablespoons of liquid dish detergent. ✷ Add a tablespoon of water to the first, glycerin (available at most pharmacies) to the second, and corn syrup to the third and mix each well. ✷ Use your own bubble wand or make one by twisting a pipe cleaner into a circle with a handle. ✷ Try blowing bubbles with each solution. ✷ Which makes the biggest and best bubbles? Learn more at sciencebuddies.org.

ENNIS ILLUSTRATION BY WARREN BECKER

IMAGINE YOURSELF *in* ENGINEERING!

In addition to being a biomedical engineer like Alyse Stofer, **YOU CAN BE A:**

Robotics Engineer



Designs robots to explore the depths of the ocean, faraway planets, or other places humans cannot go.

Engineering Technician

Helps build the next generation of medical devices.

Chemical Engineer

Discovers exciting new ways to turn recycled plastic bottles into fabulous fashion fabrics.

Microsystems Engineer

Designs tiny microphones for top-secret surveillance efforts.

> FIND MORE CAREER IDEAS AT **sciencebuddies.org**

STOFER PORTRAIT BY STEVE HENKE

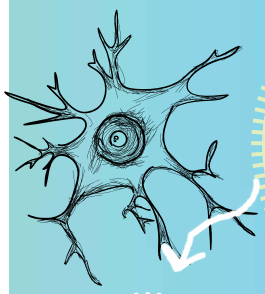
Try This: Make your pennies shine! ✷ Mix 1/4 c. white vinegar and 1 tsp. salt in a glass bowl. ✷ Add some dull pennies and wait 10 to 20 seconds. ✷ What happens?

BIOLOGY + MEDICINE: Alyse Stofer

PROGRAM MANAGER, MEDTRONIC, AND PRESIDENT-ELECT, THE SOCIETY OF WOMEN ENGINEERS

Alyse Stofer's parents always encouraged her and her sister to take accelerated math and science classes, and told them that they could be anything that they wanted to be.

✷ **"You can be** anything that you want to be."



Alyse went to an engineering summer camp for high school girls. She learned about different engineering fields, including biomedical engineering, which she had never heard of before.

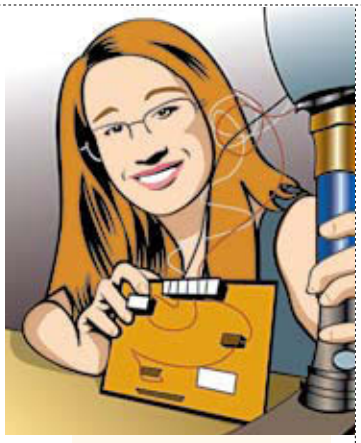
"I was fascinated to see how artificial limbs and pacemakers could change people's lives and from then on, I knew I wanted to be a biomedical engineer."

Alyse now works at Medtronic, where she helps create products for people who have chronic pain because of injuries or accidents.

She loves meeting people who are using the products that she and her team have created. "It's truly amazing to see what a difference we're making in their lives."

Alyse also belongs to the Society of Women Engineers. "I'm lucky to have had so much encouragement when I was a child. This is my way to give back."

Through her volunteer work, Alyse was invited onboard a U.S. Navy sub.

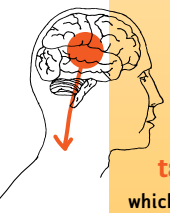


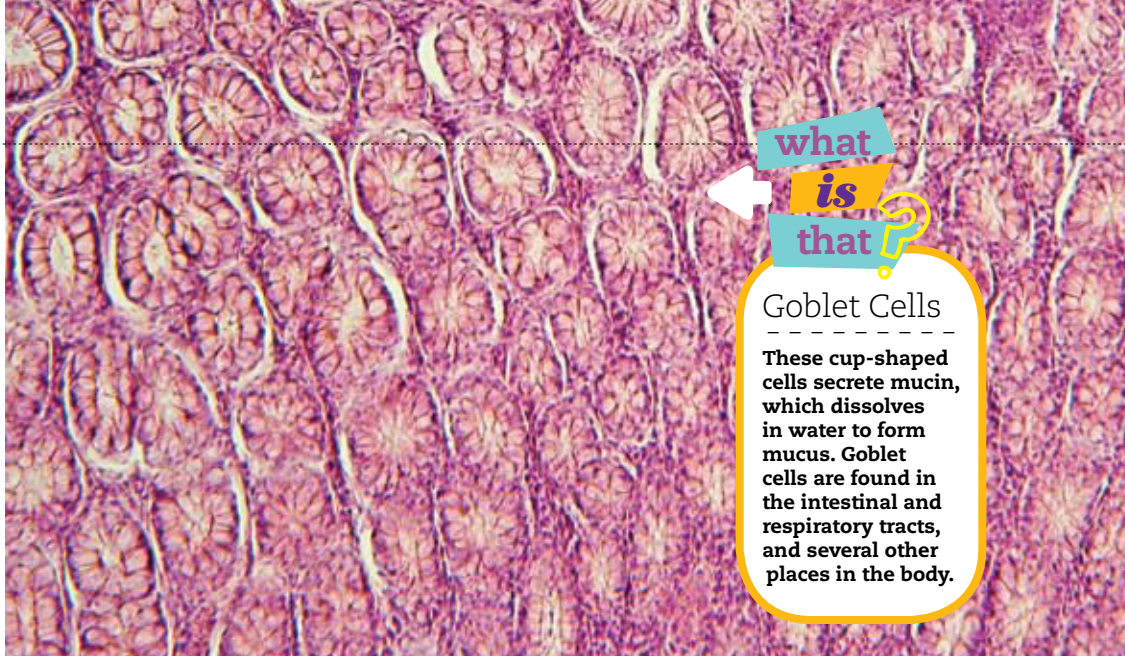
MEET A YOUNG HEALTH INNOVATOR

Helping Eliminate Phantom Limb Pain in Amputees

KATHERINE BOMKAMP, WALDORF, MARYLAND

Phantom limb pain is the feeling of pain in a nonexistent limb. This affects about eight million people around the world who have lost one or more of their arms or legs. Scientists believe that this pain is caused by the brain **sending signals and commands to the amputated limb,** which isn't there to receive the signals. When Katherine was in high school, she developed a device that uses heat to stop the brain signals and relax the muscles in the remaining part of the limb. Her invention is easily produced and does not use medications. Learn more at nmoe.org.





what is that?

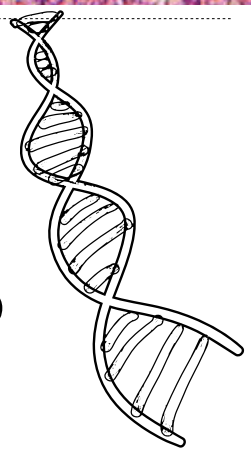
Goblet Cells

These cup-shaped cells secrete mucin, which dissolves in water to form mucus. Goblet cells are found in the intestinal and respiratory tracts, and several other places in the body.

Try This: Measure your heart rate by feeling your pulse inside your wrist. Count the number of beats in ten seconds and multiply by six.

SCIENCE IS LIFE // LIFE IS SCIENCE

Mesmerized by Medicine?

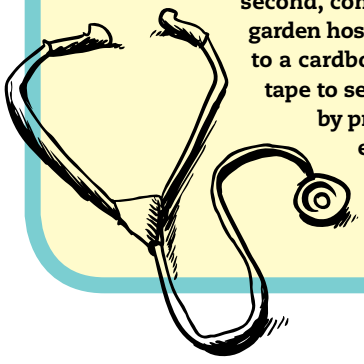


Medicine is both a science and an art. It takes its name from *ars medicina*, a Latin phrase which means the "art of healing." People who practice the art of healing can be found developing new medications, taking X-rays, putting casts on broken bones, performing kidney transplants, and other extraordinary things. By studying medicine, you can be an emergency room doctor, a psychiatrist, a paramedic, or even a zoologist!

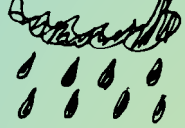
DIY SCIENCE

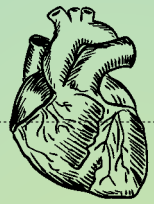
MAKE YOUR OWN STETHOSCOPE

Before the stethoscope was invented in 1816 in France, doctors pressed their ear to a patient's chest to hear the heart beat. Here's how to make three different stethoscopes. ✷ For the first, connect a small plastic funnel to a large funnel with fifteen inches of plastic tubing. ✷ For the second, connect two more funnels with fifteen inches of garden hose tubing. ✷ For the third, connect a large funnel to a cardboard tube from a paper towel roll. ✷ Use duct tape to secure the funnels. ✷ Listen to someone's heart by pressing the large funnels to their chest and your ear to the other end of the stethoscope. Is one design better than the others? Learn more at sciencebuddies.org.



BOMKAMP ILLUSTRATION BY WARREN BECKER





MEDICINE + SOCIAL MEDIA:

Raina Merchant, MD, MS

ASSISTANT PROFESSOR,
UNIVERSITY OF PENNSYLVANIA
DEPARTMENT OF EMERGENCY MEDICINE

When Raina Merchant was growing up in Corpus Christi, Texas, she loved helping her dad, a surgeon and emergency trauma specialist, when floods and hurricanes threatened their community.

After high school, Raina graduated from Yale University, the University of Chicago, and the University of Pennsylvania, where she now works.

Raina divides her time between teaching medical students, seeing patients, and doing research on sudden cardiac arrest (SCA), which kills more than 1,000 people a day in the U.S.

As part of her mission to help people survive SCA, Raina is passionate about automated external defibrillators (AEDs), portable electronic devices that virtually anyone can use to save lives.

"I love using social media to engage people in creating better public health."

To help her fellow Philadelphians become aware of AEDs, Raina and her colleagues created the MyHeartMap Challenge, a social media/crowdsourcing project and scavenger hunt.

People can use an app to snap photos of AEDs in office buildings and other places and upload them to myheartmap.org for a chance to win prizes!

"I'm so happy to be following in my dad's footsteps," Raina says. "He now lives in Fiji, where he continues to help people. I know he's really proud of me!"

MERCHANT PORTRAIT BY EDDY MARENCO

Looking Back: IN 1849, WHEN SHE WAS 28, LIZABETH BLACKWELL (1821-1910), BECAME THE FIRST WOMAN TO GRADUATE FROM MEDICAL SCHOOL.

IMAGINE YOURSELF *in* MEDICINE!

In addition to being a professor like Raina Merchant,

YOU CAN BE A:

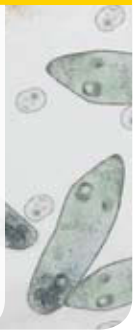
Relief Doctor

Provides medical care to people in Haiti, India, and other impoverished countries around the world.

Respiratory Therapist

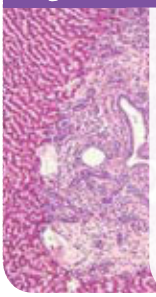
Teaches kids how to manage their asthma.

Pathologist



Figures out real-life medical puzzles, such as whether a person needs a transplant or what caused someone to die.

Cytotechnologist

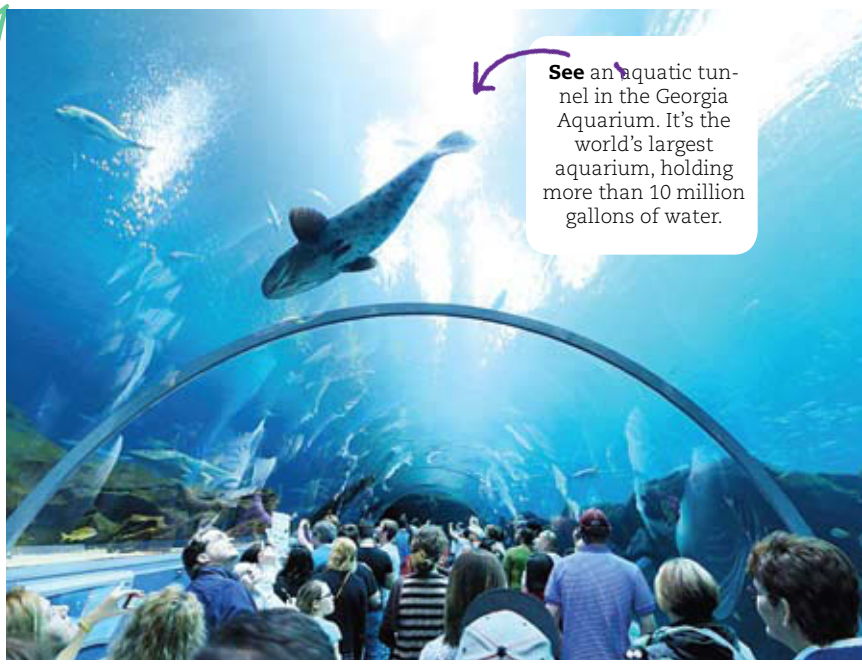


Saves lives by detecting infections, cancer, and other blood diseases.

> FIND MORE CAREER IDEAS AT **sciencebuddies.org**

Life Is Science Is Life!

If you look closely at the world around you, you'll find that science is everywhere. To help inspire you to become a health innovator, we've compiled our top picks for fun places to explore, websites to discover, new books to read, clubs to join, and other ways to get involved in the fascinating future of our world.



See an aquatic tunnel in the Georgia Aquarium. It's the world's largest aquarium, holding more than 10 million gallons of water.

Fun Places to Explore

ALABAMA
- **GULF COAST EXPLOREUM SCIENCE CENTER**, Mobile, exploreum.com

CALIFORNIA
- **CALIFORNIA SCIENCE CENTER**, Los Angeles, californiasciencecenter.org
- **DISCOVERY SCIENCE CENTER**, Santa Ana, discoverycube.org
- **EXPLORATORIUM**, San Francisco, exploratorium.edu
- **LAWRENCE HALL OF SCIENCE**, Berkeley, lawrencehallofscience.org
- **MONTEREY BAY AQUARIUM**, Monterey, mbayaq.org
- **SAN DIEGO ZOO**, San Diego, sandiegozoo.org

COLORADO
- **DENVER ZOO**, Denver, denverzoo.org

Listen to the Wave Organ, a wave-activated acoustic sculpture. Part of the Exploratorium, it's located on a jetty in San Francisco Bay.

- **THE WILDLIFE EXPERIENCE**, Parker, thewildlifeexperience.org

FLORIDA
- **JACKSONVILLE ZOO**, Jacksonville, jaxzoo.org
- **KENNEDY SPACE CENTER**, Orsino, kennedyspacecenter.com

GEORGIA
- **GEORGIA AQUARIUM**, Atlanta, georgiaaquarium.org
- **ZOO ATLANTA**, Atlanta, zooatlanta.org

ILLINOIS
- **ADLER PLANETARIUM**, Chicago, adlerplanetarium.org
- **THE FIELD MUSEUM**, Chicago, fieldmuseum.org
- **MUSEUM OF SCIENCE AND INDUSTRY**, Chicago, msichicago.org
- **SHEDD AQUARIUM**, Chicago, sheddaquarium.org

INDIANA
- **WONDERLAB MUSEUM OF SCIENCE, HEALTH AND TECHNOLOGY**, Bloomington, wonderlab.org

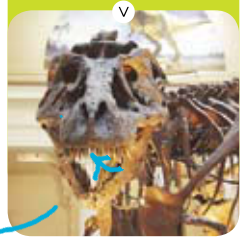
KENTUCKY
- **LOUISVILLE SCIENCE CENTER**, Louisville, louisvillescience.org

LOUISIANA
- **SCI-PORT DISCOVERY CENTER**, Shreveport, sciport.org

MASSACHUSETTS
- **MUSEUM OF SCIENCE**, Boston, mos.org

MINNESOTA
- **BELL MUSEUM OF NATURAL HISTORY**, Minneapolis, bellmuseum.org
- **COMO PARK ZOO & CONSERVATORY**, St. Paul, comozooconservatory.org

Meet Tyrannosaurus Sue at the Field Museum in Chicago.



- **GREAT LAKES AQUARIUM**, Duluth, glaquarium.org
- **INTERNATIONAL WOLF CENTER**, Ely and Minneapolis, wolf.org
- **MINNESOTA ZOO**, Apple Valley, mnzoo.org
- **SCIENCE MUSEUM OF MINNESOTA**, St. Paul, smm.org
- **THE BAKKEN**, Minneapolis, thebakken.org
- **THE WORKS**, Bloomington, theworks.org

MARYLAND
- **MARYLAND SCIENCE CENTER**, Baltimore, mdsci.org

MICHIGAN
- **DETROIT SCIENCE CENTER**, Detroit, sciencedetroit.org

MISSOURI
- **SAINT LOUIS SCIENCE CENTER**, St. Louis, sisc.org

NEW JERSEY
- **LIBERTY SCIENCE CENTER**, Jersey City, lsc.org

NORTH CAROLINA
- **DISCOVERY PLACE**, Charlotte, discoveryplace.org
- **SCIWORKS**, Winston-Salem, sciworks.org

OHIO
- **COSI**, Columbus, cosi.org

OKLAHOMA
- **TULSA ZOO AND LIVING MUSEUM**, Tulsa, tulsazoo.org

NEW YORK
- **AMERICAN MUSEUM OF NATURAL HISTORY & HAYDEN PLANETARIUM**, New York, amnh.org
- **BRONX ZOO**, New York, bronxzoo.com
- **NEW YORK HALL OF SCIENCE**, Flushing, nysci.org
- **THE CHILDREN'S MUSEUM OF SCIENCE AND TECHNOLOGY**, Troy, cmost.org

PENNSYLVANIA
- **THE FRANKLIN INSTITUTE**, Philadelphia, fi.edu
- **CARNEGIE SCIENCE CENTER**, Pittsburgh, carnegiesciencecenter.org

SOUTH DAKOTA
- **THE MAMMOTH SITE**, Hot Springs, mammothsite.com

TENNESSEE
- **ADVENTURE SCIENCE CENTER**, Nashville, adventuresci.com
- **COON CREEK SCIENCE CENTER**, Adamsville, memphismuseums.org
- **LICHTERMAN NATURE CENTER**, Memphis, memphismuseums.org
- **MEMPHIS BOTANIC GARDEN**, Memphis, memphisbotanicgarden.com
- **MEMPHIS ZOO**, Memphis, memphiszoo.org
- **PINK PALACE MUSEUM**, Memphis, memphismuseums.org
- **THE CHILDREN'S MUSEUM OF MEMPHIS**, Memphis, cmom.com

TEXAS
- **SAN ANTONIO ZOO**, San Antonio, sazoo-aq.org
- **THE DISCOVERY SCIENCE PLACE**, Tyler, discoveryscienceplace.org

VERMONT
- **MONTSHIRE MUSEUM OF SCIENCE**, Norwich, montshire.org

WASHINGTON
- **PACIFIC SCIENCE CENTER**, Seattle, pacificsciencecenter.org

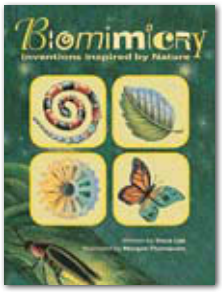
WASHINGTON D.C.
- **SMITHSONIAN NATIONAL AIR AND SPACE MUSEUM**, Washington, D.C., and Chantilly, Virginia, nasm.si.edu
- **SMITHSONIAN NATIONAL MUSEUM OF AMERICAN HISTORY**, Washington, D.C., americanhistory.si.edu
- **SMITHSONIAN NATIONAL MUSEUM OF NATURAL HISTORY**, Washington, D.C., mnh.si.edu
- **SMITHSONIAN NATIONAL ZOOLOGICAL PARK**, Washington, D.C., nationalzoo.si.edu

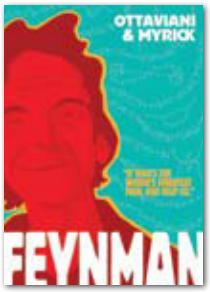
Websites to Discover

- **Ask Dr. Universe**, druniverse.wsu.edu
- **Bill Nye the Science Guy**, billnye.com
- **BrainCake**, braincake.org
- **BrainPOP**, brainpop.com
- **Cool Science for Curious Kids**, hhmi.org/coolscience/forkids
- **Did You Ever Wonder?**, lbl.gov/wonder
- **Discovery Kids**, kids.discovery.com
- **DragonflyTV**, pbskids.org/dragonflytv
- **EngineerGirl!**, engineergirl.org
- **Extreme Science**, extremescience.com
- **Funology**, funology.com
- **Girlstart**, girlstart.org
- **HowStuffWorks**, howstuffworks.com
- **Imagine Engineering** girlscouts.org
- **NASA For Kids Only**, kids.earth.nasa.gov
- **National Geographic Kids**, kids.nationalgeographic.com
- **Science Buddies**, sciencebuddies.org
- **Science Made Simple**, sciencemadesimple.com
- **Science Monster**, sciencemonster.com
- **Science Museum of Minnesota Online Activities**, smm.org/explore
- **SciGirls**, scigirls.org
- **The Science Explorer**, exploratorium.edu/science-explorer
- **TIME for Kids**, timeforkids.com
- **TryEngineering**, tryengineering.org/play.php
- **TryScience**, tryscience.org

New Books to Read

A selection of the 2012 Finalists for the AAAS/Subaru SB&F Prizes for Excellence in Science Books





MIDDLE GRADES

- **Biomimicry: Inventions Inspired by Nature**. Dora Lee, with illustrations by Margot Thompson. Kids Can Press, 2011.
- **The Case of the Vanishing Golden Frog: A Scientific Mystery**. Sandra Markle. Millbrook Press, 2011.
- **Elephant Talk: The Surprising Science of Elephant Communication**. Ann Downer. Twenty-First Century Books, 2011.
- **World Without Fish**. Mark Kurlansky, with illustrations by Frank Stockton. Workman, 2011.

YOUNG ADULTS

- **Feathers**. Thor Hanson. Basic Books, 2011.
- **Feynman**. Jim Ottaviani, with illustrations by Leland Myrick. First Second, 2011.
- **Plastic: A Toxic Love Story**. Susan Freinkel. Houghton Mifflin Harcourt, 2011.
- **Science Fair Season**. Judy Dutton. Hyperion Books, 2011.

Build a robot with a team of fellow inventors and rock the house at your local FIRST Lego League tournament!

FIRST LEGO LEAGUE PHOTO BY ADRIANA M. GROISMAN

Competitions & Clubs To Join

- **4-H NATIONAL YOUTH SCIENCE DAY,** 4-h.org
- **BOY SCOUTS OF AMERICA,** scouting.org
- **FIRST LEGO LEAYGUE,** firstlegoleague.org
- **FIRST ROBOTICS COMPETITION,** usfirst.org
- **FUTURE CITY COMPETITION,** futurecity.org
- **FUTURE SCIENTISTS AND ENGINEERS OF AMERICA,** discoverycube.org
- **GIRL SCOUTS,** girlscouts.org
- **HIGH TECH KIDS,** hightechkids.org
- **INTERNET SCIENCE AND TECHNOLOGY FAIR,** istf.ucf.edu
- **NATIONAL STEM VIDEO GAME CHALLENGE,** stemchallenge.org
- **ODYSSEY OF THE MIND,** odysseyofthemind.com
- **SCIENCE OLYMPIAD,** soinc.org
- **TRONIX TEAM,** tronixteam.org
- **YOUNG INVENTORS PROGRAM,** successbeyond.org/YIF.htm

Science Information, News & Advocacy

- **American Association for the Advancement of Science**, aaas.org
- **American Indian Science and Engineering Society**, aises.org
- **Association for Women in Science**, awis.org
- **Edutopia**, edutopia.org
- **Engineering is Elementary**, mos.org/eie
- **National Education Association**, nea.org
- **National Science Teachers Association**, nsta.org
- **National Society of Black Engineers**, nsbe.org
- **Society for Hispanic Professionals in Engineering**, shpe.org
- **Society for Science & the Public**, societyforscience.org
- **Society of Women Engineers**, swe.org
- **The Benjamin Banneker Institute for Science and Technology**, thebannekerinstitute.org
- **Women in Technology**, womenintechnology.com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Challenge the norm.
Explore new ideas.
Improve the world.
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We know that innovation starts with imagination. It's then fueled by passion, skill and determination.
The improved health of the world depends on tomorrow's scientific innovator. So we support organizations and activities geared to inspire and train the next generation of doctors, scientists and engineers.
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