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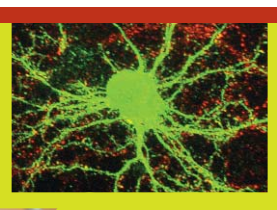
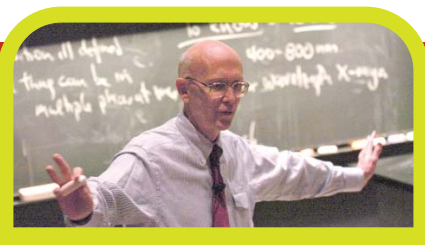
HARVARD SCIENCE

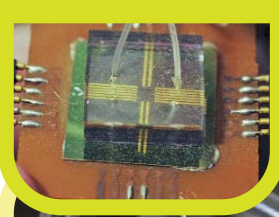
connections 2007

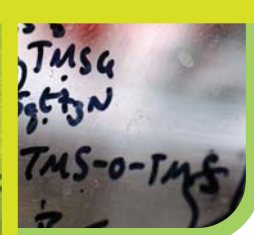
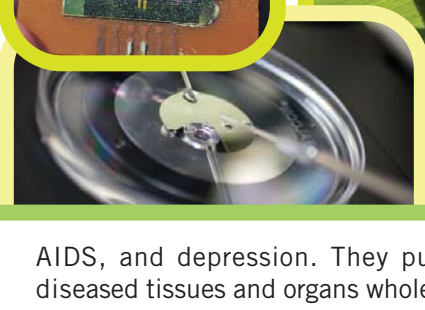









hello.

If you want to know about science at Harvard, check out your cell phone and your computer, or look in your medicine cabinet - or in your wallet. Discoveries by Harvard scientists lead to such things as smaller and faster communications devices, new drugs and treatments, and more secure credit cards. If you know someone who suffers from cancer, diabetes, heart disease, vision loss, nerve damage, Alzheimer's, or hundreds of other diseases, you should know that thousands of Harvard people are working on finding cures. And these scientists don't just pursue research – they also teach the scientists of tomorrow. When you want to know about Harvard science, just look – it's all around you.

Steve Hyman
Provost, Harvard University

Science at Harvard

is not like many people imagine. It's not just the work of individual researchers trying to solve esoteric problems that few people can identify with. Rather, it's a dynamic network of collaborating scientists and their students laboring to discover things that will make the world a better, healthier place. A resource for the world.

In the physics building Professor Lene Hau stops a beam of light, adds information to it, then sends it on its way. Across the street, Professors Charlie Marcus and Charles Lieber work on the unimaginably tiny devices of nanotechnology. Some of these gadgets are thousands of times smaller than the width of a human hair. The things Hau, Marcus, Lieber and their colleagues are learning about the nature of light and matter promise to change, for the better, how we communicate, compute, defend our country, repair our bodies, and stay healthy.

Not many blocks away, astronomers sit behind computers and operate huge telescopes thousands of miles away or orbiting the Earth. They are studying planets circling other suns, looking for signs of life on Mars, or puzzling over black holes, and the past and future of the universe.

Chemists, physicists, biologists, and medical scientists cross and re-cross the Charles River between the Faculty of Arts and Sciences, the Medical School and the School of Public Health. They work as multi-expert teams to find new drugs to cure and prevent diseases like cancers, heart problems, AIDS, and depression. They puzzle over ways to make damaged and diseased tissues and organs whole again. One line of work described in only two words – tissue regeneration – aims to do what few people thought was possible not too long ago, rebuild broken hearts, lungs, and even brains.

In small cafes and large conference rooms, scientists discuss how to reach out, not just to local communities, but to people around the world to improve education, eliminate illiteracy, and foster public health. Professor Edward O. Wilson, a distinguished zoologist and two-time Pulitzer Prize winner, huddles with colleagues from the Harvard Divinity School to discuss how endangered animals and plants can be protected from extinction. Other groups wrestle intellectually with the problems of global warming.

Such thought and work is not Harvard-centric. Scientists from the University talk every day with counterparts all over the world. They pick each others' brains, they agree and disagree.

Science students are not confined to classrooms. They work in labs, not just helping professors, but doing their own research projects. And such projects are not confined to labs, or Harvard, or even the United States. Students recently formed a new organization called Engineers Without Borders; its goal is to find new ways that engineers can make the world a better place.

So, the true picture is far from the notion of Harvard science being done in a cloistered collection of forbidding buildings. Rather, it's a collaboration of energetic people who are a tremendous resource for our region and our world. Whether you receive medical care through Harvard-trained and affiliated caregivers, or attend any of the many public science lectures and exhibits, Harvard is a great resource for you.

Peter Galison»

Deciphering science

"My question is not how different scientific communities pass like ships in the night," writes Galison, a science historian. "It is the extraordinary diversity of the participants in physics – cryogenic engineers, radio chemists, algebraic topologists, prototype tinkerers, computer wizards, quantum field theorists – they speak rather how, given to each other at all."

«Charlie Marcus

Connecting the quantum dots

Imagine working with something so small that it is only 10-50 atoms in size. That's exactly what Charlie Marcus and his team do. Quantum dots have the potential to make today's fastest computers seem like doing math with an abacus.

«Jack

Breathe

Helping pe
goal. His
focuses
schoo
caus

Mary Loe

Making babies healt

Pregnant women with diabetes are two
to five times more likely to have babies
with birth defects. Mary Loeken led a
team that finally discovered what
caused these defects; her research will
allow countless thousands of babies to
be born healthy.

Joan Brugge»

Fighting cancer with genes

When Joan Brugge's sister died of a brain tumor, the mathematics student switched gears to become a cancer researcher. She now heads the Department of Cell Biology at Harvard Medical School. Brugge's research identifies cancer-causing genes to understand how to stop them.

«Eric Mazur

Big man in a small field

Stronger than spider's silk, but only about one-thousandth the width of a human hair, a wire created by Eric Mazur and his team will change technology, making electronic devices smaller and faster and allowing scientists to poke into a cell or a droplet of liquid without disturbing its structure.

Scott Edwards»

Dino DNA

Small creatures have small genomes, or so the thinking went, until Scott Edwards, who studies birds, discovered that dinosaurs had genomes about the same size as that of a hummingbird. His research changed accepted theories about the evolution of birds and about the genetic makeup of dinosaurs.

«Dany Adams

Electrifying tails

Dany Adams and her team have regrown tadpoles' tails using the animal's own electricity, which could prove useful in developing methods for regrowing spinal cord tissue in humans, as well as slowing or even stopping the growth of cancerous tumors.

David A. Edwards»

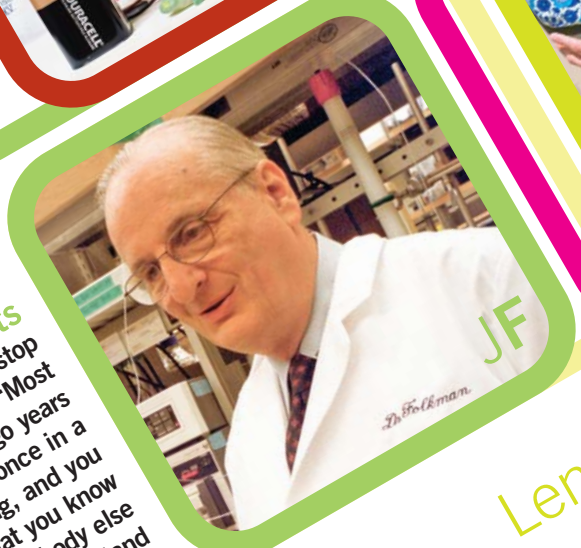
No needles needed

Needles have long been feared by children and adults everywhere – a fear that keeps some from getting life-saving vaccines. David Edwards developed a special inhaler to deliver vaccines, via the lungs, making it easier, cheaper, and less intimidating for people to get the medicines they need.

Judah Folkman»

Stopping cancer where it starts

Judah Folkman has spent his life trying to stop tumors by cutting off their blood supply. "Most research is failure," Folkman says. "You go years and years and years, and then every once in a while there is a tremendous finding, and you realize for the first time in your life that you know something that hour or that day that nobody else in history has ever known, and you can understand something of how nature works."



Lene Hau»

Light wizard

Einstein would be surprised by Lene Hau's work, which does things with light once thought impossible: slowing it down, stopping it, converting it to matter and then back into light again. Hau's discoveries promise to be as revo
lutionary as the light bulb – or harnessing fi

SOME SCIENTISTS in their ELEMENT

Spengler

easier

eople breathe better is Jack Spengler's
research, much of it based in Boston,
s on air quality in our homes, offices, and
ls, and how environmental hazards may be
sing diseases ranging from asthma to cancer.

«Doug Melton

Caring father, concerned scientist

Any parent who's ever had a sick child understands what it's like to feel helpless. When Doug Melton's 6-month-old son developed type I diabetes, Melton shifted his research focus to stem cells, which many think hold the cure for diabetes and many other terrible diseases. Melton is scientific co-director of the Harvard Stem Cell Institute.

«Robert Lue

Exciting future scientists

Robert Lue, director of Life Sciences Education, is harnessing educational technology to keep aspiring scientists, from local school children to college students, on their chosen paths of study. "When our students become equal partners in learning," he says, "we have succeeded not only in inspiring this generation, but those who will come after."

«Judy Lieberman

Battling AIDS on a global front

Judy Lieberman, a medical doctor and a theoretical physicist, leads a research team developing methods that could lead to an effective, easy-to-use and inexpensive way to prevent the spread of HIV.

«John P. Huchra

A road map to the universe

Charting the universe may seem like an impossible task to many, but not Harvard astronomer John Huchra. He and his team have spent the last two decades mapping over a million different galaxies.

«Peter Lu

Complex patterns in ancient art

Still a physics graduate student, Peter Lu's research has made headlines around the world. Lu discovered that complex tile patterns in medieval Islamic buildings reflect a form of geometry not recognized by Western mathematicians until 500 years later.

«S. Allen Counter

"The Indiana Jones of neurology"

Humanitarian, explorer and physician, Counter has studied acupuncture in China, deafness in the Inuits, and lead poisoning among native Ecuadoreans. Gold bandits, 12-year-old soldiers with automatic rifles and mining cave explosions do not deter him. Counter also directs the Harvard Foundation for Intercultural and Race Relations, fostering greater understanding among people.

«E.O. Wilson

From ants to everything

With a passion for ants, Edward O. Wilson studied the tiny creatures and applied his observations to ever larger animals, all the way up to humans. He did something few other scientists have ever done: developed an entirely new field called sociobiology. "Nature holds the key to our aesthetic, intellectual, cognitive and even spiritual satisfaction," Wilson says.

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HARVARD SCIENCE resources

places to visit.

The Harvard Museum of Natural History presents a historic and interdisciplinary exploration of science and nature through exhibitions, self-guided tours, and educational programs.
http://www.hmnh.harvard.edu/

Harvard University Art Museums consists of the Arthur M. Sackler, Busch-Reisinger, and Fogg Museums, Straus Center for Conservation, Center for the Technical Study of Modern Art, and the U.S. Headquarters for the Archaeological Exploration of Sardis. The public is welcome to experience the collections and exhibitions.
http://www.artmuseums.harvard.edu/home/index.html

The Arnold Arboretum, designed by famed landscape architect Frederick Law Olmsted, is a research institute and living museum dedicated to the study of botany and horticulture. From flowers and fragrances to fruits and textures, the Arnold Arboretum is a dynamic landscape throughout the year. Explore the collections on a free guided tour.
http://www.arboretum.harvard.edu/index.html

The Collection of Historical Scientific Instruments contains over 20,000 artifacts dating from the 15th century to the present. A permanent exhibit, Time, Life, & Matter: Science in Cambridge, is open to the public and features a cross section of scientific instruments highlighting the diverse nature of science, its practice, and its place within society and culture from the American Colonial period to the present.
http://www.fas.harvard.edu/~hsdept/chsi.html

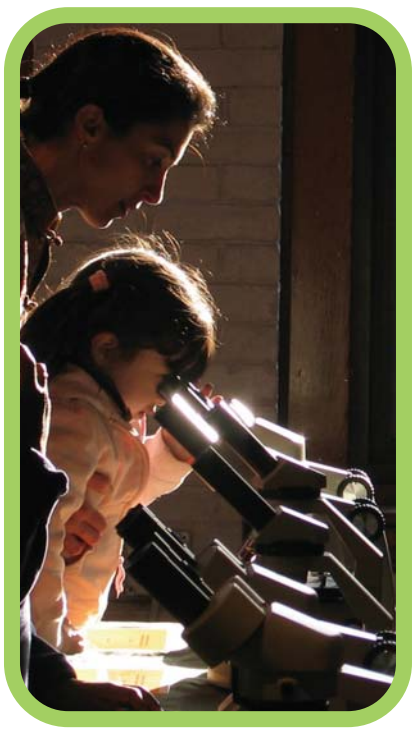
The Fisher Museum at the Harvard Forest in Petersham, Mass. sponsors exhibits related to forest history and ecology. One exhibit displays 23 internationally acclaimed models portraying the history, conservation and management of central New England forests. Nature trails connect the museum exhibits to the surrounding forests and current research.
http://harvardforest.fas.harvard.edu/museum.html

The Peabody Museum of Archaeology and Ethnology is devoted to the study of prehistoric and historic cultures. Its renowned collections are open to the public through exhibits and educational programs, as well as teacher workshops, interactive programs for children, classes and special events for families, and public lectures.
http://www.peabody.harvard.edu/

The Semitic Museum's collection of Near Eastern archaeological artifacts represents major areas of the ancient world. Current exhibits explore everyday life in ancient Israel during the Iron Age, a 2nd millennium BCE Hurrian city located in modern-day Iraq, and the history of ancient Cyprus through ceramics and metal objects.
http://www.fas.harvard.edu/~semitic/

The Warren Anatomical Museum is one of the country's leading medical museums, containing approximately 15,000 items including: anatomical and pathological specimens; various wax, paper mache, and dry preparation anatomical models; photographs, prints, paintings, and drawings; medical instruments and machines; and other medical memorabilia.
http://www.countway.med.harvard.edu/warren/

The Harvard-Smithsonian Center for Astrophysics combines the resources and research facilities of the Harvard College Observatory and the Smithsonian Astrophysical Observatory to pursue studies of the basic physical processes that determine the nature and evolution of the universe. Featured programs are monthly Observatory nights and public tours.
http://cfa-www.harvard.edu/resources/public.html



Hundreds of Cambridge children and their parents explore science mysteries at the annual Harvard Museum of Natural History's Family Science Night. At a time when most buildings close up for the week-end, the halls of the museum buzz with the sounds of youthful discovery.
Courtesy of the Harvard Museum of Natural History

Tell us what you think!
email us:
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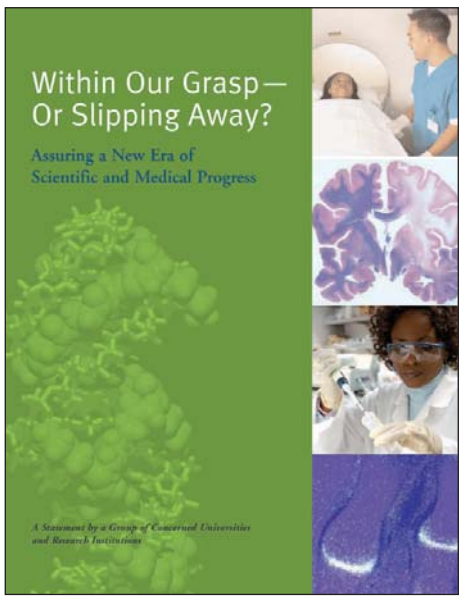
Within Our Grasp or Slipping Away?
Assuring a New Era of Scientific and Medical Progress



A consortium of nine leading academic institutions released a major report of the state of biomedical research in the United States.

The report emphasizes that to conquer current and future challenges and deliver the next medical breakthroughs, there is nothing more important than continuing a strong, vibrant basic research enterprise.

Harvard and its affiliated teaching hospitals are on the leading edge of basic research and translating that research to improve public health.

sites to visit.

Research Matters is the public entry to the latest news about medical treatments, societal research, basic science, technological advances, and earth and space exploration for the non-specialist.
www.researchmatters.harvard.edu

Labworks offers multimedia presentations of current Harvard Medical School research on topics such as diabetes, hearing and controlling infection.
http://labworks.hms.harvard.edu/index.html

Research Roundup contains links to recent articles from the Harvard Medical School web site homepage.
http://hms.harvard.edu/public/roundup/Roundup.html

Science in the News is a free seminar series conducted by Harvard Medical School students. SITNFlash is a monthly source for research updates and information on recent high-profile science issues that arise throughout the year.
www.hms.harvard.edu/sitn/

The Longwood Seminars at Harvard Medical School offer a series of four free Mini-Med School classes for the general public in the heart of Boston's Longwood Medical Area.
www.hms.harvard.edu/longwood_seminars

The Center for Health and the Global Environment works to expand environmental education at medical schools and to further promote awareness of the human health consequences of global environmental change. Its website has a variety of resources on the environment and public health that can inform the general public and provide important current data for students and teachers. The online Bulletin contains the latest news, events and activities at the Center.
http://chge.med.harvard.edu/publications/

Human Health and Global Environmental Change course at Harvard Medical School can teach you more about the relationship between human health and global environment in a course open to the public, for which all materials are available free online.
http://chge.med.harvard.edu/about/index.html

Harvard School of Public Health lectures bring experts from the U.S. and other nations to Harvard School of Public Health to share their views on the critical issues facing public health over the years.
www.hsph.harvard.edu/ddl/

Harvard Public Health Review is Harvard School of Public Health's online publication highlighting current research on local, national and global topics.
www.hsph.harvard.edu/review/

The Nutrition Source contains the latest science about health and nutrition, tips for healthy eating and dispels some nutrition myths.
www.hsph.harvard.edu/nutritionsource/

Consumer Information News from the laboratories at Harvard Medical School provides health and research news and information from Harvard faculty.
http://hms.harvard.edu/public/consumer/consumer.html

Focus Online contains news from the Harvard Medical School, Dental School, and School of Public Health.
www.focus.hms.harvard.edu/

Your Disease Risk from the Harvard Center for Cancer Prevention at Harvard School of Public Health collects the latest scientific evidence on disease risk factors into one easy-to-use tool.
http://hsph.harvard.edu/cancer/

HealthBeat contains health information and tips for healthy living from the editors of Harvard Medical School's health newsletters.
www.health.harvard.edu/healthbeat/Subscribe.htm

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