In work that sheds light on both the genetic similarities between dogs and humans and the genetic differences among dog breeds, an international research team led by scientists at the Broad Institute of MIT and Harvard announced today the completion of a high-quality genome sequence of the domestic dog.

The research will be published in the Dec. 8 issue of Nature.

Comparing dog and human DNA reveals key secrets about the regulation of the master genes that control embryonic development. Comparing dog breeds reveals the structure of genetic variation within the species. The researchers’ catalog of 2.5 million specific genetic differences across several breeds can now be used to unlock the basis of physical and behavioral differences, as well as to find the genetic underpinnings of diseases common to domestic dogs and their human companions.

Scientists have known about this nano-spring for more than 60 years, but the researchers were the first to show that it has the strongest force of any known substance.

Researchers test power of cellular engine

David Cameron
Whitehead Institute and John Fleschman
American Society of Cell Biology

Graduate student Danielle France works in the lab where she and others examined the phenomenal power of the nanospring, a fibrous coil grown by a single-cell protozoan.

“Scientists have known for some time that a long, fibrous coil grown by a single-cell protozoan is, gram for gram, more powerful than a car engine. Now, researchers led by a team at MIT and the Whitehead Institute have found that this coil is far stronger than previously thought. In addition, the researchers have discovered clues to the mechanism behind this microscopic powerhouse. These findings are twofold,” says Danielle France, a graduate student in the lab of Whitehead Member Paul Matsudaira, and, along with Matsudaira, a member of MIT’s Division of Biological Engineering. “First, they give us an idea of how a cell can manage to generate such enormous force; and second, they provide clues for how engineers might reconstruct these mechanisms for nanoscale devices.”

France presented her findings Sunday, Dec. 11, at the 45th annual meeting of the American Society for Cell Biology. Collaborators on the work are from the Marine Biological Laboratory in Woods Hole, Mass., and the University of Illinois, Chicago. Scientists have known about this nano-spring for some 60 years but the researchers were the first to show that it has the strongest force of any known substance.

DOG GENOME SEQUENCE ANNOUNCED

In work that sheds light on both the genetic similarities between dogs and humans and the genetic differences among dog breeds, an international research team led by scientists at the Broad Institute of MIT and Harvard announced today the completion of a high-quality genome sequence of the domestic dog.

The research will be published in the Dec. 8 issue of Nature.

Comparing dog and human DNA reveals key secrets about the regulation of the master genes that control embryonic development. Comparing dog breeds reveals the structure of genetic variation within the species. The researchers’ catalog of 2.5 million specific genetic differences across several breeds can now be used to unlock the basis of physical and behavioral differences, as well as to find the genetic underpinnings of diseases common to domestic dogs and their human companions.

Researchers test power of cellular engine

David Cameron
Whitehead Institute and John Fleschman
American Society of Cell Biology

Graduate student Danielle France works in the lab where she and others examined the phenomenal power of the nano-spring, a fibrous coil grown by a single-cell protozoan.

“Scientists have known for some time that a long, fibrous coil grown by a single-cell protozoan is, gram for gram, more powerful than a car engine. Now, researchers led by a team at MIT and the Whitehead Institute have found that this coil is far stronger than previously thought. In addition, the researchers have discovered clues to the mechanism behind this microscopic powerhouse. These findings are twofold,” says Danielle France, a graduate student in the lab of Whitehead Member Paul Matsudaira, and, along with Matsudaira, a member of MIT’s Division of Biological Engineering. “First, they give us an idea of how a cell can manage to generate such enormous force; and second, they provide clues for how engineers might reconstruct these mechanisms for nanoscale devices.”

France presented her findings Sunday, Dec. 11, at the 45th annual meeting of the American Society for Cell Biology. Collaborators on the work are from the Marine Biological Laboratory in Woods Hole, Mass., and the University of Illinois, Chicago. Scientists have known about this nano-spring for some 60 years but the researchers were the first to show that it has the strongest force of any known substance.

DOG GENOME SEQUENCE ANNOUNCED

In work that sheds light on both the genetic similarities between dogs and humans and the genetic differences among dog breeds, an international research team led by scientists at the Broad Institute of MIT and Harvard announced today the completion of a high-quality genome sequence of the domestic dog.

The research will be published in the Dec. 8 issue of Nature.

Comparing dog and human DNA reveals key secrets about the regulation of the master genes that control embryonic development. Comparing dog breeds reveals the structure of genetic variation within the species. The researchers’ catalog of 2.5 million specific genetic differences across several breeds can now be used to unlock the basis of physical and behavioral differences, as well as to find the genetic underpinnings of diseases common to domestic dogs and their human companions.

Researchers test power of cellular engine

David Cameron
Whitehead Institute and John Fleschman
American Society of Cell Biology

Graduate student Danielle France works in the lab where she and others examined the phenomenal power of the nano-spring, a fibrous coil grown by a single-cell protozoan.

“The incredible physical and behavioral diversity of dogs — from Chihuahuas to Great Danes — is encoded in their genomes,” said senior author Eric Lander, director of the Broad Institute and a professor of biology at MIT. “The sequencing of that genome "can uniquely help us understand embryonic development, neurobiology, human disease and the basis of evolution," said Lander, who is also a professor of systems biology at Harvard Medical School and a member of the Whitehead Institute for Biomedical Research.

Dogs not only occupy a special place in human hearts, they also sit at a key branch point in the evolutionary tree relative to humans. By tracking evolution’s genetic footprints through the dog, human GET ENERGIZED

Industry and academia work together at MIT to address the world’s energy problems.

BACK FROM THE DEAD

A new study of the planarian flatworm provides insight into regeneration.

OLYMPIC MOMENT

MIT Professor Daniel G. Nocera helps carry the Olympic torch to Turin, Italy, for the 2006 Winter Games.

GUESS WHO WAS HERE

The Abdul Latif Jameel Poverty Action Lab enjoys a brush with stardom.
Edward Thomas to head DMSE

Edwin Thomas, MIT's 1989 Institute Professor and recent winner of the 2005 MIT Information Society’s Best Paper for Science at MIT, has been named interim director of the Department of Materials Science and Engineering (DMSE) effective Jan. 16.

Edward L. "Ned" Thomas, the Morris Cohen Professor of Science and Engineering, has been appointed head of the Department of Materials Science and Engineering (DMSE) effective Jan. 16.

Ned is a noted materials scientist and engineer known for his expertise in polymer physics and engineering, phase transformations and microstructure, and electron microscopy. Said Thomas L. Magnanti, dean of the School of Engineering, who announced the appointment.

Among other accomplishments, Thom- as “has made major contributions in understanding the structure and properties of block copolymers and to developing quantitative methods for characteriz- ing the microstructure of polymeric mate- rials,” Magnanti said. He has also “developed both new experimental methodologies and theoretical models to guide valid interpre- tation of the vast range of microstructural characterizations in crystalline, liquid crystalline and non- crystalline polymers,” Magnanti said.

Thomas has held several administrative positions at MIT. He is the founding director of the Institute for Solid State Technologies and previously served as associate head for DMSE and as the director of the Program in Polymer Science and Technology. He came to MIT from the University of Mas- sachusetts, where he founded and served as co-director of the Institute for Interface Science and was head of the Department of Polymer Science and Engineering.

Thomas received a B.S. degree from the University of Massachusetts in 1969 and a Ph.D. from Cornell University in 1972.

In his announcement, Magnanti re- cognized the "outstanding service" of outgoing head Subra Suresh.

"Under his superb leadership, the depart- ment has thrived, especially with the hiring of many exceptional faculty, exciting curric- ulum innovations, and significant space renos and construction." Thomas has been an Engineering Research Council grantee, and a grant to collaborate with Subra and I very much look forward to working with Ned as well.

### Awards & Honors

Two MIT scientists are among the winners of the 2005 World Technology Awards announced on Nov. 15, and two others placed in the top five in their award categories. The awards honor "the most innovative people and organizations in the science and technology world in 2005."

MIT Institute Professor Robert Langer and former visiting scientist Andrew Lendlein won in the health and medici- ne category. Daniel Nocera, a L. Keck Professor of Energy and professor of chemistry, was named to the top five in the energy category.

Wolfgang Ketterle, professor of physics, was placed in the top five in the materials category. The awards were presented by the World Technology Network (WTN), a group of nearly 1,000 individuals representing 25 organizations from more than 60 countries, in a ceremony at San Francisco City Hall.

Chancellor Phillip Clay was named one of the 100 most important blacks in technology for 2006 by U.S. Black Engi- neer magazine. The magazine honored individuals whose "stories demonstrate something about the hurdles all minority men and women face, and about the cour- age it takes to overcome obstacles to rise to the top of professions that do not always welcome minority faces."

Michael M. Noga, earth and planetary sciences librarian and collection manager for science at MIT, was honored by Information Society’s 2005 Best Paper Award. Noga was honored for his role in examining citation frequencies of confer- ence papers published in earth science periodicals and monographic Proceed- ings, and comparing their usage to that of research papers.

Institute Professor Robert Langer was presented the 2005 Von Hippel Award at a ceremony in Boston on Nov. 30. Langer was chosen for the award, the highest honor bestowed by Information Society, for "pioneering accomplishments in the science and applications of biomate- rials in drug delivery and tissue engi- neering, particularly in inventing the use of materials for protein and DNA deliv- ery."

Senior and Army ROTC Cadet Matthew D. Smith has met all of the Army require- ments and standards to be designated as a Distinguished Military Student. To earn this distinguished rank, a student must possess outstanding leadership qualities and moral character, obtain top rank in military science course standing, and attain an upper half academic standing at his school.

Edith Ruina, a professor and analyst program manager for Information Services & Technology, was elected vice chairman of the Boston Chapter of the IEEE Computer Society for 2006.

### News Office gets interim director

Vice President and Secretary of the Corporation Kath- ryn Willmore has announced that Pamela Dumas Serfes, director of communications and donor relations in Resource Development, has been named interim director of the News Office effective Dec. 1.

"Pamela had extensive experience in news and communications as director of communications at Rudy- mph-Douglas-Woman’s College prior to coming to MIT. Will- more said in her announce- ment. Dumas Serfes is also a member of the Communications Operating Group, a senior MIT communications strategy team.

Pamela Dumas Serfes

Dumas Serfes will serve the department during the academic year, by which time a new director of the News Office is expected to be in place, Willmore said. In the meantime, the three senior staff in the office will continue their responsibilities for the three primary functions of the clinic: Pamela Holmes — criti- cal issues management, Kath- ryn O'Neill — Tech Talk and the news website, and Patti Richards — public relations strategy.

Dumas Serfes will continue with her responsibilities in resource development, but on a reduced basis for her service as director of the News Office. Dumas Serfes can be reached at x3-2703 or pserfes@mit.edu.

### Edith Ruina

She is survived by her husband, Jack Ruina, MIT professor emeritus of electrical engineering and computer science, a son, Andrew Ruina of Ithaca, N.Y.; two daugh- ters, Ellen Ruina of Washington, D.C., and Rachel Ruina of Bethesda, Md.; and seven grandchildren.

A memorial service will be held in January.

Donations may be made to the Wellfleet Public Library, 55 W. Main St., Wellfleet, MA 02667.

### obituaries

### Edith Ruina

Edith Ruina, 81, Cambridge and Wel- field, former director of MIT’s Women in Technology and Science program, died Nov. 27. She was 81.

Ruina worked at MIT for seven years and was the author of "Women in Science and Technology: A Report of an MIT Workshop," published by the MIT Press in 1981, and "How They Lived to Tell" a story of young Jews who survived the Holocaust.

She is survived by her husband, Jack Ruina, MIT professor emeritus of electrical engineering and computer science, a son, Andrew Ruina of Ithaca, N.Y.; two daugh- ters, Ellen Ruina of Washington, D.C., and Rachel Ruina of Bethesda, Md.; and seven grandchildren.

A memorial service will be held in January.

Donations may be made to the Wellfleet Public Library, 55 W. Main St., Wellfleet, MA 02667.
Page named Whitehead Institute director

The board of directors for the Whitehead Institute for Biomedical Research has announced that Whitehead Member and MIT Professor of Biology David Page has been elected director of the Institute. Page takes this position following his appointment as interim director, which began in December 2004.

"The Whitehead board and I are delighted that David Page has been elected director of Whitehead," said Alex D'Arbeloff, chair of the Whitehead Institute board of directors. "I have enjoyed working with David since last fall and have found that he has an amazing ability to listen and to lead. I know that David will make significant contributions to the future success of Whitehead, and I look forward to our continued association."

Page will make his rath er see leading the Institute at this point in time," said Susan Lindquist, Whitehead member and director of the Institute from 2001 to 2004. "Not only is David a brilliant scientist but over the last year he's shown himself to be a leader." "I believe the two roles of director and scientist enhance one another," said Page. "Keeping my feet planted firmly in the data-rich life of the lab helps me be a more effective director. And likewise, being director helps me see my lab's work in the context of the Institute's scientific mission. To my mind, the Whitehead Institute is an artist colony extraordinary. My vision is that in the years ahead we will continue to attract the best young minds and provide them a place to realize dreams." Page's own research will continue to focus on the questions of sex determination. How does the difference in chromosomes between males (who have an X and a Y chromosome) and females (who have two X chromosomes) result in such different development and major traits? This question has vexed scientists for years because it was common ly thought that the Y chromosome was mostly "junk" DNA. Page, who is also a Harvard and Hughes Medical Institute investigator, has a reputation as the scientist who gave dignity to the Y chromosome. "I often say that the Y is the Rodney Dangerfield of the chromosome world," Page says. "He gets no respect!" Page and his collaborators surprised the scientific world with two fundamental findings that challenge the scientists' opinion of it. First, they discovered that the Y chromosome had quite a few genes and that these genes were required for male fertility. Second, they found that the Y chromosome had an amazing architecture. Many of the genes on the Y chromosome are long stretches of DNA that read the same forwards and backwards — a chromosomal feature that makes them inaccessible. The first "M" on Madam mutated, the chromosome could not "read" and the "m" in Adam would then swap the appropriate genetic material. This self-correction mechanism is essential to maintain the integrity of its genes.

Daniel Nocera proudly carries Olympic torch through Rome

Sasha Brown

It will take more than 10,000 people to carry the Olympic torch of the games for the opening ceremony of the 2006 Winter Olympics on Feb. 10, and MIT Professor Daniel G. Nocera is one of them.

On Dec. 8, the first day of the torch relay, Nocera, the W.M. Keck Professor of Energy and professor of chemistry, carried the torch two miles in Rome starting at 6:10 p.m. As a runner whose regular route follows Charles River, Nocera was chosen to be among the torchbearers was a particular thrill for Nocera. "Running the torch was certainly a high and different experience. I felt a sense of community and thought about MIT," said Nocera, who ran for Ilagias, the Italian energy company and a sponsor of the 2006 Winter Olympics. Ilagias chose Nocera after he won the 2004 Igal gas Prize for Energy and Environment. Since I was running as a research on energy and research — these thoughts were apro pria t.

Although the road was rain-slick and the torch was heavy, the run was not dif ficult, said Nocera, who was especially motivated by the children cheering along the route.

As a torchbearer, Nocera has joined an important part of Olympic history. According to the official Olympic web site: "The torch bearer is the person that carries the Olympic flame. The highest recognized symbol of the Games, it announces the message, it embodies and spreads its ide als: the union and peace amongst the peo ple, the allegiance, the courage, the frater nity and solidarity." The flame dates back to ancient Greece, where athletes competed in a relay race passing a torch from one to the other. In 1928, the flame officially returned to burn in the Olympic cauldron. Since 1936, the torch has been carried to the opening cer emony by relay. Now, the Olympic torch relay is an essential part of the Olympic tradition.

The flame, held in a small lantern, arrived in Italy on Dec. 7 from Athens, Greece. Italian President Carlo Azeglio Ciampi lit the torch in front of the Olympic torch bearer at the Piazza del Quirinale in Rome on Dec. 8. The torch relay was carried by 10,001 torchbearers across Italy, visiting 140 cities, all of Italy's regions and bordering countries, visiting 140 cities, all of Italy's regions and Slovenia, Austria, Switzerland and France.

The 2006 Olympic torch relay concludes on Feb. 10 in the Stadio Comune in Turin, when the flame will be used to light the Olympic cauldron at the XX Olympic Winter Games. The closing ceremony of the Games is scheduled for Feb. 26.
Industry, MIT hunt for energy solutions

Deborah Halber
New Office News Correspondent

The automotive, fuel and other energy-related industries can best contribute to solving the world’s energy crisis in a three-day workshop sponsored by MIT’s Industrial Liaison Program (ILP) on Dec. 6.

Nearly 100 participants from industry and academia came together at the world-renowned Massachusetts Institute of Technology to propose feasible “sustainable energy,” to identify priorities and exchange ideas on how to work together to meet future energy needs while reducing greenhouse gases.

The workshop kicked off with an overview of the future of coal-based power in increasingly efficient U.S. plants and in a complex power grid. China is expected to account for roughly 50 percent of China’s growing power needs due to its rapid industrialization and carbon emissions over the next 25 years. Workshop participants also heard six MIT researchers describe work on topics ranging from photovoltaics to the use of nanotechnology in energy systems.

Technologist, academic, entrepreneur and long-time MIT supporter Kenan Sahin, founder at a real estate firm in Cambridge, Mass., spoke about the critical role of industry in MIT’s Energy Research Council (ERC), an Institute-wide initiative.

Continued from Page 1

and mouse genomes, the scientists found that humans share more of their ancestral DNA with dogs than with mice, confirming the utility of dog genetics for understanding human disease.

Most importantly, the comparison revealed the regions of the human genome that are most highly preserved throughout mammals. Roughly 5 percent of the genome that are most highly preserved are those that selective breeding has created “haplotype blocks” that are 100 times larger than the largest sources of energy, with renewable energy making up only 1 percent of the world’s energy supply. The largest increases in population and economic growth, with corresponding increases in energy needs and production, will happen in developing countries such as China. “We’ll need 60 percent more energy in 2030 than in 2000,” Jacobs said.

Bernhard Schaffner, senior vice president and head of the Corporate Research Council of ABN AMRO Switzerland, questioned how the industrialized world will maintain the reliability of electrical supply in spite of aging power plants, people’s reluctance to have transmission lines in their backyards and the risks of depending on a centralized infrastructure that might become a terrorist target.

Workshops led by industry representatives came up with the following ways MIT can contribute:

• MIT can help develop advanced turbines, fuel cells, catalytic reactors and ways to burn coal better and more efficiently.

• MIT can provide a “holistic energy plan” that looks not only at supply and demand but also at environment and efficiency through a complex systems approach. MIT can look at the issues in terms of longer time frames than industry.

• MIT can be an “honest broker” to identify key pathways toward new energy policy and technology across a broad range of stakeholders in industry, politics and academia.

Continued from Page 1

Pilot projects get funding

The MIT Center for Environmental Health Sciences, through support from the National Institute of Environmental Health Sciences, has announced its support for six pilot projects, which all began Dec. 1.

Assistant Professor Patrick Doyle of chemical engineering will study “technologies to rapidly scan single genomic DNA molecules.” Associate Professor Cathrine Dremann of chemistry will focus on structural studies of single RNA molecules.

Assistant Professor Kimberly Hamad-Schifferli of mechanical engineering will focus her research on “antimicrobial agents for medical device-related infections.” France uses a spinning platform to apply an extra load to the spring. The act of stretching a hair, such as a dog’s tail, can contribute to the spring-like behavior of these small organisms.

She used the centrifuge microscope, developed by Shinya Inoue of the Laboratory, to apply an extra load to the spring. The act of stretching a hair, such as a dog’s tail, can contribute to the spring-like behavior of these small organisms.

Continue reading on Page 4...
For 30 years, Professor Borivoje “Bora” Mikic of mechanical engineering and his wife, LiHa, have had a second family of more than 300 students.

Housemasters since 1976, the Mikics’ extended family has included first the students at Senior House and then at Next. All told, the Mikics and their two grown daughters have lived with thousands of MIT undergraduates, opening their homes and lives over the years.

For current residents of Next House, a dinner made by LiHa Mikic and served in their in-house residence is a treat. So legendarily is her food that it was used as an incentive to collect money for charity this fall. Residents of the most generous Next entry won a dinner made by LiHa.

It is these kinds of events that bring a house together and make it a home for students who are often living far from their families, said Bora Mikic, who often plays chess with the students. It was the students who originally drew the Mikics to the job. “They bring energy, a different perspective, and a whole new culture,” he said.

At the end of this academic year, the Mikics will leave Next House. Simmons associate housemasters Murid Medard and John Simmons will move into the position, leaving a vacancy in Simmons. Additionally, senior lecturer in Chinese Julian Wheatley and his wife, Marjorie Nolan-Wheatley, are planning to leave their East Campus housemasters positions after five years.

Senior faculty members interested in applying for either vacancy should e-mail Associate Dean and Director of Student Life Programs Barbara Baker at babaker@mit.edu.

For housemasters, many of whom serve five years or more, leaving a post is bittersweet.

There are 11 undergraduate residences and five graduate residences in the housemaster system. In most cases, housemasters come in teams, a senior MIT faculty member with his or her spouse or partner. The East Campus, Simmons, Green and Sidney-Pacific dorms also have associate housemasters — additional faculty members who live there as well.

“The housemasters support and provide leadership to the house team,” Baker said. In an undergraduate dorm, that team includes graduate resident tutors (GRTs) — usually one per floor or entry, a residential life associate, the house manager from the Department of Housing, sometimes an associate housemaster and often the house student leadership.

“Housemaster roles and responsibilities vary. They are very concerned about student welfare and advocate for student issues and concerns,” Baker said. “In addition, housemasters provide support for individual students, including outreach during time of crisis as well as support for student groups, especially the house government.”

“Being a housemaster is a way of life and is time consuming,” said Professor Munther Dahleh of electrical engineering and computer science. He and his wife, Jinan Abusnadi, have been housemasters in MacGregor for more than five years. “Emergencies don’t time themselves around your deadlines,” said Dahleh, who has found himself in the emergency room with a student all night, then back in class for a 4 a.m. lecture.

Still, Dahleh said the close bonds he and his family have formed with the students and the satisfaction they get from helping make it well worth it. “It becomes a part of your living style. It really is a wonderful experience.”

Since they live in apartments within the dorms, the housemasters’ lives become intertwined with the lives of all the residents. For the 350 MacGregor residents, having the Dahlehs’ three children around has been “amazingly fun.”

“Dahlehs’ job involves working with the house team to offer guidance to the house government on various policies, giving advice to the GRTs on student issues, and planning social and educational activities for the house, such as dinners, study breaks and off-campus outings.”

For housemasters in the graduate residences, life is a little different, said Ann Orlando, who has been housemaster of Ashdown House for five years with her husband, Professor Terry Orlando of electrical engineering and computer science. “People here are extremely serious about their studies,” she said. And, there are no GRTs.

But, the relationships developed are just as close. “We are rather sad to see some of our residents graduate and leave,” she said.

After 30 years, the Mikics have seen a lot of changes, said Bora Mikic. Their two daughters have grown up and moved away. The physical environment for students has improved. And, they have seen growth in the kinds of programs offered to students both in their social and academic lives.

But through it all, has always been the same. “We wanted to offer an environment that allowed them to relax,” he said. “They come full of hope and energy and they leave ready to storm the future.”

The 10 current PESO members at MIT and five partners in the Philippines advertised in and around Filipino colleges and universities hoping to spark some interest in the competition. Their persistence worked, and 2005 marked the first official competition.

More than 70 teams submitted business plans, said Ruiz, who added he was amazed by the response. “We would have been happy with 20 submissions.”

Roughly 24 percent of the teams had at least one Ph.D.-level member, said Ruiz. Ideas were submitted in a number of categories including biotech, information technology, process and manufacturing, agriculture and more.

On Dec. 4, in the Philippines, the Ayala Foundation Grand Prize went to Enhanced Solo, a team that developed a papaya with a cultured resistance to papaya ring spot virus. The virus plagues crops in the Philippines, causing papayas to ripen too quickly, thus limiting papaya production and creating big losses for small farmers. The team develops a new technique of growing it without the delayed ripening trait that allows for export.

The winner received 80,000 Philippine pesos, roughly $1,500, as well as continued help from PESO in developing and marketing its product. Sponsored prizes were awarded in six other categories as well, including the ICCP Venture Partners Best Service Prize, which went to Sanitary Aqua Vendo for developing a water vending machine capable of delivering clean water for public restrooms. Poor water quality is responsible for a number of problems in the Philippines.

“PESO is a huge success,” said Susnowitz. This past spring, PESO received the PSC’s award for best new service project.
Flatworms yield insights into mystery of regeneration

If you take a planarian flatworm and chop it in half, something extraordinary happens: the two new halves can grow into complete animals. But what if you took a cell from one of the two new animals and moved it to the other new animal? At this very moment, these cells are doing exactly that.

For centuries, scientists have puzzled over this biological phenomenon, but only recently have they understood that these creatures are a gold mine for exploring how stem cells regenerate damaged tissues. Now, scientists at MIT, the Whitehead Institute for Biomedical Research, and the University of Utah School of Medicine have begun to understand how the planarian species has evolved to regenerate when some scientists hope to one day accomplish in the matter of higher mammals, the worms still have characteristics that make them a model system for studying regeneration.

The human anatomy is much simpler than that of higher mammals, the worms still have different phyla such as skin, intestine, musculature and brain. These organs are maintained — and re-created — by planarian neuroblasts, a kind of stem cell that shares characteristics with both adult and embryonic stem cells. Neuroblasts are located in adults with mature tissue. But like embryonic stem cells, they may be capable of turning into any kind of cell type in the body.

"Planarians have solved exactly what people want to accomplish with regenerative medicine," says Reddien. "This has been worked out by evolution." The question, of course, is how.

In May, Reddien and his then-colleagues at the University of Utah created the first high-throughput RNA interference screen of planarian genes, with results published in the journal Developmental Cell. The researchers painstakingly injected 1,005 genes — RNAi techniques and found 204 genes of interest that had corresponding genes in other species, including human ones.

One of these genes, called smed2, stood out. When smed2 was disabled, the flatworm was suddenly unable to regenerate at all, and its body curved into a stationary, irregular position. This raised an obvious question: Exactly how does smed2 control the planarian's ability to regenerate?

As reported in Science, the team discovered that smed2 does not regulate the stem cells themselves, but controls cells produced by stem cells. When a stem cell divides in two, one of the daughter cells is a stem cell, and the other is a cell that can replace a specific type of cell. When smed2 is disabled, however, this group of versus two groups of friend cells can't carry out its function. Smed2 regulates regeneration through overseeding and enhancing the reparative activity of these cells. The precise mechanism by which they do this is unclear. Still, this paper marks the first instance in which a planarian gene has been studied at this level of resolution.

"This gives us some answers about how stem cells are controlled in planarians, and it's starting to hit at the basic science of stem cells," says Reddien. "It also has a broader audience of questions about understanding the biology of regeneration. We're still at the very beginning of the basic science phase, but it's a good start."

This research was funded by the National Institute of Health and by the Helen Hay Whitney Foundation. An additional author of this work is from Harvard Medical School.

Students in Wendy Jacob's 'Introduction to Visual Arts' class participate in an installation on private space in a public context. Jennifer Sundberg '08, for left, Cassandra Gibbs '08, third from left, and Faith Rogers '07 (fourth from left), are joined by pals, from left, Kristen A. Ayala '08, Mike Yes '08 and Cherrelle Walls '07.

### Flatworms and Neuroscience: Research at the MIT Brain Research Center

The Brain Research Center at MIT is home to a number of laboratories that are dedicated to understanding the neural basis of behavior and cognition. One such laboratory, led by Professor William Newsome, focuses on understanding the neural mechanisms underlying the control of movement. Specifically, the Newsome Lab is interested in how the brain represents and selects the actions that are performed.

One of the key questions that the Newsome Lab is addressing is how the brain represents and selects the actions that are performed. To address this question, the lab uses a combination of behavioral, electrophysiological, and computational approaches. The lab's experiments typically involve training animals to perform a variety of tasks, and then recording the activity of individual neurons in the brain.

In one experiment, the lab trained animals to perform a reaching task, in which they had to reach for a food reward. The lab then recorded the activity of individual neurons in the primary motor cortex, which is the brain area that is most active when the animal is reaching for food.

The lab found that the activity of individual neurons in the primary motor cortex is highly correlated with the movement that the animal is making. That is, the activity of each neuron is predictive of the movement that the animal is making. This suggests that the brain uses a set of rules to control the movement that is performed, and that these rules are represented in the activity of individual neurons in the primary motor cortex.

In another experiment, the lab trained animals to perform a sequence of movements, in which they had to reach for a series of targets. The lab then recorded the activity of individual neurons in the brain areas that are involved in planning and executing movements.

The lab found that the activity of individual neurons in these brain areas is highly predictive of the movement that the animal is planning to make. This suggests that the brain uses a set of rules to plan the movements that are performed, and that these rules are represented in the activity of individual neurons in the brain areas that are involved in planning and executing movements.

The Newsome Lab is currently working on a number of other projects, including investigating how the brain represents and selects the actions that are performed in more complex tasks, and how the brain adapts to changes in the environment.

### News Office

Innovation design practices and recent research in urban security issues were highlighted in a series of talks presented to midcareer international students by the Department of Urban Studies and Planning. Students in the Special Program for Urban and Regional Studies (SPURS) heard the talks, collectively titled "Myths About America," at luncheon meetings in the Stella Room, 7-338, during the fall term.

Bish Sunyal, professor of urban planning and director of SPURS, described the series as "one among many activities the department undertakes to build an affordable housing in their talk, 'From Design to Built Form,' given Nov. 21.

Santos, who began practicing as an architect in her native South Africa, used dramatic photographs of Health and and the Helen Hay Whitney Foundation. An additional author of this work is from Harvard Medical School.

### Gallery spots available

Applications to mount an exhibition in the Wiesner Student Art Gallery (second floor, Stratton Student Center) during the semester are now being accepted. Applications due Friday, Jan. 27, as part of the gallery's new formal application process. Supporting materials — three or four works that are representative of the exhibit as a whole, a list of pieces to be shown, and detailed schematics of anything that will be displayed — are due by Friday, Feb. 10. A committee will review the applications and make decisions on Friday, March 3. Applications are available at the Student Art Association (Room W2-429) and are downloadable at web.mit.edu/saa/wiesner.html. For more information, call x3-7019.

### NEWS YOU CAN USE

**Classifieds**

**FOR SALE**

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ladies' (size 22) skis &amp; snowboard, Cleveland. Original price $100.</td>
<td>Cambridge</td>
<td>Brand new, never used.</td>
</tr>
</tbody>
</table>

**FOR LEASE**

<table>
<thead>
<tr>
<th>Room</th>
<th>Location</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnished Studio in South Boston w/ beach access.</td>
<td>Cambridge</td>
<td>Ultra modern w/ central A/C, granite countertops, stainless steel applic.</td>
</tr>
</tbody>
</table>

**FOR RENT**

<table>
<thead>
<tr>
<th>Room</th>
<th>Location</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact studio in South Boston with kitchen, bathroom, and a/c.</td>
<td>Cambridge</td>
<td>Full kitchen, office, living room, bath.</td>
</tr>
<tr>
<td>Shingle-sided home in South Boston.</td>
<td>Cambridge</td>
<td>3 bedrooms, 2 bathrooms.</td>
</tr>
<tr>
<td>2 BR house for rent. Close to T &amp; all major highways. No utilities, no smoking, no pets.</td>
<td>Cambridge</td>
<td>Monthly plus $300.</td>
</tr>
<tr>
<td>2 BR house for rent. Close to T &amp; all major highways. No utilities, no smoking, no pets.</td>
<td>Cambridge</td>
<td>Monthly plus $300.</td>
</tr>
<tr>
<td>2 BR house for rent. Close to T &amp; all major highways. No utilities, no smoking, no pets.</td>
<td>Cambridge</td>
<td>Monthly plus $300.</td>
</tr>
<tr>
<td>2 BR house for rent. Close to T &amp; all major highways. No utilities, no smoking, no pets.</td>
<td>Cambridge</td>
<td>Monthly plus $300.</td>
</tr>
<tr>
<td>2 BR house for rent. Close to T &amp; all major highways. No utilities, no smoking, no pets.</td>
<td>Cambridge</td>
<td>Monthly plus $300.</td>
</tr>
<tr>
<td>2 BR house for rent. Close to T &amp; all major highways. No utilities, no smoking, no pets.</td>
<td>Cambridge</td>
<td>Monthly plus $300.</td>
</tr>
<tr>
<td>2 BR house for rent. Close to T &amp; all major highways. No utilities, no smoking, no pets.</td>
<td>Cambridge</td>
<td>Monthly plus $300.</td>
</tr>
<tr>
<td>2 BR house for rent. Close to T &amp; all major highways. No utilities, no smoking, no pets.</td>
<td>Cambridge</td>
<td>Monthly plus $300.</td>
</tr>
<tr>
<td>2 BR house for rent. Close to T &amp; all major highways. No utilities, no smoking, no pets.</td>
<td>Cambridge</td>
<td>Monthly plus $300.</td>
</tr>
</tbody>
</table>

**FOR FREE**

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ladies ice skates fit size 9 shoe. Celebrity boot, $6.50/ board</td>
<td>Cambridge</td>
<td>Widths 6-10 inches. Lengths 8-16 ft.</td>
</tr>
<tr>
<td>Ladies ice skates fit size 9 shoe. Celebrity boot, $6.50/ board</td>
<td>Cambridge</td>
<td>Widths 6-10 inches. Lengths 8-16 ft.</td>
</tr>
<tr>
<td>Ladies ice skates fit size 9 shoe. Celebrity boot, $6.50/ board</td>
<td>Cambridge</td>
<td>Widths 6-10 inches. Lengths 8-16 ft.</td>
</tr>
<tr>
<td>Ladies ice skates fit size 9 shoe. Celebrity boot, $6.50/ board</td>
<td>Cambridge</td>
<td>Widths 6-10 inches. Lengths 8-16 ft.</td>
</tr>
<tr>
<td>Ladies ice skates fit size 9 shoe. Celebrity boot, $6.50/ board</td>
<td>Cambridge</td>
<td>Widths 6-10 inches. Lengths 8-16 ft.</td>
</tr>
<tr>
<td>Ladies ice skates fit size 9 shoe. Celebrity boot, $6.50/ board</td>
<td>Cambridge</td>
<td>Widths 6-10 inches. Lengths 8-16 ft.</td>
</tr>
<tr>
<td>Ladies ice skates fit size 9 shoe. Celebrity boot, $6.50/ board</td>
<td>Cambridge</td>
<td>Widths 6-10 inches. Lengths 8-16 ft.</td>
</tr>
<tr>
<td>Ladies ice skates fit size 9 shoe. Celebrity boot, $6.50/ board</td>
<td>Cambridge</td>
<td>Widths 6-10 inches. Lengths 8-16 ft.</td>
</tr>
<tr>
<td>Ladies ice skates fit size 9 shoe. Celebrity boot, $6.50/ board</td>
<td>Cambridge</td>
<td>Widths 6-10 inches. Lengths 8-16 ft.</td>
</tr>
<tr>
<td>Ladies ice skates fit size 9 shoe. Celebrity boot, $6.50/ board</td>
<td>Cambridge</td>
<td>Widths 6-10 inches. Lengths 8-16 ft.</td>
</tr>
</tbody>
</table>

**FOR JOB**

<table>
<thead>
<tr>
<th>Position</th>
<th>Location</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor of political science</td>
<td>Cambridge</td>
<td>Lecturer in political science, 2005</td>
</tr>
</tbody>
</table>
Postdoc drawn to sketching

When not working with mechanical devices to mimic and echo human actions, Max Berniker is drawing the human form.

Currently a postdoctoral associate in the Media Lab’s Biomechatronics Group, Berniker has studied theoretical issues in biological motor control. He’s currently working to develop prosthetic devices that link directly to an amputee’s nervous system.

But Berniker discovered another talent at MIT: figure drawing. Although he drew and sketched as a child, he had never taken an art class until he signed up for the life drawing class at the Student Art Association (SAA) seven years ago. Hooked, he’s been taking the class ever since.

Now, his first exhibition, “10 Minutes With Max,” is on view at the Wiesner Student Art Gallery through Jan. 11. Berniker is presenting 42 charcoal sketches of the human form.

“I like lines,” he said in his artist’s statement. “Some lines communicate the shape of the figure. Some lines communicate the edge of the figure. Combinations of lines convey tonality. I like lines that communicate all at once, doing the most possible with the minimum necessary, telling the viewer: this bit of flesh is taut, this bit is soft, this bit is bony.”

Each sketch took an average of 10 minutes to draw. Berniker said, explaining the title of the exhibition. None are complete works, he said; each is a compromise between the effort to create an accurate and well-composed rendering and the fear that additions will detract from what is already on paper.

“My proudest achievement is not the whole image, but the occasional event when charcoal meets paper with just the right pressure, speed and arch to justify convey tension in a forearm, the shift of weight onto a leg, or the strain in a twisted torso,” he said.

The gallery is located on the second floor of the Stratton Student Center and is open 24 hours a day. For more information, call x3-7019.

MIT Museum shows pioneering designs

A new exhibit at the MIT Museum highlights the work of Richard Filipowski, a sculptor of international reputation who taught visual design here for 36 years.

Filipowski, who joined MIT’s faculty in 1953, was the first to introduce the teaching methods of the German design philosophy Bauhaus to MIT. He also developed a pioneering course on design theory, leaving a lasting influence on the curriculum of MIT’s School of Architecture and Planning.

“Finding Form: The Art of Richard Filipowski,” currently on view near the entrance of the MIT Museum, focuses on his sculpture and graphic art, demonstrating his influential design curriculum and revealing his pivotal manipulations of form and color.

Filipowski has described his work of “finding form” as a “sustained search for spatial-structural-emotional concepts.” Today Filipowski maintains a daily commitment to “finding form,” usually preferring to work in colored ink on paper. The exhibition includes a selection from the MIT Museum’s Filipowski Collection, including examples of some of his earliest work in sculpture and on paper, and recent work from the artist’s collection.

Now in his 80s, Filipowski is still looking ahead. “I don’t know what happens next, where the language I have developed … will lead,” he said in an interview with Jon Markowitz, Guggenheim’s education programs at the MIT Museum.

Music and theater arts lecturer Mark Harvey and his Aardvark Jazz Orchestra will present their 33rd annual Christmas concert on Dec. 18 at Emmanuel Church (15 Newbury St., Boston). The ensemble, with vocalists Jerry Edwards, Grace Hughes and senior lecturer Pamela Fried, will perform Duke Ellington’s sacred music, including “Almighty God Has Those Angels,” “It’s Freedom” and “Come Sunday,” as well as rarities such as “A Song of Helicon,” “Almighty God Has Those Angels,” and “Pennies on the Ground.” Tickets are $15.

Jennifer Alora, who received her degree from the Visual Arts Program in 2003, and her artistic partner, Guillermo Calzadilla, are among the six artists shortlisted for the Guggenheim Museum’s 2006 Hugo Boss Prize. A publication featuring the works of the finalists will be published in June, and the winner will be announced in fall 2006. An exhibition of the prize-winning artist’s work will be held in early 2007 at the Solomon R. Guggenheim Museum in New York City. Alora and Calzadilla’s installation “Download” was recently included in Art Basel Miami Beach, an international art show that took place Dec. 14.
Go Online! For complete events listings, see the MIT Events Calendar at: http://events.mit.edu.


“PANDEMIC INFLUENZA”
Talk by Sanford Weiner of MIT’s Center for International Studies.

Dec. 14
Room E38-615
Noon-1:30 p.m.

MIT CELEBRATES RANDAL PINKETT
Watch MIT alum Pinkett on “The Apprentice” finale and enjoy great desserts with the MIT community.

Dec. 15
Kresge Auditorium
9-11 p.m.

CHANTEY SING
Music and chanteys with maritime enthusiasts, professional and amateur singers.

Dec. 18
MIT Museum
1-4 p.m.

Professor’s digital ‘Nature’ on display in Paris museum

MIT-based graphic designer, artist and computer scientist John Maeda has his first European solo exhibition at Fondation Cartier Pour l’Art Contemporain in Paris.

Known for digital design, Maeda, an associate professor of design and computation in the Media Lab, was one of the first to explore the visual and artistic potential of the computer.

Maeda has two series of images on exhibit. “The Nature” consists of seven “motion paintings” representing abstract forms in movement that recall natural phenomena: trees, sky, grass, moon, rain and snow. The second series, “Eye’m Hungry,” is composed of six interactive stations designed with children in mind; visitors can use touch interfaces such as a keyboard, microphone or mouse to make broccoli jump, anchovies swim and french fries slide.

“Food is something that I’ve been focusing on for the last couple of years,” says Maeda in an interview on the Fondation Cartier’s web site (www.fondation-cartier.fr). He chose food in part because of the children, for whom he wanted to explore an accessible topic. Also, Maeda said that after 9/11 he was “so depressed” he wanted to “create art with a lively and joyful spirit close to pop art.”

The exhibition is on view through Feb. 19. If you can’t make it to Paris to see the show, you can still send some e-cards from the exhibit by going to www.maedastudio.com/2005/ecard/.