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Repairing Radiation Damage

DNA dream team: Researchers Scott Morrical, Jeff Bond, Susan Wallace, Mark Rould and Sylvie Doublié (left to right) are pursuing a new project that is bringing multiple methodologies to bear on a crucial genetic question. (*Photo: Gordon Miller/UVM Medical Photography*)

A team of UVM researchers was recently awarded a five-year, $7.5 million program project grant by the National Cancer Institute. The funding will support a study using biochemical, computational and structural biology methodologies to determine how three families of DNA enzymes repair damage caused by ionizing radiation.

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THE WEEK IN VIEW

***April 14*, 3 p.m. Lecture: "Can Race Be Erased? Coalitional Computation and Social Categorization," with Leda Cosmides, University of California, Santa Barbara. Memorial Lounge, Waterman. Information: 656-4464**

***April 15*, all day. Symposium: "Ethics in Public Life" honoring retiring Professor Alan Wertheimer. Information: 656-0427**

***April 15*, 8 p.m. Lane Series Concert: "A Gala Evening with Audra McDonald and her Trio." Flynn Center. Tickets: $60, $46. Limited seating includes champagne and chocolate reception at intermission. Information: UVM Lane Series**

***April 18*, 4 p.m. Dan and Carole Burack President's Distinguished Lecture: "Regulation and Deregulation: A Personal Journey," with Alfred Kahn, Cornell University. Lecture Hall 101, Fleming Museum. Reception immediately following.**

***April. 19*, 4 p.m. Screening: "The Final Solution," with filmmaker Rakesh Sharma showing his documentary on anti-Muslim violence in Gujarat, India in 2002. Memorial Lounge, Waterman**

NEWS BRIEFS

Racial Stigma Lingering and Damaging, Eminent Economist Argues

Despite the progress of the Civil Rights movement, black Americans are experiencing an economic crisis that is bad and growing worse, economist Glenn Loury argued in an April 11 lecture, and the "color blind" solutions increasingly in vogue won't fix the problem.

Addressing social problems in race-neutral ways, is, said the eminent Boston University professor in his Florence Davis Dean Lecture, a "superficially appealing" form of morality reminiscent of the "cheap grace" of a deathbed religious conversion. Loury argued that "color blindness" ignores the lingering effects of a unique history that has left African-Americans more persistently disadvantaged and stigmatized than members of other minority groups.

Placing racial inequality within the context of the lingering effects of slavery and discrimination, once widely accepted, is now much less popular, said Loury, the author of the 2002 book *The Anatomy of Racial Inequality*. As immigration and demographic changes have made blacks no longer the nation's largest minority group, and other groups have made substantial economic progress, our "narrative is shifting." Many no longer view racial bias as a serious ongoing problem after the Civil Rights Movement ended much overt discrimination, Loury said, and removing that piece from the puzzle makes the behavior of individuals the primary issue in racial economic disparities, a frame that no longer creates a "predisposition to a sympathetic response." Instead, Loury said, the retort often becomes "we've done what we can, let the chips fall where they may."

Deploying a variety of demographic, economic and econometric statistics, Loury sought to demonstrate that this kind of reasoning is not supported by the "facts on the ground." He presented data that a significant gap in household income between black and white families has not changed significantly in 25 years; that black infant mortality is more than twice as high as white infant mortality; that there is a huge disparity in the percentage of children born to unwed mothers; and that the number of blacks in prison has gone up four times since 1980, creating a situation where a group representing one-eighth the population has half the people under lock and key.

The correct response to these and similar statistics, Loury argued, is to look at disparities in opportunity, social capital, access to education, and persistent racial stigma – deep structural problems rather than individual behavior, because

Professor Launches Chapter of Spanish Honor Society

The university will induct its first Spanish students into Sigma Delta Pi, the national collegiate Hispanic honor society (or the *Sociedad Nacional Honoraria Hispánica*), in an installation ceremony for UVM's founding chapter, named Phi Phi, on April 18 at 7 p.m. in the Grace Coolidge Room, Waterman.

The honor society was founded at the University of California, Berkeley in 1919 and is one of the oldest, largest and most prestigious foreign language honor societies. UVM will become one of the more than 400 chapters of Sigma Delta Pi at four-year colleges and universities across the country.

Yolanda Flores, professor of Spanish, is the founding faculty member of the UVM chapter. Flores was inducted into the society herself as an undergraduate at Berkeley, an honor which she says influenced her decision to become a double-major by adding Spanish to her work in history. That move led her to pursue post-graduate work in the discipline and eventually join the faculty at UVM.

Flores was convinced of the need for the honor society after noticing that many Spanish majors here are double-majors and that many of them only received honors from their non-Spanish program. "Here, students only march with one major," she explains. "If I were a double major here, and one (program) honors me and one doesn't, I'd march with the one that does honor me."

Flores' experience with an exceptional class she taught recently cemented her desire to establish an honor society at UVM. "I thanked them for working so hard all semester and apologized for not having an institutionalized way to recognize their hard work in Spanish. They had been an inspiring class that motivated me to work on bringing an honor society to UVM, and I made the promise to them that somehow, students in the future would be recognized for their work," she recalls.

Kerri McGilvreay, one of the students in that class and one of ten to be inducted at the April 18 ceremony, says of the founding of Sigma Delta Pi, "You work hard, and it's nice to be recognized like you would be in other departments. It gives you something to strive for."

Fellow students Kerri Aveni, Allison Card, Natalie Karlin, Greg Lombardi, Ryan Mullady, Loriann Nardacci, Melissa Nepomiachi and Lindsey Walker

individual choices are heavily influenced by the context they are made within.

In one provocative line of speculation, the economist suggested that cultural taboos against racial intermarriage placed black women at a disadvantage in the marriage market. As for crime, he pointed out, "you don't have prostitutes without johns" or drug dealers without a $100 billion annual market for illegal substances. Citing Rand Corporation data, Loury said that street drug dealers are exceptionally poorly paid and argued that choosing such work points to a poverty of other options.

"Much of what we point to as values... are adaptations to a social structure of opportunity that is racially constructed," he said. In other words, he said, "[The problems] aren't just about black people."

So how to solve them? Given the entrenched nature of the issue, color-blindness is "too little, too late." Reparations – whether direct or indirect payments to individuals or groups to atone for slavery – is also not the answer to a historic debt, because it "mixes the sacred and profane" and would create a false sense of closure that belies continuing problems. Addressing racial stigma and disparities, Loury argued, requires structural changes that are both subtle and broad.

will be inducted alongside McGilvreay at the Phi Phi installation ceremony. Catherine Conner, professor of Spanish and member of Sigma Delta Pi, will co-officiate the event with Flores.

Anthropology Students Visit Reservation to Experience Culture First-Hand

Jennifer Dickinson, assistant professor of anthropology, was hoping that by taking her "Anthropology of Stuff: Modernity and Material Culture" class to the Kahnawake Kanien'kehaka (Mohawk) Reserve outside Montreal, students would experience another culture by hearing the personal stories and struggles of its people.

More than 30 students attended the one-day trip, which was made possible through a collaborative effort of the Department of Anthropology, the ALANA US Ethnic Studies Program and the College of Letters and Science Student Transition and Engagement program. Students heard personal accounts of what life was like living at Kahnawake, one of seven communities that comprise the Mohawk Nation, and participated in a number of traditional events that gave them a perspective that Dickinson said she could not have offered in the classroom.

"One student said it was very different to actually hear someone talk about their experiences and hear how they were affected by their own personal struggles," says Dickinson, whose course focuses on the diverse roles that material objects play in the lives of people around the world. "This was a real experience as opposed to an abstract classroom one."

Students attended a talk at the reserve's cultural center given by Kara Dawne Zemel, who spoke about language and cultural revitalization projects. That was followed by a traditional lunch, which included sacred plants such as corn and squash, at the Mohawk Trail Longhouse, a center of traditional Mohawk religious and political activities.

Later in the day, students watched the Thunderhawk Dancers and participated in some of the traditional dances, including the alligator dance that emphasizes the Iroquois' reverence for women in society. They also participated in a mock tribal council where women elected chiefs from each of the three clans to lead the ancient democratic form of council discussion. The topic debated was whether the university should allow corporate sponsors as food vendors in the new student center.

More information about the reserve is online at Kahnawake.

EVENTS

'Father' of Airline Deregulation to Speak at Fleming

Alfred E. Kahn will speak on "Regulation and Deregulation: A Personal Journey" on April 18 from 4 to 5 p.m. in Lecture Hall 101, Fleming Museum. The event is part of the Dan and Carole Burack President's Distinguished Lecture Series.

Kahn, the Robert Julius Thorne Professor of Political Economy, Emeritus, at Cornell University and a special consultant to NERA Economic Consulting, is considered the "father" of airline deregulation, promoting reforms that led to lower airfares and other changes in the airline industry. Kahn presided over airline deregulation as chairman of the Civil Aeronautics Board, a position to which he was appointed by President Carter a year before passage of the United States Airline Deregulation Act in 1978.

He served as an economic advisor to President Carter, chairman of the New York Public Service Commission and chairman of the Council on Wage and Price Stability. Kahn is the author of many publications including *The Economics of Regulation*, the first comprehensive integration of the economic theory and institutional practice of economic regulation, and *Whom the Gods Would Destroy, or How Not to Deregulate*.

Kahn received his bachelor's (summa cum laude) and master's degrees from New York University and a doctorate in economics from Yale University. Following service in the Army, he served as chairman of the Department of Economics at Ripon College, in Ripon, Wisconsin. He moved to Cornell University, where he served as chairman of the Department of Economics, as a member of the board of trustees of the university and as dean of the College of Arts and Sciences.

He has received L.L.D. honorary degrees from Colby College, Ripon College, Northwestern

'Family Guy' Creator Seth MacFarlane's Speech Rescheduled

A talk by Seth MacFarlane, creator of the Emmy-nominated animated series "The Family Guy," originally scheduled for April 22, has been rescheduled to April 28.

MacFarlane will be the featured speaker for the University of Vermont Student Speaker Series at 8 p.m. in Patrick Gymnasium (doors open at 7 p.m.). The UVM Senior Class Council, in conjunction with the Office of Student Life and UVMPM, is sponsoring the event as the senior class gift to the university community from the Class of 2005.

Tickets are free to the members of the UVM Class of 2005 and will be available to all others for $10 per person on a first-come, first-served basis. Advance ticket sales will be handled through the UVM ticket office.

As the inventive mind behind "The Family Guy," MacFarlane built a cult following around the Griffins, a dysfunctional family whose dog is the smartest of the bunch. Fox cancelled the show after only three seasons despite a strong and devoted following, but reruns on Cartoon Network were unexpectedly successful, especially among young people. The series then became one of the best-selling television shows on DVD, selling millions of copies. In a rare case of television resurrection, Fox decided to return the show to the network, and new episodes of "The Family Guy" will air this year.

MacFarlane produces another series for Fox, "American Dad," which premiered after the Super Bowl in February 2005. "American Dad" involves a conservative C.I.A. agent, his ultra-liberal daughter, a space alien, and a German-speaking goldfish.

In his speaking engagements, MacFarlane, who is

University, the University of Massachusetts and an honorary D.H.L. from the State University of New York, Albany. He has also received numerous awards for his work in economics, regulation and deregulation.

A reception in the Fleming Museum's Marble Court will immediately follow the lecture.

Author to Address Agricultural Entrepreneurs

Jan Albers, author of *Hands on the Land, A History of the Vermont Landscape*, will talk to successful and hopeful entrepreneurs at the UVM-sponsored "Young Entrepreneurs in Agriculture and Local Foods Symposium" at 9 a.m. on April 23 at the Billings Student Center.

Vermont Rep. Gaye Symington and Rachel Johnson, dean of the College of Agriculture and Life Sciences, will open the event, which runs from 8:30 a.m. to 4:45 p.m. and includes a series of workshops.

The symposium is free, but pre-registration is required: Registration Site or Helen Laban Jordan: hjordan@uvm.edu.

Exploring the History of Dairy Processing

Local historian Jerry Fox will explore the history of an important aspect of dairy farming on April 14 at 7:30 p.m. in Memorial Lounge, Waterman Building. Fox's talk, "After the Cow: Dairy Processing in Chittenden County," is part of the Center for Research on Vermont's seminar series.

Fox is the principal researcher with Vermont Historysmyth and is an adjunct archivist in the UVM Libraries Department of Special Collections. He is actively engaged in several aspects of local history and is a past president of the Chittenden County Historical Society, the Essex Community Historical Society, and the Champlain Valley Railroad Club. He is currently the CCHS membership chair and secretary of the Central Vermont Railway Historical Society.

also the voice of many of his characters, takes audiences inside the most raucous, innovative show on TV for a hilarious behind-the-scenes peek at everything from the writer's many neuroses to the only "Family Guy" episode that Fox refused to air.

A cartoonist since his childhood in Kent, Connecticut, MacFarlane graduated from the Rhode Island School of Design. His student film there was an 11-minute bit of animation that would eventually turn into "The Family Guy."

The student film attracted the attention of Hollywood, and MacFarlane immediately joined the Hanna-Barbera animation studio, where he worked on the cartoon series "Johnny Bravo" and "Cow and Chicken." He also worked for Walt Disney Animation as a writer on "Jungle Cubs" and revised his student script to turn it into "Family Guy," which Fox purchased.

Maple Party Puts Fun on Tap on April 19

Fresh and free maple syrup from the Proctor Maple Research Center will flow at the 15th annual Sugar-on-Snow party on April 19 from 11:30 a.m. to 3 p.m. at the Bailey/Howe Library portico.

The event will feature music by Atlantic Crossing, sugar-on-snow and exhibits on maple science and history.

The event highlights the importance of sugaring to Vermont's economy and way of life and revives the circa 1937 tradition of the "Dean Hill Sugar Party." For many students, this is a first taste of real maple syrup and sugar on snow.

Information: 656-4389

NOTABLES

April 13, 2005

Awards and Honors

Two UVM students earned second place among a field of 17 competitors in a research competition at the Society for Engineering Education's New England Conference. Senior electrical engineering major **Richard Ketcham** and **Dov Pechenick**, a junior majoring in microbiology, presented "Elastography Techniques for Computerized Tomography." Their advisors are **Jeff Frolik**, assistant professor of electrical and computer engineering, and Dr. **David Kaminsky**, associate professor of medicine.

Nora Mitchell, adjunct assistant professor of natural resources in the recreation management program of the Rubenstein School of Environment and Natural Resources, has received the George Wright Society Cultural Resources Management Award, one of the organizations four top annual awards. Mitchell was cited "for her many innovations in cultural landscape management and heritage preservation." Mitchell is founding director, since 1998, of the Conservation Study Institute of the National Park Service in Woodstock, Vt. and previously founding director of the NPS's Olmstead Center for Landscape Preservation. The George Wright Society is a national nonprofit association of researchers, managers, administrators, educators, and other professionals who work on behalf of the scientific and heritage values of protected areas.

Four Vermont farms were among the 24 receiving this year's **Northeast Sustainable Agriculture Research and Education** grants as part of UVM's Sustainable Agriculture Research and Education Program. Awards total $138,803. Vermont projects granted are: At Sweetgrass Farm in Hardwick, Jodi Lew-Smith's mustard green seed crop production; David Marchant's matted row strawberries planted as a weed suppressing cover crop at River Berry Farm in Fairfax; a comparison of biodegradable and black plastic mulches at Laura Sorkin's Cave Moose Farm in Cambridge and Mary Whitcomb's educational plan for alternative manure management at the North Williston Cattle Company in Williston.

Publications and Presentations Domenico Grasso, professor and dean of the College of Engineering and Mathematics, opened the Society for Engineering Education's New England Conference at Fairfield University April 8-9 with his keynote address, "Engineering Thought: Oxymoron or Great Challenge."

Ongoing research by **Esther Rothblum** and **Sondra Solomon**, both members of the psychology faculty, and **Kimbery Balsam**, who received her Ph.D. from the program, was featured in an article in the American Psychological Association *Monitor*. The story is available online at 'A Crucial Time' for LGB Research. Another member of the departent, **Mark Bouton**, was covered in the article Fresh Funding for Translational Research in the same issue of the publication.

Jianke Yang, associate professor of mathematics and statistics, was the principal investigator of the study "Necklacelike Solitons in Optically Induced Photonic Lattices." The research was published in the March 25 *Physical Review Letters* journal and described in an article in the April issue of *Technology Research News* magazine.

In Memoriam

Stuart "Red" Martin, longtime friend of UVM's College of Engineering and Mathematics, died April 2 at age 91. He was scientist, mathematician, engineer and founder of the state's first television station. He endowed a professorship,

the Dorthean Chair for Computer Science, in memory of his wife, the late Dorothy Martin.

April 6, 2005

Awards and Honors

A new scholarship fund has been established to honor **Robert Tyzbir**, professor of nutrition and food sciences, for his "outstanding teaching, devotion to the fields of nutrition and dietetics and dedication to the welfare of his students." The Robert S. Yzbir Scholarship Fund will support undergraduate students in the department based on their academic merit and financial need. Donations toward the $100,000 goal are being accepted by development officer Howard Lincoln.

Publications and Presentations

Jane Okech, assistant professor of counselor education and counseling, is making two presentations at the April 6-10 Annual American Counselors Association Conference and Exposition in Atlanta. She is co-presenting a paper titled "A New Model of Group Work Supervision: Empowering Group Work Supervisors by Clarifying Roles, Supervision Foci, and Supervisor Competencies." This paper has also been accepted for publication in the *Journal for Specialists in Group Work*. Okech will also be joining a panel of four Kenyan counselors in a second presentation titled "Voices from Kenyan counselors: HIV/AIDS counseling in Africa."

In Memoriam

Willard Miller, activist and UVM emeritus professor of philosophy, passed away March 31 at Fletcher Allen Hospital after a battle with cancer. He was 64. Miller, who retired in March of this year, began his career in the University of Vermont's philosophy department in 1969. His scholarly interests ranged from Marxism and the history of American philosophy to the philosophy of education and political philosophy to radical ecology and animal rights. During his 36 years, he served as faculty advisor for numerous student organizations, including the Radical Student Union, the Union of Concerned Students, the Gadfly alternative student newspaper, and the Student Political Awareness and Responsibility Collective. Miller was an engaged member of his community, working as an activist in such organizations as the Vermont Veterans for Peace, Burlington Area Draft and Military Counseling, the Green Mountain Fund for Popular Struggle, the Vermont Cuba Committee Haymarket People's Fund, and the Committee in Solidarity with the People of El Salvador.

Jeremy Felt, emeritus professor of history, died on March 8. His career at UVM spanned 39 years, during which time he served as chair of the Department of History, Director of Area and International Studies, and as University Ombudsperson. Felt directed Scandinavian Seminar, a national study abroad program in which many UVM students participated. His commitment to teaching and enriching the lives of undergraduates was recognized when he became the third recipient of the university's George V. Kidder Faculty Award. Professor Felt specialized in United States history, specifically, social reform and the progressive era of U.S. history. His publications include *Hostages of Fortune*, a book on the history of child labor reform in New York.

March 30, 2005

Awards and Honors

Six students in the College of Letters and Sciences were named Academic Programs for Learning and Engagement scholars for the spring and summer. The program is designed to support student-faculty research collaborations and hands-on internships. Scholars may receive $3,000 summer research stipends or up to $500 in project awards. This semester's winners are: **Chelsea Anne Pemberton** for "Beauty, Strength, and Resilience: The Will Power Behind the Woman"; **Dominick Lemas**, "Effects of Modifying PIG-A Gene Expression on Glycophosphatidylinositol-Anchored Proteins in Paramecium tetraurelia"; **Brett Lamonda**, "Effects of Modifying PIG-A Gene Expression on Glycophosphatidylinositol-Anchored Proteins in Paramecium tetraurelia."

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Repairing Radiation Damage

Innovative structural biology project will bring new resources to bear on DNA repair

By Carol Miklos

Article published Apr 13, 2005

DNA dream team: Researchers Scott Morrical, Jeff Bond, Susan Wallace, Mark Rould and Sylvie Doublié (left to right) are pursuing a new project that is bringing multiple methodologies to bear on a crucial genetic question. (*Photo: Gordon Miller/UVM Medical Photography)*

A team of UVM researchers affiliated with the Vermont Cancer Center was recently awarded a five-year, $7.5 million program project grant by the National Cancer Institute. The funding will support a study using biochemical, computational and structural biology methodologies to determine how three families of DNA enzymes repair damage caused by ionizing radiation.

Susan Wallace, professor of microbiology and molecular genetics and program leader of the VCC's Genome Stability & Expression Research Program, secured the award. She says the grant is one of just three program projects funded by the NCI that depend on structural biology. The others are at Stanford University and the University of California, Berkeley. Wallace says that the NCI was especially excited about the Vermont project's use of computational and phylogenetic approaches to look at DNA repair.

"I believe ours is the only biochemistry-crystallography project in the country that is based on a computational approach," Wallace says. "That's the aspect of it the reviewers praised the most. We're ahead of the curve from that perspective and we have Jeff Bond to thank for it. He is a computational biologist with a degree in biochemistry so he truly understands what the rest of us are trying to do. These days, you have to rely on people with specialized talent to push the envelope in our field."

The effort centers on four other core faculty: Jeff Bond, research associate professor of microbiology and molecular genetics; Sylvie Doublié, associate professor of microbiology and molecular genetics; Scott Morrical, professor of biochemistry; and Mark Rould, research assistant professor of molecular physiology and biophysics.

Understanding the repair of radiation-induced damage is important to cancer research for two reasons: radiation is used to treat some cancers and the ability of tumors to repair radiation-induced damage affects patient outcomes. The second is that societal exposure to low levels of radiation is increasing due to exposure to the sun, radon, some medical diagnostic procedures and nuclear waste. Since radiation is a known carcinogen, it is essential to learn how cellular repair systems cope with radiation damage to humans as a result of medical and environmental exposures.

"If we knew how to up the efficacy of some of these repair processes, which is what people try to do when they take anti-oxidants, we might be able to prevent some cancers," says Wallace. "Also, if we could down-regulate the

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Recycling RA's
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Mastitis-Resistant Cow
Collaborating scientists from UVM and the United States Department of Agriculture have, for the first time, produced genetically modified dairy cows resistant to a form of mastitis, the widespread and painful bacterial infection of cows' udders that is difficult to control with antibiotics.

repair process to make it less effective, we'd make radiation therapy for cancer patients more effective. You see, when an individual has a tumor and is being treated with radiation therapy, doctors don't want repair to be working! So our research, though very much in the basic realm, can be helpful in two very different ways related to cancer."

Digging into DNA repair

The program project will explore the two types of repair systems that fix the DNA damage caused by radiation: base-excision repair, which removes damaged bases, and repair by homologous recombination, which repairs double strand breaks (the defects in individuals carrying BRCA1 and BRCA2 gene mutations associated with hereditary breast cancers).

The researchers will focus on the HhH-GPD Nth superfamily of DNA glycosylases, the Fpg/Nei family of DNA lycoslyases, and the RecA family of recombinases. These particular enzymes were chosen for study due to their high degree of conservation across the animal kingdom.

They will organize their efforts through a program project comprising three complementary projects and three supporting “cores.”

Wallace will steer Project 1, "Specificity of the BER Oxidative DNA Glycosylases," and Doublié is the leader for Project 2, "Structural Basis for the Substrate Specificity of the BER Enzymes”; both will study base-excision repair processes. The second type of DNA repair will be studied in Project 3, "Structure and Function of Homologous Recombination Enzymes," with Morrical as the leader and Rould serving as senior investigator. A “bioinformatics core” led by Bond; an “expression, characterization, and crystallization core” led by Doublié; and an “administrative core” led by Wallace will support all three projects.

Project 1 is primarily biochemically oriented: proteins will be cloned, expressed, purified, and characterized. In Project 2, scientists will use x-ray crystallography to attempt to determine the three-dimensional structures of particular proteins that showed promise in Project 1. Those that can be crystallized will be analyzed for their unique DNA repair specificities. The third project aims to look at recombination proteins using similar biochemical, computational, and structural approaches.

"A key goal of this project is to capture an atomic-resolution image of a RecA-DNA complex," says Rould. "That's the Holy Grail of the recombination field."

Rould says that Project 3's recombination studies have the potential to inform cancer understanding in additional ways. Besides repairing genetic damage, genetic recombination is the primary means by which bacterial and cancer cells acquire resistance to treatment such as chemotherapy. When cancer cells are challenged with a new drug, they respond by increasing the rate with which they mix-and-match portions of their genes in an effort to produce new enzymes that will counter the chemical assault. This genetic swapping is itself carried out by enzymes called recombinases, which are the engines of change and evolution at the molecular level.

"One of the goals... is to understand – actually, to see – how the recombination machinery exchanges DNA between similar, but not identical strands," says Rould. "Once we know how this works, we'll be better poised to control it, perhaps leading to the development of a new class of pharmaceuticals that will prevent tumors from 'escaping' current treatments."

For more information and images, see the spring issue of the Vermont Cancer Center’s Innovations research publication, from which this article was adapted.

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Recycling RA's

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By Jon Reidel
Article published Apr 13, 2005

Student eco-rep Tori Jones (left) sorts residence hall garbage during an investigative "trash sort" with help from program founder Erica Spiegel. *(Photo: Debra Perry)*

The messy job of sifting through dormitory trash reveals much about the habits of students. Although some of these revelations are best left unspoken, a March 7 "trash sort" by the Office of Recycling and Solid Waste revealed that many students aren't getting the message that recycling is good for the environment, can save the university and potentially their parents some money and will bolster UVM's reputation as the environmental university.

Erica Spiegel, manager of recycling and solid waste, says the project is one of many initiatives carried out by the Eco-Rep Program, a fledgling effort she started to promote environmentally responsible living in residence halls. The idea is to train and place peer teachers called eco-reps, who function like "environmental RA's." Since it began last spring, the program has placed eco-reps in 16 residence halls to teach students how to recycle, compost, and conserve water and electricity.

If the initiative can change student behavior, it will pay off environmentally – and financially. Take the trash sort, which involved taking 15 randomly selected bags of trash from dumpsters outside living areas and separating their contents into 12 categories (glass bottles, recyclable paper, food waste, etc.) The analysis showed that of the 271 pounds of trash, almost half of it could have been recycled. Sorters found liquid waste in many of bottles and cans that were found, for example, accounting for almost 10 percent of the total weight. Given the university's annual waste stream of 1,800 tons per year, 172 of those tons project as liquids. So at a cost of $89 per ton, the university is paying over $15,000 (about the cost of in-state tuition and room and board) in landfill fees to dispose of leftover drinks.

The report went on to conclude that, assuming the trash sort is representative of average student waste, the university, which pays annual tipping fees for approximately 880 tons of waste generated by residence halls, could save about $30,000 a year if students properly composted and recycled.

Changing attitudes
Statistics like these aren't surprising to Spiegel, who sees the waste on a daily basis. Changing them remains a challenge; it's been hard to get the message out to students why recycling, water conservation, composting and other forms of conservation are relevant to their lives and the university. Enter the eco-reps.

"What we've done in the past hasn't worked," says Spiegel, who launched the program with Gioia Thompson, coordinator of the Environmental Council. "There's a disconnect between the environmental mission of the university and individual student behavior. We want to be the environmental university, and I think that means more than offering environmental courses and conducting

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research. Where a student lives and how they live is part of this effort."

Eco-reps have varied backgrounds and majors but tend to share a passion for environmental stewardship. They work four hours a week for $7.50 per hour and are responsible for educating students in their dorms, attending planning meetings and producing one long-term project. A light bulb swap resulted in the converting of more than 500 incandescent bulbs to compact-fluorescent lights. The exchange in Harris-Millis and Christie-Wright-Patterson will save 73 kilowatt hours per day and about 26,000 kWh per year, resulting in an annual savings of approximately $2,660.

Other projects include a recycle bin audit; organizing a monthly environmental film night; publishing a regular column in the *Vermont Cynic*; and conducting student attitude surveys about public transportation and other topics. Debra Perry, a graduate student hired this year to coordinate the program, says the surveys help to understand how students think about recycling. Despite being given biodegradable composting bags, for example, many students don't use them because it's inconvenient or because they smell.

"We try to put out a new message each week," says Perry. "It could be to turn off your computer or something. We try to go door-to-door to talk with people because I think peer-to-peer and face-to-face contact is key to getting a message across. It's also important that we keep in contact and form a network with other departments like residential life."

Combating apathy

Many eco-reps say that although education is a big part of their job, trying to motivate students to put what they've learned into action is the hardest part of their job. "Apathy will always be our biggest enemy," says first-year student Kesha Ram. "The really frustrating part of the job is that a majority of students will only do things like recycle or turn off the lights if it's of the utmost convenience. But the more you educate, the better things get."

Even still, most eco-reps believe that the program, one of only a handful in the nation, has a strong future if it receives the necessary support from other departments. Spiegel envisions Residential Life taking over the hiring and payroll aspects of the program, while she and the coordinator can focus on the program content.

"The future of this program is bright," says sophomore Will McHale, an eco-rep at Wright Hall. "Eco-reps provide the on-campus community with educational information, and listen to students' responses to campus efforts to conserve. These responses provide Physical Plant with vital information that enables it to more effectively organize its efforts to minimize environmental impact and maximize convenience and efficiency."

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New Genetically Modified Cow is Resistant to Mastitis Strain

By Cheryl Dorschner
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Jersey girl: UVM researchers created a modified gene that USDA scientists implanted into cow embryos, creating animals more resistant to a strain of mastitis. The cow shown here, GEM, appears to be immune to the bacteria. (*Photo: Stephen Ausmus/USDA*)

Collaborating scientists from UVM and the United States Department of Agriculture have, for the first time, produced genetically modified dairy cows resistant to a form of mastitis, the widespread and painful bacterial infection of cows' udders that is difficult to control with antibiotics.

David Kerr, assistant professor animal science, and Robert Wall, principal investigator and USDA animal physiologist, and colleagues published their results in the current issue of *Nature Biotechnology*.

In his UVM lab, Kerr produced the modified gene that enables animals to produce a naturally occurring enzyme, lysostaphin, in their milk. Kerr sent the gene to the USDA in Beltsville, Md., where Wall's group inserted the gene into Jersey embryos. So far, five transgenic cows and one bull carrying the lysostaphin gene have been produced. Among these, three cows underwent testing; all showed resistance to *Staphylococcus aureus*, and one never became infected. Fourteen percent of the mammary glands of transgenic cows were infected compared to a 71 percent rate of infection in nontransgenic cows in the experiment. Lysostaphin in the cows' milk breaks down the cell walls of the *S. aureus* bacteria, a major cause of mastitis.

"This is an important step toward helping dairy farmers," says Kerr. "Every year, U.S. farmers lose $2 billion to mastitis in discarded milk, veterinary costs and the like. This approach could cut that substantially. This research also addresses two other issues: current reliance on antibiotics and cattle welfare – this is a painful infection for cows." Since the disease is difficult to cure with antibiotics, it is often controlled by removing chronically infected cows from the herd.

A promising avenue
Although lysostaphin does not kill all mastitis-causing bacteria, these results suggest that it might be possible to control other harmful bacteria in dairy cattle with different antibacterial genes.

"This research is an important first step in understanding how genes can be used to protect animals from disease," says Edward Knipling, administrator of USDA's Agricultural Research Service.

As with milk from cows with mastitis or receiving antibiotics, milk from these genetically modified cows is not approved for human consumption. Use of milk containing lysostaphin would require federal regulatory approval after food-

Repairing Radiation Damage
A team of UVM researchers was recently awarded a five-year, $7.5 million program project grant by the National Cancer Institute. The funding will support a study using biochemical, computational and structural biology methodologies to determine how three families of DNA enzymes repair damage caused by ionizing radiation.

Recycling RA's
The messy job of sifting through dormitory trash reveals much about the habits of students, and proves that many simply aren't getting the message about recycling. Enter the eco-reps, an expanding peer-education program that aims to make residence hall life more environmentally sound.

safety testing. This effort is at the early stages of research and development.

"This is a milestone for UVM and puts us in the forefront among research institutions," says Rachel Johnson, dean of the College of Agriculture and Life Sciences. "Our partnership with USDA contributes immensely toward the health of cows, potentially saving billions of dollars in dairy farmer costs and moving scientific inquiry forward."

"It was brilliant of UVM provost and animal scientist John Bramley to recognize this staph bacteria's potential a decade ago," says Thomas McFadden, associate professor and interim chair of the Department of Animal Science. "His and others' research paved the way for this significant accomplishment. David Kerr has carried on and improved that initial work to bring it to recognition by one of the top journals in the field."

Future studies, Kerr says, will include developing similar defenses against other pathogens that affect dairy cattle and gauging milk's ability to effectively produce dairy products, such as cheese and yogurt.

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