

Bulletin of the

CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING



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Activities of the Academy

Following is a list of the most recent major reports of the Academy. Reports are available for a nominal fee from the Academy office or web site; executive summaries of the most recent reports are available on the Academy web site at www.ctcase.org.

"A Study of Railcar Lavatories and Waste Management Systems" (2004)

"Study Update: Bus Propulsion Technologies Applicable in Connecticut" (2003)

"A Study of Fuel Cell Systems" (2002)

"A Study of Bus Propulsion Technologies Applicable in Connecticut" (2001)

"Study of Radiation Exposure from the Connecticut Yankee Nuclear Power Plant" (2000)

"Efficacy of the Connecticut Motor Vehicle Emissions Testing Program" (2000)

"Indoor Air Quality in Connecticut Schools" (2000)

"Efficacy of MTBE Use in Connecticut" (1999)

"Radon in Connecticut: Quantitative Perspectives about Effects on Public Health" (1998)

"Building Agricultural Biotechnology in Connecticut" (1997)

"Status of Connecticut Critical Technologies" (1997)

"Evaluation of Critical Technology Centers" (1996)

Advances in Forensics Provide Creative Tools for Solving Crimes

Forensics — the application of science to matters of law — has made great strides in Connecticut in recent years. The state has gained visibility in the field through the work of the Connecticut State Police Forensic Science Laboratory and the Henry C. Lee Institute for Forensic Science at the University of New Haven.

Dr. Henry C. Lee, who established the institute at the University of New Haven and later headed the state police forensic laboratory, has been in the forefront of the advancement of forensic science for many years. Currently, he is Chief Emeritus for the Connecticut Division of Scientific Services and a professor at the University of New Haven.

The Henry C. Lee Institute for Forensic Science, which he established in 1975, established a National Crime Scene Training Center last year. The facility is putting Connecticut on the crime-fighting map by teaching crime scene analysis to attendees from all over the country.

Standardizing Procedures

The Institute works to standardize the procedure for collecting and analyzing evidence from crime scenes. "There are many cases that were not solved because evidence at the scene was not properly recognized, preserved or collected," Dr. Lee says. "Standardizing crime scene procedures can prevent this kind of problem."

Dr. Lee presented the keynote address — "Forensic Science: Using Technology to Solve Crimes" — at the 29th Annual Meeting and Dinner of the Connecticut Academy of Science and Engineering on May 25, 2004. An Academy member himself, Dr. Lee addressed a capacity crowd of more than 200 guests, including newly elected members of the Academy, student science competition winners and their families, state officials and Academy members.

(See Forensics, page 2)

News from the National Academies

The following is excerpted from press releases of the National Academies and from *Infocus Magazine*, a news resource of the National Academies, which can be found online at www.infocusmagazine.org.

◆ Indoor Mold, Dampness Linked to Asthma, Respiratory Problems

Scientific evidence links mold and other factors related to damp conditions in homes and other buildings to asthma symptoms in some asthmatics as well as to coughing, wheezing and other upper respiratory tract symptoms in otherwise healthy people, according to a new report from the Institute of Medicine (IOM). The report also concludes that while available evidence does not meet the strict scientific standards needed to establish a clear, causal relationship between either interior dampness or mold and the wide range of other health complaints that have been ascribed to them, the possibility of a link cannot be ruled out.

Given the frequent occurrence of moisture problems in buildings, excessive indoor dampness should be addressed through a broad range of public health initiatives and changes in how buildings are designed, constructed, and maintained, the report recommends.

Excessive dampness influences whether mold as well as bacteria, dust mites, and other such agents are present indoors. Moreover, wetness may cause chemicals and particles to be released from building materials. The report notes that little information exists on the toxic potential of chemicals or particles that may be released when building materials, furniture, and other items degrade because of wetness, and recommends that current animal studies of short-term, high-level inhalation exposures to microbial toxins be supplemented with new research that evaluates the effects of long-term exposures at lower concentrations.

(See National Academies, page 7)

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Special thanks to these organizations for sponsoring tables at the 29th Annual Meeting and Dinner on May 25, 2004: BEACON (Biomedical Engineering Alliance & Consortium); Coherent-DEOS; Gerber Scientific, Inc.; Pratt & Whitney; University of Connecticut School of Engineering; and Yale University.

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Forensics (continued from page one)

Research is ongoing into DNA analysis, biological evidence, arson and cyber crime. Work is underway to develop low-cost teleforensic technology, using commercially available products, to transmit high-quality images and data from a crime scene to a police laboratory in real time for quick analysis.

Computer Evidence

At the state police computer crime and electronic evidence center, established in Meriden in 1999, police mine narcotics dealers' hard drives for records of their transactions, and they examine the e-mail correspondence of murder victims to uncover motives and identify suspects.

Sgt. Joseph Sudol, commanding officer of the computer crime operation, says, "Today, police look for computer evidence in every type of crime, from homicide to fraud. We have software and hardware technology that enables us to look at the hard drive in a forensic way. We can recreate deleted files and recover instant messaging chats."

In a noteworthy case solved by computer technology, two young girls were sexually assaulted in Hartford four years ago and the perpetrator video-taped the crime and broadcast it on the Internet. The Navy spotted the tape at a military base in Japan and notified the National Center for Missing and Exploited Children. Audio- and video-enhancement technology showed that the crime occurred in Connecticut. The state police identified the victims and the room where the assaults occurred – and arrested a suspect, who has been awaiting trial.

DNA Analysis

When it comes to analyzing evidence, perhaps the greatest advance in forensic science was the introduction of forensic DNA analysis in 1985. Since then, the analysis of DNA has evolved from a laborious process taking weeks or even months to a procedure that can be completed in a matter of two days.

"Since this breakthrough in the 1980s, innovations and new applications have occurred with breathtaking speed," Dr. Lee says. "Advances in miniaturization and microchip technologies have been combined with the analytic techniques of DNA analysis to give us impressive new capabilities. Using DNA analysis and other technologies, police are less dependent on traditional crime-solving methods, such as interrogating suspects, talking with informers or relying on witness identification."

Initially, DNA samples that were small or degraded were beyond the reach of DNA-typing techniques. Over time, however, new technologies have made it possible to test older and smaller samples. Now, a revolutionary process called polymerase chain reaction, or PCR, permits the faithful reproduction of small amounts of DNA. PCR makes it possible to use the DNA from a coffee cup or even a single hair root to produce the larger volume of DNA needed to conduct a test. Even saliva found on the back of a licked postage stamp can provide enough genetic material to conduct a sophisticated DNA test.

Data Mining

Databases, such the Combined DNA Index System (CODIS) and the Automated Fingerprint Identification Systems (AFIS) help crack cases that would have been unsolvable a few years ago. And computer science is enabling police to collect evidence from e-mail and other digital files.

(See Forensics, page 8)

IN BRIEF

Science and Engineering Notes from Around Connecticut



Business & Industry

ROCKS TO WORK. Loretta Kamzik put her lifelong love of geology, her career marketing skills and her experience as a mother together to create her own company, called **Canyon Cave**. It's a birthday business in Milford that delights and excites children as they learn about rocks. The centerpiece of the business is a cave replica where kids dig through sand for real fossils, minerals, crystals and gems. The cave is dark except for lights shining from each child's hardhat and has real cave sound effects. "What I'm trying to do is get the kids to understand that geology is part of the Earth; it gives us food and fresh air," said Kamzik. Her approach must work because kids keep coming and Kamzik is currently looking into franchising her business.

BIT PARTS ADD UP. A company in Killingly called **Rogers Corp.** makes big profits by making little parts for a lot of different companies, for example, foam gaskets for Nokia OYJ cellphones, circuit boards for Siemens AG cellphone towers, and a noise control circuit for EchoStar Communications satellite TV dishes. The company's sales and earnings are up 90% in the last year. Chief executive **Walter Boomer** said the company's success is a testament to its focus on cutting expenses before the economy slowed down, while maintaining research and development because new products are the "back bone" of the company.

BIOTECH FIRST. As the state begins its 2004/2005 budgeting process, **CURE (Connecticut United for Research Excellence)** will be fighting for legislation that will lure biotechnology companies to Connecticut. "The research and development tax credit for technology companies," said CURE president and CEO **Paul Pescatello**, "has the greatest effect on CURE members." CURE is advocating that the tax credit, which is up for debate annually, be made permanent. Other focal points are a \$100 million seed fund that would help spin off startup companies from research at universities and a tax rebate that would result in additional training for employees.

BIG PLAN. **Wesleyan University** has unveiled an ambitious 10-year plan that will bring together the different communities on campus and make it fit better with **Middletown**. The intent is also to make Wesleyan more competitive in film and the sciences, as well as improve parking. A \$5.6 million film studies center will soon be complete, followed by a new university center in 2005. Later, the plan calls for an \$84 billion molecular and life sciences building with laboratories and classrooms as well a museum that would house archaeological materials, Asian objects and other collections.

BETTER ID. According to psychology professor **Jennifer Dysert** at **Southern Connecticut State University**, the old familiar line-up seen in many police shows is flawed. Dysert, together with **Rod Lindsay**, a world expert in eyewitness identification, have been working on alternatives designed to protect the innocent and decrease the many false guilty convictions associated with the line-up. One promising technique is called, "multiple independent identification" in which a witness identifies a suspect in four separate ways: by face, body, clothing and voice.



Communication

CT-MADE MAKEOVER SHOW. The most California of shows, **Extreme Makeover**, is actually produced in **Stamford**,

Connecticut by the award-winning team of **Lou Gorfain** and **Charles Bangert**. All surgery and filming, however, are done in California. Once the shows have been filmed, they are transferred via satellite to Connecticut for digital editing and then back to California. In addition, Bangert spends several months each year in Hollywood overseeing camera teams. The two local producers were tapped for the job because of their outstanding work on an earlier reality show, "Houston Medical."

COURSE CREDIT INFO ONLINE. Thanks to a newly enhanced university web site, prospective students at **Southern Connecticut State University** can find out which credits will transfer from other schools and what classes may be waived as a result. The new web feature will help community college students (who will eventually come to Southern) plan their courses wisely. It will also allow university professors to view their entire department's transfer equivalents with one click of the mouse.



Education & Cognition

UNIVERSAL PRE-SCHOOL. According to the state **Board of Education**, momentum is already building for universal pre-school in Connecticut. So it was very timely to have **David Lawrence**, the retired publisher of the *Miami-Herald* recently turned advocate for early childhood education, on hand to kick off the **Community Foundation of Greater New Haven's First Year** campaign. The campaign seeks to raise 20 million dollars over the next 10 years dedicated to improving educational programs for kids, from birth to age 5. As keynote speaker, Lawrence countered concerns about costs with studies showing that for every dollar spent on early childhood education, \$7 are saved in future costs of special education, remediation or incarceration. He also quoted a study that showed that one in four students enters grade school totally unprepared and, in Lawrence's words, already feeling like a failure by first grade.

ADULT ED TRANSFORMED. With a three-year, \$380,000 federal grant to power its transformation, **Middletown** adult education is using cutting edge technology to reach its students and make coursework come alive. A recent open house showcased networked computers, streaming video, teleconferencing, electronic white boards, projectors and interactive software. In the virtual science lab, interactive software and a white board display a pulsing heart on an overhead screen. Teleconferencing expands coursework to branches and even to isolated students in their home. More than anything else, it's the introduction to the tools of the modern workplace that provides lasting value. Said instructor **Lisa Schuerholz-Winters**, "Even if students have no computer at home, they leave here familiar with technology, job skills and confidence."

RELIGION MEETS SCIENCE. At **Yale University**, two often disparate disciplines, science and theology will come to the same table, as part of a new initiative called "**Religion, Science and Technology**." As knowledge is acquired at lightning speed, "there are vexing moral issues about genetics and technologi-

Items that appear in the In Brief section are compiled from previously published sources including newspaper accounts and press releases. For more information about any In Brief item, please call the Academy at (860) 527-2161, write the editors at 179 Allyn St., Suite 512, Hartford, CT 06103-1422, or email us at acad@ctcase.org

IN BRIEF

Science and Engineering Notes from Around Connecticut

cal advances,” said **Wesley D. Avram**, assistant professor at **Yale Divinity School**. The first step is for both groups to learn about each other. Then and only then can they begin to solve common problems.

TECH-ED PARTNERS. In **Portland**, a high school project in which students build and attach metal flags to identify fire hydrant locations, allowing the hydrants to be easily found at night or in deep snow, provides real life work experience for the students — and provides the town with a service that otherwise would cost thousands of dollars. Students are able to learn about and use sophisticated global positioning satellite gear to find the hydrants. For 13 years, Portland’s tech-ed partnership between the school system and the town has provided students with valuable skills as well as the experience and satisfaction of community service.

CT WOMEN INFO PACKET. The **Connecticut Women’s Hall of Fame**, with a grant from **Lincoln Financial Group**, is offering schools a free resource packet that hopefully will encourage teachers to incorporate women’s history into their curriculum. The material includes trading cards, posters and a teacher’s resource guide that highlights each inductee into the Hall of Fame and explains her connection to Connecticut. The inductees represent a number of fields such as medicine, astronomy, government, politics and journalism, and include the first female ambulance surgeon in the world (Emily Dunning Barringer) and the first female professor at the Harvard Medical School (Alice Hamilton).



Energy

NEW ENERGY CENTER. A recent ceremony with students and staff marked the opening of a new energy center at **Southern Connecticut State University**. The center is the cornerstone of a campus-wide commitment to practice energy conservation and reduce energy costs. With this more efficient heat and power generating system, The school has used 1,000 fewer gallons of heating oil per day and saved \$28,000 per month. It can distribute three times more electricity and four times more heat. And, in case of power outage, its seven residence halls as well as its dining hall will have backup power.

FUEL CELL ADVOCATE LANDS POST. A staunch advocate for the development of fuel cell technology, **US Rep. John Larson** has landed a leadership post on the congressional panel that oversees government research on just that topic. Several world-class fuel cell manufacturers and a leading research center are in Larson’s district. According to Larson, fuel cells will allow us to wean our nation off foreign oil and reduce rates of environmental pollution. Larson has introduced legislation that, if passed, would authorize more than \$1 billion to be spent on fuel cell research.

INVESTING IN GREEN ENERGY. Across Connecticut, a growing number of utility customers are paying extra for “green” — or renewable — energy like windmills, biomass, and solar, even though there isn’t a direct supplier in the state. The purchasers pay for and get their energy from traditional utilities but they pay an extra amount (through certificates) to help subsidize putting renewable energy, which costs more to produce, into the power grid somewhere in the country. Hopefully this investment in the future will help renewable energy become more competitive and reliable.

CELL CENTER VISIT. The **Connecticut Global Fuel Cell Center**, on the **University of Connecticut** campus, opened its doors to a busload of ninth graders from the **J.A. Foran High School** in Milford.

The center hopes to acquaint students with fuel cell technology and teach them to appreciate fuel cells as a renewable energy source. Although fuel cell technology is a complex topic, young people seem to connect with the subject because of their experience with cell phones and other electronic devices, all of which require recharging on a regular basis.



Environment

TICKS AND LYME DISEASE. The **Connecticut Agricultural Experiment Station** identifies ticks submitted by citizens. Under supervision of entomologist and Academy member **Louis Magnarelli**, The Station also tests ticks submitted by community health departments for Lyme disease. About six thousand ticks are tested annually. During 2003, thirteen communities from Greenwich in the west, to Guilford in the east and Torrington in the north each submitted more than 100 ticks. The percentage of infection in the thirteen communities ranged from 27 to 36%. The rate of infection varies widely, but statewide, the overall percentage of infection crept up from 24% in 1999 to 31% in 2003.

MORE THAN TOYS. A robotic dog, programmed to sniff out toxic materials at former landfills and radioactive sites, can now provide environmental information about parks, schoolyards and other public spaces. Designed by **Natalie Jeremijenko**, an engineering lecturer at **Yale University**, the robotic dogs have already helped uncover arsenic and other pollutants near a school in **Hamden**. They have also spurred other toxic search projects in the United States, Europe and Australia.

LOBSTER MYSTERY. Although they don’t have the answer yet, scientists studying the 1999-lobster decline in **Long Island Sound** are closing in on likely causes. The culprit(s) is either a pesticide used to kill mosquitoes carrying the West Nile virus, any one of four industrial chemicals found in the tissue of healthy lobsters, or warmer than usual 1999 temperatures. “Mother Nature did not deal this [lobster] population a good hand,” said **Penny Howell**, a biologist with the state **Department of Environmental Protection** who is in charge of Connecticut’s lobster study.

GLOBAL WARNING. “This book is a wake-up call,” said **James Gustave Speth**, dean of **Yale’s School of Forestry**, about his recently published book, *Red Sky at Morning: America and the Crisis of the Global Environment*. Because many local problems have been solved, public concern about the environment has declined. Yet the global community has hardly touched the most ominous worries, like habitat destruction, ozone depletion, climate change, and acid rain. Speth outlines eight ways to save the environment and challenges the United States to lead the way before it’s too late.

DINOSAUR SURVIVOR. Not all dinosaurs became extinct at the end of the Cretaceous Period, said **Jacques Gauthier**, curator of paleontology at **Yale’s Peabody Museum** and an expert in dinosaur evolution. “One group survived; we call them birds.” Convinced by discoveries of feathered dinosaur fossils in China as well as mounting evidence of behavioral similarities such as building nests, laying eggs and singing, virtually all paleontologists now agree that birds are a kind of dinosaur.



Food & Agriculture

ERRANT CORN POLLEN. Genetically engineered corn has raised two questions. First, will pollen drift outside the field onto

IN BRIEF

Science and Engineering Notes from Around Connecticut

other plants where a biological insecticide engineered into it might kill butterfly larvae? Second, will drifting pollen carry any engineered genes to pollinate other corn varieties accidentally? To answer these questions, Academy member **Donald Aylor** of **The Connecticut Agricultural Experiment Station** in New Haven has applied expertise earlier gained by studying the drift of plant disease spores. Besides factors of aerial turbulence, the changing shape and viability of the pollen carried from tassels enter the modeling and prediction of pollen dispersal. By reducing the airborne supply of pollen reaching and fertilizing silks, pollen trapping by foliage also affects effective pollen dispersal.

ALL IN THE FAMILY FARM. Situated where the **Pawcatuck River** flows into the Sound, the **Davis** family farm is celebrating its 350th anniversary as the oldest working farm in Connecticut, still in the same family. Crops have been grown on the farm every season since 1654. Now its mainstay products are salt hay, small vegetables and eggs from 200 hens. Hoping to preserve the site rich with family farming tradition, heirlooms and Native American artifacts, current owner **John W. Davis** is working to establish an historical museum on the 400-acre property.

YEAR-ROUND GROWING SEASON. Over twenty local farmers are now using greenhouses to extend the growing season and enable year-round production. In **New Britain**, for example, **Urban Oaks Organic Farm** owners **Tony Norris** and **Mike Kandefer** were busy harvesting salad greens and tending rosemary bushes this winter in a warm and humid plant-friendly environment. Although local restaurant chefs are already on board, the average person still has a hard time believing they're eating Connecticut produce when snow is on the ground.

THE NEW BEEF. Buffalo meat, according to **Tim Suchocki**, who keeps a herd of 50 buffalo on his **Preston** farm, is ready for a surge in popularity. That's because it has less fat, less cholesterol and fewer calories than beef and so far is not plagued by health issues like mad cow disease. Suchocki says his meat is organic, since the herd eats only hay and corn grown on his farm. Last year he began selling bison meat from his new retail shop, the **Bison Brook Farm Market**. "It's the fresh taste of the American West," he added.

CONNECTING APPLES TO KIDS. With obesity and nutritional disease in children reaching crisis stage, the state **departments of Agriculture and Education** held a forum at **West Haven High School** recently to spread the word about a little used "Farm to Cafeteria" program, designed to bring local fresh fruit and vegetables into school cafeterias while increasing business for state farmers. The departments invited 200 school lunch directors and just as many farmers to the forum to discuss the "cost and freshness" benefits of the program, find out what each side needs and entice more school districts to join in.



Health

HEART SUCCESS. Despite its dire name, heart failure can often be treated successfully. Although mainly a disease of the elderly, younger people can have it too. **Stuart Katz**, director of **Yale-New Haven Hospital's** heart failure and transplant program, cites 55 as the average age for people treated for heart failure. With early detection, a number of remedies are proving effective, including drug treatments, like ACE (Angiotensin-converting enzyme) inhibitors, which protect heart cells, and beta-blockers, which blunt the toxic impact of adrenaline on the heart. A new

drug, epleronone, is designed to help people who have already suffered a heart attack. For mechanical heart defects, there are new kinds of pacemakers and defibrillators that can restore or maintain normal heartbeats. Some day, there may be permanent corrective implants or implanted stem cells that regenerate heart muscle. But according to Katz, the best method is to "avoid heart failure by preventing coronary heart disease and high blood pressure."

GOOD NEEDLES. Last month, a 14-year old cancer patient at the **Connecticut Children's Hospital in Hartford** became one of the first children in the state to experience acupuncture within the walls of a high tech oncology clinic. Remarkably, the relief it provided was greater and lasted far longer than the morphine he had been taking previously. The treatment came at the suggestion of his physician, **William Zempsky**, who had recently completed a 300-hour acupuncture course for physicians. Although the 2,500-year-old Asian practice has been used in adult medical care for some time, treating children with acupuncture is a much newer phenomenon. Many had thought kids wouldn't take to it because of their fear of needles. Not the case, found Zempsky. He would like to see acupuncture used for other conditions that plague children, such as migraines, sickle cell disease, chronic abdominal pain, chronic fatigue syndrome and fibromyalgia.

BRAIN SHOCK. Deep brain stimulation has finally entered the mainstream of Parkinson's treatment, although doctors can't tell patients why it works — or why it sometimes doesn't work. For this procedure, doctors implant electrodes deep in the brain, where they short-circuit or block the signals that can cause debilitating tremors and even complete immobilization. According to **J. Antonelle de Marcaida**, director of the movement disorders program at the **University of Connecticut**, "Trials have shown that 8 out of 10 patients do show improvement that lasts more than 5 years;" but she added, "it doesn't work for everyone... and it doesn't cure the disease." Some scientists believe that electrical stimulation affects the release of neurotransmitters that compensate for the lack of dopamine, essential for many muscle movements. Others maintain it resets abnormal electrical signals in the brain.

ESTROGEN AND STRESS. According to a **Yale University** study, high levels of estrogen may enhance the body's reaction to stress, possibly providing a clue to why stress-related mental illnesses, such as depression and post-traumatic stress disorder, occur twice as often in women as in men. The study, which was conducted with rats, confirmed that without stress, males and females performed at the same level. With high stress, both male and female rats made mistakes. But when moderate stress was introduced, female rats became more impaired than males, but only when they were producing high levels of estrogen. "The discrepancy appears in puberty, continues through childbearing years and then declines in postmenopausal years," said **Rebecca Shansky**, a neurobiology graduate student and lead author of the study.

DIETARY LINK TO CANCER. There may be a link between consuming foods high in animal protein, saturated fat, eggs and dairy and an increased risk of non-Hodgkin's lymphoma (NHL), a cancer that attacks the lymphatic system, according to a recent **Yale University** study. Published in the *American Journal of Epidemiology*, the study also showed that diets high in dietary fiber helped to reduce the risk of NHL. "The antioxidants found in vegetables and fruits may reduce risk by about 40 percent," said principal investigator **Tongzhang Zheng**, associate professor of epidemiology and environmental health at **Yale School of**

IN BRIEF

Science and Engineering Notes from Around Connecticut

Medicine. So far only Connecticut women diagnosed with NHL have been included in the study, which was conducted between 1995 and 2001.

JUNIOR HEALTH CLUBS. First, it was hopscotch on the playground. Now, at **Velocity Sports** in **Trumbull**, it just might be plyometrics, a training program that uses jumps to increase speed and power. The decline of after-school outdoor play, the popularity of the Internet and the rising rate of childhood obesity have fueled a new growth industry — fitness and training programs for children. Health club memberships for kids are up, attracting those whose parents are trying to make sure they have a bare minimum of activity or young athletes who are trying to get an edge up on their teammates. Said **Doug Fechter**, business director of the newly opened Velocity Sports, a franchise with 15 centers nationwide, “the myth is that athletic skills are something you are born with or not and there’s not much you can do about it.”



High Technology

TOOLS FOR SAFETY. Through a recent Homeland Security grant, the **Hartford Fire Department** will be purchasing technology tools that promote better safety for firefighters and residents. An upgraded “automatic vehicle locator” system will show the progress of each fire truck on a computer map. Each truck will have a laptop computer that will locate the fastest way to an emergency. A radio on each fireman’s helmet will allow continuous communication, and a new computer program will provide up-to-the-minute aerial photos so firemen know what to expect when they arrive.

WALL STREET SIMULATOR. “This is a resource unmatched by any business school in the state,” said **Mark Thompson**, dean of the **Quinnipiac School of Business**, about their new student **Financial Technology Center** in Hamden. The center has 31 workstations that allow students to access real time financial data, practice analytical finance methods, conduct trading simulations, analyze economic databases and develop financial models. Professors are currently teaching seven undergraduate and two graduate courses in the center. Student reaction has been very positive.

STUNNING TASER. Half the state’s police departments have chosen an upgraded taser gun as the preferred way to stun and subdue combative suspects. More departments are expected to follow. Although cruder models were available in the 1990’s, few policemen used them. “The old technology,” said **Glastonbury** police lieutenant **Jay Kehoe**, who recently trained 40 officers to use the new tasers, “did not work in the cold.” The new model can penetrate winter clothing. It can immobilize a 200-pound person in a second. Even so, its jolt is only temporary. Police hope the new taser will reduce injuries and prevent tragedies.

NEW BODY IN SPACE. Using a specially constructed detector mounted on a 48-inch-diameter-telescope at the Palomar Observatory in California, NASA and a team of researchers from the California Institute of Technology, **Yale University** and Gemini Observatory have reported the discovery of a distant object. Unofficially named Sedna, it’s nearly the size of Pluto and more than 3 times as far away. Said Yale physicist **David Rabinowitz**, “In reviewing the whole sky, we are finding some very big objects.” The camera used by the team is one of the largest ever built.

LEAN MACHINES. Approximately 50 small and medium sized Connecticut manufacturing companies will participate

in a project, funded by a \$350,000 federal grant, to initiate lean manufacturing practices. These companies will learn how to cut waste to boost productivity and lower the cost of goods and services. “By providing opportunities to implement new manufacturing practices, this grant allows companies the chance to boost productivity, and in turn, further increasing their competitiveness in the marketplace,” said state **Department of Economic and Community Development (DECD) Commissioner James Abromaitis**. Under the direction of the **Governor’s Competitiveness Council** and administered by DECD and **CERC** (the **Connecticut Economic Resource Center**), the project is part of a \$1.2 million initiative funded by the US Economic Development Administration and matching state and private investments.



Transportation

RETURN OF THE JET. After an eight-year absence, commercial jet service is returning to **Tweed-New Haven Regional Airport**. Beginning in May, Comair, a subsidiary of Delta Air Lines, will run three daily roundtrip flights to Cincinnati, where passengers can connect to more than 125 domestic and international locations. **Bruce Alexander**, **Yale University** vice president for New Haven and state affairs, said all the effort by city, airport and business leaders to land Delta was worth it because this is “about the future prosperity of our city.”

AIRPORT MASTER PLAN. According to airport officials at **Bradley Field International Airport**, public input is vital to the shaping of the airport’s master plan, which must be updated every 10 years. That’s why when its time for an update, public workshops are held for interested citizens and the business community. In April, members of the **Master Plan Consultant Team** were on hand to discuss the forecast of aviation demand, future needs at the airport and alternatives for meeting those needs. The final plan will be presented at a later workshop, scheduled for fall 2004.

YELLOW DOT TO THE RESCUE. The **Yellow Dot Program**, which got its start in **Shelton**, has ‘taken off’ throughout the state. Yellow Dot is part of the state’s **Triad Project Initiative**, designed to help victims of accidents who may be unable to communicate with emergency personnel at the accident scene. Participants put a yellow dot sticker on their windshield, which alerts rescuers that information about the driver, previously filled out, is in the glove compartment. Last spring, the Triad program was recognized by the National Highway Traffic Safety Administration, part of the US Department of Transportation. The Triad is made up of area police departments, senior centers and representatives of the business community.

AHEAD OF SCHEDULE. Interstate 95 in **Bridgeport** was reopened earlier than expected thanks to round-the-clock repairs undertaken after an oil tanker fire destroyed part of the Howard Avenue overpass. The new overpass had just been completed before the crash in which a car collided with the rear of the tanker causing it to overturn and catch fire. Officials expected the highway repairs to take weeks but credited the early reopening to good luck and hard work. Ecstatic freight haulers praised the Connecticut **Department of Transportation** for getting the repairs completed ahead of schedule.

Compiled and edited by Barbara Standke

From the National Academies (from page 1)

Moisture and mold problems stem from building designs, construction and maintenance practices, and building materials in which wetness lingers. Technical information describing how to control dampness already exists, but architects, engineers, building contractors, facility managers, and maintenance staff do not always apply this knowledge, the report says. Training curricula on why dampness problems occur and how to prevent them should be produced and disseminated. Guidelines for preventing indoor dampness also should be developed at the national level to promote widespread adoption and to avoid the potential for conflicting advice from different quarters. In addition, building codes and regulations should be reviewed and modified as necessary.

Better standardized methods for assessing human exposure to organisms and chemicals linked to dampness are greatly needed, the report says. It calls for studies that compare various ways to limit moisture or eliminate mold and to evaluate whether the interventions improve occupants' health.

[<http://books.nap.edu/catalog/11011.html>]

◆ No Link Found Between Vaccines, Autism

Neither the mercury-based vaccine preservative thimerosal nor the measles-mumps-rubella (MMR) vaccine is associated with autism, according to a new Institute of Medicine (IOM) report. The report, based on a review of clinical and epidemiological studies, recommends that research to find the cause of autism be directed toward those lines of inquiry that are supported by current knowledge and evidence and that offer more promise for an answer.

The report updates two IOM reports, published in 2001, on possible links between autism and the MMR vaccine and thimerosal. At that time, the committee found that the evidence did not show an association between the MMR vaccine and autism, but there was not enough evidence to determine whether thimerosal was associated with neurodevelopmental disorders such as autism. Given that mercury is known to have a toxic effect on the nervous system and that prenatal exposures to another form of mercury have been shown to adversely affect early childhood development, the committee concluded in 2001 that it was possible to hypothesize that thimerosal might trigger neurodevelopmental problems. The committee revisited these issues because several studies exploring the epidemiology and biological mechanisms of possible links between vaccines and autism have been undertaken since 2001.

Autism is not a single condition, but rather a complex set of severe developmental disorders — also referred to as autistic spectrum disorders — characterized by sustained impairments in social

EPA Releases New Fuel Economy Figures

According to new fuel economy figures released by the US Environmental Protection Agency (EPA) in May, 2004, the average fuel economy for cars, trucks and sport utility vehicles in the United States has remained relatively unchanged since 1997. The average fuel economy for all 2004 light-duty vehicles was 20.8 miles per gallon, nearly equal to last year's 20.7 miles per gallon. US fuel economy peaked in 1988 at 22.1 miles per gallon.

The agency attributes the decline in fuel efficiency from 1988 to 1997 in part to the increasing popularity of light-duty trucks, which for model year 2004, constituted 48% of all vehicle sales, according to EPA estimates.

[<http://www.nationalacademies.org/headlines/#sh0511>]

interaction and communication abilities, as well as restricted or repetitive patterns of behaviors and interests. It is unclear how many cases of autism there are, but two reviews of published studies put the prevalence at one case for every 1,000 children. While some information suggests that autism rates may be rising, it is not clear whether the observed increase is real or due to factors such as heightened awareness of the disorder or the use of a broader diagnostic definition.

Thimerosal is an organic mercury compound that is still used as a preservative in some adult vaccines. It began to be removed from vaccines for children in 1999, and as of mid-2000, vaccines recommended for universal use in infants and young children are available in forms that have no or only trace amounts of the compound.

[<http://books.nap.edu/catalog/10997.html>]

◆ Joint Workshops on the Media and Terrorism

The US Department of Homeland Security has announced plans for a series of interactive workshops, developed and hosted with the assistance of the National Academies and the Radio-Television News Directors Foundation, on the crucial role of the media in terrorism response. The series, entitled "News and Terrorism: Communicating in a Crisis," will take place in ten locations across the country between July 2004 and July 2005. During the workshops, journalists, public information officers, scientists, engineers and emergency managers will participate in a "table-top" terrorism scenario and discussions of biological, chemical, radiological and nuclear threats.

This exercise is designed to illustrate the many challenges faced by all of these groups in getting accurate and timely information to the public during a crisis. In addition to the scenario, the National Academies will provide straightforward information on weapons of mass destruction including a series of fact sheets on specific terrorist threats as well as a listing of experts who can provide reliable information quickly in a time of crisis.

[<http://www.dhs.gov/dhspublic/display?content=3549>]
[<http://www.nae.edu/nae/naehome.nsf/weblinks/MKEZ-576QMA?OpenDocument>]

◆ Funding Urged for National Aerospace Initiative

The National Aerospace Initiative (NAI), a joint effort of the US Department of Defense (DOD) and the National Aeronautics and Space Administration (NASA), is effective in pursuing technologies necessary for future space launch needs and military operations, says a new report from the National Research Council. NASA and DOD should continue to lead the nation's efforts in three critical areas — high-speed hypersonics, space access and space technology — but the program faces technical and financial hurdles, the report notes.

NAI's high-speed hypersonic flight research aims to develop jet-like vehicles that can fly at Mach 12 by around 2014. While such vehicles may be technically feasible by then, a more comprehensive plan to undertake activities from fundamental research to flight demonstration is needed, the report says. NAI should also establish a stable and predictable source of funding to foster the creation of stable and career-oriented jobs and should increase funding to allow students, faculty, government researchers, and industry leaders to perform long-term research on reusable launch vehicles and aerospace propulsion and power, the committee said.

[<http://books.nap.edu/catalog/10980.html>]

Forensics (continued from page 2)

The use of DNA in crime investigation received a boost in 2003 with the expansion of the sex-offender DNA database in Connecticut. The legislature passed a bill last year to enlarge the database from sex offenders to all who commit a felony.

"This will help us solve more cold cases," Dr. Lee says. Early this year the database helped identify a man who had killed a number of women in the Hartford area between 1997 and 2002. DNA evidence at the crime scenes, from cigarette butts, enabled police to identify a suspect from the DNA database. Subsequently, the suspect was arrested, tried and convicted of the murders.

DNA analysis will play a key role at the Connecticut Center for Science & Exploration, the science center scheduled to open late in 2007 in Adriaen's Landing in Hartford. According to current plans, visitors will be able to perform real DNA tests and try to crack murder mysteries.

"The idea is to engage young people in the excitement of the scientific method so they'll consider careers in science, math and technology," says Theodore S. Sergi, president and CEO of the science center.

Fingerprint Techniques and Image Enhancement

Technology also has improved in the ability to detect latent fingerprints. Police can use 250 chemicals and instrumental techniques as well as light and lasers to enhance fingerprints.

When the 1975 homicide of a girl named Penny Serra went unsolved for 20 years, her father, John Serra, asked Dr. Lee to

investigate. Reviewing the evidence uncovered a tissue box with bloody fingerprints. Chemical enhancement technologies made it possible to develop ridge characteristics. Searching the fingerprint database produced a suspect, who was tried and convicted.

Advances in image-enhancement technology are helping police visualize evidence, such as imprints on hard surfaces and impressions in a softer medium such as mud, sand or snow. Nondestructive photographic techniques such as alternate lighting and filters can enhance imprints and impressions.

Chemicals also can enhance images. The material picked up by a shoe to make an imprint could contain trace elements, minerals, blood and other compounds. These substances can be made more visible though enhancement using various chemicals.

Video tape or photographs also can be scanned into a computer for image enhancement. When a convenience store robbery was videotaped, Dr. Lee says, the poor quality of the image of the robber's face initially made it impossible to make a positive identification. But color enhancement and other technologies clarified the image and led to identification of the robber.

"Whether it's DNA, fingerprints, e-mail or other evidence, technology is giving us new tools that are helping not only to solve crimes, but also to prove the innocence of those wrongly accused," Dr. Lee says. — *Woody Exley*

[Mr. Exley owns Exley Communications in West Hartford, CT.]

An expanded version of this article is available on the Academy's website at www.ctcase.org/bulletin/19_2/forensics.html

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