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Wisconsin engineer

February 2003

VOLUME 107, NUMBER 2

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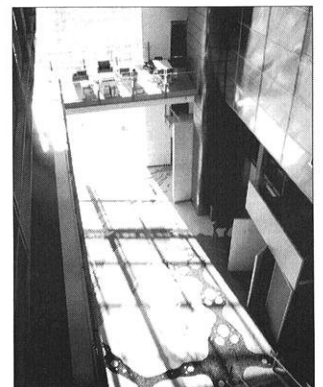
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The Engineering Centers Building (ECB) opened its doors last November and classes start in it this semester. It boasts numerous physical and computer labs and many offices for faculty.
Photo By: Carl Calhoun



COMMENTARY

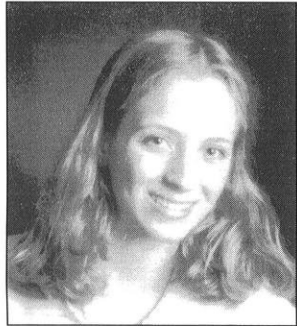
EDITORIAL

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JUST ONE MORE

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Hear Me Roar



**Karen Mandl,
Writing Editor**

I consider myself to be a feminist. Now before you roll your eyes and turn the page, I urge you to keep reading.

I was at a group interview for a scholarship for upperclassmen women. Many of the other finalists were Women's Studies majors and I was the only engineer. The topic of feminism came up and one of the other scholarship applicants began describing when she first found out she was a feminist. That moment soon turned into when I found out I was a feminist, because it was then that I learned the true definition of feminism.

I am a woman and darn proud of it. I do not see any limitations to what I can do because of my gender. All of the female role models in my life are strong, smart and independent. I do not know of it any other way. For a long time, I thought a feminist was a person that went around proclaiming at the top of her lungs that women were far more superior to men. And

while this may be true in some instances, I always felt that sort of behavior was somewhat obnoxious.

But lo and behold, that is not what feminism is. Sitting through the scholarship interview, I learned that feminism is the belief in the social, political and economic equality of the sexes. It has nothing to do with anybody being better than anyone else; it has to do with people being equal. Now that is something I can proudly stand behind.

With only 18.8% women in the College of Engineering, gender can be an issue. It can be intimidating to walk into a classroom where there are 18 men and only one other woman. Despite the fact that we all have taken the same classes and plan on getting the same jobs, we (women) are seen as a little different. Almost as if it was some sort of fluke that we ended up there, sitting amongst all the men. Where does this perceived difference come from? Does the fact that I wear nail polish really affect my ability to accurately determine the pressure drop across a pump?

Men often laugh at organizations like the Society of Women Engineers (SWE). I suspect they think it is just a group of women sitting around complaining about men. But it is not. Organizations like SWE exist to provide a welcoming community for engineers that are in the minority. It is not so that we can see ourselves as better than the rest of the college; it is so that we can feel like we belong in the college. SWE and other such organizations also welcome male members. It helps the community that is formed feel more like the environment of the rest of the college and draws even more support for women engineers.

It is amazing how many people, men and women alike, do not know the true meaning of feminism. It opened my eyes once I got my definition straight. Feminism is not a bad thing; it is not something to be scared of. It is something to embrace.

I consider myself to be a feminist. And male or female, you should be too.



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Genetic Possibilities: Manipulating the Future with RNA

By: Andrew Wentland

"I hope with the advancement of biomedical sciences, one day we will not be threatened by disease like cancer any more. This is my dream as a scientist." Liaoteng Wang, a graduate student in the Biochemistry department at UW-Madison, has gotten closer.

Wang, his project advisors, Marvin Wickens and Judith Kimble, UW-Madison Biochemistry professors, and their collaborators, Christian Eckmann and Lisa Kadyk, have discovered an enzyme that turns on ribonucleic acid (RNA).

Genetic information travels from deoxyribonucleic acid (DNA) to RNA to protein. This pathway is called the Central Dogma. This path is the focus of molecular-biological labs around the world.

Once a gene sequence is copied into an RNA molecule, it is turned into a template, called a messenger RNA (mRNA), that the cell uses to produce protein. Proteins are "directly involved in almost every function a cell performs," said Wang. The order in which genes are translated determines the protein's function in the body, whether that is to battle bacteria or form an organ.

Cells can regulate how much protein a gene produces at many steps along the pathway. An mRNA can be modified to regulate how much protein it produces. It

A longer [poly(A)] tail makes the mRNA last longer or translate into protein more efficiently.

does this by changing the number of adenosine molecules that hang like a tail from its end, called a poly(A) tail. A longer tail makes the mRNA last longer or translate into protein more efficiently.

Wang discovered an enzyme, called Germ Line Development 2 (GLD-2), that controls the number of adenosine molecules in the poly(A) tail of certain mRNAs.

This enzyme was discovered in *Caenorhabditis elegans*, a simple multicellular organism. Although it was discovered in a small creature, it is still relevant to humans. "As a general principle, the majority of genes present in one animal species are also present in another," stated Wickens. "With GLD-2, you find them all over the place, [but] it doesn't prove that their relatives (in other animals) do the same thing."

The biochemistry lab is researching the relationship between the enzyme in *Caenorhabditis elegans* and humans. Wickens said, "What you really find is the possibility that you may now get access to [the connection] in the other organisms. There is a broad intellectual question about how wide-spread some regulation is and about its role in a process of humans."

Even more difficult to discover than the GLD-2 enzyme is the extent of GLD-2's role in the human body. "Understanding biological processes at the molecular-biochemical level is invaluable in guiding the biomedical research to improve treatment and prevention of disease," said Wang. Therefore, future research is extremely important.

An RNA-binding protein that works with GLD-2 to assemble a poly(A) tail. "One of the ways you [could] regulate this enzyme is you have different partners that can come in and attract it to different RNA molecules," speculated Wickens. Knowing which RNA molecules have this attraction would further extend the knowledge of the Central Dogma.

"This RNA binding protein may target the enzyme to particular mRNAs. It is a way of regulating gene expression by regulating

mRNA. You turn on a certain gene at a certain time and in a certain place. These dynamic gene-expression changes occur throughout our own development," articulated Wang.

Wickens said, "Maybe you could find ways to turn particular genes' activities up or down. There is a potential target that you might be able to manipulate if you

Wang discovered an enzyme...that controls the number of adenosine molecules in the poly(A) tail of certain mRNAs.

want more or less protein. If you need more of some particular gene product for some therapeutic reason, there is now another target for that."

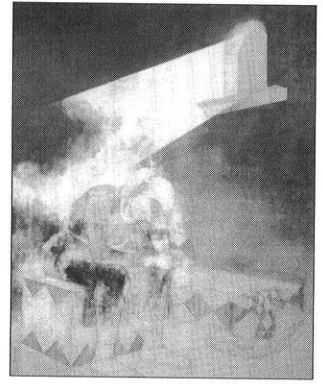
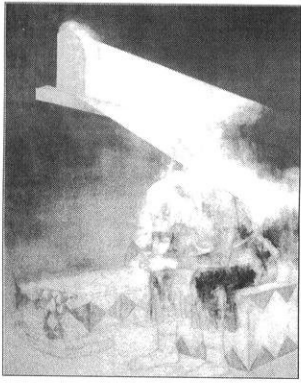
There are dangers in manipulation and regulation of genes. A geneticist could attempt to regulate or eliminate cancer cells, but inadvertently affect the DNA code of a vital organ.

Applications of the discovery of the enzyme GLD-2 are in the distant future, as other labs begin to see its potential impact and begin to expand on their research.

Wang said, "In the future, with [the] accumulation of knowledge by generations of scientists, [our] understanding of the molecular mechanisms that govern our normal life may enable us to correct the processes at will when they go awry." We

Author Bio: Andrew Wentland is a junior in Biomedical Engineering. He would like to alter his genes so he doesn't need to sleep, especially since he doesn't anyway.

Right vs. Left



By: Christine Morris

The human cerebrum is split into two hemispheres, joined together by a tract called the corpus callosum. This link determines the brain's potential for learning. The stronger the connection, the greater the brain's learning capability. Most individuals have a distinct preference for one of these hemispheres, but some are more well-rounded and equally proficient at both modes.

UW-Madison Food Chemistry Lecturer Doug Hyslop is a prime example of a whole-brained individual. "I have always had a natural talent in art and science," states Hyslop. "My biggest challenge was finding a way to incorporate both into my routine." His natural ability to use both sides was obvious at a very young age.

"As a kid I drew like an adult," explains Hyslop, "and I developed that skill by continually working on it and incorporating it into acrylic painting." His four by five foot paintings of Commedia Dell'Arte are an

excellent example of how his skills have since developed. His work has even been displayed at art shows, most recently at Memorial Union on campus this past summer. The creative thinking and skills of the imagination take place in the right hemisphere of the cerebrum. This side is accountable for random, intuitive, holistic

"But his ability to combine both hemispheres makes him an extraordinary lecturer."

and subjective thinking. But Hyslop's skills are not limited to this type of cognizance.

Just across the corpus callosum from the right hemisphere is where his left hemispheric thinking takes place. This side is responsible for logical, analytical, sequential, objective and rational thinking. It is where language, reading, writing and math

are processed. Hyslop always had an innate ability to see the relationship between science and its interconnectivity with the real world. He is developing his left hemisphere by means of food chemistry research. Through the enzyme-induced coagulation of milk and cheese, he

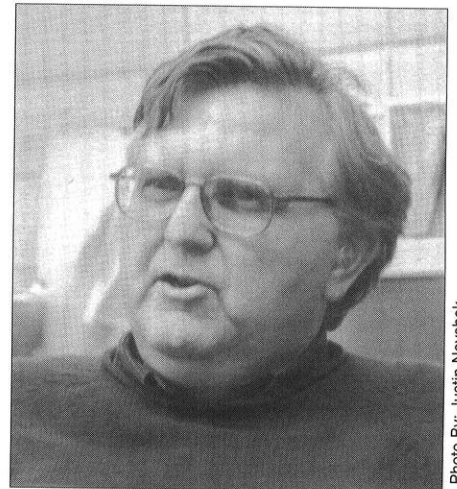


Photo By: Justin Novshek

Taking advantage of both sides of his brain has helped Hyslop to become successful artistically and professionally.

has created a mathematical reaction model from a kinetic standpoint. Numerous dairy journals across the country have since published his breakthroughs and are included in a food chemistry textbook.

But his ability to combine both hemispheres makes him an extraordinary lecturer.

A strong connection with his students makes him an impressive instructor. The numerous teaching awards his students have presented him with over the years can best support this. When questioned about his teaching strategy, he replied, "I can find out where my students are and meet them there. Then I can change their direction of thinking by providing them



Photo by: Justin Novshek

Doug Hyslop and his painting *The Fog Comes in at Twilight*



Photo By: Justin Novshek

Song for A Blue Bird

This new level is reached by his ability to inject the beauty of science into the heads of his students. "If I can get my students to think of food chemistry beyond that of the text, then they will gain a more appreciative notion of what it has to offer," said Hyslop. The process then becomes a rewarding experience for him.

To see motivation grow in the eyes of his students is the most gratifying aspect of teaching for Hyslop.

"They learn because they want to learn," explains Hyslop, "and I can provide them with a base to indulge that passion." But it has only been possible for him to do this through the benevolence of the university.

UW-Madison has given Lecturer Hyslop the freedom to teach through his own approach. "It's important that a teacher can have the freedom to teach by means of his or her own method because it will reflect positively on the students," said Hyslop. Having to follow a strict set of teaching guidelines can hinder the student's ability to learn or adapt to the material.

Developing both hemispheres of the cerebrum can enhance an individual's ability to learn. Lecturer Hyslop is a prime example of someone who can use both sides of his brain, and through his unique teaching style, develop those of his students. For the last 23 years, it has benefited students greatly to learn by his method of incorporating both right and left hemispheric thinking. Doing so has created a new breed of individuals who are well rounded and capable of offering more to society. *We*

Author Bio: Christine Morris is majoring in product management and working towards a Technical Communication Certificate. She likes to think her corpus callosum has a strong connection to each hemisphere.



Photo By: Justin Novshek

Detail from *The Fog Comes in at Twilight*



Photo By: Justin Novshek

Jester's Family

with the conceptual material." Rather than just presenting the tactical angle of science, he connects with them on another level of understanding.

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Shining hour— Employment woes place lesser- known careers in spotlight

By Kyle Oliver

A faltering economy is taking its toll on the engineering job market; as in other sectors, hiring in the field is now markedly lower than it was during the economic prosperity of the late 90s. This led Sandra Arnn, director of UW-Madison's Engineering Career Services (ECS) program, to deliver something of a disclaimer at one of ECS's new member registration sessions on Sept. 5.

"This year probably won't be as exciting," Arnn concedes, explaining that professional, cooperative education (co-op) and

intern candidates in the program will not enjoy the opportunities of preceding years. However, ECS is addressing the employment situation.

"Last year during semester break, as part of our ECS response to an increasingly difficult job market for engineers, I requested that staff members think creatively about some new initiatives or programs to assist students in their job searches," Arnn says.

They developed Careers for Engineers, a five-part series

that ran in March and April. Each session featured speakers from areas of employment frequently overlooked by engineers, including law, government and business.

Some positions in these fields require considerable amounts of technical knowledge, so the engineer is often uniquely qualified. For instance, intellectual property law, which is concerned with the regulation of patents, requires the ability to understand and evaluate technical designs submitted by patent applicants. Albert Einstein worked in a patent office early in his career.

John Archambault, Program Coordinator of the series, says

UW-Madison students often overlook patent law, citing low interest in the U.S. Patent Office at engineering career fairs in past years.

But the patent office is not the only government group struggling to recruit. Many government agencies hire engineers for jobs similar to those in the private sector.

[These jobs] require considerable amounts of technical knowledge, so the engineer is often uniquely qualified.

These positions, traditionally overshadowed by their corporate counterparts, are receiving additional attention in light of the economic slowdown.

"A lot of people don't look at government because it typically pays a little less," Archambault says. He points out, however, that the employee benefits, retirement plans and job security the government offers will likely reverse this trend.

One government agency present at Careers for Engineers and the fall Career Connections fair in September was the National Security Agency (NSA). In the post-Sept. 11 political climate, hiring more staff in agencies such as the NSA has become a high priority.

Patrice Shackleford, linguist and recruiter for the NSA, explains that intercepting and analyzing electronic signals from countries perceived as threats requires many types of engineers, mathematicians and computer scientists. She has noticed a definite increase of interest in the NSA. She believes this is not only the result of a tighter job market.

"After Sept. 11, [at] every career fair we've attended there's been a lot more interest, I think because national security is in the news," Shackleford says.

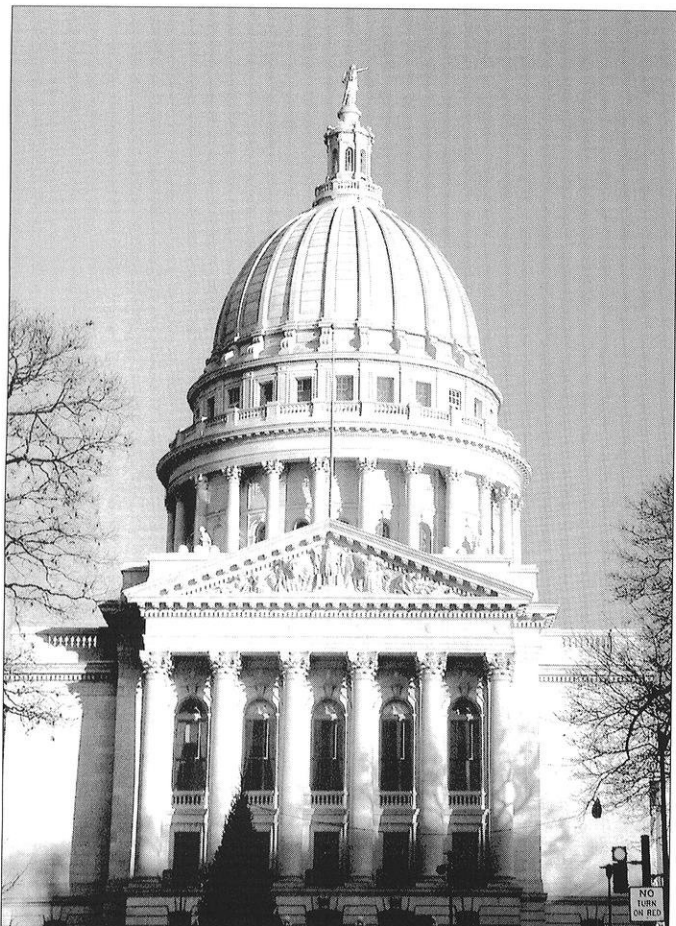


Photo By: Brad Pate

Many students do not realize the many job opportunities available through the U.S. and State governments.

A third opportunity is the relationship between engineering and business. Some may doubt the compatibility; science, math and engineering courses hardly leave room for developing the skills required to succeed in business.

One businessman does not think so. Frank Foulk, manager of Steam and Combustion Turbine Technical Support for Siemens-Westinghouse, is an engineer-turned-businessman who thinks good communications skills can help engineers in a variety of careers. "Engineering skills and the softer skills on top of them—that's the key to being able to [succeed] in other areas," Foulk says.

Based at Siemens-Westinghouse headquarters in Orlando, Fla., Foulk is taking time from his usual management position to work on a project his background prepared

"When the engineer says something as the sales rep., the customer knows he knows what he's talking about."
- Frank Foulk

him for. He is working with Siemens-Westinghouse's Best of the Best Benchmarking team. The team studies the practices of businesses rated best in their class and designs ways of implementing their information and resource management systems.

"We picked companies who we do not compete with," says Foulk. "We actually called them up and said, 'Can we learn from you?' Nobody's turned us down." Agreements with these companies restrict him from releasing their names, but they include top manufacturers of medical equipment, oil service equipment, commercial airliners and printing presses. These companies use machinery similar in size and complexity to Siemens-Westinghouse's gas and steam turbines.

Although his project is not a reaction to the unstable economy, Foulk stresses the importance of benchmarking as a sound business practice. "Our upper management sees value in benchmarking as more of an ongoing process," Foulk says. "Sometimes you have to change just to stay even." That statement could also be applied to the job market; engineers seeking work might consider changing to a



Photo By: Brad Pate

Grainger Hall is a great place for business-oriented engineers to look for jobs.

business-oriented position. Archambault believes there are many positions out there.

"Lots of employers need engineers in sales and marketing," he said. "When the engineer says something as the sales rep., the customer knows he knows what he's talking about."

It seems, then, that some good may come of this struggling economy. Forced to expand their search for work, engineers

may stumble upon an unnoticed career. As Foulk says, "They put a lot of tools in your tool box in engineering school." *W e*

Author Bio: Kyle Oliver is a freshman from Wauwatosa, WI. He plans to study Mechanical Engineering and hopefully complete the Engineering Honors in Liberal Arts program and the Technical Communications Certificate. He is the former editor-in-chief of Wauwatosa East High School's Cardinal News.

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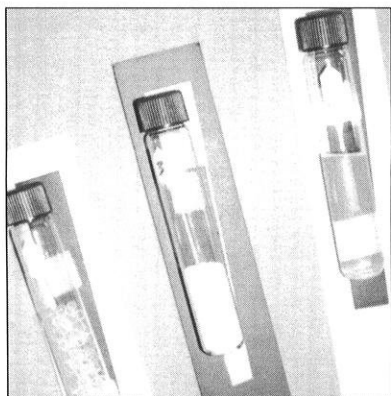


Photo By: Shawn Enright

Different suspensions of titanium dioxide. Titanium dioxide coated objects form the heart of Dr. Anderson's inventions.

By Kyle Oliver

Thanks to UV light, hours of research and thin films of titanium dioxide, Professor Marc Anderson is improving fuel cells and cleaning the environment.

Researchers are developing photocatalysis, an effective means of cleaning water and air. This chemical process combines the removal and treatment of pollutants into one step. Marc Anderson, a Professor of Civil and Environmental Engineering at UW-Madison who researches photocatalysis, says it is superior to filtration. Instead of merely collecting pollutants, "it actually destroys the stuff."

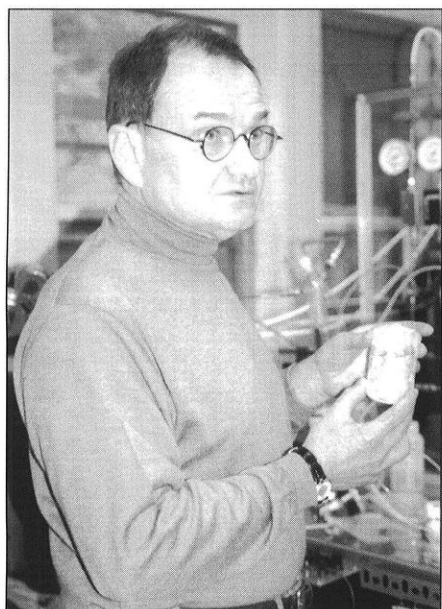


Photo By: Shawn Enright

Professor Marc Anderson discusses his current research with hydrogen fuel cells.

Clean Machine

Photocatalytic Reactors Purify Water and Air

Fundamental to the photocatalytic process is Anderson's area of expertise: thin films. "We make... tiny titanium dioxide particles, the same as are in white house paint," Anderson says. These particles are suspended in a thin membrane, which serves as a semiconductor in the reaction.

Photocatalysis begins by irradiating these films with ultraviolet (UV) light. UV light lies outside the visible spectrum, with frequencies higher than violet light. Higher frequency light has more energy, which is why UV light must be used in photocatalysis. That extra energy excites electrons in the titanium dioxide membrane. In other words, Anderson says, the UV light is sufficient to "pump up an electron in the semiconductor and leave a 'hot hole' behind. That hole is very oxidizing. It's like bleach—it can oxidize anything."

Oxidation is the chemical process where bonds to oxygen are formed or bonds to hydrogen are broken. Thus, the "hot hole" oxidizes water, breaking one of water's bonds to hydrogen and forming a hydroxyl radical. The hydroxyl functional group (OH) is common in organic compounds like alcohols and carboxylic acids. However, the hydroxyl radical has a lone electron, which makes it extremely reactive and able to break down countless pollutants to form mostly carbon dioxide and water. This process takes place in a photocatalytic reactor, which houses a UV light source and the titanium oxide-coated material.

In contrast to photocatalysis, traditional filtration methods are limited in their effectiveness because they use physical processes to collect pollutants from water and air.

This delays the treatment of these volatile substances. Unless they can be used in some other application, the pollutants must eventually be treated with a chemical process or even stored indefinitely. Photocatalysis removes and treats contaminants.

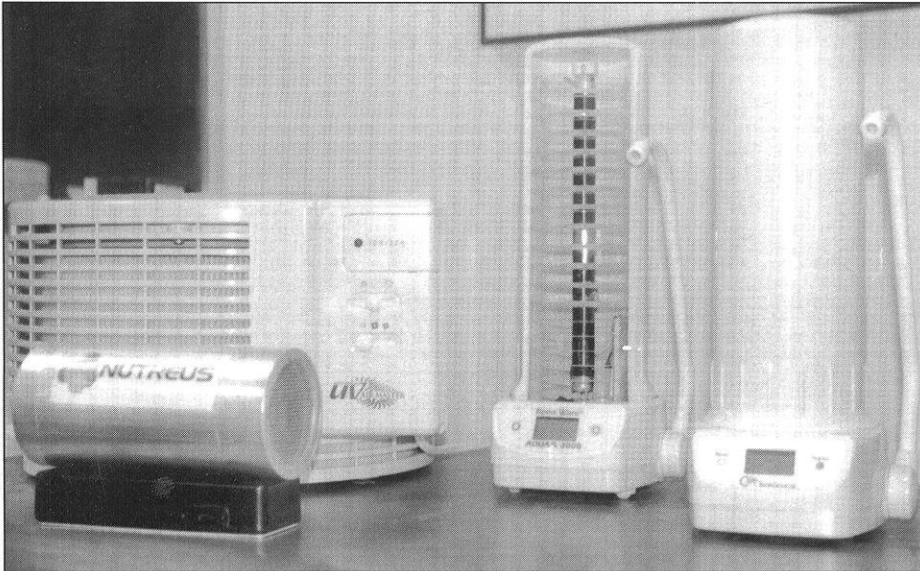
This nonspecific process can be used to convert a large number of pollutants in liquids or gases. Its versatility qualifies it for a multitude of applications, even in space. "We've been in space many times, courtesy of our NASA program here on campus,"

Anderson says. UW researchers design plant growth modules for the space shuttle. Anderson and his team work on devices that accompany them.

For Anderson's NASA project, the contaminating chemical is ethylene, a gaseous plant growth hormone. Ethylene serves as ripening agent and, when present with plants in a closed space, causes them to rot. "Let's say you've got a banana and you put it in a bag. Close the bag. That ethylene makes the banana ripen really fast," Anderson says. The plant growth chamber on the shuttle is similar to the bag; it does not allow ethylene to escape, so the gas must be manually removed. The photocatalytic device converts ethylene to carbon dioxide and water, two chemicals the plants need.

Anderson has developed similar products that are now commercially available. Marketed by KES Science and Technology, this device, called Bio-KES, is a photocatalytic reactor used in produce and flower storage rooms and display cases. In this case, the ethylene removed is not produced by the plants, rather it comes from

Researchers are developing photocatalysis, an effective means of cleaning water and air. This chemical process combines the removal and treatment of pollutants into one step.



Some products based on the research of Dr. Anderson. Left back – air filter, left foreground – refrigerator freshener, right – drinking water filters

outside sources like fluorescent lights, cigarette smoke and plastics. This same device, Anderson says, can also be used in

experiment where you took two electrodes and you turn up the juice and you get

Instead of merely collecting pollutants, "it actually destroys the stuff."

post offices to remove anthrax.

Anderson works on a variety of thin films with many applications. Unlike those used in photocatalysis, some films are "not made to degrade things...Everything starts with these kinds of suspensions," Anderson says.

For instance, thin films play a crucial role in fuel cells. Fuel cells generate electricity through a chemical reaction and have been used increasingly over the past fifty years. They successfully powered NASA's Apollo spacecraft in the 1960s.

Anderson is now developing thin films for proton exchange membrane fuel cells. Like in all fuel cells, hydrogen and oxygen react to produce electricity. Anderson's membranes direct the flow of protons and electrons in the reaction. Protons from hydrogen pass through the membrane while electrons are forced through a circuit and produce current. Protons and electrons are united on the other side of the membrane, and hydrogen reacts with oxygen from air to form water.

"Did you ever do the high school physics

hydrogen and oxygen? Instead of turning up the juice we get juice out of it," Anderson explains.

Anderson's fuel cell research has broad environmental implications. Fuel cells are an extremely clean energy source and will likely become common in the future. For example, the auto industry is researching the possibility of powering automobiles with fuel cells, which would dramatically decrease emissions.

Purifying water and indoor air as well as developing clean energy sources, Anderson is engineering the environment one membrane at a time. *WE*

Author Bio: Kyle Oliver is a freshman from Wauwatosa, WI. He plans to study Mechanical Engineering and hopefully complete the Engineering Honors in Liberal Arts program and the Technical Communications Certificate. He is the former editor-in-chief of Wauwatosa East High School's Cardinal News.

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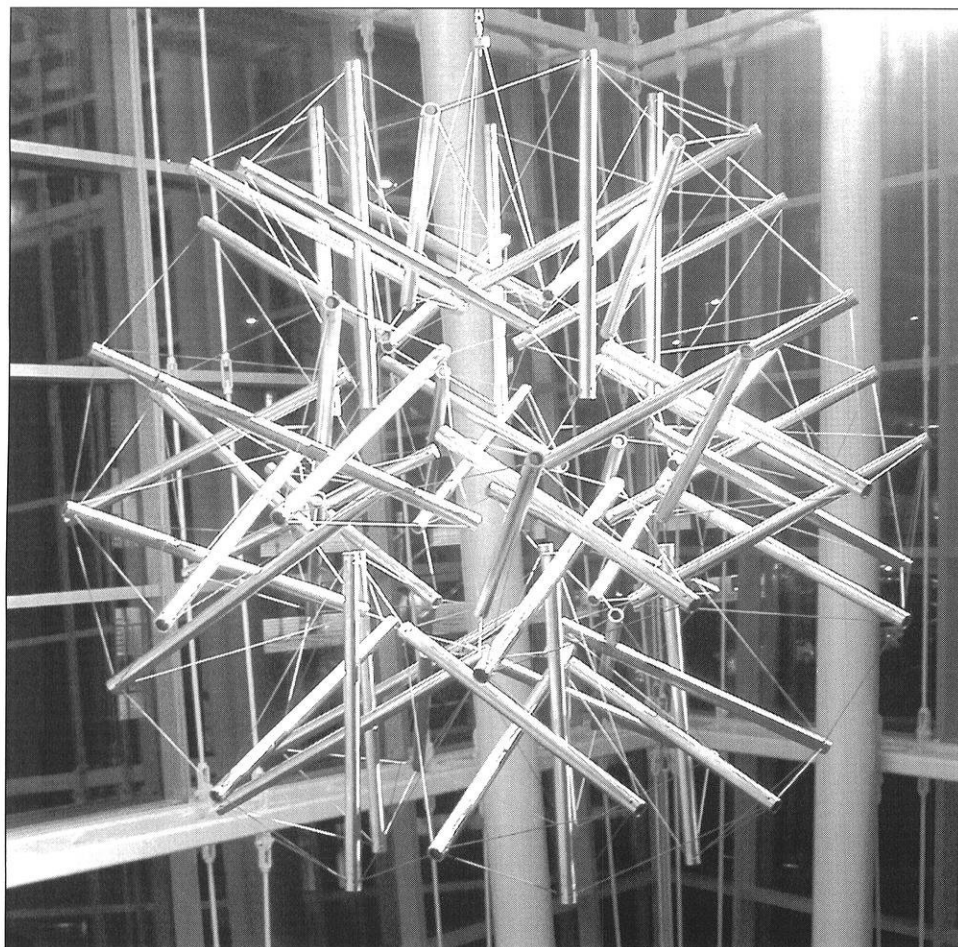
Studio Apartment

Two Bedroom Apartment

Engineering Centers Building

By Meg Cox

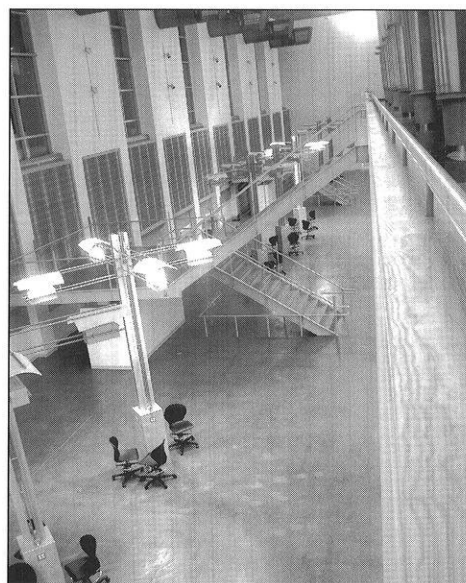
Late in November, the door opened to the Engineering Centers Building, the College of Engineering's first completely new building in 30 years. Construction of the \$53.4 million building began in June of 2000 and now houses student organizations, research labs, conference rooms, and the Biomedical Engineering Department. Designed by local architects Flad and Associates, the building promotes hands-on learning with touches such as exposed mechanical systems.



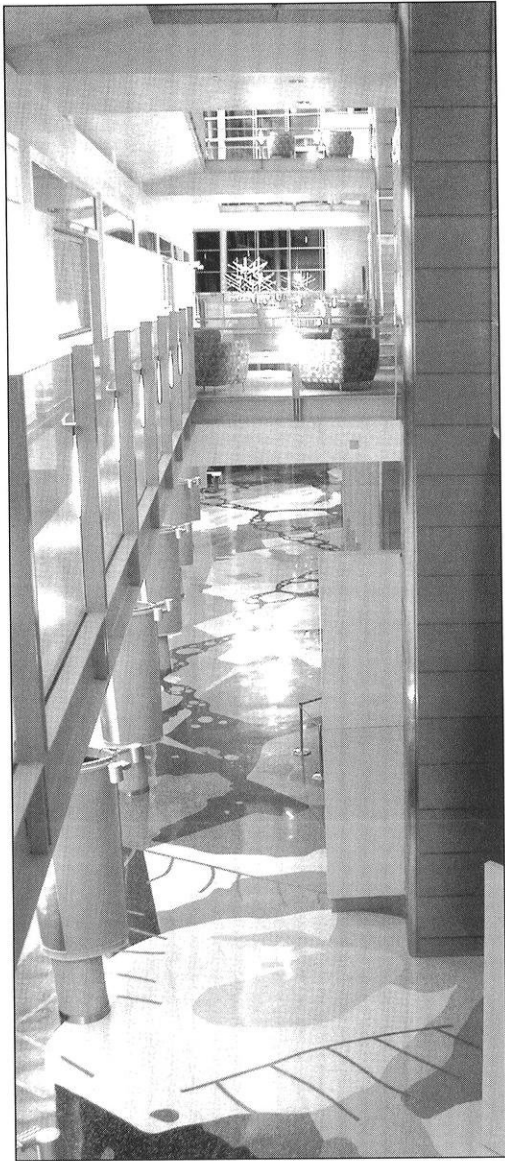
This "Buckyball" hangs in the main entrance to the Engineering Centers Building.



The "Buckyball" hangs in the great glass entrance to ECB.



Part of ECB's basement is open from above and includes portable lab space.



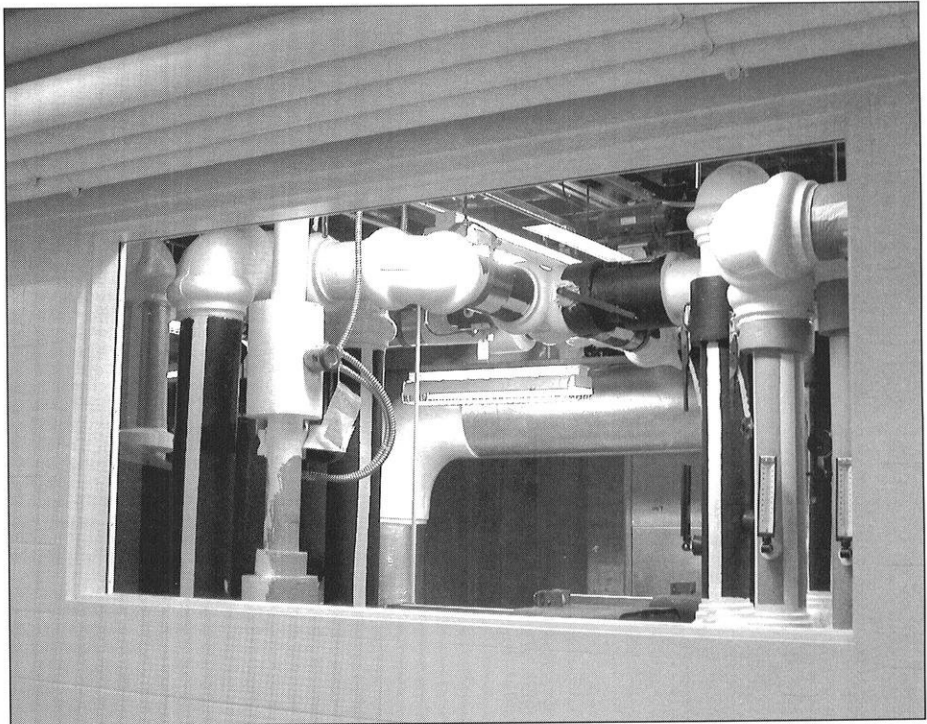
ECB's first floor has an elaborate pattern that can be observed from above.



The Engineering Centers Building has many comfortably furnished corners for individuals or groups of students to study in or take a study break.



The hallways on the north end of the building are curved.



Many of ECB's mechanical systems are exposed for viewing.

Sorting Through the Cellular Mess

By Colleen Kelly

The fast pace of the modern world has changed our perception of cellular phones. Once considered a luxury item, cellular phones are now becoming a staple in the American lifestyle. Many people are replacing their phone lines with wireless service. The wireless industry's prominence has created a large market full of various service options. This has made the task of choosing a cellular service provider somewhat confusing, as each company offers a wide variety of calling plans and incentives.

Most cellular service providers offer three types of plans: local, regional and national coverage. Local plans are generally the most cost efficient, with the most minutes for the same price. Regional plans are moderately priced, being more expensive than local plans because of a larger coverage area. National plans tend to be the most expensive because they provide coverage to the entire country.

Local calling plans are best for individuals who do not travel and will typically make most calls in their home area. Local calling plans can exceed the monthly cost of national calling plans if roaming charges

are accrued. A national plan is suggested for travelers or out of state students who will use their phones in many areas of the country.

US Cellular, Cingular, AT&T Wireless (SunCom), Voice Stream (now T-mobile) and Verizon Wireless are some of the carriers that offer local plans for the Madison area. Their plans range from \$19.99-\$249.99, offering different combinations of anytime and night and weekend minutes. Anytime minutes are used during the weekday, typically from 7:00 AM to 9:00 PM. People who make most of their calls during weekdays should find a plan that offers enough anytime minutes. The more anytime minutes offered, the more expensive the calling plan.

Sprint is a cellular service provider that only offers national coverage. While customers are in their PCS Service Area, calls can be made and received on a Sprint PCS phone. While the PCS network reaches most metropolitan areas, their coverage is less reliable in rural areas. Sprint would not be an optimal provider for people that live in or frequently travel through remote areas.

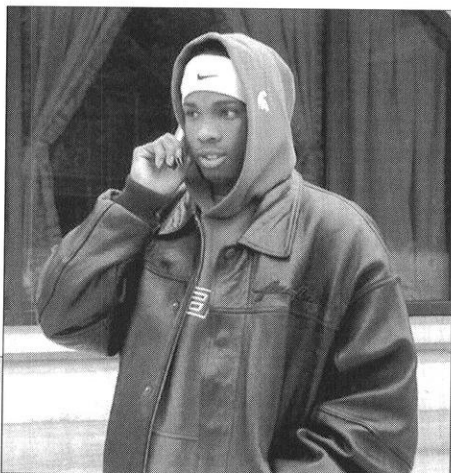
Once considered a luxury item, cellular phones are now becoming a staple in the American lifestyle.

Paying close attention to a cellular service coverage area is vital. In the case of poor coverage the following problems can be experienced: static, signal fading resulting in dropped calls or no phone service at all.

Regional and local coverage customers should be attentive to coverage areas because of roaming charges. Roaming costs are incurred when calls are made or received outside of the coverage area. Northern Wisconsin, for example, is not included in many local service plans. Most cellular providers have a flat per minute roaming rate. If a cell phone owner regularly calls roaming areas, their monthly bill will be higher than expected.

Activation fees apply when purchasers first initiate their calling plans. Sometimes providers run specials that waive activation fees. Verizon Wireless waives the activation fee with the signing of a two-year contract. Activation fees are the highest with Cingular at \$36.00. Voice Stream, Sprint, and SunCom are at \$35.00. US Cellular is less with at \$25.00. This shows why it is important for consumers to ask about special deals available.

The provision of night and weekend minutes differs with each provider. Each offers



Photos by: Chris May

Above: Cell phones have become part of everyday life.

Left: Cell phone users can customize their phones with different covers and accessories.



different amounts of minutes. Also the allotted timeframe, and the area in which the minutes are valid may vary.

US Cellular provides unlimited night and weekend minutes from 9:00 PM to 5:59 AM Monday through Thursday and through-

It is important to remember that purchasing a cellular phone involves signing a contract ranging from one to two years

out the day on weekends. However, all calls must be made in the local calling area. People placing calls outside their local area during these periods will still have minutes deducted from their monthly allotment of anytime minutes.

For an additional \$10.00 per month, SunCom offers unlimited night and weekend minutes for calls made only in the local area

Voice Stream provides unlimited weekend services for calling plans ranging from \$39.99-\$99.99. The service of unlimited night minutes from 9:00 PM to 6:59 AM, however, is an additional \$6.99.

Cingular offers 3000 night and weekend minutes to their customers paying over \$39.99 per month, and 1000 minutes to those paying \$29.99. Cingular's night minutes are Monday-Friday from 9:00 PM to 7:00 AM and all day Saturday and Sunday.

Sprint has a variety of night and weekend minute plans from 9:00 PM to 7:00 AM Monday through Thursday, and 9:00PM Friday to 7:00AM Monday. The minutes offered range from 3650 to 7000 minutes per month.

Many companies that do not provide free unlimited night and weekend minutes run specials waiving the monthly fee.

There are many resources available on the internet for people interested in researching and locating an appropriate cellular service provider. *Point.com* helps consumers locate and order calling plans to suit their needs. By simply entering in your zip code, you can view and customize the service options available in their area. *Getconnected.com* and *wirelessadvisor.com* also contain a wealth of information

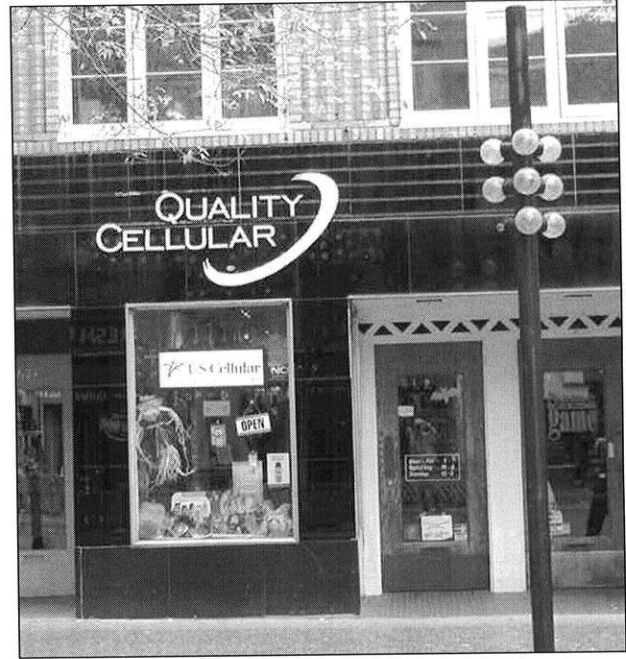


Photo by: Chris May

All over the country wireless stores are popping up, making it easier than ever to buy a cell phone.



Photo by: Chris May

As technology advances the phones get smaller.

regarding cellular service options. All of the companies discussed here have web sites.

Not only is helpful information located on the internet, but also deals exclusive to internet buyers. US Cellular, for example, provides a \$55.00 coupon to those purchasing their calling plans via the internet.

It is important to remember that purchasing a cellular phone involves signing a contract ranging from one to two years. The termination of such contracts can result in charges from \$100-\$200. Ultimately, take your time to ask questions and pay attention to specials to help defray the monthly cost. Do your homework and choose a service provider that you are confident will suit your personal needs. We



Photo by: Chris May

Someday people may not have a traditional phone line and will only use cell phones.

Comparing Roaming Rates:

| Service Provider | Roaming Rate per/min |
|------------------|----------------------|
| Cingular | \$.79 |
| US Cellular | \$.65 |
| Voice Stream | \$.49 |
| Verizon | \$.69 |
| Suncom | \$.69 |

Author Bio: Colleen Kelly is a junior majoring in English and Technical Communication.

Fantasy Technology Projects Come True

By Tanner Dabel

Imagine a world with no computer crashes, slow downloads, or interrupted media streams. For UW-Madison students, this fantasy may be closer to reality than they might think.

On September 24, 2002, John Morgridge announced that his company, Cisco, will be the primary donor of two of the largest technology upgrades on the UW-Madison campus. The first of the two projects is a campus-wide network technology upgrade. The second is an all-new concept called Wisconsin Advanced Internet Laboratory (WAIL).

Morgridge is donating equipment valued at approximately \$10.8 million dollars through the TOSA Foundation. Sixty-eight percent of that is going to the campus-wide network upgrade, which, will cost upwards of \$14.7 million dollars over the next five years. The remainder of the donation is going to WAIL.

"We are proud to be associated with the

university on these two projects" said Morgridge. "Like many other Cisco employees who have used our educational donation program, it is an honor to be able to make a contribution to the University of Wisconsin-Madison, which has meant so much to me through the years."

The campus-wide network upgrade will bring an enhanced network with faster connections, better security and more reliability. It will also feature a more efficient data travel of high demanding media such as video and audio streaming and a smart critical traffic system which can reroute traffic on the network in case of outages.

"An upgrade has been a long-range goal for the university. However the gift dramatically speeds up the timeline for implementing the changes", said Ann Studen, director of UW-Madison's Division of Information Technology

(DoIT). "It allows us to obtain more advanced technology than we might otherwise have been able to afford. When this technology is implemented, we will have

"Our ability to precisely measure and evaluate slices of the Internet in this environment will be unprecedented."

one of the fastest campus based networks in the country, a real benefit to our research community."

The WAIL will be the first Internet Experiment Lab of its kind, which will allow researchers to create a mock Internet in a controlled environment so that experiments can be run. Such experiments could include performance, management and security on a large interment network. This allows the researchers to study how these changes might affect the real Internet. This is an ability UW-Madison has never had before.



A wider broadband means more students can access the internet at once without losing speed.

Photo By: Stanley Nangoy

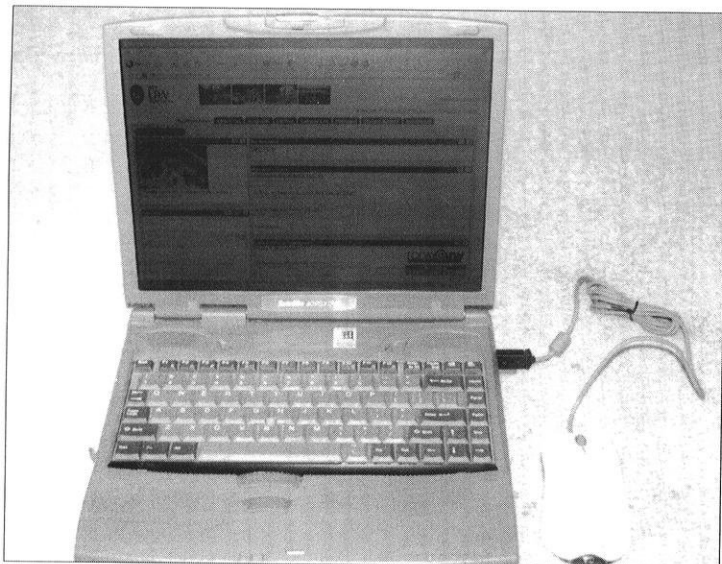


Photo By: Stanley Nangoy

This donation also allows more simultaneous users of the campus' wireless network.

"The best analogy for WAIL is that it will be used to recreate network conditions in much the same way that wind tunnels are used to recreate wind conditions," said Paul Barford, UW-Madison Computer Science Professor. "Our ability to precisely measure and evaluate slices of the Internet in this environment will be unprecedented."

the advent of WAIL, I am confident that UW-Madison will be well positioned, not only to function effectively in the 21st century, but to lead in the advancement of Internet Studies." W & E

"An upgrade has been a long-range goal for the university. However the gift dramatically speeds up the time line for implementing the changes"

Author Bio: Tanner Dabel is a senior at UW-Madison majoring in the rhetoric side of communication arts. He is on the advisory board of the Badger Student Fan club and co-president of the Comic Book Club. In the past he has been a sports writer for both the Badger Herald and Daily Cardinal.

These two projects are the propelling block to help bring UW-Madison up to speed in the 21st century. This will push other schools to catch up.

UW-Madison Chancellor John Wiley states, "Through the network upgrade and



Photo By: Stanley Nangoy

The CAE Labs will benefit from the higher connection speeds.

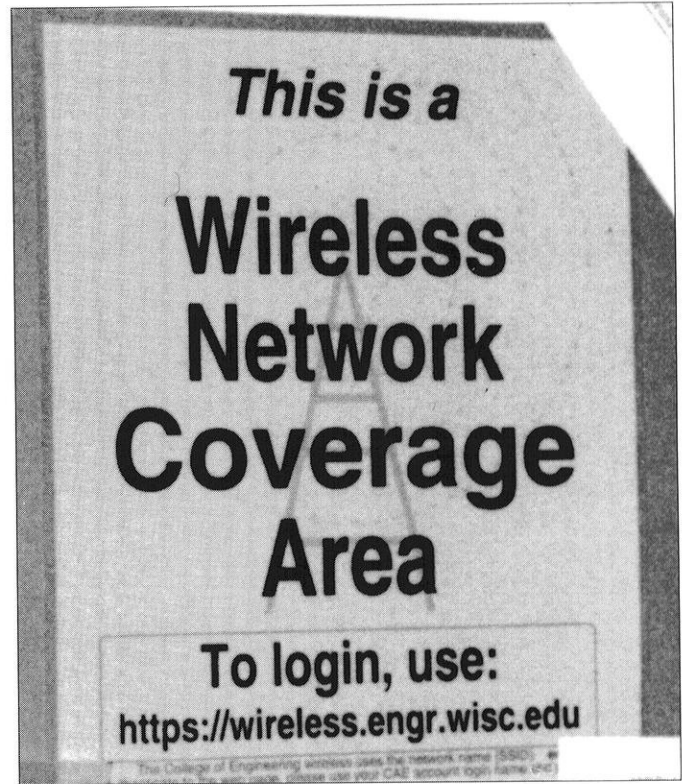


Photo By: Stanley Nangoy

Wireless internet connection is widely available on campus

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Islet Cell Transplant Shows Signs of Life

By Robert Coy

The daily insulin injections that have become a lifelong routine for millions of Type 1 diabetics may one day be unnecessary. As part of an ongoing research project, Dr. Jon Odorico and his transplant team at the UW-Hospital performed Wisconsin's first islet cell transplant on September 18. This transplant may eliminate a diabetic's reliance on insulin.

Islet cells are the part of the pancreas that release insulin to the blood stream to control sugar levels. Insulin is the chemical in your body that transports sugar from your

bloodstream into your cells. If your body has a shortage of insulin, sugar builds up in your bloodstream and your cells have a shortage of energy. Patients can then go into a coma and die without medical help.

Type 1 diabetes is a condition where people's bodies produce no insulin. This usually happens when the immune system mistakenly targets and destroys the islet cells in the pancreas. Odorico says, "For some reason, a person's immune system starts to react against those tissues. Specifically the beta cells of the islet are destroyed. The beta cells are the insulin producing cells."

Most people are diagnosed with Type 1 diabetes as children or young adults. Estimates indicate that as many as 1.7 million people in the United States may have Type 1 diabetes. Currently, patients with this disorder must give themselves several injections of insulin each day.

Transplanting islet cells can eliminate this dependency on regular insulin injections. Odorico says, "Over the past 10 or 15 years, there have been over 400 islet transplant done in the United States and worldwide, mostly in Europe. The results have not been better than about a 10% insulin independence rate at one year."

Doctors have developed a procedure to extract islet cells from a donor pancreas and purify them. The cells are then implanted into the patient's liver through an IV. "The catheter is run out of the liver vein through the skin and is hooked up to an IV bag containing the islets. The islets are run through the IV and lodge into the portal vein in the liver," explains Odorico. They are placed into the liver because the pancreas has already been destroyed by diabetes.

The transplant procedure itself is relatively non-invasive. The patient remains awake through the entire transplant (which lasts about one hour) with pain relieved by a

sedative and local anesthetic. The patient can usually leave the hospital after several days.

Dr. Jon Odorico and his transplant team at the UW-Hospital performed Wisconsin's first islet cell transplant on September 18.

The current clinical trial at the UW-Hospital is testing the effectiveness of a medicine called Pioglitazone when it is combined with the islet cell transplant. This medicine helps sensitize the cells to better respond to the insulin produced by the new islet cells. To be considered for this clinical trial, patients must have very poorly controlled Type 1 diabetes and decide against a conventional pancreas transplant.

Recent results from islet cell transplants have shown success rates as high as 80%. Odorico explains, "Success is due to a combination of things. First is the new immunosuppressive drug cocktail, second is the automated method of islet purification, and third is sometimes doing sequential transplants." Combined, these factors help make islet cell transplantation a realistic alternative for future patients.

"We hope that this procedure will become more routine, that the success we have seen so far is sustainable, and that we could enlarge our islet transplant program to be able to help more patients. Ultimately, if this is as successful as solid organ pancreas transplants this could one day replace pancreas transplants, because no one would want major surgery when they can get this less invasive procedure," says Odorico. *We*

Author Bio: Robert Coy is a senior majoring in Engineering Mechanics. Dr. Odorico put a huge strain on his memory of biology, and convinced him to stay with physical science.

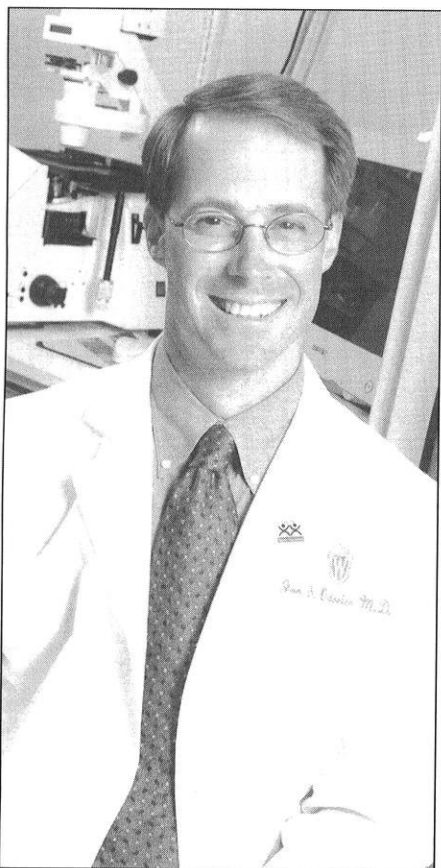


Photo By: UW - Hospital

Dr. Jon Odorico and his transplant team at the UW-Hospital performed Wisconsin's first islet cell transplant.

UW-Madison Gets Wired

By Andy Mathys

The thought of being without a computer or a cell phone is unfathomable for most students these days. Who could live without instant access to massive amounts of free media and unlimited night-and-weekend minutes? As we adjust to the 21st century, techno savvy is an integral part of life at UW-Madison. Students at the UW today are better equipped than ever with tools and services to navigate the ocean of technology.

UW-Madison's 10th annual student survey, conducted by the Division of Information Technology (DoIT), revealed results consistent with emerging national trends. They found that 91% of UW students own a computer (more than one-third of those are laptops), 46% own a cell phone and 15% use a personal digital assistant (PDA). These numbers should come as no surprise, but they are much different than a few years ago. For example, computer ownership among undergraduates has grown from only 32% in 1994 to over 90% today. And cell phone use has quadrupled in the last few years, from 11% in 1999 to 46% in 2002. These once-futuristic technologies are now standard fare.

The ARCH

Campus officials urge students not to forget the wealth of services that are available to them even if they already own a personal computer (PC). For example, use of campus Academic Resources and Computers in Housing (ARCH) facilities has dropped as the number of students owning PCs has skyrocketed.

ARCH Residence Life Coordinator Michael Crawford says, "The decrease in usage [of the ARCH] since the mid '90s offers a challenge to us. Computers are both our strength and our weakness because students owning their own PCs tend to forget that the ARCH offers a lot more than just computers."

The ARCH offers computer facilities for students living in campus housing. In addition to computers, the ARCH facilities provide software training and tutoring as well as resume and interview workshops.

Even if a student owns a PC, he or she may benefit from the hardware and software available at ARCH locations. Besides basic Microsoft and Adobe software packages, ARCH computers are equipped with photo programs such as Photoshop and web page publishing programs like Dreamweaver and Pagemaker. The ARCH centers also provide CD and DVD burners, scanners, color laser printing and digital camera checkouts. Besides providing an environment more conducive to study than the average dorm room, these options make the ARCH a great resource for students.

There are four ARCH locations on campus: Gordon Commons (under Pop's Club), the basement of Theodore Kronshage Hall, first floor Chadbourne Hall and in Elizabeth Waters Hall. Also, there are kiosks available in lower Frank's Place and Witte Hall. The ARCH centers are open Monday through Thursday 10:15 a.m. to midnight, Friday 10:15 a.m. to 2:00 p.m., closed Saturday, and open Sunday noon to midnight. The exceptions are the ARCH at Gordon Commons—which is open an hour earlier Monday through Thursday—and the two kiosks, which are open 24 hours per day. For more information, visit the ARCH website at www.arch.wisc.edu.

DoIT InfoLabs

DoIT computer labs are another technological resource available to UW students. Students are never more than a five-minute walk from one of the 15 campus locations, and the facilities are free (except printing) for any student with a UW-Madison ID. Software available on these computers includes many popular spreadsheet, desktop publishing, graphics, video editing and word processing applications. Most InfoLabs also offer course-specific software. Hardware available at DoIT centers includes DVD/CD-RW and Zip drives, scanners and color printing. A point of interest to engineers: students enrolled in engineering programs can use up to 300 pages of free black-and-white printing per semester.

Additionally, UW-Madison is going wireless. DoIT reports that over 12,000 students use laptop computers. Wireless web service is fast—about 20 times faster than a 56k

modem—and available at 15 locations, including Memorial Union (and Union Terrace), Memorial Library, and Union South. The wireless connection allows students to do everything they could do with a hardwired network connection, but from many different sites on campus. The only necessary hardware is a wireless network card, available from DoIT for as low as \$65.

Students who own PCs can also share in the wireless revolution. That's because InfoLabs now have laptop computers outfitted with wireless network cards available for checkout. These laptops are loaded with most of the programs that other InfoLab computers include. Any student can check out a computer and use it to write a report while enjoying a beautiful fall evening on the Union Terrace. Laptop checkout locations include L&S Learning Support Services, College Library, Memorial Library, Pharmacy Library, and Union South. For more information about DoIT InfoLabs, go to www.doit.wisc.edu.

e-Resources

Another way UW-Madison has made life easier for students in the last few years is by developing its online interface. Students can easily access information about their schedules, grade reports and advisors as well as request a DARS report through the EASI website. In addition, the MyUW portal (<http://my.wisc.edu>) allows access to financial aid records and online enrollment options. If you have trouble finding information on a research topic, UW-Madison's many libraries and thousands of database resources can be searched online at www.library.wisc.edu.

Students at UW-Madison are more wired than ever before. But through resources such as the ARCH, DoIT InfoLabs, Wireless Web, and its online interface, UW-Madison continues to stay one step ahead of its students by providing much of the hardware, software, and instruction necessary for students to maximize the technology at their fingertips. We

Author bio: Andy Mathys is a sophomore majoring in Mechanical Engineering. Special thanks to Michael Crawford and Keri Sawyer for help on this article.

Crime Scene Investigation:

The Scientific Series that's Baffling Hollywood

By Nathan Estep

Thirty million viewers tuned in to CSI: Crime Scene Investigation for its 2002-2003 television premiere. All of a sudden, people are intrigued with science and its capabilities due to one of America's most popular shows. The Discovery Channel cannot compete with those ratings, and it is doubtful that 30 million people have heard of Bill Nye "The Science Guy."

CSI is based on a real crime scene investigation unit in Las Vegas, Nevada. Unlike Law and Order and NYPD Blue, the crimes are approached from a scientific standpoint. In other police dramas, a crime is committed, and detectives investigate the case by finding witnesses and asking questions. The detectives question possible suspects, but often have little or no luck. Then, a curious name pops up on the station's computer, and the detectives, with no other leads, follow fate and decide to find that person for questioning. This, of course, leads to convicting the offender.

CSI takes a different approach. Crimes are pursued with scientific devices such as bloody print enhancers, cyanoacrylate fuming, electrostatic dust-printer lifters. The suspects often keep their mouths shut, and, as the forensic specialists like to say, "blood talks." A bloody glove isn't sent off to some far away forensic lab so the detective can hear the next day that the DNA is a match. CSI shows the procedure and explains what tools are being used to detect specific evidence. Millions of dollars are spent to fully equip the set with a realistic forensic lab, complete with an electrostatic detection apparatus and a combined DNA index system.

In one episode, investigators used phenolphthalein to test dice from a specific craps table that a suspect played at the night before. Analysis exposed traces of blood and saliva on one of the die the suspect blew on before he rolled it. This discovery,

among other pieces of scientific evidence, led to the suspect's arrest. This approach to crime investigation intrigues audiences through analysis of concrete evidence, leaving little doubt as to who is guilty and who is not at the end of the episode.

In the past shows based solely on science do not have the highest ratings, and are rarely nominated for "Best Series" at the Golden Globes, as CSI was. CSI includes the drama and suspense audiences adore. There are six main characters, four men and two women. All are attractive and well



Gil Grisham (William Petersen) and Catherine Willows (Marg Helgenberger), ready to explore the latest homicide.

Source: CBS

educated. One investigator, Sara Sidle, graduated from Harvard with a physics degree, and the main character, Gil Grissom, graduated from UCLA with a degree in biology.

All characters are single, leaving a wide array of openings for love interests, jeal-

ousy, and deceit. All characters have haunting pasts, as shown during a popular episode when character Catherine Willows was exposed as a former exotic dancer.

**"namely, no crime is so complex, no mystery so vexing and no malfeasance so cryptic and involved that by the final five minutes of the show it can't be wrapped up."
- Philip Michaels**

Also, character Warrick Brown has a job-threatening addiction to gambling.

No series would be complete without competition and tension between characters. Nick Strokes and Warrick Brown are the young, fit men that are in direct competition with one another for respect from their co-workers, especially Gil Grissom, their boss.

Each episode usually has two crimes that are separately investigated with Gil Grissom overseeing both. The solutions are often disclosed in the last five minutes of the show, leaving the audience excited and captivated until the end.

Philip Michaels, a television critic, says of the 44 minute limit, "namely, no crime is so complex, no mystery so vexing and no malfeasance so cryptic and involved that by the final five minutes of the show it can't be wrapped up." With only 44 minutes to tell a story, Elizabeth Devine, technical advisor to CSI, admits to a little "fudging."

The series must be as realistic as possible, but still wildly entertaining. Devine said the colorful bottles in the background of the forensics lab are for no purpose other than "simply because television craves color." In one episode, Devine says, "a cast was made of a knife wound, something not

possible in reality." The audience has a stronger connection to the story if they think it is realistic, or even based on a real

Everything on the program is there for a reason, scientific or not, and that approach makes people feel more involved with the crime.

investigation. The hurdle for the CSI producers is that the crime must be introduced and solved in 44 minutes. People will lose interest if a crime lasts all season, which is closer to reality, as real crimes often take years to solve.

Overall, CSI is a show ahead of its police drama competition. The show is as realistic as a hit series can be. Shows closely resembling reality intrigue audiences, evidenced by the show's phenomenal ratings. Everything on the program is there for a reason, scientific or not, and that approach makes people feel more involved with the crime. The characters are not super heroes; they live demanding and interesting lives

that hundreds of investigators live day-to-day. The program introduces new scientific words and phrases on every episode, making it not only entertaining, but also educational. Each problem, no matter how fictional or surreal, is solved by the powerful combination of justice and science. *W&E*

CSI is aired on Thursday nights at 8:00 pm Central Time on CBS.

Author Bio: Nathan Estep is a senior majoring in English Language and Linguistics with a certificate in Technical Communication. He is currently interning in medical communications at the UW-Madison Medical School.



CSI: Crime Scene Investigation uses forensics to solve crimes in Las Vegas.

Source: CBS

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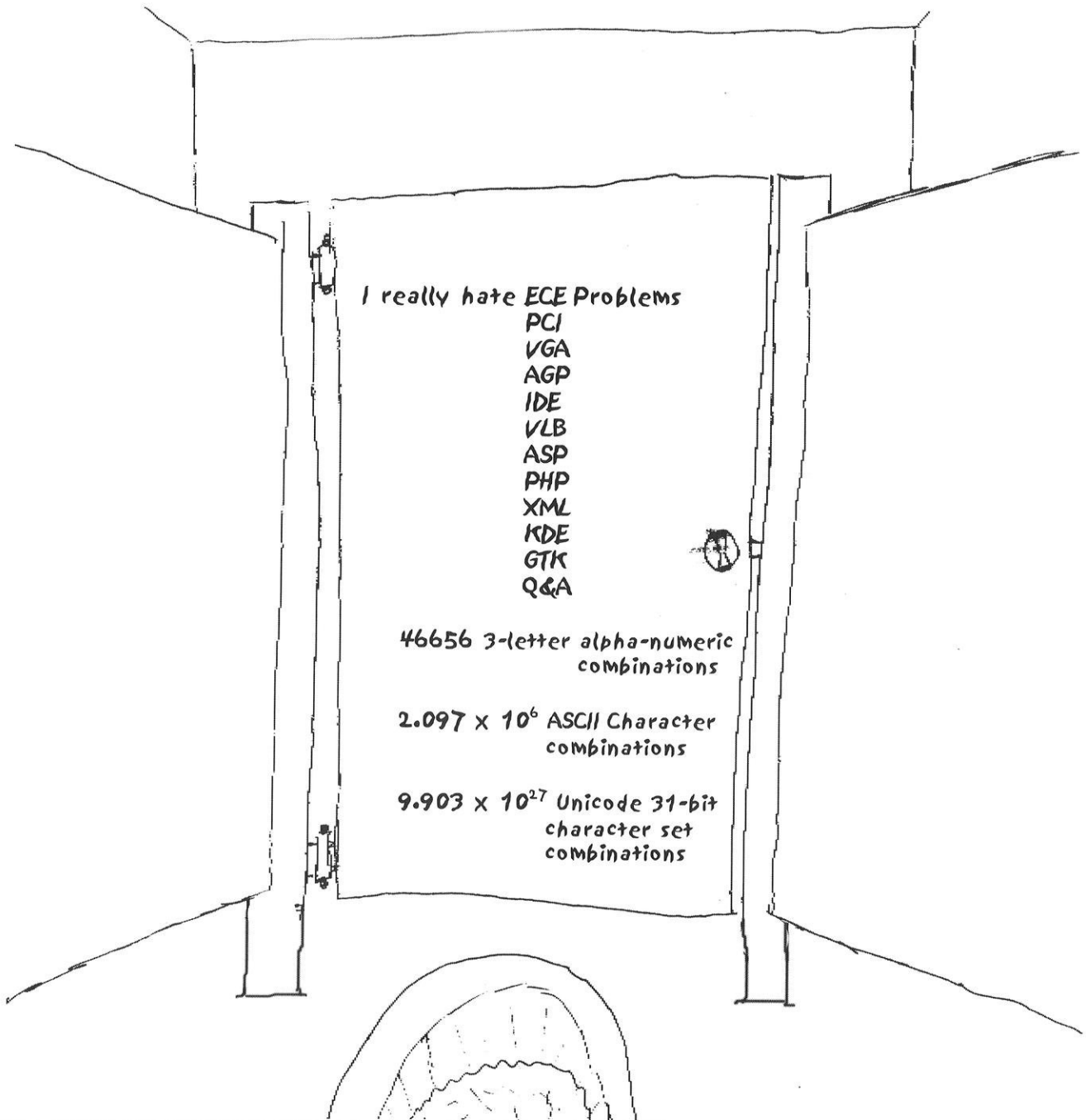
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ECE's view on 3-letter Acronyms

By Nicholas P. Mueller

Editor's Note: The following drawing was drawn as shown for effect. Nicholas is actually a much better artist than this.



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- HBG Construction
- Imation Corp.
- JF Ahern Co.
- Kimberly-Clark
- Lockheed Martin
- Marshall Erdman & Associates
- MIT Lincoln Lab
- Oshkosh Truck
- Parker Hannifin
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