

Spinach for sight

Light-sensitive proteins in chlorophyll may provide treatment for some eye diseases

Spinach, a vegetable famously rich in vitamins and minerals, can be safely assumed to be good for the eyes. A collaboration between ORNL researchers and the University of Southern California is investigating whether it might someday even restore sight to the legally blind.

In people who suffer from age-related macular degeneration or retinitis pigmentosa, the photoreceptor ability of the retina is lost even though the neural wiring from the eye to the brain remains intact.



Eli Greenbaum and his colleagues in the Chemical Technology Division propose replacing these inactive photoreceptors with spinach protein, which has a similar reaction to light that may prove able to trigger optical signals to the brain.

Chlorophyll-containing proteins in spinach give off a small electrical voltage after capturing the energy of incoming photons of light. Called Photosystem I, or PSI (pronounced PS One), the main function of this photosynthetic reaction center protein is to perform photosynthesis, using the energy of the sun

to make plant tissue.

The same spinach protein might one day be used to replace key, light-receiving parts of the human eye that have lost their ability to function.

Eli proposed using the proteins to treat vision loss after meeting with Mark Humayun of the Doheny Retina Institute at USC. Humayun and his research team showed that if retinal tissue is stimulated electrically using pinhead-sized electrodes implanted in the eyes of legally blind patients, many of these people can perceive image patterns that mimic the effects of stimulation by light.

It might be possible, Eli suggests, to use PSI proteins to restore photoreceptor activity. ORNL experiments show that PSI proteins can capture photon energy and generate electric voltages of about one volt.

The question is, can these voltages trigger neural events, allowing the brain to interpret images?

Degeneration of the retina—the light-sensitive layer of tissue at the back of the eye—has left 20,000 people totally blind in the United States, and another half-million visually impaired.

One condition, retinitis pigmentosa, or RP, is an inherited condition in which the rods—specific photoreceptor cells in the retina—degenerate.

Eventually the disease diminishes a person's ability to see in dim light and gradually can reduce peripheral vision.

Another disease, age-related macular degeneration, or AMD, affects the macula, or center of the retina.

People rarely go blind from AMD but may have great difficulty reading, driving, and performing other activities. When light is focused onto the macula, millions of cells change the light into an electrical current that tells the brain, by way of the neural wiring, what the eye is seeing.

Eli and his colleagues want to try to implant the light-sensitive proteins in damaged retina to see if they can generate electrical impulses that might result in sight. Using Laboratory-Directed Research and Development funds, Eli, Tanya Kuritz and James W. Lee, all of Chem Tech, and Frank W. Larimer of the Life Sciences Division are working with Ida Lee and Barry D. Bruce, both of the University of Tennessee, and Humayun and his



Eli Greenbaum

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Organizational changes aimed at honing ORNL's competitive edge

A summer-long Laboratory organizational review has culminated in a plan to streamline ORNL's structure from 19 to 16 research divisions, some of them newly created. The moves are designed to align science and technology capabilities with customer needs, give the Lab a more uniform business structure, reduce costs and clarify program management and staff development responsibilities.

"There are new and expanding opportunities for ORNL to participate in the future research needs of

Under the new plan there will be 16 divisions, no sections and 180 or fewer groups.

DOE and other customers," said Lab Director Bill Madia in a September 5 message to Lab staff members. "Significant growth potential exists for our work in the fundamental sciences, energy technologies—including nuclear, and other applied missions. In order to best capitalize on these opportunities, we must realign the Laboratory's capabilities in ways

that will enable us to compete more effectively."

The Organizational Review Task Force, charged last April 30 to make recommendations on how to improve the Lab's management structure, delivered in mid-August after a series of meetings by teams and subteams and armed with suggestions from staff members and focus groups.

The task force reported that current ORNL divisions (depending on how one counts them, there are 19) contain 62 sections, broken down further into 250 groups. Of those groups, 25 are "virtual," meaning essentially that they have no members, while 44 have two or less. Some groups have more than 25.

Under the new plan there will be 16 divisions, no sections and 180 or fewer groups. Smaller groups will be consolidated, increasing the average number of full-time employees per group to around a dozen—more than the current average of eight but still a size that's deemed appropriate.

"The task force suggested a re-alignment of research capabilities to strengthen the R&D product

of the Lab. This resulted in many small movements of research groups between divisions, and even the complete relocation of capability that resulted in the removal of three divisions," says Deputy Director for Science and Technology Lee Riedinger. "Also, the task force studied the grouping of research capabilities needed to make the strongest possible level-two units, and this resulted in 16 research divisions."

Major changes include the following:

- With an eye toward the 100-teraflop era, a new directorate, Computing and Computational Sciences, will house the Computational Sciences and Engineering, Computer Science and Mathematics, and Networking and Computing Technologies divisions, as well as the Center for Computational Sciences. The new directorate will be led by current CMSD Director Thomas Zacharia.
- Most nuclear research capabilities will be housed in a newly created Nuclear Science and Technol-

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Organize

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ogy Division. NSTD will incorporate the nuclear capabilities previously contained in the Chemical Technology, Engineering Technology, Robotics and Process Systems, and Computational Physics and Engineering divisions.

- A newly formed Engineering Science and Technology Division will consolidate ORNL's engineering and measurement capabilities from the former Engineering Technology, Instrumentation and Controls, Robotics and Process Systems, and Energy divisions.
- ORNL's Chemical and Analytical Sciences Division will add fundamental chemistry capabilities from the former Chemical Technology Division to form a newly constituted Chemical Sciences Division.
- The Environmental Sciences Division will add Energy and Environmental Analysis research from the former Energy Division.
- Only minor changes are planned for the Fusion Energy, Physics, Solid State, Metals and Ceramics, Life Sciences, and Research Reactors divisions, and for the Spallation Neutron Source's Accelerator Systems, Experimental Facilities, and Conventional Facilities divisions.

The task force's preliminary findings were made available to staff members in presentation form as soon as the August 16 briefing to senior staff concluded. The task force found large variation in the health of divisions and groups, that capabilities of some divisions and groups had "drifted" and that the Lab could improve opportunities for staff to work across division lines by establishing uniform business rules and management reviews of the divisions' organizational burdens.

They noted areas of overlapping capabilities

among organizations, where the sizes of groups ranged from pairs of employees to scores, and where business rules varied among divisions.

Staff opinions and ideas were solicited by the task force from the outset. A series of 10 focus group discussions was the primary mechanism, held to gather input from managers, staff and various levels of management.

"Four key themes emerged from these focus groups that were considerations in the deliberations about reorganization," says Deputy Director for Operations Jeff Smith, who co-chaired the task force with Lee. "These themes were to reduce costs, make it easier to work across division lines, improve the attention given to taking care of people and their career development and clarify where the responsibilities for line and program management reside."

In his message to staff, Bill cited the elimination of the section-head level of management as "by far the most dramatic change in ORNL's management structure." Various employee forums had called for a streamlining of the management structure at ORNL. Most management responsibilities performed by section heads will go to division directors, while group leaders and senior science staff will have a "sharpened focus" on staff development.

The new organizational structure reflects an effort to remove embedded support positions scattered throughout Lab organizations. "Grouping these positions into a single organization will reduce existing duplication and make the lab more efficient," Bill says. "I also expect the research staff to be demanding customers and pay only for service that is value added."

As for changes in business rules, the new plan calls for a structured process for reviewing and approving budgets, particularly involving organiza-

tional burden. The new plan categorizes "hidden" service center costs into appropriate indirect accounts and provides a consistent and uniform policy for assigning responsibility for projects and tasks done by one organization for another.

Program development also drew attention from the task force and the Leadership Team and is receiving heightened visibility. A formal program management career ladder will recognize "the importance of program management to ORNL's growth, strategy development and customer relations."

The task force ultimately said the chosen reorganization model would retain the Lab's customer focus, strategically align capabilities to meet customer needs, achieve a relatively uniform structure across the Lab while removing a layer of management, clarify program management and staff development roles and responsibilities and, finally, contribute to the Lab's goal of reducing costs.—B.C. [ornl](#)

This year's Awards Night sports new look, new awards

This year's Awards Night, slated for November 30, will have a new look. Most significantly, the total number of awards will be reduced while several new awards will be introduced, says Honors and Awards Coordinator Phil King. "The changes reflect greater balance among the award categories of scientific research, operations and community service."

Of the 28 awards to be given at the ceremony, the top four awards will be the Director's Awards for Outstanding Individual Accomplishment in Science and Technology, Laboratory Operations and Community Service and the Director's Award for Outstanding Team Accomplishment. This year all members of honored teams will be invited to the ceremony.

New categories have been added to the Community Service area to better balance it with the R&D and Operations mandates of the Laboratory. For example, the new award for Science Communicator will go to a scientist or engineer who has most effectively contributed to the public's better understanding of the value of science and technology.

Also added are three new Community Service awards designed to recognize individuals and teams who have made significant contributions toward enhancing the quality of life within the ORNL community and for its neighbors, and who have responded in an exemplary fashion to someone with immediate needs. The emphasis of this set of awards will be to honor peer-recognized role models who exhibit exemplary character traits such as respect and appreciation of others, dedication to achieving challenging goals and positive attitude, Phil says.

Nominations for this year's awards closed on September 5.—B.C. [ornl](#)



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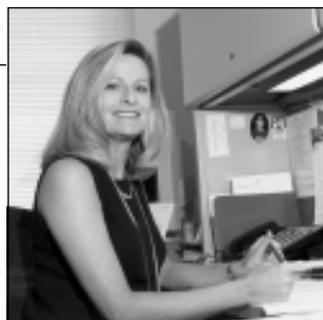
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Curtis Boles

Sandy Presley works in the Business and Information Services Directorate's Treasury Services group over in Building 1000. She lives in Kingston and spent much of this summer on nearby Watts Bar Lake.

Lab Notes

Publishing power in CASD

The journal *Analytical Chemistry* recently did a lengthy article on the subject of “data mining”—using information retrieval, processing and integration techniques to search for useful information on any one subject. In the course of preparing the scholarly piece the authors searched all articles published in *AC* between June 1998 and August 2000, about 2,000 overall.

Their results: *AC*'s most prolific author during that period was ORNL's Mike Ramsey, Laser Spectroscopy and Microinstrumentation group leader in the Chemical and Analytical Sciences Division, with 19 articles. Another member of the group, Steve Jacobson, is fourth on the list with 14 articles.

Mike says that most of those articles pertain to the group's work with microfluidics, or “lab-on-a-chip.”

ORNL was listed as *AC*'s most prolifically contributing single institution with 45 submissions. The University of California had 83, but that total included submissions from both Los Alamos and Lawrence Livermore national labs.

Developer for three buildings named

On August 29 UT-Battelle Development Corporation named Colliers Keenan the developer of the three new privately funded facilities at ORNL. The Columbia, S.C.-based firm is a veteran of large design-build-lease projects, including the Centers for Disease Control and Federal Aviation Administration buildings in Atlanta.

To demonstrate its community commitment, Collier Keenan also brought to town a \$150,000 grant for Roane State Community College.

ORNL's modernization plan has changed significantly since the first concepts appeared last fall. No longer aligned in a row, the three new facilities will sit on the south end of the east parking lot in a “pi” configuration. The horizontally oriented building will have four levels, leading to an open atrium area. The two adjacent buildings will be two stories high.

The new buildings will be
Oak Ridge National Laboratory



A design concept of the new Mouse House, which will be located almost due west of Building 1000.

multipurpose as well as impressive. Because they are privately owned and will be built to commercial standards, some of the space in the facilities may be used for commercial activities.

Third District Rep. Zach Wamp speculated at the announcement, held under the oaks on the Building 4500 North lawn facing the building site, that employee enthusiasm will improve as ORNL's facilities improve. That might happen sooner rather than later—construction is set to start in November.

'Home' improvement project to commence

A new Mouse House has been on ORNL's wish list since the early 1970s. The current home for ORNL's mutant mouse colony at Y-12, for all its legendary impact on science, also serves as a poster child for ORNL's plight of aging, paint-peeled, expensive-to-maintain facilities.

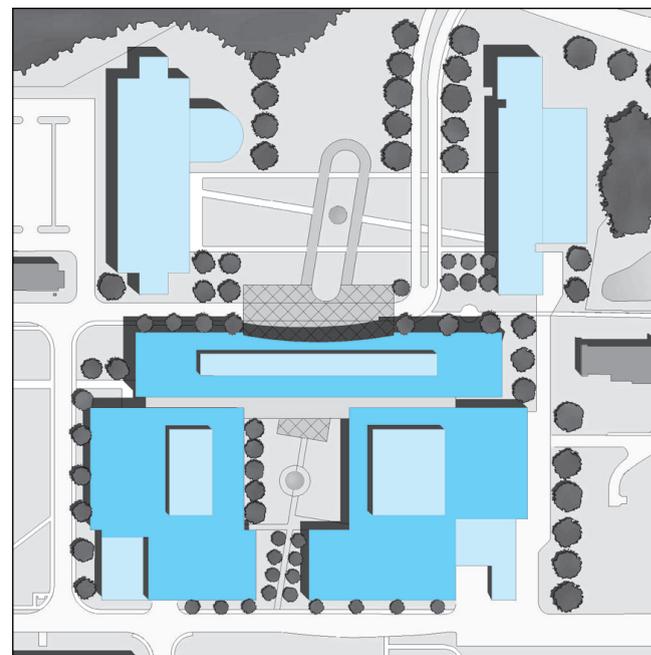
Last month Turner-Universal of Nashville was awarded the contract to, at long last, build a new Laboratory for Comparative and Functional Genomics on ORNL's west side. Groundbreaking should happen this fall, with a completion for the \$14 million facility set for 2003.

Barry Berven of the Life Sciences Division's front office says the biggest improvement in the new house is that the mice will be “clean”; that is, pathogen free. “That means that, unlike our current colony, they won't have the types of diseases that you'd normally expect to find in rodents—or cats or dogs, for that matter.”

That's important, Barry says, because DOE and the National Institutes of Health want ORNL to share its mouse strains with other facilities. To do that, those mice have to be clean because the presence of pathogens can confuse experimental results. Cleaning a mouse is an expensive process involving in vitro fertilization and implantation of the embryo into a clean mouse mom.

ORNL and the University of Tennessee are already creating a new, clean colony for the new Mouse House at UT's clean facility. “About 90 strains of mice have been rederived, working with UT,” Barry says.

Other improvements include an automatic watering system that will solve longstanding ergonomic issues arising from the task of keeping water bottles filled for 60,000 caged mice. Another advantage: The proximity to the Environmental Sciences Division, where similar genomic studies are done with plants, will enable LSD and ESD to share resources and enhance collaborations.



The new east facilities' “footprint” includes the three privately funded buildings, which will go in the southern half of what's currently the east parking lot.

Barry says the new lab should drastically reduce the current Mouse House's \$1.4 million annual utility bill, a definite plus, in addition to “having a facility specifically designed for animal care. The old Mouse House,” Barry says, “was designed for uranium separations.”

Parking: New routines

Meanwhile, back over on the east end of the Lab, a strip of parking spaces along Sixth Street, facing Building 4500-North, is complete. That's the first in a line of projects to create and construct slots to replace those currently in the east, or main, parking lot that will soon become the site for the three new privately funded research buildings.

By the time you read this, expansion should also have started on the “flagpole” parking lot in front of 4500-North, from 80 to 280 spaces, and work will soon begin on expansion of the lot on the hill above the 6026 trailers. Those trailers eventually will be replaced by parking space as well.

Although the loss of the east lot spaces will undoubtedly change a lot of morning routines, the Revised Access Control program—converting access to the Lab from rotogate readers to building proximity readers—means that areas inside the fence, such as the flagpole lot, will become available for commuter parking. (See page 5.)

So the answer to the question, “Where the heck am I going to park?” is likely, “Someplace different, possibly a little further away or possibly a little closer.” It may be an inconvenience at first, but plans are for parking supply to stay ahead of demand. And if you can share a ride, here's an incentive: Special carpool parking slots are being set aside. See home.ornl.gov/carpool on the Web.

Reported by Bill Cabage

Supercomputing projects involve multiple research areas, 4-teraflop resource for users

ORNL has gathered up a considerable head of steam toward fulfilling the supercomputing goals of its Lab Agenda. The Lab made three announcements involving supercomputing projects and partnerships in August.

The three announcements involve a partnership with IBM to develop a supercomputer that performs on a petaflop scale, a project with leading universities to explore fusion processes and another project aimed at climate studies. Meanwhile, the Center for Computational Sciences is installing a four-teraflop supercomputer that will give ORNL researchers and scientists outside the Lab a state-of-the-art computing resource for solving complex problems.

Named for the fleetest of mammals, the CCS's new "Cheetah" supercomputer, provided as part of DOE's Scientific Discovery through Advanced Computing, or SCiDAC, program, will serve research communities including astrophysics, biology, chemistry, climate, fusion and materials.

Cheetah will be powered by an IBM Power4 gigaprocessor. ORNL is also working with IBM on the Blue Gene research project, which combines advanced protein science with IBM's next-generation cellular architecture supercomputer design.

Unlike today's computers, cellular servers will run on chips containing "cells," which are processors that contain memory and communications circuits.

Cheetah will allow scientists to write computer programs and solve problems that simply could not be solved before.

Cellular architecture will help scale computer performance from teraflops (1 trillion calculations per second) to petaflops (1,000 trillion calculations per second).

"The world of supercomputing is

rapidly changing and we need to develop approaches to solving computational problems that are able to scale to thousands of processors and at the same time be tolerant of failures of some of these processors," says Ed Oliver, associate director in DOE's Office of Advanced Scientific Computing Research and former leader of ORNL's computing organization.

Enormous computing power and support from DOE are expected to help researchers at ORNL, the Massachusetts Institute of Technology and Princeton University better understand and control fusion machines.

With SCiDAC funding, the research team hopes to obtain highly accurate methods to predict the effects of radio waves in the plasma that would be at the core of a fusion power plant. One specific goal of the project is to increase the dimensionality of the computer models. This involves computing the radio

waves' interaction with plasma in two and three dimensions. Until now, scientists have had to make calculations that take into account just one or marginally two dimensions.

"In the past, we had to make simplifying assumptions about the physics," says the Fusion Energy Division's Don Batchelor. "With this kind of computing ability, we can handle far more complex equations that give us a more accurate picture of the plasma waves across an entire plasma cross section."

The work will build on the research of Don, Fred Jaeger, Lee Berry and Mark Carter of Fusion Energy and Ed D'Azevedo of the Computer Science and Mathematics Division.

"Besides heating the plasma in much the same way a microwave oven heats food, experiments show that radio waves can drive electric currents through the plasma and force the plasma to flow," Don says. "With these waves, we think we can improve the ability of the magnetic field to hold the energetic particles and plasma energy inside the device. This will be done by reducing turbulent fluctuations in plasma velocity and pressure brought on by the high plasma energy."

Cheetah will make many of the advances possible by allowing scientists to write computer programs and solve problems that simply could not be solved before.

ORNL is also co-leading a team, armed with SciDAC funding, that over the next five years will speed the development of computer models to predict climate change.

The project, awarded jointly to ORNL and Los Alamos National Laboratory, will allow the labs to develop a climate model that will provide a scientific basis for evaluating policy alternatives.

"It's difficult to assess the effects of policies if we do not have accurate models," says John Drake of the Computer Science and Mathematics Division. "This funding will allow us to develop tools to provide accurate information to policymakers looking at the potential effects of increased greenhouse gases."

ORNL's current IBM and Compaq supercomputers boast more than 1.5 teraflops of computing power that can contribute to the modeling and software design and engineering required to develop and maintain high-quality climate prediction capabilities. Others involved in the project are the Argonne, Lawrence Livermore and Pacific Northwest national laboratories; the National Center for Atmospheric Research; and NASA.

The Blue Gene project with IBM is the subject of a cooperative research and development agreement. "This is an exciting next step in ORNL's history of evaluating new computational architectures and pushing the computational science envelope," says CSMD Director Thomas Zacharia. —*Reported by Ron Walli ornl*

PNNL picks Reinhold Mann for deputy director post

Pacific Northwest National Laboratory has named ORNL Life Sciences Division Director Reinhold Mann as PNNL's deputy laboratory director for science and technology. Reinhold starts his assignment at PNNL Oct. 1.

His duties will include ensuring that key scientific initiatives at PNNL—including systems biology, computational science and engineering, and nanoscience and nanotechnology—will be integrated with PNNL's other research activities.

"Reinhold is highly thought of by DOE and others for his ability to integrate large programs and lead large research teams," says PNNL Director Lura Powell. She says that



Reinhold Mann

Reinhold's outstanding research career and extensive management experience will help strengthen PNNL's S&T programs and better link them with ORNL.

Reinhold joined ORNL as a visiting scientist in 1981. During the following two decades he built successful programs in robotics and intelligent systems, bioinformatics and computational biology. Reinhold was named ORNL Leader of the Year in 1999. [ornl](#)

Group studies travel policies

ORNL's Travel Focus Group, comprising Lab employees and Travel Services staff, has been analyzing the Lab's travel services and will soon recommend significant changes in travel policies and procedures.

In the most marked change, travel arrangements are returning to the phone. This fall, staff members again will be able to arrange most of their trips over the telephone with a travel representative. The Travel Services Web site will still be used for settlements; what's coming back is the service aspect of talking person to person, says Janet Dippo, who chairs the focus group.

Travel Services is relinquishing much of its "policing" role in travel arrangements. Travelers and their supervisors will have more responsibility in ensuring that travel complies with company travel guidelines. Travel Services' Kathie Shearer says her office will "offer advice and cautions concerning business policies."

Ombudsman Steve Stow points out that many of the issues being looked into by the Travel Focus Group are in direct response to the Quality of Work Life survey completed early in the year. Watch for an announcement later this fall on new travel policies. In the meantime, staff members who would like to contribute to the discussion can contact Janet Dippo, 574-6971, [dippojl. ornl](#)

Revised access

On October 1, building access changes will lead to a more open Lab

BY BILL RICH

On October 1, with completion of the first stage of the Laboratory's Revised Access Control project, Lab staff members will see significant changes in how the site and site buildings are accessed.

With the approval of Oak Ridge Operations, beginning on that Monday morning, ORNL Protective Force members will no longer staff the vehicle portals leading into the main campus area during normal work hours (from 6 a.m. to 6 p.m.) on Mondays through Fridays. Also, badge-reader-operated turnstiles will no longer be in use on the X-10 site's fenced perimeter.

Appropriately badged operators of authorized vehicles (government vehicles and specifically authorized private vehicles) will be able to drive into the main campus enclave without having to present a badge. Appropriately badged employees will be able to walk onto the site through either a freewheeling turnstile or an open swing gate without having to swipe a badge through a reader.

While pedestrian gates on the main campus perimeter will remain accessible around the clock, all but one vehicle portal will be closed and locked from 6 p.m. until 6 a.m. the next normal workday. A member of the Protective Force, who will be responsible for controlling vehicular access to the site, will staff the sole vehicle portal remaining open (the west portal adjacent to Building 2500) beginning at 6 p.m.

You will see new automated access controls (using proximity cards and proximity card readers) at the boundaries of many buildings within the fenced main campus area. Other on-site buildings will be secured when unattended. This will help us better know where employees are as they perform their official duties and, more specifically, give us better control over the area access of nonemployees and visitors to the site. This will in turn facilitate more positive control over access to sensitive internal areas and better protection of sensitive information.

While access to the main campus area will be more open, access to certain "controlled areas" within the Laboratory will continue to be controlled, either

through the presence of a Protective Force member or with an automated device. For instance, the High Flux Isotope Reactor complex portal will continue to be staffed by the ORNL Protective Force during normal work hours, and automated access controls will continue to be in place for those seeking pedestrian access into the complex.

Overall security of the site and the protection afforded DOE security interests will not be diminished. The legal site perimeter will be maintained—additional signage will be posted to remind the public that only "appropriately badged personnel" are authorized to enter the site, and "no trespassing" rules will be enforced. Regarding your personal protection, Protective Force personnel freed up from previous static posts will be used to provide increased roving patrol coverage of the site and to enable quick response to any potential security incident.

What is expected of ORNL employees when more openness comes? First, wear your issued DOE badge at all times while on the site—on an outer garment, above the waist—because the ORNL Protective Force will be charged to respond to investigate the presence of unbadged personnel within the Laboratory.

Next, be attentive for persons not displaying a badge. Report such situations to ORNL Security so the presence of these unbadged persons may be investigated.

Also, you will need to ensure that work areas, government vehicles and equipment items you are responsible for are secured when unattended. Current rules require that govern-

ment vehicles parked off site be locked. With a more open campus environment after October 1, this same rule will be applied to unattended government vehicles parked within the site.

So what will be the next step associated with the Revised Access Control Project? Automated access controls will continue to be applied at additional buildings throughout the site over the course of the next year. When the entire project is complete, even more openness may then be achievable. [ornl](#)

Bill Rich is ORNL's security manager.



Curtis Boles

A more open Laboratory means that staff members should be observant for individuals who aren't wearing badges and should make sure they wear their own badges properly. The Managed Hardware Program's Karen Peacher shows two proper ways to wear a badge: on the left, clipped to her collar and visible on the outer garment, and on the right, suspended from a lanyard. In both cases the badge is visible above the waist. The new proximity cards should be worn behind the DOE photo I.D. badge, as shown. The prox card will activate a reader through the DOE badge, so you won't have to fumble with it.

ORNL people

The Metals and Ceramics Division's **Lance Snead** has been named winner of the 2001 Excellence in Fusion Engineering Award by Fusion Power Associates' board of directors. Winners are selected for "both outstanding technical accomplishment and potential to become exceptionally influential leaders in the fusion field." Previous winners from ORNL include Steve Zinkle and Martin Peng.

Nermin Uckan of the Fusion Energy Division is editor of the American Nuclear Society journal *Fusion Science and Technology*. She renamed the journal from *Fusion Technology* to reflect the common goal of the fusion science and technology communities, which is fusion energy.

The Life Sciences Division's **Kowetha Davidson** received an outstanding achievement award at this year's Oak Ridge YWCA Night of Tribute. Kowetha's award topped the science and technology category.

Spinach

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team at the Doheny Retina Institute at USC.

"We have assembled an outstanding interdisciplinary team of scientists, vitreo-retinal surgeons, ophthalmologists and biomedical engineers, to attack this important problem," Eli says. The project is based on recent original discoveries in the Chem Tech Division.

"Using Kelvin force microscopy, we have performed the first measurements of voltages induced by photons of light from single photosynthetic reaction centers," Eli says. "The measured photovoltage values, typically one volt or more, are sufficiently large to trigger a neural response."

The work was published last year in an issue of the *Journal of Physical Chemistry B*.

"We are proposing the insertion of purified PSI reaction centers into retinal cells to determine whether they will restore photoreceptor function in persons who have AMD or RP. Once we demonstrate this is possible, USC researchers will test the technique in the laboratory and, if feasible, later in humans in clinical trials."

In recent research, the collaborators showed that PSI reaction centers could be incorporated into a liposome, an artificial membrane that mimics the composition of a membrane of a living cell. They also showed that the PSI can be functional inside a liposome—that is, it produces the experimental equivalent of a voltage when light is shone on it. A liposome will likely be used to deliver PSI to a retinal cell.

Eli has long believed that his group's research in photosynthesis could have important impacts on humans in terms of energy production and biomolecular electronics. Now, he is especially excited that it also could lead to restoration of vision to the blind. —Reported by Carolyn Krause [ornl](#)

Sheldon Datz pioneered niches of physics in a much heralded career

Sheldon Datz, the ORNL physicist whose many awards include the Enrico Fermi Award presented to him by President Clinton last year, died August 15 of respiratory complications. He retired from the Lab last year as head of the Physics Division's Atomic and Molecular Physics section.

He was a strong supporter of the Lab's Wigner Fellowship program, which attracts top young scientists to ORNL.

In a 1999 interview with *ORNL Reporter*, Sheldon described himself as a researcher who "filled the gaps" in basic research between larger physics facilities and smaller experiments. He and ORNL's Ellison Taylor were early explorers of molecular-beam physics that broke ground for the field of chemical dynamics. Researchers who followed up on those studies eventually received Nobel prizes.

Seemingly arcane basic science, Sheldon said, sometimes resulted in billion-dollar industries. He cited ORNL's early work in particle-solid interactions, which resulted in analytical methods and the surface modification of materials widely used in industry today.

Sheldon came to ORNL in 1951, hired by Taylor, then the Chemistry Division director, who had been his supervisor at Columbia University's Manhattan Project labs. The two investigated what happened at the molecular level during chemical reactions and demonstrated the use of crossed molecular beams in 1955.



Sheldon Datz

Those experiments eventually led to the development of "differential surface ionization" to characterize, using the Graphite Reactor's neutrons, the tiny amounts of product deposited by the crossed-beam experiments. The method greatly simplified the experiment and germinated the field of molecular beam chemistry. This ORNL work laid the foundation for the field of chemical dynamics research.

Sheldon's work took him around the globe. He did work in the early 1960s in The Netherlands, where he reported the ion-channeling effect that had been predicted by early computer models at ORNL. Ion channeling explained a number of reported characteristics of particle-solid interactions.

He was a veteran of experiments at CERN in Switzerland and had a close relationship with physical science facilities at the University of Stockholm, Sweden, which presented him with an honorary doctorate in 1998, the same year he received a similar award in Japan. He also received the American Physical Society's Davisson-Germer Prize for his research into atomic interactions with ions, electrons and photons.

He remarked in 1999: "No one said, 'go out and invent a laser so that we can use a scanner at the supermarket checkout counter.'" Such important new discoveries, he believed, were the serendipitous results of speculative, curiosity-driven research.

He was 74.—*B.C., with Carolyn Krause ornl*

That's progress

Seeking an alternative to that SUV? Jonathan Scurlock's 1957 Roadmaster is for sale

Editor's note: The Environmental Sciences Division's Jonathan Scurlock has advocated energy conservation in the pages of ORNL Reporter and on the Web through ORNL Today. Ironically, he likes to drive big, old cars such as his 1957 Buick Roadmaster, a tail-finned anachronism from the cheap oil days. But, in this "more enlightened" time of the sport utility vehicle, is it so ironic? And is his '57 such an anachronism?

BY JONATHAN SCURLOCK

Driving home on a Friday evening in August, I heard a feature on NPR's *Market Place*: Joni Mitchell seen driving an SUV on Sunset Boulevard!

Surely not. The flower children of the 1960s drive fuel-efficient Honda Insights or safety-minded Volvos, don't they? Or perhaps they might be forgiven if they run around in trendy '50s or '60s cars. (Like me!)

The radio commentator implied that if the woman who sang, "They paved paradise, put up a parking lot," felt that "we gotta get back to the garden" by driving there in an ugly, oversized piece of conspicuous consumption like a Big Yellow Cadillac Escalade, then we all might as well give up saving the planet and just go home.

Let's face it: Very few of us actually need two feet of ground clearance in order to get over a few speed bumps in our subdivision.

But who am I to criticize? I drive a 1957 Buick. After all, when I'm not out evaluating more environmentally friendly forms of transport like GM's electric EV1 or the aforementioned hybrid-engined

Honda Insight (see *ORNL Reporter* No. 10, December 1999), I suppose I'm just indulging my passion for those classics of American Baroque design that I could never afford to gas up or park back home in Britain.

Somehow those behemoths of the 1950s and '60s belong to a brighter, less cynical, more optimistic era, when we all believed in the power of technology to improve our quality of life. Such extravagant automobiles were actually little more than designer skins draped over conservative railroad-locomotive frames, but we lived and loved the illusion that they were futuristic fairy stagecoaches.

Yes, the fuel economy on these absurd, great road-going boats—just like today's mega-SUVs—stinks. But somehow they had a wistful elegance which is sadly lacking in the brutish Escalades, Navigators and Expeditions that I see around the ORNL parking lot.

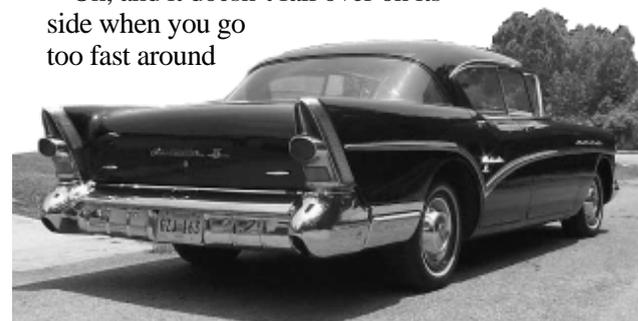
And what if we compare yesterday's status symbols with those of today?

Hmmm. Let me see: I could have a 2001 Ford Expedition Eddie Bauer special edition for \$40,695 with a 5.4L V8 giving 260 hp and 12/17 mpg, capable of cruising comfortably at a little above the interstate speed limit. Or for \$10,000 more I could have one of those ghastly boat-shaped Lincoln Navigators (similar engine, about 300 hp and 12/16 mpg).

But wait a minute! That's almost exactly the performance and gas consumption I get from my Buick! It has a 364 ci (5.9 litre) V8 engine, giving about 300 hp and SUV-like performance, plus

electric windows, six-way power seat, station-seeking Wonderbar radio, clock, etc.—all the mod cons of a contemporary luxury automobile, with space for five or six people and a smooth jolt-free ride (one of my friends wishes her Discovery were half as smooth as the Buick).

Oh, and it doesn't fall over on its side when you go too fast around



The '57 Buick Roadmaster. You'll get about 12/17 miles per gallon. Find out what more contemporary models get by checking www.fueleconomy.gov.

a bend. It just rolls a bit—like an ocean liner on the high seas.

Progress? What progress? Ah well, I suppose 44 years is nothing in the life of the motor industry. *ornl*

Make Jonathan an offer around \$9500 for his restored 1957 Buick. He needs the money to trade up to a Honda Insight.

Nurse practitioner students observe at ORNL

A one-month preceptor program for Carson-Newman College nurse practitioner graduate students will be initiated in November at ORNL.

Two C-N students will spend one month working with Joann Leinart, ORNL's nurse practitioner, to observe her health assessments and treatments of ORNL employees visiting Medical on the first floor of Building 4500 North. Leinart has served as ORNL's nurse practitioner since June.

Nurse practitioners are able to perform many of the same functions as physicians, including administering many treatments and prescribing medication. They receive additional training and certification above that earned by registered nurses, including a master's degree in nursing/nurse practitioner.

"This will provide an opportunity for two nurse practitioner graduate students from Carson-Newman each year to receive exceptional hands-on training in health assessments," says Dr. James Phillips, director of ORNL's Health Services Division.

Leinart, who earned a master's in nurse practicing from Carson-Newman, will work on a constant basis with the two students, who will be assigned by the college to ORNL. She will evaluate the students' performance during the month and assign a grade at the end. The experience is part of the students' curriculum toward earning a master's.

"The physical exams conducted at ORNL are the most comprehensive in this area," said Leinart, who worked as a nurse and nurse practitioner at Oak Ridge DOE facilities during the past nine years at

East Tennessee Technology Park and Y-12 and served as a case worker in the Benefit Plans office. "This will give the students a chance to see a complete physical exam."

Phillips said Carson-Newman approached ORNL about participating in the program. He is hopeful of developing similar programs in the future with area medical education organizations.

Carson-Newman's nurse practitioner program includes approximately 16 students per year.—Fred Strohl [ornl](#)



Nurse practitioner Joann Leinart, left, consults with Leslie Henderson.

Service Anniversaries

September

51 years: William (Bill) L. Griffith, Chemical & Analytical Sciences

45 years: Jack S. Watson, Chemical Technology

44 years: L.B. Shappert, Chemical Technology

35 years: Walt K. Brown, Research Reactors; Wayne E. Bullard, Logistical Services

30 years: Edith C. Jones, Office of Training Services & SBMS; David J. Poston, Jr., and B.D. Collins, Plant and Equipment; David M. Zehner, Solid State; Beverly V. Abele, Business & Information Services Dir.; James A. Rome, Computer Science & Mathematics; Carl A. Burtis, Jr., Health Services; Ronald D. Poor, Research Reactors; Philip A. Jallouk, Engineering Technology

25 years: Julia D. Malone, Business & Information Services Dir.; Pete Hoke, Quality Services; W. S. Key, B. D. Collins and George Farquharson, Engineering Technology; W. Scott Aaron, Catherine K. McKeown and Charles S. Webster, Chemical Technology; Victoria H. Rodgers and Larry C. Combs, Plant and Equipment; John H. Johnson and Glenn O. Allgood, Instrumentation and Controls; Fred W. Meyer, Physics; Phillip D. Fairchild, Energy; Clarence W. Cross, Jr., Logistical Services; Richard H. Enix, Operational Safety Services; Barry B. Spencer, Robotics and Process Systems; J. E. Sutherland, Chemical & Analytical Sciences

20 years: Brian Damiano, Instrumentation & Controls; David L. Angel, Plant and Equipment; Linda L. Horton, Metals & Ceramics; Davis A. Reed, Operational Safety Services; Terry R. Sharp, Energy

UT-Battelle corporate giving aims at educational targets

UT-Battelle's corporate giving program in recent months has included money for science labs in area schools as well as several other educationally oriented gifts. Here's a summary of recent check presentations.

- Support for college scholarships for minority students, Delta Sigma Theta Sorority, Oak Ridge Chapter (\$2,000) and Knoxville Chapter (\$1,000).
- Purchase of electronic dictionaries for Rockwood students involved in Roane State Community College-sponsored mentoring program (\$400)
- Sponsorship of Altrusa Literacy Luncheon (\$500)
- Equipment for science labs for Clinton Middle School, Coalfield School, Midway High School, Oak Ridge High School, and Vine Middle Performing Arts and Sciences Magnet School (~\$10,000 each)
- Sponsorship of Oak Ridge Rotary Club Street-Painting Festival to support Roane State Community College Foundation (\$1,200)
- UT Minority Engineering Scholarship (\$15,000)
- Support for Oliver Springs High School science students' participation in "Botball" robotics competition (\$1,000)
- Sponsorship of Valley Corridor Summit (\$10,000)
- General support for Youth Haven (\$1,000)
- General support for Knoxville Opera (\$1,000)

- General support for Smoky Mountain Cultural Center of Townsend (\$250)
- Support for Oak Ridge Art Center ceramics studio (\$10,000)

Energy employees' compensation resource centers open

The U.S. Departments of Energy and Labor have opened three Energy Employees' Compensation Resource Centers to serve workers from facilities managed by Oak Ridge Operations. These centers can provide assistance to current and former DOE federal and contractor employees in filing claims for compensation under the Energy Employees Occupational Illness Compensation Program Act of 2000.

The new law, which became effective July 31, provides \$150,000 lump-sum compensation and related medical expenses to workers who became seriously ill from exposure to radiation, beryllium or silica while working at a DOE facility. Staff at each center have been trained to assist DOE workers who have occupational illnesses file claims with the DOL. They will also assist workers in applying for benefits that may be available through state workers' compensation programs. The centers are open

8:30 a.m.–5 p.m., Monday–Friday at the following locations:

Oak Ridge: 800 Oak Ridge Turnpike (Jackson Plaza), Suite C-103, Oak Ridge; phone (865) 481-0411.

Portsmouth, Ohio: 4320 Old Scioto Trail, Portsmouth; phone (740) 353-6993.

Paducah, Ky: 125 Memorial Drive (Barkley Centre), Paducah; phone (270) 534-0599.

Appointments are encouraged to ensure that each employee is provided the necessary time to discuss their claim with a counselor. Additional resources available to workers include the Department of Labor's Energy Employees Occupational Illness Compensation Program hotline at 1-866-888-3322, or Web site www.dol.gov, or DOE's Office of Advocacy hotline at 1-877-447-9756 or Web site www.eh.doe.gov/advocacy.

Team UT-Battelle answering curtain call for OR Playhouse volunteers

ORNL employees who have felt the lure of the limelight now have an opportunity to follow that dream. Oak Ridge Playhouse and Team UT-Battelle have agreed to work together to keep bringing quality productions to the community theater's stage. The playhouse needs volunteers.

Most of the volunteer opportunities lie with hammers and paintbrushes as opposed to scripts and grease paint. As anyone who has ever worked with a stage production can attest, bringing a show to opening night requires a tremendous amount of behind-the-scenes work.

"The Oak Ridge Playhouse needs help with stagecraft," says the Radiochemical Engineering and Development Center's Bob Wham, who is serving as director for this Team UT-Battelle project. "We need volunteers for set design and construction, costumes, stage make-up and lighting—and we need organizers."

Bob approached the Team UT-Battelle Advisory Committee to see if the playhouse's needs fit what Team UT-B is all about. Team UT-Battelle, which has been organized to help direct the skills, talents and volunteerism of Lab staff members toward worthy community projects, indeed includes cultural activities in its scope.

The Oak Ridge Playhouse is drawing big crowds with its productions. It needs a corresponding growth in volunteer workers.

"Although the playhouse's ticket sales are higher than ever, our volunteer base has dropped significantly over the last ten to fifteen years," says Bob. He attributes this partly to an aging core group of volunteers, combined with a general trend of growing demands on leisure time. Although the playhouse has experienced no shortage of actors for its auditions, getting backstage help for building sets, hanging lights and even doing the organizational chores has

been more of a challenge.

"Lots of folks try out for shows," says Bob, whose participation with the playhouse spans a couple of decades. "We need people to work behind the scenes, backstage."

A backstage perspective doesn't diminish the excitement of staging a performance. And the benefits, Bob says, go beyond applause.

"Producing a show requires leadership and management skills. You learn people skills and how to overcome shyness. You also have to stay on budget and you have to stay on deadline—on opening night the show goes on whether you're ready or not. This deadline doesn't slip," he says.

"It's a great development experience and I encourage people to get involved," he says. "Even kids. The Oak Ridge Junior Playhouse allows both children and parents to become involved in the theatre. Children can cover all aspects of a production from acting to backstage work—under adult supervision."

Team UT-Battelle's Bill Pardue says that ORNL, with its rich supply of skilled employees and volunteerism, can be a great booster for the community playhouse.

"We intend for Team UT-Battelle's activities to have a broad range—from charitable causes, such as the recent Habitat for Humanity builds and several charity fundraising events, to cultural, such as the Oak Ridge Playhouse."

The playhouse featured "Guys and Dolls" in July. Remaining on this season's playbill are "Deathtrap" (October 12–21), "Peter Pan" (November 22–



Oak Ridge Playhouse productions with elaborate set designs, such as *Rumors* shown here, depend on volunteers to build them.

December 2), "Having Our Say" (February 15–24), "The Man Who Came to Dinner" (April 12–21) and "The All-Night Strut" (May 10–19). The junior playhouse is featuring "Wiley and the Hairy Man" (September 15–16), "Alexander and the Terrible, Horrible, No Good, Very Bad Day" (January 26–27) and "Alice in Wonderland" (March 16–17).

The Oak Ridge Playhouse is one of the community's most enduring traditions. The lights went up on the playhouse almost as soon as they went on in Oak Ridge—next year marks the playhouse's 60th season.

Although the playhouse's needs are mainly in stagecraft, would-be thespians needn't despair—there are slots open for acting roles, particularly for the popular musicals. "We need men who can sing and dance," Bob says.—B.C. [oml](#)

oml reporter

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