

Like a butterfly

Atom-force acoustic microscopy advances biological imaging to nanoscale

Scanning probe microscopes, usually applied to imaging inorganic materials at nano- to microscopic scales, may soon be giving researchers new insights into the biomechanical structures and functions of living organisms — for example, nature’s engineering of a butterfly’s wing.

Sergei Kalinin, a Eugene P. Wigner fellow in the Condensed Matter Sciences Division, and Alexei Gruverman, a research professor at North Carolina State University, have obtained images of the structure of a *Vanessa virginiensis* (American Lady) butterfly’s wing at approximately 10 nanometer resolution.

Their experiment demonstrates that emerging advances in scanning probe microscopy can be applied to more than hard inorganic materials such as superconductors and semiconductors. Although the images are “a proof of concept,” it is a concept that eventually could provide clues to the functionality of complex hierarchical biological systems such as bones, teeth and other tissues.

Nevertheless, even the early results provide clues to the complex structure behind the elasticity and relative durability of the splendidly functional butterfly wing.

“Scanning probe microscopy provides unlimited opportunities for understanding material structure, properties and functionality at all length scales,” Kalinin said. “This will pave the way to better and cheaper materials for biological and medical applications.”

Kalinin’s and Gruverman’s work with imaging biological systems has its roots in the development of atomic force microscopy in



the 1980s. In this technique, a tiny cantilevered probe could “sense” the force between two atoms, providing a key to topographical imaging with atomic resolution.

Enhancements have followed over the years. Magnetic and conductive probes enabled the measurement of magnetic fields, electrostatic potential and conductivity with nanometer resolution. Scanning probe microscopes developed by Kalinin provided information on frequency-dependent transport on the nanoscale — crucial information for nanoelectronic and molecular devices.

Gruverman and Kalinin also pioneered high-resolution vector electromechanical imaging in perovskite ferroelectric materials, which are used in nonvolatile memory devices and other applications.

Now Kalinin and Gruverman are using a technique called Atomic Force Acoustic Microscopy, AFAM, which uses tiny blasts of sound to probe not only the surface but also the subsurface structures of delicate

biological materials, with approximately five nanometer resolution.

“This improved imaging sheds lights on how biological systems work, down to the five-nanometer resolutions, which is comparable to the size of a DNA molecule — about as small as you need for biological materials,” Kalinin said. “Biosystems, because they are not ordered like, for instance, crystalline materials, require real-space imaging of local elastic properties and structure. Scanning probe microscopes are a wonderful tool that is suited for exactly this purpose.”

Kalinin and Gruverman also are exploring the applications of Ultrasonic Force Microscopy, a technique similar to atom-force acoustic microscopy, to delve inside the biological structures. Besides their disordered

(See BUTTERFLY, page 7)

Raises nearly \$200,000 for support in Asia

Lab’s tsunami relief effort ‘exceeds all expectations’

ORNL employee contributions and matching funds from UT-Battelle totaling more than \$192,000 have been raised to aid victims of the recent Asian tsunami, ORNL director Jeff Wadsworth announced during a ceremony for drive supporters held in the new Research Support Center.

Among those attending the event were many employees from countries hit hardest by the disaster, which has claimed more than 200,000 lives.

“The amount collected from employees and retirees was nothing short of remarkable,

exceeding all my expectations,” Wadsworth said. “We thank all those who contributed so generously to the fund. This is one of the largest expressions of good will in the laboratory’s history.”

Wadsworth reminded ceremony attendees that the laboratory’s tsunami relief fund follows recent donations of more than \$800,000 from ORNL staff during the annual United Way campaign.

Some 900 ORNL staff and retirees have donated checks or cash to the fund. Staff contributions, which represent one-half of the

total raised, are being given to the American Red Cross to help tsunami victims. UT-Battelle matching funds will be applied to a specific tsunami relief project, such as the rebuilding of a school or orphanage. The project will be selected by the Team UT-Battelle Board of Directors from suggestions developed by laboratory staff.

“This incredible outpouring of support and generosity from Oak Ridge National Laboratory and UT-Battelle will go directly toward

(See TSUNAMI, page 7)

Seven ORNL researchers elected to fellowships

Four ORNL researchers have been elected fellows of the American Physical Society, and another three have joined the fellowship of the Institute of Physics.

The four APS fellows are David J. Dean, Anthony Mezzacappa and Predrag S. Krstic of the Physics Division and Lal A. Pinnaduwege of the Life Sciences Division. Election to fellowship in the APS is limited to no more than one half of one percent of the annual APS membership and is in recognition of outstanding contributions to physics.

Glenn Young and Witold Nazarewicz of the Physics Division and Parans Paranthaman of the Chemical Sciences Division have been elected fellows of the Institute of Physics, based in London.

The APS recognized Dean for his important contributions to understanding of quantum many-body systems and for applications of computational quantum mechanics to the structure of atomic nuclei.

Mezzacappa was cited by the APS for his pioneering work toward identifying the explosion mechanism of core collapse supernovae and his leadership in the development of U.S. computational science.

The society recognized Krstic for his important and diverse contributions to atomic theory, in particular, to the theory of non-adiabatic heavy-particle collisions and of relativistic effects in ultra-strong laser-atom

interaction.

Pinnaduwege was cited for his work in developing microcantilever-based sensors for detection of explosive vapors and elucidation of fundamental physical principles underlying nanodeflagrations. He was part of the R&D 100 award winning team for a sensor for detecting explosives.

The Institute of Physics elected Young, who directs the Physics Division, for his experimental research that focuses on states of nuclear matter at very high energy density.

Nazarewicz, whose nuclear theory research focuses on the description of nuclei far from stability, is scientific director of the Holifield Radioactive Ion Beam Facility as well as a professor at the University of Tennessee in Knoxville. He is among the most highly cited physicists worldwide.

Paranthaman, a senior research staff member in the Chemical Sciences Division,



Pinnaduwege, Dean, Krstic and Mezzacappa



Young



Nazarewicz



Paranthaman

shared an R&D 100 Award earned in 1999 for co-inventing the rolling-assisted-biaxially-textured substrates (RABiTS) technology to fabricate high-performance superconducting wires and has authored and co-authored numerous and frequently cited papers on superconducting technology.

PHAP now available to all medical plan participants

The Personal Health Assistance Program (PHAP) administered by Matria Healthcare is now available for all eligible CIGNA medical plan participants. This change extends coverage in the program to include Point of Service (POS) as well as Open Access participants.

Under the program, Optum NurseLine provides a resource for health questions, self-care tips or information to help you choose appropriate care. Experienced registered nurses are available 24 hours a day, seven

days a week at 1-888-233-4877.

The PHAP disease management program offers support, information and services to help you better manage your heart disease, chronic obstructive pulmonary disorder (COPD), asthma, diabetes, low back pain, cancer or pregnancy and improve your quality of life.

The PHAP program includes:

- Access to a PHAP care coordinator who will periodically call you to review your health status, answer your questions, and provide

encouragement.

- A staff of professionals who will be available to answer more complex clinical questions about heart disease, chronic obstructive pulmonary disorder, asthma, diabetes, low back pain, cancer or pregnancy.
- Helpful educational materials that will be sent to you. These materials also are also available on the PHAP website [<http://www.matriacares.com/pl/orbit/index/index.aspx>] in the Information Center.
- Health assessments, which will be used to determine your overall health status and to identify areas where you may require additional support and education. These assessments are also available on the website in the Assessment Center.

You may enroll in the program by calling 1-888-233-4877. Individuals who are pregnant or dealing with cancer should call as soon as diagnosed to receive maximum benefit from the program. PHAP care coordinators are available Monday through Thursday from 8 a.m. to 11 p.m., Friday from 8 a.m. to 9 p.m. and Saturday from 9 a.m. to 6 p.m. Eastern Time.

NurseLine and PHAP are completely confidential and are provided at no cost to you and your family through UT-Battelle as part of your medical plan benefits.



is published for employees and retirees of Oak Ridge National Laboratory, which is managed and operated for the U.S. Department of Energy by UT-Battelle.

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Teresa Ferguson and Donna Moates sampled entrees at the new cafeteria during the grand opening.

Curtis Boles

Lab Notes

Contract extension in works

DOE has exercised its option to extend the UT-Battelle contract to operate ORNL, announcing the decision to begin discussions to add another five years to UT-Battelle's management and operating contract.

The DOE announcement cited UT-Battelle's "proven and sustained track record of excellent performance" and its leadership in the effort to modernize the laboratory.

UT-Battelle's current contract expires March 31. DOE and UT-Battelle officials will be discussing the contract extension, which is expected to become effective April 1. Estimated value of the contract is approximately \$4.8 billion over the next five years. The option DOE will be exercising is a part of the ORNL contract that was competed in 1999.

RSC open for business

Conference Center meeting space in the Research Support Center, Bldg 5200, is now available. Facilities include the large conference room, which divides into three separate spaces. Combined, the big room seats 170 at classroom-style tables, or about 50 in each partitioned area. AV equipment is state of the art, with audience cameras for teleconferenc-

ing. The RSC has wireless capabilities and plenty of phone connections for staying in touch.

The center also has a number of smaller but plush meeting rooms, including a teleconferencing room with a multi-image screen and projector and three other smaller rooms, all AV and telecom equipped. Two conference

dining rooms are close to catering facilities and include waterfront views.

Several of the meeting rooms may be scheduled by general ORNL staff on Outlook Exchange. Rooms 202 ABC (large rooms) and 227J must be scheduled through the Conference Office's Angie Fincher (fincherah, 574-5980). Staff also may contact the Conference Center staff when assistance is required for a meeting.

When you have business in the RSC, be sure to check out the huge new mural, just past the cafeteria. (See below.) Designed by Creative Media's LeJean Hardin, the big picture takes advantage of the RSC's ample spaces to depict ORNL science, history and life.

Good news in Bredeesen budget

Gov. Phil Bredeesen's proposed state budget includes \$8 million in funding for the Joint Institute for Neutron Sciences, the third state-backed joint institute ORNL will share with the University of Tennessee.

JINS, sited adjacent to the Spallation Neutron Source, will join the Joint Institute for Computational Sciences on ORNL's new east campus and the Joint Institute for Biological Sciences, which will begin construction on the west end in late spring.

In his State of the State Address, Bredeesen cited UT and ORNL's partnership in re-establishing the university as an academic force, partly through the recruitment of "national academy-level" professors. His budget proposal also includes \$10 million over the next three years to help hire top scientists for joint ORNL-UT appointments.

If the General Assembly approves the funding for JINS, construction is slated to begin in early fall.

Snow forecast? Call 574-XTEN

Although this winter has been relatively mild so far, there's still plenty of time for snow and ice and possible weather-related work schedule changes.

For updates on work scheduling, call the ORNL Work & Weather Information line, 574-XTEN or 574-9836. Also, consult ORNL's Time Away from Work Policy, section 9.g. for information on the laboratory's inclement weather policy.

Bodman takes DOE helm

Samuel W. Bodman has been sworn in as Secretary of Energy following his unanimous-consent confirmation by the Senate.



Bodman

President Bush nominated the former deputy secretary of the Treasury and Commerce departments following Spencer Abraham's announcement that he would step down.

At Treasury and Commerce, Bodman oversaw organizations with a focus on science and technology. He has also worked in the National Oceanic and Atmospheric Administration, the Patent and Trademark Office and the National Institute of Standards and Technology. He was a professor at the Massachusetts Institute of Technology and is a financier and engineer by trade. Bodman, a former CEO of Cabot Corporation, holds a bachelor's in chemical engineering from Cornell and a doctorate in science from the Massachusetts Institute of Technology.

March 7 is scholarship deadline

March 7 is the deadline for submitting an application for the 2005 UT-Battelle Scholarship, which has been increased to \$5000 per academic year. The award goes annually to a child of a UT-Battelle employee and is granted on a competitive basis.

This scholarship to UT-Knoxville is aimed at encouraging careers in science. It is renewable for four years if the student maintains full-time enrollment, a strong grade-point average and steady progress toward a baccalaureate degree.

Students may select a course of study leading to a baccalaureate degree offered through UT in science, engineering or mathematics. In addition, UT-Battelle scholars will spend at least one practicum term at ORNL. Applicants must meet the following eligibility criteria:

- *Son or daughter of a current UT-Battelle employee
- *High school diploma held by the end of the current school year
- *Resident of Tennessee
- *Acceptance to UTK for following fall term
- *Minimum high school GPA of 3.75 in a 4.0 system and an ACT test score of 31

Applicants will be considered based on academic performance in high school; ACT scores; academic references and awards; and activities, community service and leadership.

The application form is available on the UT-Battelle Scholarship Web page. Completed applications and reference material should be sent to Gail Beyersdorf, 4500N, MS-6266.



Curtis Boles

Pat and Ron Parr checked out the RSC's mural, which features a large image of the late Herman Postma, former ORNL director.

Significant Event Award recipients

Employees honored for individual, team achievements

More than 130 ORNL staff members recently received Significant Event Awards in recognition of their achievements during the second half of fiscal year 2004. SEAs – lump-sum awards of various amounts – recognize individual employees and teams for their contributions and achievement of significant goals or milestones in support of ORNL goals and objectives.

Nominations for these awards are reviewed and approved by their respective divisions and directorates before final selection by a Leadership Team subcommittee. Congratulations to the following SEA recipients:

Baohua Gu of Environmental Sciences and **Gilbert M. Brown, Bruce A. Moyer, Peter V. Bonnesen** and **David R. Cole** of Chemical Sciences for the R&D 100 Award for the highly selective, regenerable perchlorate treatment system

Lal A. Pinnaduwege and **Thomas G. Thundat** of Life Sciences for the development and demonstration of an explosives sensor

Jeffrey A. Nichols, George A. Geist and **Arthur S. Bland** of Computer Science & Mathematics and **Debra D. McCoy** of the Computing & Computational Sciences Directorate for the winning proposal for the National Leadership-Class Computing Facility

Patrick H. Worley of Computer Science & Mathematics for his exemplary role in the Cray evaluation project and benchmarking results presented at the X1 Review

Robert J. Silvia, Gregory G. Pike and **Rebecca A. Fahey** of Computer Science & Mathematics and **Carl E. Thomas** and **Walter P. Dykas** of Networking & Computing Technologies for the Center for Computational Sciences certification and accreditation

Budhendra L. Bhaduri, Edward A. Bright, Phillip R. Coleman and **Paul E. Johnson** of Computational Sciences & Engineering for mission-critical support to DOE's Office of Energy Assurance

Dennis M. Depp, Ann K. Farrar, Scott A. Friend, David C. Giles, Lara A. James, Nancy K. McCurdy, Karen D. Peacher, Larry M. Rosenbaum, Janette C. Sharp, Doug R. Smelcer, Brian K. Swail, Brian S. Wallace, Daniel S. Walls and **Suzanne W. Willoughby** of Networking & Computing Technologies for Exchange Outlook implementation

John T. Simpson and **Brian R. D'Urso** of Engineering Science & Technology for the development and demonstration of superhydrophobic nano-spiked material

Jonathan A. Demko and **Michael J. Gouge** of Fusion Energy for development of the world's first power transmission line using second-generation high-temperature superconductor

Clint Ausmus, Dane R. Brashear and

John A. White of Nuclear Science & Technology for the successful plasma separation process enrichment of palladium-102 at Theragenics Corporation

Lewie D. Gasaway of Nuclear Science & Technology for a nuclear security transportation demonstration

Stephen M. Bowman, Lester M. Petrie, Willena C. Carter and **Sharon K. Lichtenwalter** of Nuclear Science & Technology for the public release of Version 5 of SCALE Software System

Brendan J. Kirby and **John D. Kueck** of Engineering Science & Technology and **Thomas J. King** of Metals & Ceramics for technical support to the Federal Energy Regulatory Commission on determining the causes of the August 14, 2003, blackout in the United States and Canada and recommendations to FERC to avoid future wide-spread blackouts

Daryl F. Cox of Engineering Science & Technology for exceptional technical efforts in achieving a major goal of the DOE BestPractices Program

Michael S. Hileman, William Holmes and **Raymond W. Tucker** of Engineering Science & Technology for the successful completion of the critical USEC CRADA milestone to develop and deploy a Centrifuge Balance Stand Data Acquisition System

Matthew F. Chisholm, Stephen J. Pennycook, Maria Varela del Arco, Julia T. Luck and **William H. Sides** of Condensed Matter Sciences for achieving the theoretical resolution limit of the HB603 STEM (a new world record of 0.6 angstroms) and obtaining the first spectroscopic analysis of a single atom within a bulk solid

Rodney D. Williams of Research Reactors and **Gary H. Henkel** of Quality Services for the fabrication of in-vessel component for the High Flux Isotope Reactor

Roosevelt Merriweather and **John M. McMahon** of Chemical Sciences for the disposition of more than 1,700 waste items from the SAAs in the Chemical Sciences Division laboratories

Terry C. Aves of Physics for leadership of 2003-2004 PHENIX Experiment operations

John D. Hunn, Richard A. Lowden, Jerry C. McLaughlin, Lloyd J. Turner, Ronald H. Baldwin and **Randall B. Ogle** of Metals & Ceramics and **William E. Comings** of Operational Safety Services for establishing uranium-coated particle fuel fabrication and characterization capability at ORNL

Gary A. Johnson, Paul E. Gibson, Claude A. Conner, Daryl P. Briggs, Robert C.

Morton, Randal L. McPherson, Johnny Y. Tang, Derrick C. Williams, Craig E. Deibele and **John A. Crandall** of the Spallation Neutron Source for the Drift Tube Linac and Coupled Cavity Linac recovery and installation effort

Suzanne A. Herron, Robert W. Steffey, Todd C. Holzer, Jama B. Hill and **Janet B. Bivens** of the Spallation Neutron Source; **Bryan M. Coulter** of Business & Information Services; and **Laurie S. Curtis** of Facilities Development for a successful Defense Contract Management Agency review (the first of its kind to have no non-compliances)

M. Katherine Collins, Alvin P. Guidry, Penny M. Owens, Angela G. Shillings and **Sonny Rogers** of Contracts; **Russell P. Langley, Tracey O. Lawson** and **Jeffrey L. Parkison** of Business & Information Services; and **Nicole E. Porter** of the Legal Directorate for standard contracts formats

Connie E. Arnwine of Quality Services for Battelle inter-site supplier evaluation and information-sharing initiatives

Jon J. Bartlett of Asset Management &

The Special Event Awards Program recognizes individual ORNL employees and teams for their contributions and achievements in support of the laboratory's goals and objectives.

Small Business Programs for the acquisition of leased space for Surplus Property Management

Jane C. Parrott, LeJean M. Hardin and **Carolyn H. Krause** of the Communications & External Relations Directorate for production of the SuperComputing proposal document

Sandra M. Beeler of Environmental Protection & Waste Services for outstanding support to the successful Nevada Test Site Waste Certification Audit

Susan R. Michaud of Environmental Protection & Waste Services for outstanding contributions to the Pollution Prevention and Environmental Management programs

Carlo D. Melbithess and **Faye S. Brewer** of Facilities Development; **Stephen D. Van Hoesen** of Environmental Protection & Waste Services; **John Scott Bowman** of Facilities Management; and **Mitchell L. Connor** of Operational Safety Services for Biology Complex deactivation

Hurtis U. Hodges, Tammy J. Rader, Vickie S. Martin, Thomas F. Orlin, Walter I. Dothard and **Michael J. Mitchell** of Facilities Management and **Donald C.**

Sampsell of Craft Resources for the development and implementation of a work scheduling and estimated cost forecasting system used for scheduling daily work activities in Facilities Management Division core teams

Mark W. Kohring, John H. Platfoot and **David G. Renfro** of Operational Safety Services; **Gary D. West** of Nuclear Science & Technology; and **Dale A. Caquelin, Judy M. Butler, Thomas M. Kenney, Patrick S. Bishop, Elvira M. Hodges** and **Robert E. Rosenbaum** of Nonreactor Nuclear Facilities

for the implementation of 10CFR830 Subpart B-compliant documented safety analyses for Nonreactor Nuclear Facilities

William J. Manuel, Sheila R. Holbert and **Ronald R. Smith** of Laboratory Protection for security for the presidential visit

Sheria W. Johnson of the Human Resources Directorate for support to the legal discovery process

Joanne Ledford of Environmental Sciences for FACE Facility recovery planning and execution

Betty S. Evans of Nuclear Science &

Technology for space reduction & clean-out of legacy wastes

LaRonda S. Mack of the Energy & Engineering Sciences Directorate for the Conference on Fossil Energy Materials

Brenda B. Hickey of Metals & Ceramics for the creation of historical CDs of the Ceramic Technology Program

Linda S. Edwards, formerly of the Human Resources Directorate (now of the National Security Directorate), for administrative support for the DOE On-Site Review Meeting

ORNL People

Mike Gouge, leader of the Applied Superconductivity Group in the Fusion Energy Division and applications team leader in the Superconductivity Program, has been named an editorial board member of the *Journal of Superconductivity: Incorporating Novel Magnetism*. Gouge will help secure article submissions in the area of applied superconductivity.

Mike Willard of the Human Resources Directorate received a Human Resource Management Excellence Award, presented at the Society of Human Resource Management's 12th Annual Tennessee State Human Resources Conference in Memphis. This award recognizes his efforts in support of SHRM's mission of "advancing the profession" and "serving the professional," as demonstrated by his achievements during his 30 years of human resources experience, his certification as a Senior Professional in Human Resources, and his leadership and contributions to the SHRM in both the local chapter (Tennessee Valley Human Resource Association) and in the state council, where he serves as district director for East Tennessee and State Council director-elect.

Life Sciences Division researcher **Thomas Thundat** received the Jesse W. Beams award for research excellence at the 71st Annual Meeting of the Southeastern Section of the American Physical Society. The award

recognizes especially significant or meritorious research in physics, the major portion of which was carried out in the 10-state SESAPS region. Thundat also was listed as one of the "Scientific American 50 Award" winners. The magazine recognizes "those who during 2003-2004 exhibited outstanding technology leadership in the realms of research, business and policy making." His listing, which he shares with the University of Nevada's Jesse Adams, is based on his work with microcantilevers for TNT detection.

Tykey Truett of the Engineering Science & Technology Division participated in the Huntsman World Senior Games in St. George, Utah. Truett ran the half-marathon (gold medal), 10K (gold medal), 1500-meter (silver medal), and 400-meter races. The Huntsman Senior Games are international in flavor. Over the past 18 years, athletes from 52 different nations have competed. About 7,800 seniors participated in the 2004 games.

Rekha Pillai, ESTD's Transportation Policy & Planning Group, was honored by the Indian American Kerala Cultural and Civic Center in Long Island, N.Y., as "Outstanding Malayalee Achiever" in the areas of engineering and science. The Kerala Cultural and Civic Center is the only center of its kind serving the Keralites (people from the southern state of Kerala in India) and the Indian American community in the tri-state New York area.

Sujit Das, Engineering Science & Technology Division, has been selected as the Light Metals Division's Journal of Metals award winner for his article on "Magnesium for Automotive Applications: Primary Production Cost Assessment," which appeared in the November 2003 issue of the journal. The winning article examines the prospects of economic viability of primary magnesium for automo-



Hu



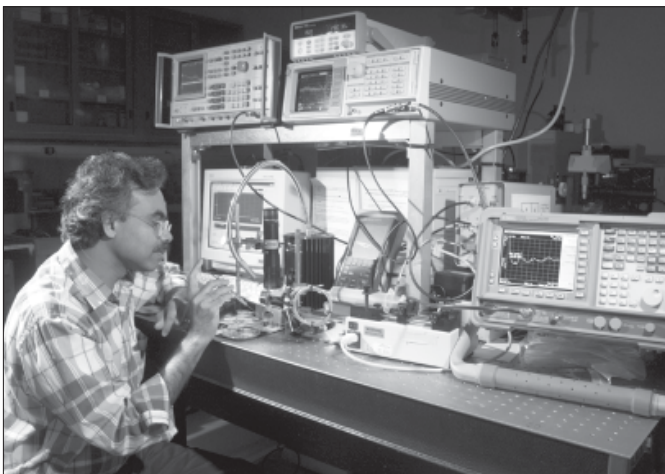
Bloom

tive applications in the near future.

Pat Hu, director of the Center for Transportation Analysis in the Engineering Science & Technology Division, has been appointed chair of the Transportation Research Board's Committee on National Transportation Data Requirements and Programs. This committee and the TRB Committee on Military Transportation are spearheading a one-day symposium during the 2005 TRB Annual Meeting on "Cargo Tracking for Supply Chain Integration." Hu also has been appointed guest editor for a special edition of the international *Journal of Transportation Statistics* on travel behavior.

The Metals & Ceramics Division's **Everett Bloom** has received the Outstanding Achievement Award from the Materials Science and Technology Division of the American Nuclear Society, in recognition of his "significant and sustained contributions to the development of materials for advanced nuclear fission and fusion systems."

Debbie Jenkins has joined the Audit and Assessment Directorate as P-AAA coordinator. Jenkins brings more than 15 years of experience in P-AAA, quality assurance and quality control programs for government organizations. She previously managed Assessments and Quality Systems at the Fernald Environmental Management Project. "Debbie's main goal will be to develop and institutionalize new P-AAA operating practices, to ensure the program operates effectively while identifying and mitigating risks," said A&A Director Scott Branham.



Thundat

Swan lakes

ORNL's feathery former residents adapt to new Morgan County home

ORNL's swans, which graced the erstwhile "swan pond" for more than three decades, left the laboratory in November, and many staff members miss them.

The reason for their removal was attributed to the innumerable geese that joined them in the pond and grazed throughout the ORNL campus, fouling lawns and walkways with their emerald leavings. Wildlife consultants said the geese could not be discouraged if the swans were present and being fed.

So it was determined that the swans should relocate. But don't worry about them.

Judging by a recent ORNL Reporter visit to their new home, the big birds are adapting well to their new surroundings. It could even be said that they've got it made.

Larry Smarsh, a recent retiree from the Facilities and Operations Directorate, volunteered to take the four swans to his farm in Morgan County, located roughly between Lancing and Deer Lodge. His spread is located on a beautiful rolling tract of the Cumberland Plateau, whose sandy soils are ideal for ponds. In fact, nearly every home in the area sports a body of water.

Smarsh's house has two sizeable ponds nearby, one literally in his backyard and another across the road and down a draw. Two of ORNL's older swans—Admiral and Queen—live in the backyard pond. The other pair—Charles and Princess Diana—reside in the lower pond, delighting two nuns who live within their view.

The four expatriates join Hercules, a gimpy-legged ORNL swan that Smarsh adopted a couple of years ago.

Smarsh divested himself of his cattle a while back, but five horses, a border collie and a donkey-zebra hybrid keep the swans company and predators away. He intends to build islands on the ponds to provide a nesting area for the birds.



Curtis Boles

Recent ORNL retiree Larry Smarsh feeds Charles and Princess Diana at their scenic new home on the Cumberland Plateau.

The wings of the four new swans are clipped to prevent them from flying. Hercules, however, is unclipped and airworthy. He once left home, but Smarsh happened to spot him in a pond near Jamestown, about 35 miles away.

"I stopped and hollered at him, and he came home," Smarsh said. Hercules now alternates between the upper and lower ponds.

During the visit, at the lower ponds, Smarsh's horses thundered down to the water as Smarsh enticed Charles and Di with some "egg-laying hen feed."

"They eat more than the horses," he observed.

Maybe if they had known life would be so good on the plateau, they would have given their captors an easier time of it. It took

several successive weekends to corral the birds from ORNL's pond.

Swans, as the ORNL volunteers would attest, are intelligent birds and quick to figure when something's up. A few fruitless weekend forays left the Life Sciences Division's Barry Berven — who was appointed head wrangler — dejected and nearly defeated. They were finally hustled into pouch carriers provided by longtime swan volunteer Alicia Compere and carted away.

Smarsh said that when Admiral and Queen were reunited on his pond, they were at first disoriented, then found each other and entwined necks in the storied swan embrace.

It's been plumb ducky for them ever since.

— Bill Cabage

New Staff Members

ORNL continues to grow. This feature lists new employees at the laboratory. Welcome to all.

Deborah Jenkins, Audit & Assessment Directorate
Kristina Thiagarajan, Biological & Environmental Sciences Directorate
William Heller, Carolyn Thompson and Leslie Wilson, Chemical Sciences
Andrew Sproles, Communications & External Relations Directorate
Joseph Lake, Paul Nance, James Nutaro and Dianna Smith, Computational Sciences & Engineering
Richard Barrett and Michael Bast, Computer Science & Mathematics
Angela Smythe, Contracts
Jason Baxter, Jeffery Brummitt, Joseph Keck, Dennis Owens, Roe Rainey and Amy Yarber, Craft Resources
Jennifer Fusaro, Energy & Engineering Sciences Directorate

Jeremy Campbell, Engineering Science & Technology
Deanne Brice, Christopher Schadt and Wei Wang, Environmental Sciences
Robert Johnston, Fabrication
David Green, Human Resources Directorate
Jennifer Morrell, Life Sciences
Jeremy Busby, Metals & Ceramics
John Doesburg and Richard Snead, National Security Directorate
Sally Silvia, Networking & Computing Technologies
Marty Milburn, Nonreactor Nuclear Facilities Division
Christopher Blessinger and Germina Ilas, Nuclear Science & Technology
Jacqueline Richmond and Michael Stafford, Operational Safety Services
Robert Bodine II, Research Reactors
Benny Cole, Priscilla Witmer and Yan Zhang, SNS Accelerator Systems
John Richards, SNS Experimental Facilities
Casey Porto, Technology Transfer & Economic Development Directorate



Curtis Boles

The swans have plenty of company, including five horses, a donkey-zebra hybrid and a border collie.

Butterfly

Continued from page 1

complexity, biological systems such as the insect wings are very fragile, and the new technique permits their analysis without immediately obliterating the samples. The new scanning probe techniques will allow researchers to obtain images beyond the surface topography.

"People are already using scanning probe microscopy to study biological systems," Kalinin said. "We want to extend the SPM techniques developed for characterization of hard materials such as ferroelectric and semiconductor to the biological realm to gain a new understanding of biological functionality on the nanoscale. AFAM and UFM look at the elastic forces and provide the key to understanding their relationships to the function of the system."

Beyond the actual employment of the new microscopes, Kalinin noted the value of collaboration with theorists within ORNL and at collaborating universities such as North Carolina State, which is home to Gruverman.

"Obtaining the images is relatively easy," said Moscow native Kalinin, who came to ORNL as a Wigner fellow in 2002. "The difficulty is in interpretation. Much of our effort is devoted to understanding of the fundamental physical phenomena in the nanometer size contact area between the tip and the surface. Without theory, which often varies from first principle modeling to continuum mechanics, the images remain just that — images. With theory, SPM becomes a tool capable of quantitative measurements on the nanoscale, the ultimate goal in materials

characterization."

Because scanning probe microscopy produces direct, real-space images, it represents a very promising technology for exploring the relationships between structure and functionality of the organism. Those new perspectives likely will lead to breakthroughs in biological R&D at the interface between

physical and biological sciences.

"Scanning probe microscopy is a key to the advancement of nanoscience," said Kalinin. "It is a new field and it develops rapidly, so novel methods appear virtually overnight. However, it takes a sustained interdisciplinary effort before the true potential of SPM is realized." — *Bill Cabage*.

Tsunami

Continued from page 1

helping to ease the suffering and speed the recovery of those who were stricken by this tragic catastrophe," said Tony Farris of the Appalachian Chapter of the American Red Cross.

Farris was presented a check during the ceremony from Wadsworth and Budhendra Bhaduri, a researcher in ORNL's Computational Sciences and Engineering Division. Bhaduri helped develop the LandScan database system used by the United Nations to aid recovery efforts following the tsunami.



ORNL's Budhendra Bhaduri (left) and Jeff Wadsworth presented a tsunami relief check to Tony Farris of the American Red Cross during ceremonies at the RSC.

Curtis Boles

Bhaduri is one of more than 150 ORNL foreign national staff and guest researchers from India, Indonesia, Sri Lanka and other nations directly affected by the tsunami.

Service Anniversaries

December

35 years: Masanori Murakami, Fusion Energy

30 years: Kenneth W. Childs and Cyrus M. Smith, Computational Sciences & Engineering; J. F. Wendelken, Condensed Matter Sciences; John Wayne Cornett, Michael E. Fraker, Wallace S. Leffew and L. V. Parks, Craft Resources; Mike Oliver, Facilities Development; Victoria S. Harmon and James William Mathys, Facilities Management; Robert Hord Ross, Life Sciences; James Bentley and Terry N. Tieg, Metals & Ceramics; W. Harvey Gray, National Security Directorate; Ed Rosenbaum, Nonreactor Nuclear Facilities; Douglas L. Selby, Physical Sciences Directorate; Paul Alan Wright, SNS Accelerator Systems

25 years: Kathy J. Davis, Business & Information Services Directorate; Donald (Don) A. Palmer, Chemical Sciences; Deborah S. Barnes, Communications & External Relations Directorate; Mark T. Elmore and Terri A. Rose, Computational Sciences & Engineering; Ralph Girard Shooster Jr., Craft Resources; William Keith

Kahl and Vince C. Mei, Engineering Science & Technology; Ronald L. Sy, Facilities Management; David E. Greenwood, Fusion Energy; Joe A. Horton Jr., Metals & Ceramics; Greg C. Groover, Nonreactor Nuclear Facilities

20 years: Arthur Sanford Bland, Computer Science and Mathematics; Susan Shepherd Horne, Contracts; Terri N. Hensley, Craft Resources; Sujit Das, Engineering Science & Technology; Chuck Hohanadel, Health Services; C. A. Sampson Jr., Nuclear Science & Technology

January

40 years: Richard (Dick) G. Haire, Chemical Sciences

35 years: Kent Alan Williams, Nuclear Science & Technology; Jim R. Lawson, SNS Project and Site Support Office

30 years: Wayne E. Kohlriseser and Teddie Eugene Welch Jr., Craft Resources; Boyd Michael Beets, Engineering Science & Technology; Julia L. Mobley and Dan J. Naus, Metals & Ceramics; Mitch L. Conner

and John R. Slaten, Operational Safety Services

25 years: Robert K. Abercrombie and B. Timothy Rhyne, Computational Sciences & Engineering; Casper W. Brummett and Hugo K. Hughes Jr., Craft Resources; Gwendolyn M. Sims, Energy & Engineering Sciences Directorate; Chester Coomer, Engineering Science & Technology; Betty Vann Shelton, Environmental Protection & Waste Services; Brenda L. Baber and Twana Faye Ferguson, Fabrication; Robert D. Lively, Facilities Management; DeLena Lois Akers, Fusion Energy; Jane Marie McConnell, Laboratory Protection; Patricia M. Garnet, Logistical Services; Charles A. Baldwin, Clifford Charles Davisson, Michael Howell and Curtis Jack Miller, Metals & Ceramics; Gregory C. Young, Nonreactor Nuclear Facilities; Frederick P. Griffin, Research Reactors; Frank V. Damiano, Tech Transfer & Economic Development Directorate

20 years: Vladimir A. Protopopescu, Computer Science and Mathematics; Alan Lee Wintenberg, Engineering Science & Technology; Lawrence Frederick Allard Jr., Metals & Ceramics

Roberto receives National Materials Advancement Award

Jim Roberto, deputy director for science and technology, has received the National Materials Advancement Award from the Federation of Materials Societies.



Roberto

In a ceremony at the National Press Club in Washington, D.C., the

organization honored Roberto for a number of materials-sciences-related activities nationally and at ORNL including managing one of the nation's largest materials science and engineering programs.

Roberto's responsibilities have included the recent upgrade of the High Flux Isotope Reactor and management of the laboratory's nanoscience research programs. He has helped lead the establishment of DOE's Nanoscale Science Research Centers, including the Center for Nanophase Materials Sciences currently under construction.

"Jim's award is terrific news. He has played a major role at ORNL in building and sustaining one of the world's top advanced materials programs," said ORNL Director Jeff Wadsworth.

The 700,000-member Federation of Materials Societies comprises professional societies, universities and National Research Council organizations involved with materials science, engineering and technology. The federation's National Materials Advancement

Award recognizes individuals who have demonstrated outstanding capabilities in advancing the multidisciplinary field of materials science and engineering, and who contribute significantly to the application of the materials profession to national problems and policy.

Previous recipients of the award include the late Rep. George E. Brown Jr., chairman of the House Science Committee; Arden Bement, director-designate of the National Science Foundation; Jerry Woodhall, Yale University and National Medal of Technology Laureate; and the late John H. Hopps Jr., deputy undersecretary of Defense.

Roberto resides with his wife, Jane, in Farragut. They have two adult children and two grandchildren.

More Team UT-Battelle projects sought for spring after holiday success

The warmer spring weather that should be around the corner means volunteer projects will be ramping up. If you have a cause that you need fellow ORNL employee support or muscle power for, submit it as a **Team UT-Battelle project** by contacting Brenda Hackworth, 241-7249, bbt@ornl.gov.

Team UT-Battelle facilitates volunteer activities by offering advice, consultation and the organizational support needed to get the projects and initiatives off the ground, as well as possibly a little money for items that will help promote the projects.

It also provides a way to attract volunteers within ORNL who are willing to commit time and energy. Submit your project now.

Cathy Cheverton and the **ORNL Angel Tree Committee** expressed appreciation to all

the volunteers and employees who supported the Angel Tree Program during the holidays.

"All 201 children were selected from the virtual tree. Also, due to some generous cash donations, there was enough money to provide additional bicycles, toys and clothing, as well as to provide gifts for children whose names were not on the virtual tree," Cheverton said. "As in previous years, the gifts of toys and clothing for the children poured in on the collection days," she added.

Committee members also thanked Herb Debban and the residents of Bldg. 2518 for use of their auditorium as a collection point.

RIGHT: ORNL "angels" Kahra Gilley, Roxanne Raschke and Lee Riedinger were among those who helped with the holiday project.



Curtis Boies

ornl reporter

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[ORNL tsunami relief, page 1](#)

[Researchers elected to fellowships, page 2](#)

[Latest Significant Event Award winners, page 4](#)

[Former ORNL swans in new Morgan County home, page 6](#)

Inside