

Answering ancient questions

ORNL, UT staff using radiation testing equipment to help date archeological finds

Methods routinely used by Life Sciences Division health physicists to do radiation measurements and determine personnel exposures are helping University of Tennessee researchers determine the age of archeological finds.

For more than five years, Jim Bogard and his team in the Dosimetry Applications Research (DOSAR) Calibration Laboratory have been able to find new applications using the same equipment they use in their everyday work. Yet the subjects they are using are much older than those they usually work with.

Try half a million years older.

Bogard, along with Life Sciences health physicist Michael Murray and graduate research fellow Sarah Bernal, are using radiation testing equipment to determine the relative age of anthropological finds. They conservatively estimate that one such find—a bovid (horse or cow) tooth associated with a hominid (early human) tooth found buried under a rice patty on the island of Java, Indonesia—is more than 500,000 years old.

"We determine the age of the fossil by something called radiation damage dating," Bogard said. "The people from

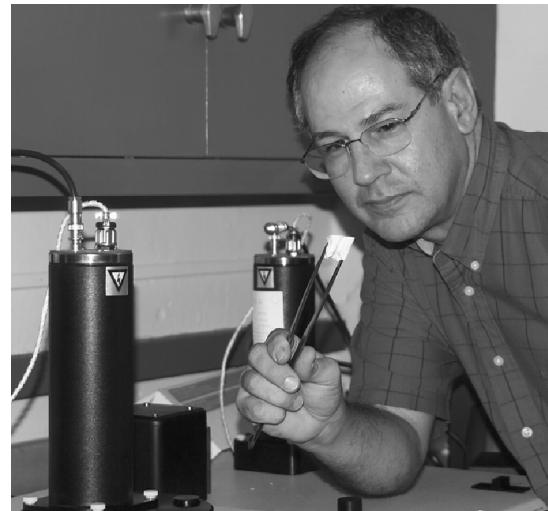
UT determine what is anthropologically significant and we do the physical measurements."

Bracketing the age of the adult hominid tooth UT anthropologists discovered in Java has been the most significant collaboration between the laboratory and university teams so far. The tooth may be a piece in the puzzle to understanding the evolution and migration of man across Southeast Asia.

The effort between the two institutions began with the vision of Michael Elam, an associate professor of anthropology at UT.

"Elam walked in the door one day and asked if I would be interested in doing some archaeological work," Bogard said. "We do radiation measurements and provide calibrated exposures for instrument testing and we'd been doing soil analysis for years. It's a different application for the same equipment."

The ORNL team's onsite costs are funded through grants to UT from the National



Michael Murray examines a tooth found on the island of Java, Indonesia.

Curtis Boles

Science Foundation and the Wenner-Gren Foundation for Anthropological Research.

Radiation damage dating supplements a variety of other techniques that also can be used to determine the age of the material.

The first step in radiation dating is to extract
(See DATING, page 6)

Major benefits change

CIGNA 2 (old Healthsource plan) goes out for bid

ORNL Benefits staff members are anticipating another challenging fall and Open Enrollment period. The CIGNA Option 2 plan is going through a request for proposal (RFP) process. Operating through the multiple-employer arrangement, ORNL and BWXT Y-12 have hired Mellon, a national benefits consulting firm, to assist in the RFP process and to evaluate the responses. HealthCare 21, a regional coalition of employers, health care providers and vendors with a focus on quality of health care, also is providing input.

The RFP announcement went out to five qualified bidders in mid-July, responses were received from three in early August and the other two declined to bid. A recommendation for selection is expected around the end of August, in time for the fall Open Enrollment period.

Does this mean there could be another insurance provider in addition to CIGNA? It is certainly possible, says Benefits staff; however, an RFP was conducted to replace the old Option 1 plan last year, and CIGNA returned with the best proposal. Any company bidding on the ORNL health care plan must be able to meet several requirements:

- It must have a national network of providers and be able to offer "guesting" services for off-site employees and dependents.
- The physician and hospital network must meet certain standards.
- The provider must meet certain quality standards, as determined by several national programs such as the National Committee for Quality Assurance.
- It must be able to work within the ORNL minimum premium funding arrangement, which allows ORNL to determine its own

cost based on actual utilization of medical services.

- It must be able to handle ORNL retirees under the age of 65—i.e., before they qualify for Medicare.
- It must be able to provide both ORNL and BWXT Y-12 with population-specific claims data.
- Last but not least, it must be cost competitive.

In evaluating bids, ORNL management must look not only at the lowest bid offer, but also at the possible cost of disruption and internal administrative costs for managing contracts with two insurance companies.

One driver for putting the plan out for bid was the result of CIGNA's long-term IT development strategy, which is to migrate its health plans to its CIGNA Healthcare System

(See CIGNA, page 2)

Employees named to Benefits Advisory Group

In an effort to gain more staff involvement in an important and complex area, ORNL Employee Benefits has initiated an employee-focused Benefits Advisory Group.

The advisory group will be a sounding board to solicit reaction and comments and to help inform decision making. Benefits staff members hope to receive feedback and valuable input on benefits strategies, service

CIGNA

Continued from page 1

platform, the same platform that supports the Open Access plan. This migration will result in the termination of the current Option 2 plan as of January 2005.

ORNL Benefits staff members advise that employees should not expect to see lower premiums, regardless of which company wins the health plan bid. Each insurance company establishes its own network of providers, hospitals and support organizations by negotiating discounted rates for services. Their bids consist of claims projections based on their network rates, along with an administrative fee. Any profit to the insurance company is included in the administrative fees, not the cost of claims.

Employees can learn more about benefits options at the Benefits Fair, set for Oct. 14 on Main Street. This year's fair, with a theme of "Choosing Well," will provide an opportunity for employees to obtain valuable information while allowing them plenty of time to make decisions during Open Enrollment. Meetings also are being scheduled during Open Enrollment for employees to learn more about benefits changes for 2005.

More information about the selection process and Open Enrollment will be announced as soon as it is available.

and information. The advisory group also will provide another avenue for employees to bring issues and ideas to the attention of Benefits, HR and ORNL management.

Group members were selected to represent as many professional and demographic sectors of the laboratory as possible. Employees in research, technical, professional and administrative support roles are participating. Male, female, foreign national, retiree, single-parent and traditional family demographics are represented, in addition to a range of ages and tenures at ORNL.

Advisory group members are receiving an education in the Byzantine intricacies of the world of benefits. Topics have included benchmarking and benefits valuation; accountability to DOE, the lab and employees; relationship of benefits costs to ORNL

Benefits Advisory Board

William Craddick	Engineering Science & Technology, 574-0757
Karen Downer	ESH&Q, 241-1550
Lorie Hickey	Business & Information Services, 576-5076
Jeanine Holbrook	Environmental Sciences, 574-7374
Joe Horton Jr.	Metals & Ceramics, 574-5575
Bryan Kendrick	Business & Information Services, 574-4184
David Rupert	Human Resources, 576-2433
Joseph Setaro	Coalition of Oak Ridge Retired Employees, 675-2832
Maria Varela del Arco	Condensed Matter Sciences, 574-6287

operating costs and charge-out rates; politics of the health care industry; trends in health care plan design; and factors in the operation of the pension fund.

Now that the advisory group is developing a knowledge base, its members are ready to take on a more active role as a two-way conduit for bringing benefits issues and concerns both to management and employees.

Group members want to hear from you. They will be at the Benefits Fair Oct. 14. Stop by and share your ideas and thank them for taking on this important role.

MetLife offers optional long-term care inflation increase

If you participate in UT-Battelle's Long-Term Care Insurance Plan from MetLife, you have the opportunity to increase your daily nursing home and home care benefits without having to provide proof of good health.

The costs of long-term care continue to rise, and your current level of coverage may not be enough to cover these increases. The cost of nursing home care alone has risen more than 10 percent in the last 18 months. The average

cost is now \$58,000 per year and is expected to rise to \$190,000 by the year 2030.

At least once every three years, MetLife offers an optional inflation increase. You are eligible since this is the first time the offer has been made to you. You will remain eligible for future offerings as long as you accept one offer of the last two consecutive offerings.

All eligible participants should have received a letter from MetLife explaining the offer for increased coverage. MetLife has notified Benefit Plans of an error in the letter—the quotes for new Daily Benefit Amounts (DBA) are based on an effective date of July 1, 2004, rather than Oct. 1, 2004. MetLife officials apologize for the mistake. When you call MetLife, they will provide the correct DBA and new premium, based on an Oct. 1, 2004, effective date. They also have issued new letters with the correct information.

This offer is available from Aug. 9 through Sept. 3, 2004. To make this change to your coverage, call MetLife at 1-800-438-6388, prompt #3, Monday through Friday, 8 a.m. to 8 p.m. Eastern Time. The offer ends Friday, Sept. 3, at 8 p.m. Eastern Time.

If you accept the offer, your increased coverage and premium will become effective Oct. 1, 2004. If you have additional questions about the Long-Term Care Insurance Plan, call MetLife at the number above.



Curtis Boles

Chandrika Kalluri Udaya, who displays her art during Asian Pacific American Heritage month celebrations at the lab, is a member of the Environmental Sciences Division.

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Lab Notes

Lab receives ISO recommendation

ORNL has been recommended for ISO 14001 registration following an audit by a team from the International Organization for Standards' independent assessment body, the National Sanitation Foundation.

"Lots of folks worked hard for this and should be congratulated," said ESH&Q Director Kelly Beierschmitt. "ISO registration requires commitment from the entire lab. The R&D divisions and Facilities & Operations staff were instrumental in this success."

Four auditors reviewed the design and implementation of ORNL's Environmental Management System for conformance to the ISO 14001 environmental systems standard, recording only three minor findings.

"At the closeout meeting, the auditors announced that we 'passed' the audit and that our EMS would be recommended for registration," said David Skipper, who led the ORNL effort. "Our achieving ISO registration sends a message that we're a leader in the area of environmental protection. By successfully undergoing the process, ORNL now enjoys an external validation of the effectiveness of the lab's environmental management."

The process is ongoing, with annual assessments and a full re-registration audit every three years.

Review on computing

The latest issue of the ORNL Review highlights the lab's supercomputing program. It includes a message from Thomas Zacharia, ORNL associate laboratory director for Computing and Computational Sciences, and an introductory article describing ORNL's recently announced leadership role in a major national project to build the world's most powerful scientific supercomputer. This Review edition departs from previous issues in that it sticks completely to the theme in all articles, except to the awards page at the end. It

is available on the Review website, www.ornl.gov/info/ornlreview/

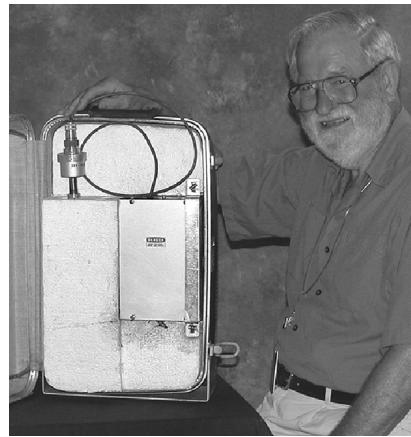
If you do not subscribe to the Review but want a hard copy, you can pick one up in the Central Research Library in Bldg 4500-North. If you wish to subscribe, provide your name, building number, mail stop, and badge number to Review editor Carolyn Krause (krausech@ornl.gov) or to the Mail Room's Peggy Ward (wardps@ornl.gov).

Retiree Weeks honored in France

Robert Weeks (shown at upper right), who retired from the former Solid State Division in 1984, was honored for his research on glass materials and service to the community of glass scientists at the 5th Symposium "SiO₂, advanced dielectrics, and related devices" held in France earlier this summer. He also served as honorary chairmen and plenary lecturer of the conference.

Weeks, who analyzed samples from all of the Apollo missions, was the first ORNL scientist to bring lunar samples from the Apollo 11 mission to the laboratory for research on their magnetic properties. A recipient of the Morey award from the Glass and Optical Materials Division of the American Ceramic Society, Weeks was a research professor in the Department of Materials and Mechanical Engineering at Vanderbilt University after he retired from ORNL.

He has served as a research professor emeritus since his 1999 retirement from Vanderbilt and is a valued volunteer in the ORNL History Room.



Team UT-B plans volunteer fair

Team UT-Battelle is planning a Volunteer Fair to showcase volunteer activities and community volunteer opportunities. Find out about volunteer opportunities, or tell about your own cause, at this fall's event, set for Oct. 6 on Main Street. Plans now call for having representatives at the fair from Team UT-Battelle and a large number of charitable organizations to let you know about their causes and goals and associated volunteer opportunities.

"Volunteerism is an ORNL trait—UT-Battelle employees continue to demonstrate outstanding concern for worthwhile causes," said Bill Pardue of Communications & Community Outreach. "Team UT-Battelle assists and supports ORNL employees in their organized volunteer services to community projects."

From 2001-2003, Team UT-Battelle sponsored events involving more than 1,900 employees who contributed some 11,000 volunteer hours and raised nearly \$150,000. Details about Team UT-Battelle are available on the Team UT-Battelle Web page (<http://www.ornl.gov/info/news/cco/teamutb.html>).

If you have questions or suggestions about the fair, contact Pardue (pardueb@ornl.gov) or Brenda Hackworth (hackworthbt@ornl.gov).

Property Sales in new home

ORNL Property Management staff recently celebrated the move of the Excess and Property Sales Warehouse to a new facility at 115 Union Valley Road (shown at left). Activities commemorating the move included a ribbon cutting ceremony, tours of the new warehouse and an employee-only auction.

For more information about ORNL Property Sales or the new facility, call 241-3699 or see the website at www.ornl.gov/adm/property/.



Curtis Boles

Cutting the ribbon on the new ORNL Property Sales facility were, from left, Will Minter, Marcia Whitson, Greg Turner, Barbara Jackson of DOE and Cheri Cross.

Significant Event Award recipients

Employees honored for individual, team achievements

More than 140 ORNL staff members recently received Significant Event Awards in recognition of their achievements during the first 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:

Dennis Heatherly, Kenneth Thoms and **Robert Sitterson** of Nuclear Science & Technology for irradiation experiment capsules for the DOE fusion energy mission

George Wrenn and **Donald Kovacic** of Nuclear Science & Technology for conducting an additional protocol field trial for the U.S. government

John Czachowski, Engineering Science & Technology; **David Fowler**, Environmental Sciences; **Frank Kornegay**, Spallation Neutron Source; **Randall Ogle**, Metals & Ceramics; **David Poker**, Condensed Matter Sciences; **Carol Scott**, Operational Safety Services; **Ross Toedte**, Computer Science & Mathematics; **Marcia Whitson**, Asset Management & Small Business Programs; **Victoria Harmon** and **Jimmy Stone**, Facilities Management; **Stephen Van Hoesen**, Environmental Protection & Waste Services; **John Hensley**, Logistical Services; and **Joe Herndon**, Energy & Engineering Sciences Directorate, for completion of Phase 1 of the Lab Space Manager Program

Robert Wagner of Engineering Science & Technology for developing and demonstrating adaptive nonlinear control algorithms that improve energy efficiency and reduce harmful emissions in lean-burn natural gas engines

William Key of Engineering Science & Technology for exceptional technical support to the Office of FreedomCAR and Vehicle Technologies at DOE Headquarters

David Felde and **Carolyn Pollard** of Nuclear Science & Technology and **Vincent Campbell** and **Robert Norris** of Metals & Ceramics for successfully establishing a 22,000 sq. ft. centrifuge rotor fabrication and test facility and the on-schedule completion of the major CRADA milestone to fabricate a production-scale carbon-composite rotor

Gwen Scudder of Engineering Science & Technology for the DOE Building Envelope Peer Review

Sonya Sharp of Nuclear Science & Technology for contributions to the International Nonproliferation Export Control Program Conference at ORNL

James Wade of Engineering Science & Technology for outstanding contributions to

efforts that improved the operational discipline of the Fuels, Engines, and Emissions Research Center

Rita Thearp of Engineering Science & Technology for outstanding organizational skill and administrative support in the organization of a workshop on advancing the efficiency of internal combustion engines

Gerald Tuskan and **Stan Wullschleger** of Environmental Sciences for the first tree genome sequenced as a result of ORNL research

Frank Larimer, Miriam Land and **Dale Pelletier** of Life Sciences

for completing the genome sequence of the metabolically versatile photosynthetic bacterium *Rhodopseudomonas palustris*

Jizhong Zhou and **Kim Smith** of Environmental Sciences

for contributions to the 11th International Conference on Microbial Genomes

Glenn Allgood of Computational Sciences & Engineering for his performance as a combat identification leader for the Future Combat System Integrated Support Team

Mark Floyd, Carl Thomas, Philip Arwood, Gregory Hinkel and **Matthew Smith** of Networking & Computing Technologies for countering the threat of the 2003 computer virus wars

Alexander Aleksandrov, Yoon Kang, Sydney Murray and **Robert Morton** of the Spallation Neutron Source for SNS Radiofrequency Quadrupole Recovery

David Vandergriff and **Jerry Crabtree** of the Spallation Neutron Source and **Virginia Miller** of Contracts for procurement of the SNS Inner Reflector Plug and Moderator Assemblies

Charles Garren, Gregory Irby and **Kevin Norris** of the Spallation Neutron Source and **Randall Wood** of Facilities Development for startup of SNS Utilities/Central Utilities Building and Cooling Tower

John Bumgardner of Research Reactors for the development and implementation of RRD's first integrated work plan

Ronald Baldwin, Frank Edwards, Randy Nanstad, Mikhail Sokolov and **Eric Manneschmidt** of Metals & Ceramics and **William Comings** and **Suzanne Eubanks** of Operational Safety Services for rapid response to a Nuclear Regulatory Commission R&D Request

David Cook, James Freels, Joseph Inger, Kevin Smith, Robert Brackett and **Donald Abercrombie** of Research Reactors for a safety evaluation for USQ involving HFIR check valve-induced waterhammer

Michael Brady, Glenn Romanoski and **James Klett** of Metals & Ceramics and **April**

McMillan of the Office of the Laboratory Director for ORNL Materials R&D in support of PEM Fuel Cell Technologies recognized as Top 10 Projects of 2003 by DOE's Office of Hydrogen, Fuel Cells, and Infrastructure

Daniel Bardayan, Jeffery Blackmon, Michael Smith, Dan Shapira and **Carl Gross** of Physics for the first neutron transfer reaction measurement on a nucleus in the astrophysical r-process path

Young Kwon, Joan Muecke, Mike Farrar, Richard Hale, Daniel Pinkston and **Kevin Smith** of Research Reactors; **John**

SEAs recognize individual employees and teams for their contributions and achievement of significant goals or milestones in support of ORNL goals and objectives.

Ellis of Facilities Development; and **Gustavo Aramayo** and **Srdan Simunovic** of Computer Science & Mathematics for HFIR Experiment Room floor live load limit analysis due to the finding of the static loads not previously considered

Michael Rogers of Metals & Ceramics for significant improvements in laboratory housekeeping, appearance and safety in Building 4508, Labs 139, 139B and 139C

Gary Van Berkel and **Becky Maggard** of Chemical Sciences and **Pamela Hadley** of Metals & Ceramics for the scientific workshop, "A Role for Mass Spectrometry in Homeland Security: Past, Present, and Future"

Fred Peretz and **Robert Owens** of Nuclear Science & Technology for the INSCOM-DTRA Radiation Detection Test Flights

John Fenton of Contracts and **Forrest Spears** of Facilities Development for personnel and laboratory moves into the Private Sector Facilities

Gary Fraker, Martha Justice, James Mathys, Samuel Wood, Randall Burnett and **Daniel O'Connor** of Facilities Management for the Research Center Complex Support of UTBDC, State and Off-Site Leased Buildings

James Baxter of Facilities Management for the development of a training program for utility operators

Kerry Miller of Integrated Operations Support for DOE approval of the ORNL Maintenance Implementation Plan

Charles Bruce of Facilities Management for outstanding operational leadership in the Electrical Utilities Group

Donald Foster of Nuclear Science & Technology; **Dale Brewer, Marvin Lowery, Philip Watts** and **Gerald Sullivan** of Nonreactor Nuclear Facilities; and **Brent Albertsen** of Operational Safety Services for

NNFD System Engineering Program Implementation

Robert McMahon and Edward Smith of Nonreactor Nuclear Facilities for fabrication, certification and packaging of californium-252

Randal Roberts of Laboratory Protection for security provided for high-profile activities involving Special Nuclear Material

Russell Johnson of Laboratory Protection for East Campus key and lock services

Denver White, Robert Bryant, Sarah Shaver and Teresa Childs of Records, Training & SBMS Services for implementation of the LSM program for R&D work environments

William Hill of Research Reactors for

Tower Shielding Facility defueling

William Black, Merendia Caldwell, Cathy Inklebarger, Nancy Leinart, Sherrian McNeese, Janet Smith and Katherine Wilson of Health Services; **Danny Rosenbalm, Kenny Loveday, Ryan Hargis and Daron Long** of Laboratory Protection; and **Michael Jessie** of Craft Resources for their emergency response to a significant cardiac event

Joan Hughes, Regis Loffman and Angela Barnard of Environmental Protection & Waste Services for development and implementation of a Basic Order Agreement for procuring analytical services

Marvin Liles of Contracts for the contract for the Direct Write Electron Beam Lithogra-

phy System in support of the Center for Nanophase Material Sciences Project

Kevin Trent, Judy Trimble, Barbara Arrington, David Rupert, Janet Swift, Sheria Johnson, Verda Adkins and Craig Parker of Human Resources for HR Managers and Internal Staffing administration of and support to Voluntary Separation Program (VSP)

Diana Cooper, Diana Dowdell, Manuel Gillespie, Tana Helms, Pamela Love and Donald Sharp of Communications & Community Outreach for the production of benefits change material and VSP information packets

Field Day prepares amateur radio operators for emergency response

No egg tosses. No sack races. Not even a trophy for the fastest wheelbarrow team.

The 27-hour field preparedness event for amateur radio operators was anything but a typical field day. That is, unless you count the bragging rights.

Jim Bogard and Michael Murray of the Life Sciences Division operated an emergency response station at the 2004 Amateur Radio Relay League Field Day. The annual event is designed to prepare amateur radio operators to provide emergency communications when other forms of communications fail.

"We go out in the field and see how many contacts we can make," Bogard said. "By doing this once a year, we train a number of people that can pick up and go if an emergency happens."

The goal of Field Day is to try to contact as many other participating stations as possible using as many bands and modes as possible (including shortwave, satellite and digital methods). This year, participants are estimated to have made 1.5 million QSOs (individual contacts).

To simulate an actual emergency situation, operators take their equipment into the field and operate at temporary locations under off-grid power. Bogard and Murray chose the Melton Hill Dam visitor overlook because it provides a good location for erecting antennas for shortwave operation as well as for repeaters. Shortwave radios allow statewide and international communications; repeaters are radio relay devices that enable countywide or regional coverage from just a small handheld or mobile two-way radio.

Operating with the Blount County Amateur Radio Emergency Services group, the ORNL team set up five transmitters at Melton Hill Dam. Emergency power for all the transmitters was supplied from an ORNL mobile laboratory van.

"The mobile laboratory allows us to operate without dependence on commercial power by using the onboard generator," Bogard said. "Its use associates ORNL and the Department of Energy with civil emergency response."

Ham operators can respond to emergencies during times of war as well as during natural and technical disasters such as fires, floods, earthquakes and nuclear power plant accidents. Locally, hams have participated in emergency situations by providing services, such as in 2002 when tornados devastated parts of Morgan County, and when a train carrying fuming sulfuric acid derailed and leaked in west Knox County.

Operators can participate in emergencies by "shadowing" government and agency officials, riding shotgun and following them on foot to keep them in touch through high frequency repeater systems. Other functions include setting up communications at base stations like shelters and hospitals, operating in traffic nets to move information in and out of disaster areas, and using digital communications to move data. Many hams are also proficient in Morse code, which is a low-bandwidth mode that is effective under poor conditions.

In 2003, more than 2,100 amateur radio clubs and individuals from across the United States and Canada, from the Arctic Circle to Antarctica and the International Space Station, submitted operating logs for the event. These logs showed participation by

more than 33,000 individuals. Although this year's results are not yet available, even more people are believed to have contributed to Field Day 2004.

Field Day began in the 1930s to test the emergency communications abilities of the amateur radio community through simulated emergency situations. Today it is the largest annual on-the-air operation, with many individuals and almost every amateur radio club in North America participating.

Ham operators have been providing emergency communications services to the public since 1913. The services typically



ORNL's mobile laboratory van supported the amateur radio emergency response field day

are organized through two ARRL organizations – Amateur Radio Emergency Services and the Radio Amateur Civil Emergency Service.--Amy Merrick

[Amy Merrick worked as a summer intern from the University of Tennessee science writing program.]

Service Anniversaries

30 years: Stanley E. Attenberger, Computational Sciences & Engineering; David K. Christen, Condensed Matter Sciences; Terry Wright Christie, Thomas L. Crawford, C. W. Reijordan Jr. and R. E. Wallen, Craft Resources; Jim Buchanan, Facilities Management; Steve Abercrombie, Laboratory Protection; Eric B. Lewis, Life Sciences; Dixie L. Barker, James R. Keiser, Louis K. Mansur and Betty S. Miller, Metals & Ceramics; Dennis Warren Everett and Carl Edward Thomas, Networking & Computing Technologies; Alan M. Krichinsky, J. T. Miner and Brian D. Murphy, Nuclear Science & Technology

25 years: R. Gail Baker, Business & Information Services Dir.; Doug Goeringer, Chemical Sciences; Daniel Wayne Sluss and Dennis Martin Weaver, Craft Resources; Carl Randy Hudson II, Richard W. Jones and Robert L. Wendt, Engineering Science & Technology; Sandy M. Odom, Integrated Operations Support; Claire Maddux Chitwood, Legal Dir.; Zane W. Bell, Nuclear Science & Technology; Mary Lynne Howell, SNS Project and Site Support Office

20 years: Brenda Phillips Stansberry, Communications & Community Outreach Dir.; Cindy Kendrick, Environmental Technology Programs; Samuel E. Wood, Facilities Management; Mylissa S. Buttram, Kyle Johnson and Jim Joyce, Human Resources Dir.; Peggy J. Richardson, Laboratory Protection; Marilyn E. Langston, Life Sciences; Betty D. Miller, Operational Safety Services; Steven Jerome Wyatt, Research Reactors



Curtis Boles

Petersen visits JICS/ORCAS

New University of Tennessee President John Petersen (left) met with ORNL leaders and visited the Joint Institute for Computational Sciences and Oak Ridge Center for Advanced Studies. Here, Petersen admires the facility surroundings while ORNL Director Jeff Wadsworth and Deputy Director for Science and Technology Lee Riedinger look on.

Dating

Continued from page 1

the information, a sub-atomic clue holding the answer to the sample's age, trapped in the tooth or sample.

"In the soil around the quartz or tooth, there are natural radioactive materials such as uranium and thorium," Bogard said. "They irradiate the sample and promote electrons to an excited state."

Electrons in the excited state are stored in what is known as "traps." Traps, naturally occurring in crystalline materials such as quartz, feldspar and tooth enamel, hold the promoted electrons until they are emptied by heat. These traps provide a way to determine the dose that was delivered by the surrounding radiated materials. Because some samples undergo heating in processes such as a volcanic event or grass fire, some age estimates are conservative and provide only a lower bound for the age.

Scientists routinely empty the traps of the sample using one of two methods, either thermoluminescence (TL) or Optically Stimulated Luminescence (OSL). In thermoluminescence, heat energy is applied to the sample to make the excited electrons fall back into the ground state, similar to pushing a rock off a ledge. When that occurs, energy is given off in the form of light, providing a measurable dose of the radiation that was delivered by the surrounding materials. TL and OSL are considered "destructive" because once the traps are emptied, the signal is erased.

The OSL technique is performed by applying a laser beam to a portion of the sample, heating the specific part, and emptying the trap. This process is considered less

destructive than TL because it only empties traps in small areas rather than in the entire sample.

Electron Spin Resonance (ESR) is an alternate method of determining the dose of the sample.

For every set of paired electrons in an orbit, each electron spins in a different direction, canceling out the measurable force emitted from the spin of the other. When ionizing radiation from the soil interacts with electrons, it can promote the electrons to a higher energy

By being able to improve the dating process, the team hopes to be able to solve some of anthropology's greatest mysteries.

state, known as a metastable state.

"ESR takes the prepared sample—either in a powder or in a bar—and puts it between two gigantic electromagnets," Elam said. "Each magnet is about the size of half of a VW car."

With one electron in each state, the spins are no longer paired. By applying the permanent magnetic field and a superimposed oscillating field, scientists such as retired ORNL researcher Robert Weeks force the promoted electrons' spins to line up and then count the number of electrons to determine the "as-found measurement."

The "as-found measurement," along with the radiation sensitivity, is used to calculate the dose of the sample.

Coinciding with the efforts to determine the

dose of the sample, the Life Sciences Division's Murray determines the dose rate of the contextual material surrounding the sample using an instrument known as a gamma spectrometer. The gamma spectrometer tests the soil around the sample to determine what radioactive materials are present and in what amount.

Most radioactive elements emit gamma radiation that shows up as sharp peaks in an energy spectrum generated in the test, looking similar to a heart beat on a heart monitor. Every peak on the spectrum originates from a specific radionuclide.

"Ciphering all the peaks takes about as much black magic as science," Murray said. "They've tried to make the process dummy proof but they can't. You have to factor in things such as the density of sand and the moisture content—all things that affect the spectrum."

Although the methods for performing the two measurements—of dose and dose rate—may be complex, the final formula is relatively simple: divide dose by dose rate to determine the time the sample has been buried in the ground.

By being able to improve the dating process, the team hopes to be able to solve some of anthropology's greatest mysteries.

"We want to find out 'where did we come from?' and 'what paths did we take to get here?'" Bogard said. "The whole deal with anthropology is to figure out the story of man."—Amy Merrick

[Amy Merrick worked as a summer intern from the University of Tennessee science writing program.]

ORNL People

The Metals & Ceramics Division's **Ted Besmann** received the American Ceramic Society's Spriggs Phase Equilibria Award for his paper titled, "Thermochemical Modeling of Oxide Glasses," J. Am. Ceram. Soc., 85 [12] 2887-94 (2002). The award is for his work toward developing critically needed models for predicting the behavior of commercial and high-level nuclear waste glasses.

Gordon Michaels has been named to the new position of chief technology officer for the Energy and

Engineering Sciences Directorate. This position is part of the directorate office and reports directly to Associate Lab Director David Hill. As chief technology officer, Michaels is responsible "for maintaining a complete picture of EES technologies, for developing strategies

that allow EES technology R&D to find appropriate applications and for understanding trends in the technology market place so that EES can anticipate emerging opportunities." He had served as Nuclear Technology Program director since 1994. More recently, he also served as ORNL homeland security director.

Glen Harrison, Engineering Science & Technology Division, has accepted an appointment to the Transportation Research Board's Committee on Military Transportation, AT035. The appointment continues through April 2005.

Will Minter, director of Asset Management and Small Business Programs, has been selected to serve on the Economic and Community Development Task Force for the Tennessee Legislative Black Caucus. The appointment is for a one-year period and can be renewed annually. There are 18 members of the Tennessee Black Legislative Caucus—three in the Senate and 15 in the House.

Jy-An Wang, Nuclear Science and Technology Division, and **Ken C. Liu**, Metals and Ceramics Division (retired), received a Certificate of Appreciation from ASME International for their Outstanding Materials and Fabrication Technical Paper titled, "A New Approach to Evaluate Fracture Toughness of Structural Materials." The award was presented during the Pressure Vessels and Piping Conference in La Jolla, Calif.

The Metals & Ceramics Division's **Edgar Lara-Curcio** received an American Society for Testing and Materials certificate of appreciation for "significant contributions to the development of ASTM Standard Test Method C1557-03 on tensile strength and



Michaels

Young's modulus of ceramic fibers." He is leader of the Mechanical Properties and Mechanics group.

Nuclear Science and Technology Division staff member **Michael Z. Hu** was invited to be an editorial board member for the journal Current Nanoscience. This journal aims to publish current research developments (review articles) in fundamental and applied disciplines of nanoscience and nanotechnology.

Juske Horita of the Chemical Sciences Division has been selected to receive the 2004 Geochemical Society of Japan Award, in recognition of his outstanding contributions in the area of "experimental studies of stable isotope partitioning at elevated temperatures and pressures." The award honors major achievements in geochemistry or cosmochemistry consisting of outstanding publications that have had great influence on the field.

The Chemical Sciences Division's **Parans Paranthaman** has been invited to serve as associate editor for the Journal of the American Ceramic Society, "...the premier forum and archive used by scientists, engineers, and students to learn about original research in ceramics." The journal publishes about 40 reviewed papers monthly that describe research concerning traditional and advanced ceramic materials and composites, fabrication processes, applications, and instrumentation.

The Genome Management Information System in the Life Sciences Division received an Excellence Award from the Society for Technical Communication. Recognized by STC were **Denise Casey**, **Marissa Mills** and **Judy Wyrick**. The award was given in the Informational Materials category of STC's



Paranthaman



Dole

international technical publications competition for a poster titled Beyond the Human Genome Project.



Price

Jeanne M. Dole of ORNL Publishing Services has been named a fellow of the Society for Technical Communication, the highest rank the society confers upon a member. The rank of fellow is awarded those members who have attained such eminence in the arts and sciences of technical communication that their service has distinguished both the society and the profession.

David Price has been appointed executive director of the High Flux Isotope Reactor and Center for Neutron Scattering. The position was created "to help realize the opportunity for international leadership in neutron scattering made possible by the combination of the Spallation Neutron Source and High Flux Isotope Reactor." Price provides strategic leadership and senior management for the HFIR facility, the neutron scattering user program, and related research and instrumentation activities, including those in the Research Reactors Division, the Center for Neutron Scattering and the HFIR Experimental Upgrades Office.

The Life Sciences Division's **James S. Bogard** has been elected president-elect of the American Academy of Health Physics. His term of office will begin at the winter meeting of the AAHP Executive Committee during the Health Physics Society Midyear Symposium in New Orleans..

New Staff Members

ORNL is growing. This feature lists new employees at the lab. Welcome to all.

Pamela Hale, Business & Information Services Directorate

Cristal Case, Kristopher Daley and Pamela Manos, Computational Sciences & Engineering

Gonzalo Alvarez and Philip Roth, Computer Science & Mathematics

Eric Pauley and Michael Rochford, Office of Counterintelligence

Derrick Childs and Cynthia Summers, Craft Resources

George Ulrich, Metals & Ceramics

Jeremy Cohen and Wilma Fioravanti, National Security Directorate
Diane Fischer, Mary Vanessa Grebert, Shannon Morgan, Sandra Poarch, Emilian Popov, Deborah Weaver and Peggy York, Nuclear Science & Technology

Shari Butters and Stephanie Lay, Operational Safety Services

Wendy Mosca, Records, Training and SBMS Services

Adrian Arvin, Carl Hammons, Thomas Hardek, Wayne Newby and Jeffrey Patterson, SNS Accelerator Systems

Larry Davis, SNS Experimental Facilities

Robert Scott, Technology Transfer & Economic Development Directorate

Laboratory's United Way campaign racing along

The lab's 2004 United Way drive is well under way, with kickoff activities, ambassador/coordinator training and agency tours now complete.

The campaign got rolling with a successful kickoff event featuring Russell Biven of WBIR-TV's "Live at Five" and the "ORNL 500" radio-controlled car race on the laboratory's Main Street. Other celebrity "drivers" for the event were ORNL Director Jeff Wadsworth, ATLC Vice President Carl Wright and Lauren Eiler of Girls Inc.

Next on the horizon is the popular on-line auction, which last year featured such items as pottery, jewelry, ORNL logo items, framed artwork, floral arrangements, hand-crafted afghans and gift baskets.

Auction coordinator Carol Leffew is still looking for items before the initial on-line postings. If you have items or services that could be donated, or if you need more information about the auction, please contact

Carol at 574-5982 or leffewcj.

Descriptions and photos of auction items will be posted soon on the UW home page, http://home.ornl.gov/general/united_way/.

The theme for this year's campaign, led by Scott Branham and Lee Riedinger, is "ORNL: A Workforce United to Help Others Along the Way."

The 2003 campaign provided more than \$700,000 to support our neighbors in need in 17 counties. This year's ORNL goal is \$750,000.

[Photos by Curtis Boles]



United Way campaign chair Scott Branham raises the green flag for the first heat of the "ORNL 500" as announcer Bill Corwin and racers Lauren Eiler, Russell Biven, Carl Wright (partially hidden) and Jeff Wadsworth get ready to go.



(LEFT) The laboratory's Charlene Patrick visits with a client at the Keystone Day Program at First United Methodist Church in Oak Ridge, a United Way agency.

(RIGHT) ORNL campaign ambassadors and coordinators learn about the Children's Museum of Oak Ridge during a tour of area United Way agencies.



om1 reporter

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