

*33rd Annual*

**Once Upon a  
Christmas Cheery in  
the Lab of Shakhashiri**

**December 2002**



**December 7, 8 (1:00 & 4:00 pm)**  
*Farrington Daniels Chemistry Building*  
*University of Wisconsin-Madison*

*[www.scifun.org](http://www.scifun.org)*

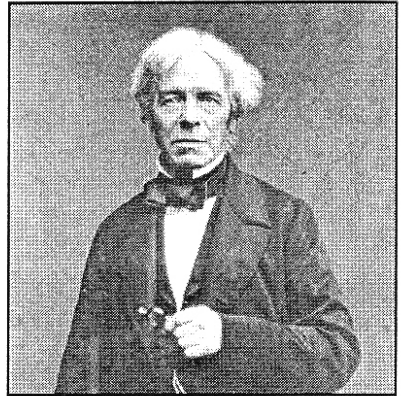
Wisconsin Public Television telecast:  
4:00 pm, Wednesday, December 25, 2002  
8:00 am, Sunday, December 29, 2002



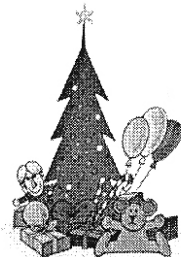
## The Origin of the Christmas Lecture

Michael Faraday, the noted English physicist and chemist, lived from 1791 to 1867. He was a gifted lecturer, and he began giving his Christmas Lectures for children at the Royal Institution of Great Britain in the 1840s.

Faraday loved simplicity, and he had a strong sense of the dramatic. His audience entered wholeheartedly into the world of science with him as guide. His ideas were still considered very unorthodox at that time, and children, who had not yet adopted conventional ideas, would react enthusiastically to the ones he presented. Eventually, the lectures became very



popular, and even the Prince of Wales attended and learned about the mysteries of electricity. Faraday sought to awaken the sense of wonder in his listeners. He knew that once a person could be made to wonder about the world, it was only a short step to studying it. He strove to point out that if you looked closely at the most ordinary thing, such as the force of gravity, it ceased to be ordinary and became somehow miraculous. Faraday did all he could to urge his listeners to see and judge for themselves, to experiment—to question nature directly—whenever anyone discovered something out of the ordinary.



33

**As**

Arsenic

This year is the 33rd annual presentation of the Holiday Lecture, "Once upon a Christmas Cheery in the Lab of Shakhashiri." It is fitting for a chemist to mark an anniversary with the element whose atomic number is 33, namely arsenic.

Arsenic was well known in ancient times as both a medicine and a poison. Both Aristotle and Pliny the Elder mention compounds of arsenic in their writings. Arsenic trioxide has been used for centuries in traditional Chinese medicine. Before the development of antibiotics in the 1940s, arsenic compounds were used in the treatment of many infectious diseases. Alloyed with copper, arsenic takes on a rich green color that has been used for centuries in dyes and colored glass. Arsenic is a key component of semiconductors in the form of gallium arsenide, used in light emitting diodes.

Arsenic is probably best known as a poison. The element arsenic is steel gray, crystalline, and brittle, and it is not very toxic, but some of its compounds are very toxic. Arsenic oxide is a tasteless white powder that has long been the poison of choice for murderers and murder mystery writers. The French called it "inheritance powder." Among the famous who may have been killed by arsenic oxide is Napoleon Bonaparte. Some historians believe he was murdered by his British captors, while others think the poisoning was accidental, caused by fumes from deteriorating wallpaper that contained an arsenic-based dye.

The use of arsenic remains controversial. Currently, about 40,000 tons of arsenic-based pesticides are used in the U.S. every year. Pressure-treated lumber is impregnated with chromated copper arsenate as a preservative. Such lumber is common in home construction. However, its sale for residential use will be banned in the U.S. starting in January 2004. Arsenic contamination of drinking water is a major problem in many places around the world, usually coming from natural aquifers. After considerable debate, the acceptable standard for drinking water in the U.S. has been reduced from 50 to 10 parts per billion starting in 2006. Arsenic is found almost everywhere in the environment and would be impossible to eliminate completely from drinking water. The human body naturally contains trace amounts of arsenic and some people think small amounts of the right compounds are actually good for you!



## **BASSAM Z. SHAKHASHIRI**

***William T. Evjue Distinguished  
Chair for the Wisconsin Idea***

---

“Scientist by training, teacher and public servant by trade, advocate by conviction, optimist by nature”—that is the way Bassam Z. Shakhashiri describes himself. As Professor of Chemistry at the University of Wisconsin-Madison, Dr. Shakhashiri finds outlet for all four attributes, to which he might add a fifth: entertainer by avocation.

Dr. Shakhashiri is probably best known to the public at large for his annual program, “Once Upon a Christmas Cheery/In the Lab of Shakhashiri,”; that attracts enthusiastic live and television audiences across the country. The one-hour show as well as two half-hour shows are featured year round on PBS and on other stations. The Christmas Lecture, which is in the tradition of the great British scientist Michael Faraday, is only one demonstration of Dr. Shakhashiri’s attachment to hands-on science.

Dr. Shakhashiri is a guest on TV and radio talk shows across the country and is a regular guest on the Larry Meiller Show of Wisconsin Public Radio. He has been featured in newspaper, magazines, national and local radio and television including the *New York Times*, the *Washington Post*, *Newsweek*, *Time*, NBC Nightly News, CNN, and the Larry King Show.

A native of Lebanon, Dr. Shakhashiri came to the United States in 1957 when he was 18 years old with one year of college (at the American University of Beirut) behind him. He completed undergraduate work at Boston University (Class of '60) with an A.B. degree in chemistry, served as a teaching fellow at Bowdoin College for one academic year and then earned master’s and Ph.D. degrees in chemistry at the University of Maryland ('64 and '68 respectively).

After a year of post-doctoral research and two years as a chemistry faculty at the University of Illinois, Urbana, Dr. Shakhashiri joined the faculty of the University of Wisconsin in 1970, a position he has held since. In 1977 he was the founding chair of the University of Wisconsin System Undergraduate Teaching Improvement Council. In 1983 Dr. Shakhashiri founded the Institute for Chemical Education (ICE) and served as its first director.

Dr. Shakhashiri has given over 1000 invited lectures and presentations in the US and other countries. He has co-authored several publications including *Workbook for General Chemistry*; *Chemical Demonstrations: A Handbook for Teachers of Chemistry, Volumes 1, 2, 3 and 4*; and semi-programmed booklets on equilibrium, kinetics, and organic chemistry. Another of his pioneering efforts is an interactive chemistry exhibit on permanent display since 1983 at the Chicago Museum of Science and Industry.

From 1984 to 1990 Professor Shakhashiri served as Assistant Director of the National Science Foundation for Science and Engineering Education. As the NSF chief education officer he presided over the rebuilding of all the NSF efforts in science and engineering education after they had been essentially eliminated in the early 1980's. His leadership and effectiveness in developing and implementing national programs in science and engineering education became legend and have helped set the annual NSF education budget at its current level of \$900 million. His NSF strategic plan launched the systemic initiatives and most of the other NSF education programs of the last decades.

Among his over 25 awards are the 1977 Kiekhofers Distinguished Teaching Award from UW-Madison, and the 1979 Manufacturing Chemists Association Catalyst Award. He is the youngest recipient of two of the American Chemical Society's most coveted recognitions—the James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry (1983) and the ACS Award in Chemical Education (1986). In 1995 he was cited in the *Year Book of Encyclopaedia Britannica* as the “dean” of lecture demonstrators in America. He is the recipient of five honorary doctoral degrees.

The American Association for the Advancement of Science, which is the world's largest general scientific organization, has just announced that Dr. Shakhashiri will receive the 2003 AAAS award for "Public Understanding of Science and Technology" for his tireless efforts to improve public understanding and appreciation of science and technology and for his outstanding contributions to the "popularization of science."

Dr. Shakhashiri currently directs the Wisconsin Initiative for Science Literacy (WISL) and its various programs including Science in the City; Science, the Arts, and the Humanities; Women in Science; Science on the Road; and Conversations in Science. For more information about the goals and scope of WISL, please visit our web site at [www.scifun.org](http://www.scifun.org)



## Oxygen

This spring, the University Theater will present the play "oxygen," written by two world-renowned scientists. Carl Djerassi, inventor of the birth control pill, is also a best-selling novelist and UW-Madison alumnus. Roald Hoffmann received the Nobel Prize in chemistry in 1981 and is a published poet. "Oxygen" travels playfully in time between two tense meetings in Stockholm. One occurs in 2001, when a Nobel Prize committee is debating who should be awarded a "retro Nobel" for the discovery of oxygen in the 18th Century. At the other meeting, in 1777, three scientists anxiously await the announcement of the award of the King's Gold Medal. The mysterious and often cut-throat world of science is demystified in this engaging play. The play will be presented March 28-29 and April 3-5 at the Mitchell Theater in Vilas Hall. Both authors will be in Madison for appearances on campus. For ticket information contact the Vilas Hall Box Office, 821 University Avenue, Madison, WI 53706; telephone 608-265-4075.



### Support the Holiday Lecture

For over 30 years, audiences have been entertained and edified by Professor Shakhkashiri's Holiday Lecture. Even people who have not attended a Holiday Lecture have been able to enjoy the show through television broadcasts across the country. Presenting the annual Holiday Lecture requires the combined efforts and support of many collaborators and friends. You can join Professor Shakhkashiri and his friends in supporting the Holiday Lecture by making a gift to the *Shakhkashiri Science Education Fund* at the University of Wisconsin Foundation. You may send your tax-deductible contribution to:

Shakhkashiri Science Education Fund (attn Wendy Richards)  
University of Wisconsin Foundation  
P.O. Box 8860  
Madison, WI 53708-8860

Your gift, no matter the amount, is greatly appreciated.



## ORDER YOUR CHRISTMAS LECTURE VIDEO

You can have your very own copy of this year's Christmas Lecture on videocassette! The 1999 30th Anniversary Presentation as well as a limited number of the 2001, 1998, 1997, 1996, 1994, and 1993 Shows are available from **Educational Innovations, Inc.** The cost of the tapes is \$30.00 for one, \$25.00 each for two or more.

**Educational Innovations, Inc.**  
**362 Maine Avenue**  
**Norwalk, CT 06851**

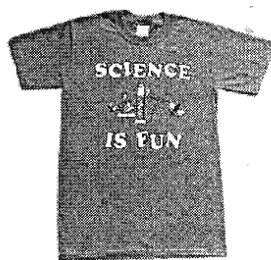
**Phone: 1-888-912-7474 (toll free)**

**Fax: 203-229-0740**

**E-mail: [info@teachersource.com](mailto:info@teachersource.com)**

**Web site: [www.teachersource.com](http://www.teachersource.com)**

Also available from **Educational Innovations, Inc.** are **SCIENCE IS FUN** buttons, shirts, hats, mugs, Chem Time Clocks, periodic table cups, and the 4-volume set of *Chemical Demonstrations: A Handbook for Teachers of Chemistry*. The full catalog is available online at [www.teachersource.com](http://www.teachersource.com)



## Acknowledgements

The 2002 Christmas Lecture is made possible through the cooperation and support of:

University of Wisconsin-Madison  
Department of Chemistry  
Alpha Chi Sigma Chemistry Fraternity  
Bucky Badger  
Wisconsin Public Television  
Public Broadcasting System  
DuPont Office of Education  
Datex-Ohmeda, Inc.  
William T. Golden Family Foundation  
Evjue Foundation  
Friends of the Christmas Lecture  
Santa Claus  
Santa's Elves

