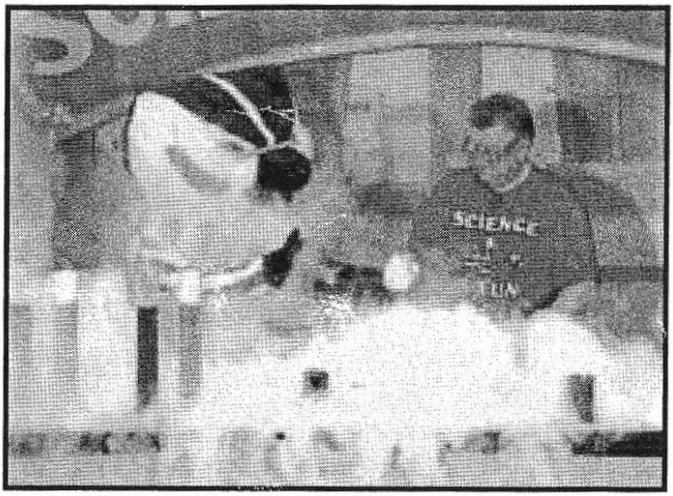
34th Annual

Once Upon a Christmas Cheery in the Lab of Shakhashiri

December 2003



December 6, 7 (1:00 & 4:00 pm)
Farrington Daniels Chemistry Building
University of Wisconsin-Madison

www.scifun.org

Wisconsin Public Television telecast:
4:00 pm, Thursday, December 25, 2003
8:00 am, Sunday, December 28, 2003

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 Britiain 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.

This is the 34th annual presentation of the Holiday Lecture, "Once Upon a Christmas Cheery in the Lab of Shakhashiri." It is fitting for a chemist to mark the anniversary with a note about the element whose atomic number is 34, namely selenium.

The name comes from the Greek word for moon, *selene*, selected because in the periodic table of the elements, selenium is immediately above the element tellurium, which had been previously named after the Earth, from the Latin *tellus*. Selenium is not very common in the earth's crust, being only slightly more common than gold. Selenium is rarely found in its elemental state in nature. It is usually found in metal compounds that are mixed with sulfur-containing ores. In fact, most elemental selenium is produced as a by-product of processing copper ore. The element has two forms, a red powder and a silver-gray solid.

Though it's not a well-known element, selenium is vital for human life and is very useful in technology. The small "trace" amounts we consume with food are necessary to keep us healthy. Researchers now believe that certain selenium compounds may be antioxidants, can prevent cancer, and are of key importance in efficient energy metabolism. One recommended source of selenium is selenomethionine, but others such as sodium selenite and sodium selenate are used. UW-Madison scientists are part of a $200 million 10-year nation-wide study of 32,000 men in which selenium is used as a supplement to prevent prostate cancer.

The compound cadmium selenide, CdSe, is used in a very exciting new field of research where quantum dots are fabricated in semiconductor material. Quantum dots are nanometer-size locations containing one free electron (or several thousand electrons) in which the presence or absence of quantum electrons can be used to store information.

Selenium has many high-tech uses. It's photoconductive, which means its electrical resistance decreases with increased exposure to light. Selenium is also photovoltaic, converting radiant energy like sunshine into electrical energy. These properties make selenium an ideal element for use in solar cells, exposure meters for cameras, TV cameras and other electronic devices. It's also used in Xerography for reproducing documents, in glass and ceramics (for red coloring) and as an additive to make stainless steel easier to mold and bend. Compounds containing selenium help control dandruff and are found in many shampoos.

The element selenium is non-toxic, but several selenium compounds are very toxic and resemble arsenic in their effects. Plants growing in selenium-rich soil can produce enough poisonous compounds to harm grazing animals. The poison in locoweed, which grows in many Western states, is a selenium compound. As the name implies, animals that eat locoweed act "crazy", staggering around until they collapse. Humans exposed to too much selenium give off a garlic-like odor.

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 and on WKOW-TV's WAKE UP WISCONSIN. He has been featured in newspapers, 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 member 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.

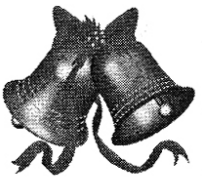
Dr. Shakhashiri has given over1000 invited lectures and presentations in the US and other countries. He has co-authored several publications including *Workbook for General Chemistry; Chemical Demonstrations: A Handbook for Teachers of Chemistry, Volumes 1, 2, 3 and 4;* and semi-programmed booklets on 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 1980s. 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 more than 25 awards are the 1977 Kiekhofer 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, awarded Dr. Shakhashiri the 2002 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



Wisconsin Initiative for Science Literacy Activities

The Wisconsin Initiative for Science Literacy sponsors many programs in addition to the **Holiday Lecture**. Among its offerings are **Science Saturdays** and **Science Is Fun** presentations. Science Saturdays are a series of Saturday morning activities for middle school students accompanied by a parent or guardian. At these sessions, each student and parent work together on a set of hands-on experiments dealing with one of a wide range of science topics, such as energy, sound, polymers, light, or ecology. A set of Science Saturdays activities will be offered again during the coming months. In the Science Is Fun presentations, a group of UW students travel to a school or other civic organization and demonstrate a series of educational and entertaining scientific phenomena. If you like the Holiday Lecture, you'll also like the Science Is Fun presentations. If you are interested in participating in either Science Saturdays or Science Is Fun presentations, please check the Science Is Fun Web site, *www.scifun.org*. There you will find a schedule of upcoming Science Saturdays and how to register for them. You will also find information about how to request a Science Is Fun presentation for your school or group.

We Welcome Your Support

For over 30 years, audiences have been entertained and edified by Professor Shakhashiri'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. Many have also seen his presentations at schools, shopping malls, and other locations. Students, parents, and the general public have benefitted from the many science activities sponsored by the Wisconsin Initiative for Science Literacy. You can join Professor Shakhashiri and his friends in supporting the Holiday Lecture by making a gift to the *Shakhashiri Science Education Fund* at the University of Wisconsin Foundation. You may send your tax-deductible contribution to:

Shakhashiri 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.

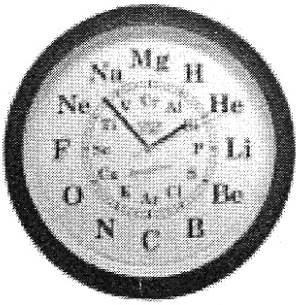
ORDER YOUR CHRISTMAS LECTURE VIDEO

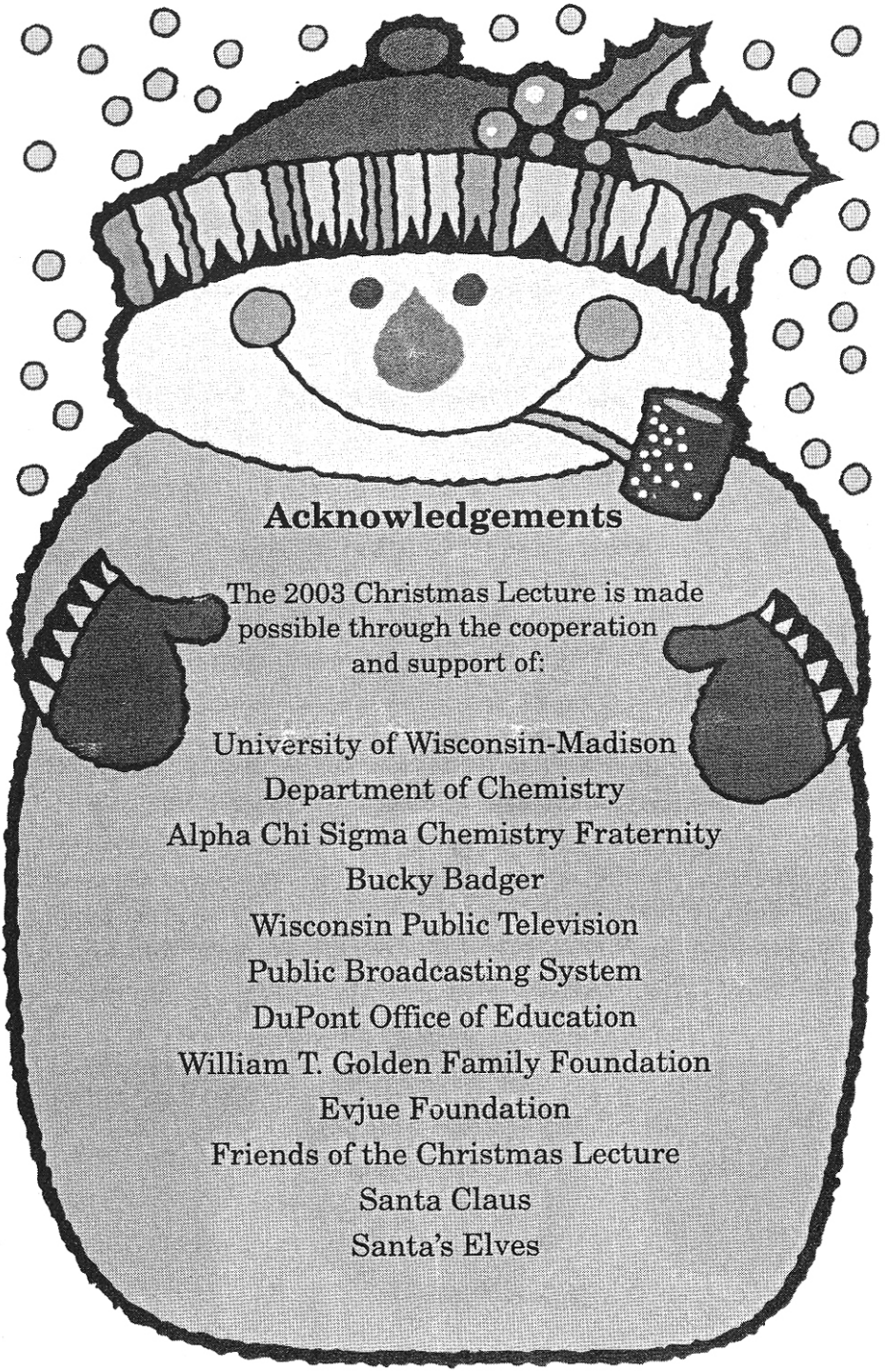
You can have your very own copy of this year's Christmas Lecture on videocassette or DVD! The 34th Anniversary Presentation, as well as those from previous years, are available from **Educational Innovations, Inc.** The cost of the tapes is $30.00 for one, $25.00 each for two or more.

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
Web site: www.teachersource.com

Also available from **Educational Innovations, Inc.** are **SCIENCE IS FUN** buttons, shirts, caps, and mugs; ChemTime clocks; periodic table cup; and the 4-volume set of *Chemical Demonstrations: A Handbook for Teachers of Chemistry*. They also have videos of last spring's production in Madison by the University Theatre of the play *Oxygen*. The full catalog is available at their Web site.





Acknowledgements

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