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# Once Upon a Christmas Cheery, IN THE LAB OF SHAKHASHIRI

*a special 45<sup>th</sup> anniversary presentation*

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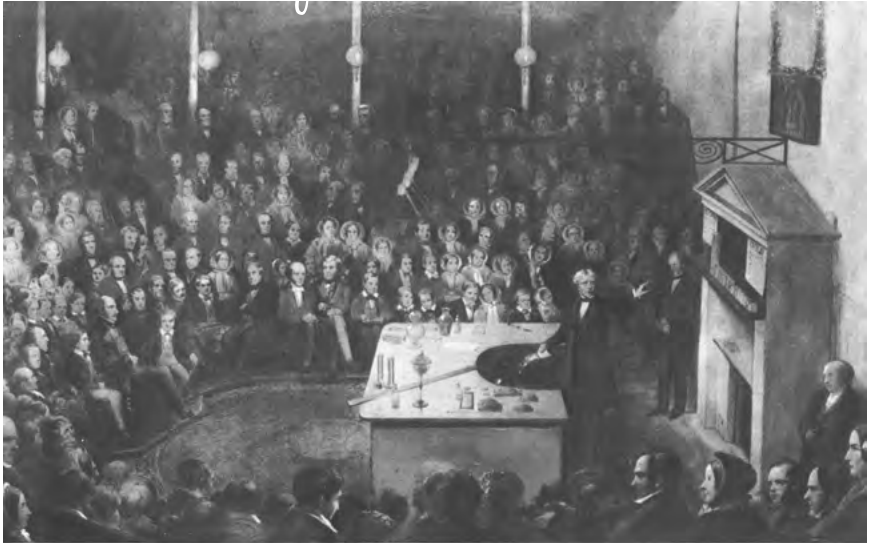
Sunday, November 30, 2014  
Wisconsin Union Theater



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

# Origin

## *of the Christmas Lecture*



**M**ichael Faraday, the noted English physicist and chemist, lived from 1791 to 1867. He was a gifted lecturer who began giving his Christmas Lectures for children and their families 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 his guidance. 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. Throughout the 19 annual Christmas Lectures that he presented, Faraday did all he could to urge his listeners to see and judge for themselves, to experiment, and to question nature directly whenever anyone discovered something out of the ordinary.

# The Christmas Lecture @ UW-Madison

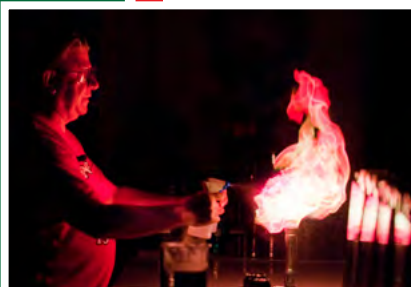
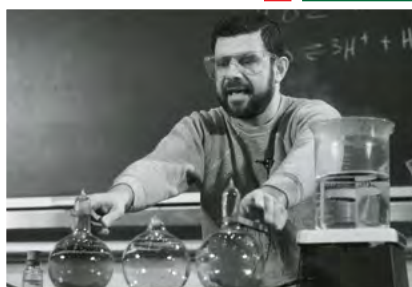
I first learned of Michael Faraday's Christmas Lecture from Professor Gilbert Haight while I was teaching at the University of Illinois prior to joining the faculty at Wisconsin. In December of 1970 I gave my first Wisconsin Christmas Lecture for the students in my general chemistry class and called the lecture ONCE UPON A CHRISTMAS CHEERY IN THE LAB OF SHAKHASHIRI. With help from our Lecture Demonstrator Odell Taliaferro I presented colorful displays and exciting chemical transformations.

Word spread that my Christmas Lecture was a fun event and the following year the lecture hall overflowed with students and their friends. In 1972 I decided to give the Christmas Lecture in two evening sessions open to the public. In 1973 WHA-TV (now Wisconsin Public Television) offered to videotape the program for broadcast during the week of Christmas. Thus began an uninterrupted collaboration between the Chemistry Department and UW-Extension to bring science to audiences throughout Wisconsin. Since then, versions of the show have played to packed houses elsewhere across the country and around the world.

The goal of the Christmas Lecture has remained the same over the years and across the globe: connectivity with the audience. My ultimate purpose is to trigger cerebral and emotional engagement to heighten the audience's joy in learning. Wherever I go, my 'Science is Fun' motto prompts smiles and questions from kids of all ages. I want everyone to appreciate that science contributes to the quality of life in society, and that it is intellectually stimulating and emotionally rewarding.

I cherish the Wisconsin Idea. I am blessed to be in an environment that promotes scholarly achievements and values public service. I am committed to developing talent and personal growth and to nurturing responsible attitudes and behavior for the benefit of our country and the world.

*~ Bassam Z. Shakhashiri*

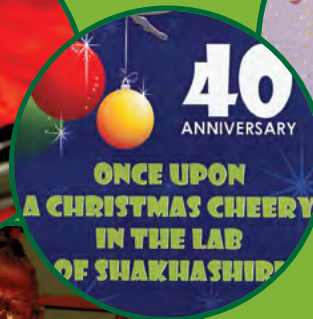


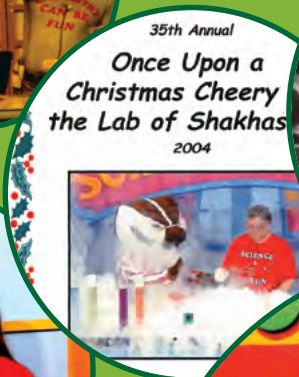


*Bassam Z. Shakhashiri* is professor of chemistry at the University of Wisconsin-Madison and the first holder of the William T. Evjue Distinguished Chair for the Wisconsin Idea. He has given over 1400 invited lectures and presentations around the world. He is the recipient of 7 honorary doctoral degrees and over 35 awards, from organizations like the American Association for the Advancement of Science, Madison Metropolitan School District, American Institute of Chemists, American Chemical Society, National Science Board, Council of Scientific Society Presidents and more.

From 1984-90 Bassam served as NSF Assistant Director for Science and Engineering Education. In 2002 he founded the Wisconsin Initiative for Science Literacy (WISL) and continues to serve as its director. He has been featured in newspapers, magazines, national and local radio and television; these include the New York Times, Washington Post, Newsweek, Time, NBC Nightly News, National Public Radio, CNN, and the Larry King show. He appears as a regular guest on the Ideas Network of Wisconsin Public Radio.

Bassam was elected the 2012 President of the American Chemical Society. He will serve as ACS Councilor for life. He and his wife June live in Madison. Their daughter Elizabeth, a 2007 alumna of UW-Madison, graduated in 2010 from the University of Michigan Law School and lives in Chicago with her husband Bob.





# Science & Society

**Today our biggest challenge is to help sustain Earth and its people in the face of:**

- Population Growth
- Finite Resources
- Malnutrition
- Spreading Disease
- Deadly Violence
- War
- Climate Change
- And the denial of basic human rights, *especially the right to benefit from scientific and technological progress.*

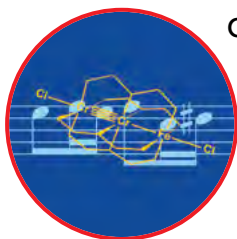
We advance chemistry through research, education, and innovation. Basic research in science greatly increases our understanding of nature, triggers creative waves of invention and innovation, and prompts technological breakthroughs that can serve society well in the future. Solutions to the world's problems demand thinking "outside the box" and encouraging radical innovation, both coupled with transformative changes in education.

We must aim to effect comprehensive, fundamental, and systemic change in our own attitudes and in our behavior as scientists and as responsible citizens. Purposeful communication of the critical role of science and technology in society can help alter attitudes of the general public and can also foster collaboration among people across geographic boundaries to work together to solve global grand challenges. We have the talent and the capacity to succeed, but as scientist-citizens we must also help develop the will to take action.

**"Science and society have what is essentially a social contract that enables great intellectual achievements but comes with mutual expectations of benefiting the human condition and protecting our planet."**

**Bassam Z. Shakhashiri, January 2, 2012**

# Science, the Arts and the Humanities



Creativity, passion and the urge for expression and exploration are essential human qualities that inspire science, the arts, and the humanities, and thus constitute a common bond among them. WISL helps people explore, discuss, and cultivate the intellectual and emotional links between science, the arts, and the humanities.

## *Climate change affects everyone,*

so everyone should understand why the climate is changing and what it means for them, their children, and generations to follow. We encourage everyone to engage in respectful conversations about climate change.

**The public can learn more about climate change at:**

**[www.climate.nasa.gov](http://www.climate.nasa.gov)**

**Scientists can learn about how to communicate the science of climate change at:**

**[www.acs.org/climatescience](http://www.acs.org/climatescience)**



## *Join in sustaining our science outreach and make your gift to **WISL** today*

The dual mission of the Wisconsin Initiative for Science Literacy is to promote literacy in science, mathematics and technology among the general public and to attract future generations to careers in research, teaching and public service. WISL programs are supported by UW-Madison and by private donations. Your financial support enables WISL to reach multiple audiences and to maintain rich intellectual and emotional connections with and among our audiences. You may send your tax-deductible contribution to:

**The Shakhshiri Science Education Fund**

**UW Foundation**

**US Bank Lockbox 78807**

**Milwaukee, WI 53278**

*~ Your gift is greatly appreciated. ~*

# This Year's Guests

**Rodney Schreiner** Senior Scientist at UW-Madison, he has presented science shows in a wide variety of locations including the Epcot Center and has collaborated on 44 Christmas Lectures.

**Bucky Badger** has participated in many of Bassam's Christmas Lectures, and he always obeys the safety rules!

**Michael Leckrone** Professor of Music and Director of Bands at UW-Madison, he has delighted audiences for over 40 years in a wide variety of venues. Today he is joined by members of his UW Varsity Band.

**Paul Rowe** Professor of Voice at the UW-Madison School of Music, he has performed with many of the leading musical organizations, including the Boston Symphony Orchestra, American Ballet Theater and Musica Sacra.

**Alan Alda** A six-time Emmy Award winner, the host of Scientific American Frontiers on PBS, and founder of the Alan Alda Center for Communicating Science at Stony Brook University.

**Clint Sprott** Professor Emeritus of Physics at UW-Madison, next February will mark the 32<sup>nd</sup> annual presentation of his Wonders of Physics program.

**Elizabeth Reynolds** has been a guest of the Christmas Lecture many times. Her first appearance was in 1992, when she was 7 years old.

**Jim Maynard** UW-Madison Chemistry Department lecture demonstrator, he has led the department's demonstration lab since 2001.

**Raia Ottenheimer** A sixth grader at Hamilton Middle School and member of the Madison Youth Choir.

**Kailey Boyle** A junior at Middleton High School, she has been featured in many productions at Children's Theatre of Madison and elsewhere.

## Acknowledgements

**The 45<sup>th</sup> Annual Christmas Lecture is made possible through the cooperation and support of:**

University of Wisconsin-Madison

Wisconsin Public Television  
Deb Piper

Evjue Foundation

Rod MacDonald

Department of Chemistry

Madison Youth Choirs  
Michael Ross & Marcia Russell

Gialamas Family Foundation

Tracy Drier

Donors to WISL

# Rhodium

Rhodium is one of the rarest and most expensive of all metals. Its price fluctuates greatly with the world economy, ranging from \$1,000 an ounce to \$10,000 in recent years. On average, it is much more expensive than gold. Rhodium is silvery white and shiny like platinum, and it doesn't tarnish. Despite its beauty, however, rhodium is rarely used for jewelry and other decorative objects.

That's not only because of its cost, but because rhodium is very difficult to work with. It has a very high melting point, and it is not malleable. That means it can't be easily molded or pounded into different shapes. This is the opposite of gold, which has a relatively low melting point and is very malleable.

Most of the rhodium produced goes into catalytic converters that reduce the pollution produced by cars and trucks. A catalyst is a substance that promotes a chemical reaction while not being changed itself. In a catalytic converter, rhodium helps convert

harmful nitrogen oxides and unburned hydrocarbons (soot and smoke) into carbon dioxide and water, releasing the nitrogen. Carbon dioxide ( $\text{CO}_2$ ) is a plentiful greenhouse gas, contributing to global climate change, but nitrous oxide ( $\text{N}_2\text{O}$ ) is far worse, with each molecule packing 300 times the greenhouse effect of  $\text{CO}_2$ , so the conversion is a big plus for the environment. Other similar metals, such as platinum

and palladium, are also used in catalytic converters.

Rhodium was discovered in 1803 by William Hyde Wollaston, who isolated it from an ore he got from South Africa, which is still the main source of rhodium. The name comes from the ancient Greek word for rose, which is the color of a compound of rhodium and chlorine. Rhodium reacts with very few other substances, and it is often used as a coating on other metals where corrosion resistance is vital. So this scarce and expensive metal is rarely used for its beauty, but has much more practical uses.



# Wisconsin Public Television Telecasts



**Saturday, December 20**

**5:00 p.m.** (On The Wisconsin Channel)

**Sunday, December 21**

**11:00 a.m.** (On WPT)

**Thursday, December 25**

**2:00 p.m.** (On WPT)

**Check local listings for telecast times elsewhere around the country.**



**PUBLIC ENGAGEMENT**

**ONE OF THE HALLMARKS OF THE**

WISCONSIN INITIATIVE FOR

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