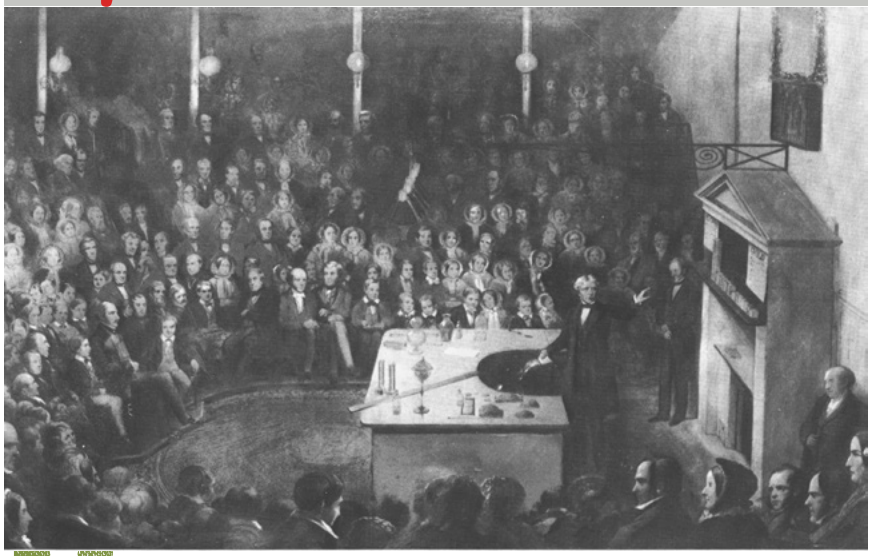
Once Upon a Christmas Cheery in the Lab of Shakhashiri

SUNDAY, DECEMBER 1

Middleton Performing Arts Center

ORIGIN of the Christmas Lecture



Michael 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.

Once Upon a Christmas Cheery In the Lab of Shakhashiri

In December of 1970, near the end of my first semester on the faculty of UW-Madison, I presented the first ONCE UPON A CHRISTMAS CHEERY IN THE LAB OF SHAKHASHIRI in my freshman chemistry class. Colorful displays of exciting chemical transformations were used and the audience was thrilled. Word spread that the Christmas Lecture was a fun event and the following year the lecture hall overflowed with students and their friends. In 1972 the Christmas Lecture was given in two evening sessions and opened to the public. In 1973 Wisconsin Public Television offered to videotape the program for broadcast during the week of Christmas. Thus began an uninterrupted collaboration with UW-Extension to bring science to audiences throughout Wisconsin, and on PBS stations.

Since then, variations of this program have played to packed houses at the National Academy of Sciences and the Smithsonian's Air and Space Museum in Washington, the halls of the US Congress, Boston's Museum of Science, elsewhere across the country and around the world. The goal of the Christmas Lecture has remained the same over the years: *connectivity with the audience*. My ultimate purpose is to trigger cerebral and emotional engagement to heighten the audience's joy in learning and to celebrate the role of science in society.

It is my good fortune to mark this 50th anniversary with appreciation for the wide interest and support that all my work enjoys locally and globally.

>> Bassam Z. Shakhashiri

"I expect to pass through the world but once.
Any good therefore that I can do, or any kindness
that I can show to any fellow creature, let me do it now.
Let me not defer or neglect it,
for I shall not pass this way again."

>> Attributed to Etienne de Grellet du Mabiller (1773-1855)

Fostering COMMUNITY APPRECIATION OF SCIENCE

Science literacy enlightens and enables people to make informed choices, to be skeptical, and to reject shams, quackery, unproven conjecture, and to avoid being bamboozled into making foolish decisions where matters of science and technology are concerned. Science literacy is for everyone—scientists, artists, humanists, all professionals, the general public, youth and adults alike.

>> Bassam Z. Shakhashiri

"Public sentiment is everything. With public sentiment, nothing can fail; without it nothing can succeed."

>> Abraham Lincoln

Bassam Z. Shakhashiri

is professor of chemistry at the University of Wisconsin-Madison and since 2001, the first holder of the William T. Evjue Distinguished Chair for the Wisconsin Idea. He has given over 1500 invited lectures and presentations around the world. He is the recipient of 7 honorary doctoral degrees and over 35 awards from the American Association for the Advancement of Science, Madison Metropolitan School District, American Chemical Society (ACS), National Science Board, Council of Scientific Society Presidents and more. He is the recipient of the 2018 ACS Grady-Stack Award for Interpreting Chemistry for the Public.

In 1977 Bassam became founding chair of the UW System Undergraduate Teaching Improvement Council, now called the Office of Professional and Instructional Development. In 1983 he founded the Institute for Chemical Education (ICE) and served as its first director. From 1984-90 he 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 served as the 2012 President of the American Chemical Society.

Bassam has been featured in newspapers, magazines, national and local radio and television, and appears as a regular guest on the Ideas Network of Wisconsin Public Radio. He and his wife June live in Madison. Their daughter Elizabeth, a 2007 alumnus of UW-Madison, graduated in 2010 from the University of Michigan Law School and lives in Chicago with her husband Bob and their daughter Violet.

The new Bassam Shakhashiri Faculty Engagement Award was announced at the 2019 Wisconsin Science Festival:

- **To recognize the unique role that Bassam has played in inspiring faculty engagement at UW-Madison and beyond**
- **To commemorate Bassam's 50th year of making extraordinary contributions at UW-Madison**
- **To recognize Bassam's role in inspiriting the creation of the Wisconsin Science Festival**
- **To inspire more faculty engagement going forward and especially in time for the 10th Festival in 2020**

GLOBAL WARMING IS UNEQUIVOCAL

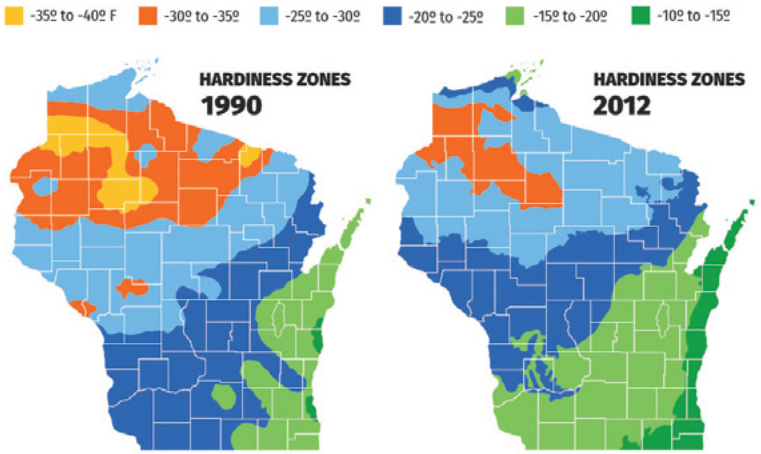
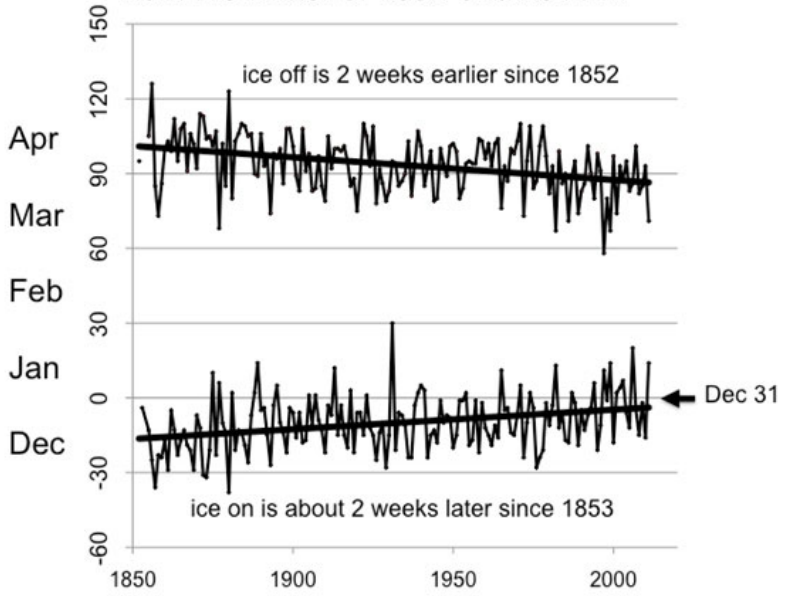


Illustration by Brandon Raygo, The Capital Times / Data Source: U.S. Dept. of Agriculture, PRISM Climate Group, Oregon State University

The zone color key shows the lowest observed winter temperatures in that area.

ICE-ON AND ICE-OFF DATES FOR LAKE MENDOTA FROM THE WINTER OF 1852-53 TO 2011-12



What can you do?

- Increase your scientific knowledge of climate change.
- Commit to taking responsible action to help mitigate global warming.
- Initiate and sustain conversations in your research group about global warming.
- Engage your family, friends, and others in conversations about global warming.
- Be respectful, trustworthy, and confident in what you say about global warming.
- Keep in touch with us, in person, and electronically at scifun@chem.wisc.edu

- Buy less stuff. (Reduce/Reuse/Recycle)
- Change those light bulbs. (And turn them off.)
- Use a programmed thermostat.
- Eat less meat. (Especially beef)
- Walk, bike, use more public transportation. Fly less.
- Switch to a car with better fuel economy or an electric vehicle.

In Every Election

Raise your voice...

- Union of Concerned Scientists: ucsusa.org
- Citizens' Climate Lobby: citizensclimatelobby.org
- Skeptical Science: skepticalscience.com
- Project Drawdown: drawdown.org
- ACS Climate Science Toolkit: acs.org/content/acs/en/climatescience.html

In the Lab

RODNEY SCHREINER

Senior Scientist Emeritus at UW-Madison, he has presented science shows in a wide variety of locations, including the Epcot Center, and has collaborated on 49 Christmas Lectures.

BUCKY BADGER

He has participated in many of Bassam's Christmas Lectures and public events, and he always obeys the safety rules!

MICHAEL LECKRONE

Professor of Music Emeritus, conducting the **SCIENCE IS FUN BAND**: Nicholas Bartell, Catherine Harris, Aaron Johnson, Michael Koszewski, Jim Kyle, Jason Reisterer, Jamie Sercombe, Darren Sterud, Mark Wurzelbacher.

SARA BARTLETT

ENDA O. BREADON

KATIE DEBBS

KIKI MORITSUGU

FAITH OLDENBURG

AMY RUTH

SAM TAYLOR

BRIAN COWING, ARTISTIC DIRECTOR

Acknowledgements

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is made possible through
the cooperation and support of:

University of Wisconsin-Madison

Department of Chemistry

PBS Wisconsin

Friends of
Science is Fun in the Lab of Shakhashiri

This year's featured element is tin. The atomic number of tin is 50, which corresponds to the 50th anniversary of Once Upon a Christmas Cheery in the Lab of Shakhashiri. The chemical symbol of tin is Sn, which comes from its Latin name, stannum.

Pure tin at room temperature is a silvery metal with a slight yellow tint. It is soft and easily bent. The metal contains large crystals which slide and break when it is bent, causing a faint crackling sound called tin cry. Tin melts at a low temperature, about 232°C (450°F), so it can be easily melted and poured into a mold to form objects such as toys like tin soldiers.

The silvery metal is stable at temperatures above 13°C (56°F). However, at lower temperatures it gradually changes into a dull-gray, powdery form. The transformation is called tin disease, and it can cause objects made of tin to decompose at cold temperatures. This is blamed for the disintegration of buttons on coats of the French army during the winter of Napoleon's invasion of Russia which may have contributed to Napoleon's defeat, as described in the book "Napoleon's Buttons".

Pure tin has had only a few uses, such as in molded toys. It was also used in making wrapping foil similar to aluminum foil to keep certain products fresh. However, aluminum foil has completely replaced it for this use, although some people today still refer to aluminum foil as tinfoil.

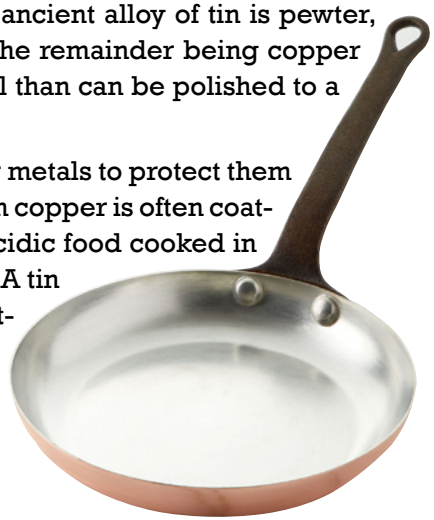
An industrial use of pure tin is in the production of panes of glass. Hot, molten glass is poured into the surface of molten tin and both are allowed to cool together. Because the surface of the molten tin is perfectly flat, the glass pane that forms on its surface is also perfectly flat. This makes transparent glass panes that are free of any distortions.

Nearly all tin today is used to form alloys by mixing tin with other metals, and to form protective coatings on other metals. Most tin is

This lead-free solder is 94 percent tin and 6 percent silver.

used today in making solder, a low-melting alloy that joins other metals together. Solder is used in joining copper pipes in plumbing. It is also used in joining components together in electronic devices. Solder had been an alloy of tin with lead, but efforts to reduce toxic lead in the environment has prompted the development of solders that are alloys of tin with a variety of other metals.

The first alloy of tin to be widely used is bronze, which is a mixture of 12 percent tin and 88 percent copper. It was first produced around 5000 years ago, during the Bronze Age. Bronze is much harder than either tin or copper alone. Another ancient alloy of tin is pewter, which is about 85 percent tin, with the remainder being copper and antimony. Pewter is a gray metal than can be polished to a bright surface resembling silver.



Tin is also used as a coating on other metals to protect them from corrosion. Cookware made from copper is often coated on the inside with tin, because acidic food cooked in copper can react and become toxic. A tin coating on iron prevents it from rusting. Tin-plated iron is widely used for preserving food, which is why the cans in which we buy food are often called tin cans.

PBS WISCONSIN TELECASTS

Monday, December 16 at 5 a.m.
Wednesday, December 18 at 9 a.m.
Friday, December 20 at 11 a.m.
Sunday, December 22 at 7 a.m.
Tuesday, December 24 at 5 a.m.
Wednesday, December 25 at 11 a.m.

WHA-TV Madison • WHLA-TV La Crosse • WHRM-TV Wausau
WHWC-TV Menomonie • WLEF-TV Park Falls
WPNE-TV Green Bay

Check local listings for telecast times elsewhere around the country.

PUBLIC ENGAGEMENT
ONE OF THE HALLMARKS OF

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