

How Edison Got His Groove Back

Watch it online <http://www.kqed.org/quest/television/how-edison-got-his-groove-back>

TV story length 10:41 minutes

QUEST SUBJECTS

- Life Science**
 - Biology
 - Health
 - Environment
- Earth Science**
 - Geology
 - Weather
 - Astronomy
- Physical Science**
 - Physics
 - Chemistry
 - Engineering

CA SCIENCE STANDARDS

Grade 3

Physical Science

1. (d) Energy can be carried from one place to another by waves, such as sound waves, by electric current and by moving objects.

Grades 9-12

Waves

4. (d) Sound is a longitudinal wave whose speed depends on the properties of the medium in which it propagates.

Conservation of Energy and Momentum




2. (d) The laws of conservation of energy and momentum provide a way to predict and describe the movement of objects.

PROGRAM NOTES

Music has come a long way since 1877 when Thomas Edison invented the Edison phonograph. Scientists have discovered a way to preserve the early recordings of Edison and many others through a process that takes microscopic pictures of the cylinder grooves in old discs and cylinders without touching them.

In this story you'll find...



-  who the key players were in the invention of sound recording.
-  how sound works.
-  why this new method of preserving early phonographic recordings is so important to society.

TOPIC BACKGROUND

Serendipity is the making of a fortunate discovery by accident, especially when looking for something else entirely.

In a moment of serendipity, scientists at Lawrence Berkeley National Laboratory discovered a way to combine science and music and preserve early recordings made by the Edison phonograph and other recording devices. Their discoveries preserve the sounds without touching the fragile, sometimes disintegrating discs and cylinders.

Sound was first recorded in 1859 by a Frenchman, Leon Scott. His “phonograph” recorded sounds on a long strip of paper covered by a sooty substance called lampblack, but the mechanism couldn’t play the sounds back. In 1877, Thomas Edison invented the means to record and reproduce sounds on tinfoil and, later, wax cylinders. Edison’s method used a stylus to make grooves in a cylinder. Spinning the cylinder to play the sounds made the needle move up and down in the grooves. The needle was connected to a diaphragm, which vibrated and produced the sound waves. The brain converts those air vibrations (or compressions and rarefactions of the air) into impulses that it recognizes as sounds. Unfortunately, these fragile cylinders have deteriorated over the years due to mold and other factors. The sounds were in danger of being lost entirely without a way to play them back.

LBL Senior Scientist Carl Haber and his team invented ways to save the recordings on lacquer discs and tin and wax cylinders. Their Image Reconstruct Erase Noise Etcetera (IRENE) can take microscopic pictures of the grooves in flat disc recordings without touching them. It has been invaluable in saving original sounds that would otherwise be lost. Recordings on wax cylinders proved more problematic. Using what they learned from IRENE, Haber’s team came up with a technique called “confocal microscopy.” This method measures the depth of the impressions on the wax or tin cylinders. It allows the team to preserve rare music, speeches, and even the recordings of tribal languages, such as that of Ishi, the last Yahi Indian, in the collections of the Phoebe Hearst Anthropology Museum, which would otherwise be unavailable for research.

VOCABULARY

Phonautograph

Leon Scott's 1859
sound-recording
invention

Sound

a form of energy, like
electricity and light.
Sound is made when
air molecules vibrate
and move in a pattern
of waves.

Compression

regions in the air where
the air particles are
close together (high air
pressure)

Rarefaction

regions in the air where
the air particles are
spread apart (low air
pressure)

Amplitude

magnitude of
compressions and
rarefactions (loudness
of sound)

Yurok

Northern California
Indian tribe, currently
the state's largest

Ishi

the "last" Yahi Indian.
He came into contact
with white men in
Oroville in 1911, after
the rest of his small
group died. He lived the
rest of his life in the
Anthropology Museum
in San Francisco.

PRE-VIEWING

- Who is Thomas Edison?
- What is a phonograph?
- What is sound? How does sound work?

VIEWING FOCUS

NOTE: You may choose to watch the television segment twice with your students: once to elicit emotional responses and get an overview of the topic and again to focus on facts and draw out opinions.

- What is sound? How is sound made?
- How were the scientists able to replay the sounds without touching the original cylinders?
- What has destroyed so many wax cylinders?
- What were some of the problems with Leon Scott's phonautograph? How was Thomas Edison's invention different? Better?
- What did Carl Haber and fellow scientists invent?
- Who is Ishi? Why is he so important to the project?

For all media see:

- Segment Summary Student Sheet
http://www.kqed.org/quest/downloads/QUEST_SegSum_StudentSheet.pdf
- Personal Response Student Sheet
http://www.kqed.org/quest/downloads/QUEST_PersResp_StudentSheet.pdf

QUEST, PBS and NPR LESSON PLANS and RESOURCES

NOTE: Resources from the Teachers' Domain collection require a fast and free registration.

Forgotten Inventors Teachers' Domain

<http://www.teachersdomain.org/resource/phy03.sci.engin.design.inventor/>

Even when it looks as though an invention came about by accident, usually there was a creative and determined inventor behind the scenes who turned the idea into reality. This illustrated feature from the **American Experience** website describes the events that led to some very useful inventions and the inventors responsible for them.

Edison's Miracle of Light: Edison Recordings American Experience

<http://www.pbs.org/wgbh/amex/edison/sfeature/songs.html>

The Edison Company produced these five tunes between 1919 and 1926 in West Orange, New Jersey. Also included is a reenactment of the first words recorded on a phonograph.

The Way the Music Died Frontline

<http://www.pbs.org/wgbh/pages/frontline/shows/music/inside/cron.html>

This is an examination of some of the technological milestones of recorded music, from Thomas Edison's first indentations on tin foil to the current digital revolution.

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Monterey Bay Aquarium
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www.mbari.org

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www.oaklandzoo.org

The Tech Museum of Innovation
www.thetech.org

UC Berkeley Natural History Museums
<http://bnhm.berkeley.edu/>

U.S. Geological Survey
www.usgs.gov

MORE EDUCATIONAL RESOURCES FOR USING QUEST MULTIMEDIA TO ENHANCE 21st CENTURY SKILLS IN TEACHING AND LEARNING

Why Use Media in Science Education?

www.kqed.org/quest/downloads/QUEST_Why_Media_08-09.pdf

- “As science educators, we know how important critical thinking and new technology skills are in the scientific community...” ([read more](#)).

Science Multimedia Analysis

www.kqed.org/quest/downloads/QUEST_Science_Multimedia_Analysis_08-09.pdf

- “By increasing students’ awareness of the intersections between media and science, we give them the tools to think like scientists...” ([read more](#)).

How to Use Science Media for Teaching and Learning

http://www.kqed.org/quest/downloads/QUEST_Media_Tips_08-09.pdf

- If we consider all forms of media “texts” from which students gather information, we can use similar literacy strategies to engage them in video, audio, blogs and Explorations. Once students have obtained information from multiple media sources, how do they share what they have learned? Through their own media-creation projects, of course!

Using Google Maps to Create Explorations

http://www.kqed.org/quest/files/download/52/QUEST_ExplorationCreation.pdf

- Do you like the science hike Explorations on the **QUEST** site? Use this place-based educational guide for educators and group leaders to create similar science-based maps with youth.

OTHER WAYS TO PARTICIPATE IN QUEST



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Mondays at 6:30am and 8:30am



WATCH

KQED Channel 9
Tuesdays at 7:30pm

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