

MUSEUM OF THE MOVING IMAGE

**SLOAN**  
**SCIENCE**  
**& FILM**



# TEACHER'S GUIDE

A Guide to Short Science-Related Films for the Classroom

# INTRODUCTION

From Museum of the Moving Image's *Sloan Science & Film*, this guide provides a teaching framework for 47 short, narrative (fiction), films—all supported by the Alfred P. Sloan Foundation's nationwide film program. Each film integrates scientific or technological themes. These films are freely available to stream in your classroom. Our goal is to help teachers engage elementary, middle, and high school students in STEM learning.

- Films range from 7 to 33 minutes, averaging 20 minutes in length
- Subjects include astronomy, biology, chemistry, ecology, evolution, genetics, mathematics, physics, psychology, technology, and the history of science
- Each film is correlated with Next Generation Science Standards ([available here](#)), and New York City Science Scope and Sequence ([available here](#))
- Included with each film are discussion questions and scientific resources for further engagement

*Sloan Science & Film* ([scienceandfilm.org](http://scienceandfilm.org)) is a website and online resource that covers all things science and film. It is published by the Museum of the Moving Image and funded by the Alfred P. Sloan Foundation. Sloan Science & Film publishes articles, interviews, and goes on as well as hosting a growing library of over 50 short films—featuring science and technology themes—available to stream any time. The site also catalogues over 500 film projects, including short and feature films, which have been funded beginning in 1997 via the Foundation's twelve institutional partners.

Each short film in this guide was made by filmmakers from: New York University, University of California Los Angeles, University of Southern California, Columbia University, American Film Institute, or Carnegie Mellon University. Each filmmaker was paired with a science professor who advised the filmmaker on the accuracy of the story's scientific content.



## KEYS

NGSS=Next Generation Science Standards;  
NYC=New York City Science Scope and Sequence; NYU=New York University;  
UCLA=University of California Los Angeles;  
USC=University of Southern California;  
CU=Columbia University; AFI=American Film Institute; CMU=Carnegie Mellon University

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**MATHEMATICS** Chasing Patterns

**PHYSICS** California King, For All Mankind, Hardbat, Jornada Del Muerto,  
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**PSYCHOLOGY** Atrocity, Cradle, The Disappearance of Andy Waxman, In Vivid Detail, The Reality Clock, The Witness

**TECHNOLOGY** App, The King's Pawn, Temma, Three Light Bulbs, Without Fire

**ACKNOWLEDGEMENTS**

## **JOSHUA TREE** (Click here to watch)

2002. 23 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Earth Science (Astronomy)  
National/NGSS: Grades 9-12, Earth's Place in the Universe  
(The Universe and Its Stars, ESS1.A; The History of Planet  
Earth, ESS1.C)

**SUMMARY:** *Joshua Tree* is about a loving but frayed mother-daughter relationship, a burgeoning friendship between a lonely girl and her new neighbor, and a widowed environmental scientist. It is a meditation on how the heavens have inspired both scientific inquiry and imagination.

**QUESTIONS TO EXPLORE:** What can stargazing reveal about the history of the universe? Why does it take so long for starlight to reach earth? How are stars "born"?

### **RESOURCES:**

Activity to measure the distance and size of the universe:  
<https://stardate.org/sites/default/files/pdfs/teachers/StarsGalaxies.pdf>

A book, *What Scientists Actually Do*, by a former space engineer: <http://www.thespacereview.com/article/1214/1>

Introductory lesson plans about the universe:  
[http://www.smithsonianeducation.org/educators/lesson\\_plans/universe/index.html](http://www.smithsonianeducation.org/educators/lesson_plans/universe/index.html)

Classroom activity on the color of stars:  
<https://stardate.org/teachers/plans/color-stars>



**TALENT:** Directed by Jonathan Messer. Written by Chris Raymond. Produced by Petra Erikssen. Edited by Byron Smith. Photographed by Kevin Krupitzer. Production design by Kristy Thomley. Music by Sean Morris. Principal cast: Taylor Dayne, Madison Eginton, Rebecca Klinger. Funded by a AFI-Sloan Production Grant.

## **THE KITE MESSENGER** [\(Click here to watch\)](#)

2003. 16 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, Earth Science (Astronomy)  
National/NGSS: Grades 6-12, Earth's Place in the Universe  
(The Universe and Its Stars, ESS1.A; Earth and the Solar System, ESS1.B)

**SUMMARY:** When teenager Allie discovers that her mother has passed away, she is forced to return home and confront her father. He is a distant astrophysicist who has always been more focused on his daughter's prospects as a scientific prodigy than her need for love.

**QUESTIONS TO EXPLORE:** How does a telescope work?  
What is a constellation?

### **RESOURCES:**

Articles and artifacts related to astronomy at the National Air and Space Museum:  
<https://airandspace.si.edu/topics/astronomy>

Classroom exercises about telescope technology:  
<http://mcdonaldobservatory.org/teachers/classroom/ttt/TelescopeTechnology.html>



**TALENT:** Directed by Debra Bellon. Edited by Bellon. Photographed by Hugh Scott. Music by Martin Wallace. Principal cast: Kristen Torrianni, Stephen Hastings, Karina Stow. Funded by a UCLA-Sloan Production Grant.

## **STARRY NIGHT** (Click here to watch)

2013. 20 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, Earth Science (Astronomy)  
National/NGSS: Grades 6-12, Earth's Place in the Universe  
(The Universe and Its Stars, ESS1.A)

**SUMMARY:** *Starry Night* is the story of Dawn, a teenage girl trying to escape her small town to pursue her passion for astronomy.

**QUESTIONS TO EXPLORE:** What tools do astronomers use?  
According to *Starry Night*, what are variable stars? How do astronomers measure the distance between objects in the solar system?

### **RESOURCES:**

An explanation of variable stars and where to find them:  
<https://www.aavso.org/variables-what-are-they-why-observe-them>

Facts and classroom activities related to astronomy:  
<https://mcdonaldobservatory.org/teachers/classroom>



**TALENT:** Written and Directed by Paxton Farrar. Produced by Farrar and Katherine Paige. Edited by Farrar and William Pierce. Photographed by Maria Rusche. Music by Andy Clausen. Principal cast: Paige Hiskey, Brian Combs, Joe Lambricht, Frank Lawler, Shondale Seymour. Funded by an NYU-Sloan Production Grant.

## **GRAY MATTER** (Click here to watch)

2000. 26 minutes.

**AGE GROUP:** High School \*Mature Content\*

**STANDARDS:** NYC: Grades 9-12, Living Environment (Scientific Inquiry) National/NGSS: Grades 9-12, From Molecules to Organisms: Structures and Processes (Structure and Function, LS1.A)

**SUMMARY:** *Gray Matter* follows a Los Angeles coroner from his visit to a crime scene to the autopsy on a young girl who was apparently the victim of sexual abuse.

**QUESTIONS TO EXPLORE:** What is the medical purpose of an autopsy? When were autopsies first performed, and how have they impacted medical diagnoses? What causes a brain aneurysm?

### **RESOURCES:**

The history of autopsies: <http://www.ncbi.nlm.nih.gov/books/NBK458/>

An interactive exercise to perform a virtual autopsy:  
<http://www.le.ac.uk/pathology/teach/va/welcome.html>

An overview of brain aneurysms:  
<http://www.mayoclinic.org/diseases-conditions/brain-aneurysm/basics/definition/con-20028457>



**TALENT:** Directed by Anthony Dominici. Written by Leonard Hartman. Produced by Arlene Knight. Photographed by Hyun Sung Kim. Edited by Matt Kregor. Principal cast: William Beck, Rudy Moreno, Detective Marcos, Robert Madrid, Dr. Neylan, David T. Hayman. Funded by a AFI-Sloan Production Grant.

**MAY** [\(Click here to watch\)](#)  
2012. 15 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Living Environment (Genetics)  
National/NGSS: Grades 9-12, From Molecules to Organisms: Structures and Processes (Structure and Function, LS1.A); Biological Evolution: Unity and Diversity (Adaptation, LS4.C; Developing Possible Solutions, ETS1.B)

**SUMMARY:** David's father is a record-holding skydiver, runs a successful business, and has a perfect family. He is also blind. At the age of 50, he discovers that he is a perfect candidate for a new stem cell and cornea transplant procedure. Though there are huge health risks involved, the operation could give him vision after a lifetime of blindness.

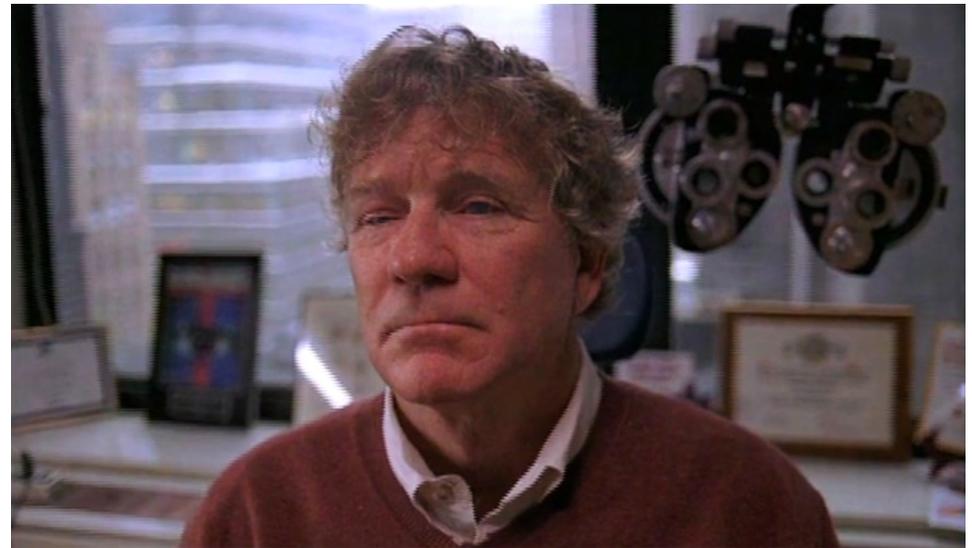
**QUESTIONS TO EXPLORE:** What is the function of the cornea? What areas of the brain affect vision and translate what the eye sees? What has to be rehabilitated in those that have been born blind?

**RESOURCES:**

Interview with surgical patient Mike May, who inspired the film: <http://www.npr.org/templates/story/story.php?storyId=129731859>

A panel of neuroscientists discussing on television the biology of the visual system:  
<https://charlierose.com/collections/3/clip/14569>

A comparison between an eye and a movie camera:  
[http://www.theatlantic.com/magazine/archive/1953/10/movies-and-tv-murder-or-merger/306082/?single\\_page=true](http://www.theatlantic.com/magazine/archive/1953/10/movies-and-tv-murder-or-merger/306082/?single_page=true)



**TALENT:** Written and Directed by Jesse Israel. Produced by Ryan Key and Nick Panama. Edited by Isaac Cole. Photographed by Adam Newport Berra. Production design by Laura O'Hara. Music by Daniel Fujikawa. Principal cast: Ned Cray, Matt Nardozzi, Rob Herring, Kim Anderson, Harriet Trangucci, William Otterson. Funded by an NYU-Sloan Production Grant.

**STANDING8** ([Click here to watch](#))  
2014. 15 minutes.

**AGE GROUP:** High School \*[Mature Content](#)\*

**STANDARDS:** NYC: Grades 9-12, Living Environment (Evolution)  
[National/NGSS](#): Grades 9-12, Heredity: Inheritance and Variation of Traits (Structure and Function, LS1.A)

**SUMMARY:** In the months between beating an opponent to death in the ring and battling for the next title, a journeyman boxer, Abdul Gillings, is forced to examine if he can survive the sport. Abdul is preparing for the biggest fight of his career. But, when a neurologist suspects a chronic brain injury, she hesitates to sign Abdul's health certificate, threatening his chances of becoming a champion.

**QUESTIONS TO EXPLORE:** What are the symptoms of Chronic Traumatic Encephalopathy (CTE)? Why is CTE so difficult to diagnose? What areas of the brain are affected in CTE?

**RESOURCES:**

An overview Chronic Traumatic Encephalopathy (CTE):  
<http://www.bu.edu/alzresearch/ctecenter/chronic-traumatic-encephalopathy-faqs/>

How CTE affects the brain:

<http://www.pbs.org/wgbh/frontline/article/the-four-stages-of-cte/>

Premiere of *Standing8*: <http://scienceandfilm.org/articles/2735/premiere-michael-molina-minards-standing8>



**TALENT:** Written and Directed by Michael Molina Minard. Produced by Ophelia Harutyunyan and Michel Stolnicki. Photographed by Angelos Rompolis. Principal cast: Jon Michael Hill, Alfie Fuller, Germar Gardner. Funded by a CU-Sloan Production Grant.

## **THE COLLECTOR'S GIFT** [\(Click here to watch\)](#)

2011. 8 minutes.

**AGE GROUP:** Elementary School and higher

**STANDARDS:** NYC: Grades K-12, Chemistry (Periodicity)  
National/NGSS: Grades K-12, Matter and Its Interactions  
(Structures and Properties of Matter, PS1.A)

**SUMMARY:** A young girl pieces together the journey of a man who once tried to gather all of the elements of the periodic table.

**QUESTIONS TO EXPLORE:** What is a chemical element?  
What distinguishes one element from another on the periodic table? Who are some of the key people who discovered the elements?

### **RESOURCES:**

The stories of people who helped develop the periodic table:  
<http://www.rsc.org/periodic-table/history/about>

A program about where the elements on the periodic table come from:  
<http://www.pbs.org/wgbh/nova/physics/hunting-elements.html>

A lesson plan and educational videos about the elements:  
<http://www.pbs.org/wgbh/nova/education/physics/hunting-the-elements-collection.html#lesson>

A free App that lets players build and explore elements:  
<http://www.pbs.org/wgbh/nova/physics/elements-ipad-app.html>



**TALENT:** Written, Animated, Produced, and Directed by Ryan Kravetz.  
Funded by a USC-Sloan Production Grant.

**HABER** (Click here to watch)  
2008. 33 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Chemistry (Atomic Concepts, Kinetics and Equilibrium) National/NGSS: Grades 9-12, Matter and Its Interactions (Structure and Properties of Matter, PS1.A; Chemical Reactions, PS1.B); Ecosystems: Interactions, Energy, and Dynamics (Cycles of Matter and Energy Transfer in Ecosystems, LS2.B); Earth and Human Activity (Natural Resources, ESS3.A; Human Impacts on Earth Systems, ESS3.C; Developing Possible Solutions, ETS1.B)

**SUMMARY:** Fritz Haber was a brilliant German-Jewish chemist with one of the most amazing dual legacies in history. His revolutionary process for creating synthetic fertilizers averted the greatest overpopulation crisis the world has ever known and won him a Nobel Prize in 1918. However, Haber used his genius to create the first chemical weapon, which was used during World War I.

**QUESTIONS TO EXPLORE:** How is ammonia made and what are some of its practical uses? What were Fritz Haber's contributions to the military? What is Fritz Haber's legacy?

### RESOURCES:

A teacher's guide to *Haber*:

<http://www.haberfilm.com/PDFs/HABER-TeacherResources.pdf>

A radio interview about the life and legacy of Fritz Haber:

<http://www.radiolab.org/story/180132-how-do-you-solve-problem-fritz-haber/>

Fritz Haber's acceptance speech for the Nobel Prize:

[http://www.nobelprize.org/nobel\\_prizes/chemistry/laureates/1918/press.html](http://www.nobelprize.org/nobel_prizes/chemistry/laureates/1918/press.html)



A brief history of chemical warfare:

<https://www.chemheritage.org/distillations/article/brief-history-chemical-war>

**TALENT:** Written and Directed by Daniel Ragussis. Produced by Ragussis, Shannon Factor, Brian Hwang, and Chris Spanos. Photographed by Carlos Verón. Edited by Sara Corrigan. Music by Simon Taufique. Production design by Kay Lee. Principal cast: Christian Berkel, Juliane Köhler, Wolf Kahler, Mark Margolis, Ted Pejovich. Funded by a CU-Sloan Production Grant.

**PAPRIKA** (Click here to watch)  
2004. 7 minutes.

**AGE GROUP:** Elementary School and higher

**STANDARDS:** NYC: Grades K-12, Food and Nutrition, Chemistry (Chemical Bonding) National/NGSS: Grades K-12, Matter and Its Interactions (Chemical Reactions, PS1.B; Structure and Properties of Matter, PS1.A; Optimizing the Design Solution, ETS1.C); From Molecules to Organisms: Structures and Processes (Organization for Matter and Energy Flow in Organisms, LS1.C; Growth and Development of Organisms, LS1.B)

**SUMMARY:** *Paprika* celebrates the Hungarian scientist Albert Szent-Györgyi who received a Nobel Prize in 1937 for his work on the isolation of Vitamin C.

**QUESTIONS TO EXPLORE:** Who was Albert Szent-Györgyi? How does the body digest Vitamin C? Why is Vitamin C important for healthy bodily functions?

## RESOURCES:

The biography of Albert Szent-Györgyi: [http://www.nobelprize.org/nobel\\_prizes/medicine/laureates/1937/szent-gyorgyi-bio.html](http://www.nobelprize.org/nobel_prizes/medicine/laureates/1937/szent-gyorgyi-bio.html)

A factsheet about Vitamin C:  
<https://ods.od.nih.gov/factsheets/VitaminC-HealthProfessional/>

The history of the discovery of Vitamin C: <https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/szentgyorgyi.html>

A book, *Vitmania: How Vitamins Revolutionized the Way We Think About Food*, about the history of vitamins:  
<http://thepenguinpress.com/book/vitmania-our-obsessive-quest-for-nutritional-perfection/>



**TALENT:** Directed and Animated by Katalin Nivelt Anguelov. Produced by Sharon Barnes. Sound design by Juri Hwang. Music by Patrick Kirst. Principal cast: Philip Proctor, Damian Mordano, Caroline King. Funded by a USC-Sloan Production Grant.

# CHEMISTRY, BIOCHEMISTRY

**YELLOW RAIN** ([Click here to watch](#))  
2014. 21 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Living Environment (Scientific Inquiry, Ecology, Human Influences on the Environment); Chemistry (The Physical Nature of Matter)  
National/NGSS: Grades 9-12, Matter and Its Interactions (Chemical Reactions, PS1.B); Earth and Human Activity (Human Impacts on Earth Systems, ESS3.C)

**SUMMARY:** Near the end of the Cold War, the U.S. government received numerous reports from Southeast Asia of chemical weapons being used against democratic insurgents. After investigating, the U.S. accused the Soviets of supplying chemical weapons to the communist governments in the area. Matthew Meselson, a Harvard molecular biologist, reviewed samples of the substance but was unconvinced that what the U.S. government found was a weapon. Meselson traveled to Thailand with Thomas Seeley, a renowned animal behaviorist, to prove that the yellow substance falling from the sky was not a chemical weapon but a natural phenomenon.

**QUESTIONS TO EXPLORE:** What is the difference between a virus, bacteria, and toxin? How are biological weapons used and detected? Who was Matthew Meselson and what was his most important scientific contribution?

**RESOURCES:**

A history of biological warfare:  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1326439/>

Information about the "Yellow Rain" controversy:  
<http://www.nonproliferation.org/wp-content/uploads/npr/81tucker.pdf>



Matthew Meselson's program on chemical and biological weapons:  
[http://belfercenter.ksg.harvard.edu/experts/148/matthew\\_meselson.html](http://belfercenter.ksg.harvard.edu/experts/148/matthew_meselson.html)

An entomologist on bees: <http://insects.ucr.edu/faculty/Visscher.html>

**TALENT:** Directed by L. Warren Thompson. Written by Christopher Sachs. Produced by Thompson, Sachs, Badrish Patil, and Chris Roessner. Photographed by Blake Clifton. Music by Marc Uddo. Production design by Kody Busch. Principal cast: Peter McGlynn, Fred Ochs, Emmanuel Todorov, Danielle Taddei. Funded by a USC-Sloan Production Grant.

**11 WEEKS** [\(Click here to watch\)](#)  
2010. 29 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Living Environment (Human Influences on the Environment, Organization and Patterns in Life) National/NGSS: Grades 9-12, Matter and Its Interactions (Chemical Reactions, PS1.B); Energy (Energy in Chemical Processes, PS3.D; Defining and Delineating Energy Problems, ETS1.A); From Molecules to Organisms: Structures and Processes (Organization for Matter and Energy Flow in Organisms, LS1.C); Ecosystems: Interactions, Energy, and Dynamics (Cycles of Matter and Energy Transfer in Ecosystems, LS2.B; Energy in Chemical Processes, PS3.D)

**SUMMARY:** Set in an old-age home in Kashmir, India, *11 Weeks* is a story about a 60 year-old research scientist who learns the meaning of humanity from a 10 year-old Muslim orphan visiting him for community service.

**QUESTIONS TO EXPLORE:** What is the function of a plant's root?  
What sources of fuel come from our natural environment?  
What are the barriers to adopting different kinds of energy fuel?

## RESOURCES:

An explanation of the importance of plant roots:  
[http://facweb.furman.edu/~lthompson/bgy34/plantatomy/plant\\_root.htm](http://facweb.furman.edu/~lthompson/bgy34/plantatomy/plant_root.htm)

A video series about the history of different forms of energy:  
<http://www.klru.org/episode/energy-at-the-movies/episode-details-2/>

The basic differences between Ethanol and Biodiesel:  
[http://www.eia.gov/energyexplained/?page=biofuel\\_home](http://www.eia.gov/energyexplained/?page=biofuel_home)

A list of feature films which feature different sources of energy: <http://energyatthemovies.com/category/energyfilms/>



**TALENT:** Written and Directed by Dipesh Jain. Produced by Jain, Shuchi Jain, and Eric Berghemanm. Edited by Tyler Earring and Beth Moody. Photographed by Prasahant Rai. Music by Layla Minoui. Production design by Sidarth Mathawan. Principal cast: M.K. Raina and Dion Deboulle. Funded by a USC-Sloan Production Grant.

# ECOLOGY, ORNITHOLOGY

## **BIRD IN HAND** (Click here to watch)

2004. 17 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Living Environment (Ecology, Human Influences on the Environment)  
National/NGSS: Grades 9-12, Ecosystems: Interactions, Energy, and Dynamics (Interdependent Relationships in Ecosystems, LS2.A; Social Interactions and Group Behavior, LS2.D); Biological Evolution: Unity and Diversity (Natural Selection, LS4.B)

**SUMMARY:** A struggling adolescent draws inspiration for her own music from working in a laboratory, which studies how birds learn their songs.

**QUESTIONS TO EXPLORE:** Why do birds sing? What happens when a bird is raised in isolation? How do scientists record birdcalls?

### **RESOURCES:**

The Cornell Lab Bird Academy on bird songs:  
<https://academy.allaboutbirds.org/birdsong/>

A study of Zebra Finches raised in isolation:  
[http://www.eurekalert.org/pub\\_releases/2009-05/cshl-ssf043009.php](http://www.eurekalert.org/pub_releases/2009-05/cshl-ssf043009.php)

A guide to recording birdcalls:  
<http://www.wildlife-sound.org/equipment/newcomersguide/>



**TALENT:** Written, Directed, and Edited by Janet McIntyre. Produced by Liz Foley and Dan Meisel. Photographed by Rory Hanrahan. Production design by Martha Almy and Alan Rackham. Principal cast: Eden Durbin Schwartz, Greg Shamie. Funded by an NYU-Sloan Production Grant.

# ECOLOGY, BOTANY

**CONCRETE** (Click here to watch)  
2000. 14 minutes.

**AGE GROUP:** Elementary School and higher

**STANDARDS:** NYC: Grades K-12, Plant Diversity; Animals and Plants in their Environments; Diversity of Life; Living Environment (Human Influences on the Environment)  
National/NGSS: Grades K-12, Ecosystems: Interactions, Energy, and Dynamics (Interdependent Relationships in Ecosystems, LS2.A); From Molecules to Organisms: Structures and Properties (Organization for Matter and Energy Flow in Organisms, LS1.C); Earth's Systems (Biogeology, ESS2.E); Earth and Human Activity (Human Impacts on Earth Systems, ESS3.C); Biological Evolution: Unity and Diversity (Ecosystem Dynamics, Functioning, and Resilience, LS2.C; Adaptation, LS4.C)

**SUMMARY:** The juxtaposition of New York City's concrete with lush greenery inspired *Concrete*, a film about a botanist who decides to make a garden behind his apartment building.

**QUESTIONS TO EXPLORE:** What does a botanist study? What kinds of plants thrive in a city and why? What are some negative impacts humans have on the environment where plants grow?

## RESOURCES:

A selection of lesson plans about plants growing in a variety of environments: <http://www.nybg.org/edu/teacher/lesson-plans.php>

A working list of all plant species: <http://www.theplantlist.org>

An outline of the field of botany:  
<http://www.botany.org/bsa/careers/car-what.html>

An explanation of phytoremediation:  
<http://www.unep.or.jp/letc/Publications/Freshwater/FMS2/1.asp>



**TALENT:** Written and Directed by Andy Watts. Produced by Gaye Lirot and Betsy Alton. Photographed by Patrick Cady. Production design by Bryan Johnson. Music by Randy Lee. Principal cast: Willie C. Carpenter, Jasmyn Ledford, Ephriam, Martell. Funded by a CU-Sloan Production Grant.

**JOLIANA** ([Click here to watch](#))  
1998. 16 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, Diversity of Life; Living Environment (Ecology, Human Influences on the Environment)  
National/NGSS: Grades 6-12, Ecosystems: Interactions, Energy, and Dynamics (Ecosystem Dynamics, Functioning, and Resilience, LS2.C); Earth and Human Activity (Natural Resources, ESS3.A)

**SUMMARY:** A young girl's father is a pearl diver unable to meet the quota that supports his family.

**QUESTIONS TO EXPLORE:** Where are pearls found? How do oysters make pearls? Why are pearls so hard to retrieve?

**RESOURCES:**  
Notes from a Natural History Museum exhibition about pearls: <http://www.amnh.org/exhibitions/pearls>

The history and method of pearl diving:  
<http://www.divingheritage.com/pearldivingkern.htm>



**TALENT:** Directed by Carlos Vila. Written by Vila and Michelle Frances. Produced by Frances. Edited by Lisa Molomot. Photographed by Daniel Aranyo Batlle. Principal cast: Simone Perrin, Robert Keefe, Kelly Galindo. Funded by an AFI-Sloan Production Grant.

**THE LONELIEST** [\(Click here to watch\)](#)  
2014. 10 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, Living Environment (Scientific Inquiry) [National/NGSS](#): Grades 6-12, Inheritance and Variation of Traits (Variation of Traits, LS3.B); Waves And Their Applications in Technologies for Information Transfer (Wave Properties, PS4.A)

**SUMMARY:** A filmmaker and a marine biologist go looking for the loneliest whale in the world, that has a voice too high for other whales to hear.

**QUESTIONS TO EXPLORE:** What is the benefit to whales living in pods? How do sound waves travel through water? What is the relationship between a wavelength and its frequency?

**RESOURCES:**

Facts and classroom activities about whales:  
<http://kids.nceas.ucsb.edu/index.html>

A curriculum guide to whales which includes information as well as activities:  
<http://acsonline.org/wp-content/uploads/2011/03/ACS-Cetacean-Curriculum.pdf>

An explanation of why whales make sounds:  
<https://oceanservice.noaa.gov/facts/whalesounds.html>



**TALENT:** Written, directed, produced, and edited by Lilian Mehrel. Music by Ariel Marx. Principal cast: Madeline Wise, Gabriele Schafer, Thomas Burns Scully. Funded by an NYU-Sloan Production Grant.

## **PASSERINE: A BIRD DUET** (Click here to watch)

2011. 15 minutes

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Living Environment (Ecology, Human Influences on the Environment)  
National/NGSS: Grades 9-12, Ecosystems: Interactions, Energy, and Dynamics (Interdependent Relationships in Ecosystems, LS2.A; Biodiversity and Humans, LS4.D)

**SUMMARY:** On a hike in the woods, Darius, a noisy day-hiker, finds himself unwittingly at odds with The Baz, a crusty loner who claims to be an ornithologist in the midst of a delicate experiment.

**QUESTIONS TO EXPLORE:** Where are passerines found and what makes them ecologically significant? How does noise pollution affect bird behavior?

### **RESOURCES:**

An overview of passerine birds:  
<http://press.princeton.edu/birds/unwin/passerines.pdf>

An article about noise pollution and how it affects birds:  
<https://www.theguardian.com/environment/2012/jul/11/sparrows-urban-noise>

An article discussing the design and function of bird nests:  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4242575/>

A feature film about teenage birders:  
<http://scienceandfilm.org/projects/239/a-birders-guide-to-everything>



**TALENT:** Written, Directed, and Edited by Denise Iris. Produced by Chip Hourihan and Veronica Nickel. Photographed by Rick Siegel. Music by Starzetta Cremosa. Principal cast: Jason Odell Williams, Liam Mitchell. Funded by an NYU-Sloan Production Grant.

**TYMBALS** ([Click here to watch](#))  
2010. 7 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, Diversity of Life; Living Environment (Ecology) [National/NGSS](#): Grades 6-12, Biological Evolution: Unity and Diversity (Adaptation, LS4.C); From Molecules to Organisms: Structures and Processes (Growth and Development of Organisms, LS1.B)

**SUMMARY:** *Tymbals* is the story of Charlotte, an entomologist recovering from the accidental death of her husband. When the 13-year cicadas hit their peak cycle, Charlotte has to face the paralyzing grief that they bring back along with their sound.

**QUESTIONS TO EXPLORE:** How does a cicada make its sound? Which types of cicada stay underground? What is the job of an entomologist?

**RESOURCES:**

An explanation of how cicadas know when to emerge:  
<https://entomologytoday.org/2016/03/22/how-do-cicadas-know-when-to-emerge-from-the-ground/>

The life cycle of cicadas:  
<http://www.amnh.org/explore/news-blogs/news-posts/all-about-periodical-cicadas>

A laboratory exercise for biology classes:  
[http://hydrodictyon.eeb.uconn.edu/projects/cicada/citizen/Dwyer\\_Simon\\_2014.pdf](http://hydrodictyon.eeb.uconn.edu/projects/cicada/citizen/Dwyer_Simon_2014.pdf)



**TALENT:** Directed by Filippo Conz. Written by Jon Haller. Produced by Geoffrey Quan. Edited by Conz. Photographed by Marius Chira. Production design by Ola Maslik. Music by Freddie Khaw. Principal cast: Lola Glaudini, Trevor Long. Funded by a CU-Sloan Production Grant.

# EVOLUTION, EVOLUTIONARY GENETICS

**CAIN** ([Click here to watch](#))  
2013. 18 minutes.

**AGE GROUP:** High School \*[Mature Content](#)\*

**STANDARDS:** NYC: Grades 6-12, Living Environment (Evolution)  
[National/NGSS](#): Grades 6-12, Hereditary: Inheritance and Variation of Traits (Growth and Development of Organisms, LS1.B; Inheritance of Traits, LS3.A; Variation of Traits, LS3.B); Biological Evolution: Unity and Diversity (Evidence of Common Ancestry and Diversity, LS4.A; Adaptation, LS4.C)

**SUMMARY:** Ixtao has always been the most curious Neanderthal in his tribe, so when he comes across an injured creature that he has never seen before—a human child—Ixtao doesn't hesitate to take him under his wing, much to his tribe's chagrin.

**QUESTIONS TO EXPLORE:** What are the similarities and differences between humans and Neanderthals? What are some of the pre-linguistic forms of communication and what made them effective? What tools did the Neanderthals use?

**RESOURCES:**

An explanation of primitive skills and how they were used:  
<http://www.justinsprimitiveskills.com>

A collection of lesson plans and learning resources about human evolution:  
<https://ny.pbslearningmedia.org/collection/hs11/#.WZyWeZOGN0s>



**TALENT:** Directed and Edited by Zijian Yan. Written by Yan and Ajani Jackson. Produced by Miroslav Macala. Photographed by Zachary Halberd. Production design by Perry Mateson. Music by Dylan Glatthorn. Principal cast: Jamyl Dobson, C.J. Bane, Jovan Davis, Derek Johnson, Christopher Stadulis. Funded by a CU-Sloan Production Grant.

**FLOOD** ([Click here to watch](#))  
2016. 14 minutes.

**AGE GROUP:** Middle School and higher \*Mature Content\*

**STANDARDS:** NYC: Grades 6-12, Geology; Living Environment (Evolution); Earth Science (Earth History) National/NGSS: Grades 6-12, Hereditary: Inheritance and Variation of Traits (Structure and Function, LS1.A); Biological Evolution: Unity and Diversity (Adaptation, LS4.C); Earth's Place in the Universe (The History of Planet Earth, ESS1.C)

**SUMMARY:** Miriam is an unemployed journalist who has a beat on a story that could turn her bad luck around. For ten years, her dad, Gordon, has lived in the Mojave Desert running a paleontology museum, but Gordon believes that the earth was made in days, people and dinosaurs coexisted, and the fossil record is a result of Noah's Flood. Miriam ventures west to interview Gordon about what made him a creationist.

**QUESTIONS TO EXPLORE:** What is the job of a paleontologist? How did the dinosaurs become extinct? How do scientists study the origins of the universe?

## RESOURCES:

A museum guide to fossil and geology collections:  
<https://www.fieldmuseum.org/science/research/area/fossils-meteorites>

Multi-media educational resources about paleontology:  
<http://paleosoc.org/educators/educational-resources/>

Interview with paleontologist Jack Horner: <http://scienceandfilm.org/articles/2718/science-on-screen-interview-with-jack-horner-jurassic-world>

Premiere of *Flood*:  
<http://scienceandfilm.org/articles/2691/premiere-katy-scoggins-flood>

Short documentary film about two amateur fossil hunters:  
<http://scienceandfilm.org/articles/2614/exclusive-watch-four-videos-from-the-science-in-film-forum>



**TALENT:** Directed and written by Katy Scoggin. Produced by Isabella Wing-Davey. Edited by Danielle Morgan. Photographed by Michael Rossetti. Music by Damian Quinones. Principal cast: Rosie Benton, Paul Klementowicz, and Mary B. McCann. Funded by a NYU-Sloan Production Grant.

**EXTROPY** ([Click here to watch](#))  
2009. 15 minutes.

**AGE GROUP:** High School \*[Mature Content](#)\*

**STANDARDS:** NYC: Grades 9-12, Living Environment (Genetics)  
[National/NGSS](#): Grades 9-12, Hereditary: Inheritance and Variation of Traits (Structure and Function, LS1.A; Inheritance of Traits, LS3.A); Biological Evolution: Unity and Diversity (Developing Possible Solutions, ETS1.B)

**SUMMARY:** In *Extropy*, a geneticist whose father is succumbing to Alzheimer's Disease believes he had discovered a way to stop the aging process. He turns to an eccentric businessman to fund his endeavor, but with time running out for his father the geneticist begins to test his discovery on himself.

**QUESTIONS TO EXPLORE:** What are the markers of Alzheimer's Disease in the brain? How do telomeres contribute to human aging? Is Alzheimer's Disease hereditary?

**RESOURCES:**

Leading neuroscientists discuss Alzheimer's Disease and aging on a television panel:  
<https://charlierose.com/collections/3/clip/16493>

An article on the role of telomeres:  
<http://learn.genetics.utah.edu/content/chromosomes/telomeres/>



**TALENT:** Written and Directed by Jonathan Sanden. Produced by Sanden and Alexis Ward. Photographed by Chris J. Lytwyn. Edited by Ian Ogden. Production design by Lilian Cohen. Music by Cameron Bossert. Principal cast: Gregory Waller, Austen Cooke, Gene Morra, Clare Stevenson, Ralph DeMatthews. Funded by an NYU-Sloan Production Grant.

## **THE FIRST VAMPIRE** [\(Click here to watch\)](#)

2002. 24 minutes.

**AGE GROUP:** Middle School and higher \*Mature Content\*

**STANDARDS:** NYC: Grades 6-12, Reproduction; Heredity and Evolution; Living Environment (Genetics) National/NGSS: Grades 6-12, Heredity: Inheritance and Variation of Traits (Structure and Function, LS1.A); Biological Evolution: Unity and Diversity (Biodiversity and Humans, LS4.D)

**SUMMARY:** The story of *The First Vampire* centers on the true origins of the Western Vampire Legend: fourteenth century Scandinavia. A Viking fleet is decimated by an unknown force, which drains men of their blood. The main character tries to make sense of the horror unfolding in front of him.

**QUESTIONS TO EXPLORE:** What are the causes of Congenital Erythropoietic Porphyria (also known as Guenther's Disease)? What parts of the body are affected in Congenital Erythropoietic Porphyria? Why are some people susceptible to contracting Porphyria?

### **RESOURCES:**

A thorough description of the various causes and symptoms of Porphyria: <https://www.niddk.nih.gov/health-information/health-topics/liver-disease/porphyria/Pages/facts.aspx>

An article on the origins and possible treatments for Porphyria: <http://www.scientificamerican.com/article/born-to-the-purple-the-st/>



**TALENT:** Directed by Jason Todd Ipson. Written by Kevin Burke and Jason Todd Ipson. Produced by Jaime Lynn Ipson, Jason Todd Ipson, Frederick Wedler, and Randy Weiss. Edited by Chad Galster. Photographed by Michael Fimognari. Principal cast: Ben Livingston, Derrick O'Connor, Susan Duerden, Dan Merket, Sarah Ann Schultz. Funded by a USC-Sloan Production Grant.

## **LOVE CHANCE** ([Click here to watch](#))

2005. 26 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Living Environment (Genetics and Biotechnology, Reproduction and Development) [National/NGSS](#): Grades 9-12, Heredity: Inheritance and Variation of Traits (Inheritance of Traits, LS3.A; Variation of Traits, LS3.B); From Molecules to Organisms: Structures and Processes (Growth and Development of Organisms, LS1.B)

**SUMMARY:** In *Love Chance*, a pregnant genetic counselor and a young couple on the verge of getting married all face the unhappy potentialities inherent in their genes.

**QUESTIONS TO EXPLORE:** What can genetic sequencing predict? What is Cystic Fibrosis and Huntington's Disease? What effect can the environment have on genes?

### **RESOURCES:**

An article about the role of genetic counselors:  
<http://www.marchofdimes.org/pregnancy/genetic-counseling.aspx>

Neuroscientists discuss Huntington's Disease and its treatments on a television panel:  
<https://charlierose.com/collections/3/clip/15489>

An overview of Cystic Fibrosis:  
<https://ghr.nlm.nih.gov/condition/cystic-fibrosis#>



**TALENT:** Directed by Gregory Lehane. Written by Mary F. Unser. Produced by Shirley J. Saldamarco. Edited by Ralph Vituccio. Photographed by Mark Knobil. Production design by Cletus R. Anderson. Principal cast: Lissa Brennan, Daniel Krell, Stephen Schellhardt, Aimée DeShayes, Nicholas Lehane. Funded by a CMU-Sloan Production Grant.

# GENETICS, EPIDEMIOLOGY

**NZARA '76** (Click here to watch)  
2014. 19 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Living Environment (Reproduction and Development, Homeostasis and Immunity, Genetics and Biotechnology) National/NGSS: Grades 9-12, Heredity: Inheritance and Variation of Traits (Structure and Function, LS1.A); Biological Evolution: Unity and Diversity (Developing Possible Solutions, ETS1.B)

**SUMMARY:** 1976. A deadly disease spreads in people on the border of Zaire and Sudan. The responding team of doctors find themselves caught between local cultural customs and the extreme measures needed to stop the diseases' spread.

**QUESTIONS TO EXPLORE:** What are the similarities between Ebola and the disease depicted in *Nzara '76*? What is the difference between a virus and a bacterial infection? What is role of the World Health Organization?

## RESOURCES:

The research of an infectious disease expert:  
<http://www.einstein.yu.edu/faculty/4218/louis-weiss/>

A visual guide to antibiotic resistance: <http://blogs.scientificamerican.com/sa-visual/a-visual-guide-to-antibiotic-resistance/>

Information about the World Health Organization:  
<http://www.who.int/en/>



**TALENT:** Written and Directed by Jon Noble. Produced by Bernardo Duran Jr., Micaela Colman, and Meenakshi Ramamurthy. Edited by Saira Haider. Photographed by Sean McDaniel. Music by Jon Licht. Production design by Angel Herrera. Principal cast: Tad Shafer, Neil Ellice, Gladys Nyoth, Ratidzo Mambo. Funded by a USC-Sloan Production Grant.

**XP** (Click here to watch)  
2002. 10 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 9-12, Weather and Atmosphere; Living Environment (Genetics)  
National/NGSS: Grades 9-12, Heredity: Inheritance and Variation of Traits (Inheritance of Traits, LS3.B); Earth's Systems (Weather and Climate, ESS2.D)

**SUMMARY:** In *XP*, a young boy is afflicted with xeroderma pigmentosum rendering him unable to venture outside into the sunlight or endure any sources of UV radiation in the home. He is torn between the admonitions of his mother and doctor, and his wish to live a normal boyhood.

**QUESTIONS TO EXPLORE:** What is xeroderma pigmentosum (XP)? How is XP transmitted? What are some ways to stay protected from UV radiation?

**RESOURCES:**

The causes and symptoms of xeroderma pigmentosum:  
<https://medlineplus.gov/ency/article/001467.htm>

A teacher's guide outlining the harmful effects of UV radiation exposure from the sun:  
<http://enhs.umn.edu/current/5103/uv/harmful.html>

Tips on how to stay protected from the sun:  
<http://www.cancer.org/cancer/cancercauses/sunanduvexposure/skincancerpreventionandearlydetection/skin-cancer-prevention-and-early-detection-u-v-protection>



**TALENT:** Directed and written by David Barba. Produced by James Pellerito. Edited by David Barba. Photographed by Rick Lopez. Production design by Joe Kucharski. Music by Scott Starrett. Principal cast: Blake Coelho, Jennifer Elise Gould, Roberto Garcia. Funded by a CU-Sloan Production Grant.

**VISIBLE PROOF** (Click here to watch)  
2011. 23 minutes.

**AGE GROUP:** High School, \*Mature Content\*

**STANDARDS:** NYC: Grades 9-12, Living Environment (Genetics and Biotechnology) National/NGSS: Grades 9-12, Inheritance and Variation of Traits (Structure and Function, LS1.A)

**SUMMARY:** Based on the true story of the first murder solved by fingerprinting.

**QUESTIONS TO EXPLORE:** Who were Juan Vucetich and Eduardo Alvarez and what was their major scientific contribution? What can forensic practitioners tell from a fingerprint that they cannot tell from a DNA test, and vice versa? How are fingerprints recorded and classified?

## RESOURCES:

An interactive ebook about the role of science in the legal system: <https://nysci.org/false-conviction/>

A biography about Juan Vucetich, one of the police officials who pioneered the use of fingerprinting:  
<https://www.nlm.nih.gov/visibleproofs/galleries/biographies/vucetich.html>

Educational websites and activities related to fingerprinting:  
<https://www.nlm.nih.gov/visibleproofs/resources/weblinks.html>



**TALENT:** Written and Directed by Gabil Sultanov. Produced by Drew Diamond and Evan Cook. Photographed by Adam Goral. Production design by Flora Ortega. Edited by Cole Duran. Music by Drew Silverstein. Principal cast: Ezequiel Stremiz, Francisco Garat, Erika Macke, Natalia Adame, Anibal Silveyra, Juan Monsalvez, JP Pereat. Funded by a USC-Sloan Production Grant.

# HISTORY OF SCIENCE, MICROBIOLOGY

## **SEMMELWEIS** (Click here to watch)

2001. 21 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Living Environment (Human Influences on the Environment, Scientific Inquiry)  
National/NGSS: Grades 9-12, From Molecules to Organisms: Structures and Processes (Structure and Function, LS1.A); Ecosystems: Interactions, Energy, and Dynamics (Social Interactions and Group Behavior, LS2.D; Developing Possible Solutions, ETS1.B)

**SUMMARY:** In 1847, the Hungarian physician Ignaz Semmelweis discovered that many cases of childbirth fever had been caused by the fact that doctors weren't washing their hands before treating pregnant women. His findings were spurned by the medical community.

**QUESTIONS TO EXPLORE:** What is the germ theory of disease? Why is hand-washing important? How have hospitals changed since the late 19th century?

### **RESOURCES:**

Historical information from the Semmelweis Museum:  
[http://www.semmelweis.museum.hu/muzeum/index\\_en.html](http://www.semmelweis.museum.hu/muzeum/index_en.html)

The history of pain and cleanliness:  
<http://www.sciencemuseum.org.uk/broughttolife/themes/surgery/pain>

Feature article on *Semmelweis*: <http://scienceandfilm.org/articles/2724/tbt-from-the-archive-jim-berrys-semmelweis>



**TALENT:** Written and Directed by Jim Berry. Produced by Berry, Sam Riegel, and Fritz Michel. Edited by Jessica Sharzer. Photographed by Berry. Production design by Katya DeBear. Music by Andrew Kaiser. Principal cast: Fritz Michel, Eden Riegel, Keiko Agena. Funded by an NYU-Sloan Production Grant.

# HISTORY OF SCIENCE, AERONAUTICS

**SKYLAB** ([Click here to watch](#))  
2005. 12 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, Earth Science (Astronomy); Physics (Mechanics) National/NGSS: Grades 6-12, Earth's Place in the Universe (Earth and the Solar System, ESS1.B); Engineering Design (Defining and Delimiting Engineering Problems, ETS1.A)

**SUMMARY:** An 11-year-old spends the summer of 1979 certain that Skylab, America's First Space Station—then falling back to Earth, though no expert could say where—is about to land on top of him. It might almost make him less miserable if it did; he is spending the summer with his mother who is planning a second marriage to a guy he can't stand.

**QUESTIONS TO EXPLORE:** What were the goals of the Skylab Space Station? What were some of the engineering challenges that the Skylab Space Station faced? What is the International Space Station and what sorts of experiments are conducted on board?

**RESOURCES:**

An explanation of how Skylab led to the International Space Station: <http://www.nasa.gov/content/40-years-ago-skylab-paved-way-for-international-space-station>

The goals of the Skylab Space Station:  
<http://www.history.com/news/the-day-skylab-crashed-to-earth-facts-about-the-first-u-s-space-stations-re-entry>

Skylab at the National Air and Space Museum:  
[http://airandspace.si.edu/collections/artifact.cfm?object=nasm\\_A19761033000](http://airandspace.si.edu/collections/artifact.cfm?object=nasm_A19761033000)

A lesson plan about how things fly: <http://howthingsfly.si.edu>



Article about *Skylab*:

<http://scienceandfilm.org/articles/2708/tbt-from-the-archive-mark-landsmans-skylab>

Interviews with astronauts from the International Space Station:

<http://scienceandfilm.org/articles/2690/youre-calling-from-space-imax-a-beautiful-planet>

**TALENT:** Written and Directed by Mark Landsman. Produced by Shani M. Rotkovitz. Edited by Brad Schwartz. Photographed by Young Rho Kim. Production design by Laura Paddock. Music by William West. Principal cast: Dennis Bendersky, Joe Marinelli, Dorian Frankel, Adam Riancho. Funded by an AFI-Sloan Production Grant.

# HISTORY OF SCIENCE, AERODYNAMICS

## **THROUGH THE AIR TO CALAIS** [\(Click here to watch\)](#)

2008. 17 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Earth Science (Maps and Measurements); Chemistry (Periodicity, Chemical Bonding); Physics (Mechanics) National/NGSS: Grades 9-12, Motion and Stability: Forces and Interactions (Forces and Motion, PS2.A); Energy (Relationship Between Energy and Forces, PS3.C); Engineering Design (Defining and Delimiting Engineering Problems, ETS1.A; Developing Possible Solutions, ETS1.B)

**SUMMARY:** January 7th, 1785. The birds have dominated the skies and gone relatively unchallenged as rulers of the aerial kingdom...until now. Eccentric French Inventor, Jean-Pierre Blanchard and his American financier, Dr. John Jeffries, are embarking on a journey to become the first men to cross the English Channel in a hydrogen balloon. This unlikely pair is bringing: a set of wings to row through the air, the first bag of international airmail, and a bottle of cognac to celebrate their success. However, before these pioneers of aviation can celebrate, they'll need to survive the crossing.

**QUESTIONS TO EXPLORE:** Who was Jean-Pierre Blanchard? What is buoyancy? What are the advantages and disadvantages of using hydrogen for a balloon?

### **RESOURCES:**

An entry on the life and inventions of Jean-Pierre Blanchard:  
<http://www.bbml.org.uk/ballooning-history/jean-pierre-blanchard/>

The difference between hydrogen and helium:  
<http://www.airships.net/helium-hydrogen-airships>

A detailed description of the mathematics of buoyancy:  
<http://web.physics.ucsb.edu/~lecturedemonstrations/Composer/Pages/36.39.html>



**TALENT:** Directed by Joseph Mauceri. Written by Mauceri and Jonathan Eisen. Produced by Seth Kamphuijs. Photographed by Andrew Zeiderman. Edited by Mechan Hernandez. Production design by Jennifer Bash. Principal cast: Casper van Dien, Joseph Benmiloud. Funded by an AFI-Sloan Production Grant.

## **THE WORK OF 50 MEN** (Click here to watch)

2005. 19 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, Energy and Simple Machines; Physics (Mechanics) National/NGSS: Grades 6-12, Engineering Design (Defining and Delimiting Engineering Problems, ETS1.A; Developing Possible Solutions, ETS1.B; Optimizing the Design Solution, ETS1.C)

**SUMMARY:** *The Work of 50 Men* tells the story of Eli Whitney's invention of the cotton gin in 1794. Whitney was an American inventor and his invention helped shape the economy of the South, and had a huge impact on the slave trade.

**QUESTIONS TO EXPLORE:** Who was Eli Whitney? How does a cotton gin work and what technologies preceded it? What were some of the consequences of the invention of the cotton gin?

### **RESOURCES:**

A historian discusses the effects of the cotton gin on slavery:  
<http://teachinghistory.org/history-content/ask-a-historian/24411>

Eli Whitney's original patent, along with an explanation of the invention: <https://www.archives.gov/education/lessons/cotton-gin-patent/>

A selection of classroom activities about cotton:  
[http://www.agintheclassroom.org/TeacherResources/TerraNova/clr\\_cottonnews.pdf](http://www.agintheclassroom.org/TeacherResources/TerraNova/clr_cottonnews.pdf)



**TALENT:** Directed by Gregory Lehane. Written by Lynne Kuemmel. Produced by Shirley J. Saldamarco. Production design by Cletus R. Anderson. Principal cast: Andrew Gehling, Laurie Klatscher, Ashley-Nicole Sherman, Demetrius Gross, Don Wadsworth. Funded by a CMU-Sloan Production Grant.

## **CHASING PATTERNS** (Click here to watch)

2003. 16 minutes.

**AGE GROUP:** Elementary School and higher

**STANDARDS:** NYC: Grades K-12, Exploring Properties National/  
NGSS: Grades K-12, From Molecules to Organisms:  
Structures and Processes (Structure and Function, LS1.A)

**SUMMARY:** The young hero of *Chasing Patterns* is lucky enough to have a teacher who encourages his fascination with the patterns he sees in sunflowers and pine cones—a passion that dovetails with his love of narrative, especially a book of Arthurian legends that belonged to his late mother.

**QUESTIONS TO EXPLORE:** What is the Fibonacci Sequence?  
Where is the Fibonacci Sequence in nature? Why does the Fibonacci Sequence occur so often in the environment?

**RESOURCES:**  
How the Fibonacci Sequence was first invented, plus many examples of it in nature:  
<https://plus.maths.org/content/life-and-numbers-fibonacci>

How to count spirals:  
<http://momath.org/home/fibonacci-numbers-of-sunflower-seed-spirals/>



**TALENT:** Written and Directed by Monika Hennig. Produced by Hennig and John Halbert. Edited by Hennig and Nancy Wang. Photographed by Ruben F. Russ. Production design by Marcia Scheese. Principal cast: Danny McCarthy, Donal O'Sullivan, Neil Fournier, King Stuart. Funded by a USC-Sloan Production Grant.

## **CALIFORNIA KING** [\(Click here to watch\)](#)

2008. 21 minutes.

**AGE GROUP:** High School \*[Mature Content](#)\*

**STANDARDS:** NYC: Grades 9-12, Physics (Measurement and Mathematics through Kinematics) [National/NGSS](#): Grades 9-12, Motion and Stability: Forces and Interactions (Forces and Motion, PS2.A; Types of Interactions, PS2.B)

**SUMMARY:** A womanizing mattress salesman, who employs false ideas about physics to get female customers into bed, falls for a skeptical insomniac who knows her science better than her heart.

**QUESTIONS TO EXPLORE:** What is inertia? What is the relationship between mass and acceleration? How are Newton's laws of motion applicable in *California King*?

### **RESOURCES:**

An explanation of the law of inertia, along with some fun experiments: [http://muse.tau.ac.il/museum/galileo/the\\_law\\_of\\_inertia.html](http://muse.tau.ac.il/museum/galileo/the_law_of_inertia.html)

An explanation of Newton's second law of motion:  
<https://www.grc.nasa.gov/www/k-12/airplane/newton2.html>

An explanation of Newton's third law of motion:  
<http://www.qrg.northwestern.edu/projects/vss/docs/propulsion/2-every-action-has-an-equal-and-opposite.html>



**TALENT:** Written and Directed by Eli Akira Kaufman. Produced by Kori Shadrick and Dena Hamama. Edited by Harry Yoon. Photographed by Vanessa Holtgrewe. Production design by Tristam Steinberg. Music by Lee Curreri. Principal cast: Don Harry, Monique Curnen. Funded by a UCLA-Sloan Production Grant.

## **FOR ALL MANKIND** (Click here to watch)

2009. 16 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Earth Science (Astronomy); Physics (Energy, Mechanics)  
National/NGSS: Grades 9-12, Energy (Relationship Between Energy and Forces, PS3.C; Defining and Delineating Engineering Problems, ETS1.A); Earth and Human Activity (Developing Possible Solutions, ETS1.B)

**SUMMARY:** Johnny Red always wanted to be a scientist and work for NASA. After several academic mishaps, he ends up stuck in his suburban Pennsylvania town. Johnny decides to build a functioning time machine. Instead of using correct science, Johnny decides to base all of his research on action-adventure films of the 1980s and 1990s.

**QUESTIONS TO EXPLORE:** What is the speed of light? How does the speed of light relate to time travel?

### **RESOURCES:**

An article on whether it is possible to go backwards in time by travelling faster than light: <http://www.pbs.org/wgbh/nova/blogs/physics/2015/08/can-you-really-go-back-in-time-by-breaking-the-speed-of-light/>

NASA's space-time experiments:  
<http://spaceplace.nasa.gov/review/momentum3/>

The history of measuring the speed of light:  
<http://galileoandeinstein.physics.virginia.edu/lectures/spedlite.html>

The physics of *The Flash*:  
<http://scienceandfilm.org/articles/2753/science-goes-to-the-movies-the-flash>



**TALENT:** Written and Directed by Daniel Clifton. Produced by Clifton, Amanda Menaker, and Mary-Michael D'Onofrio. Edited by Clifton and Rob Malone. Photographed by Bernard Hunt. Production design by Nicholas Shakespeare. Music by Siddhartha Barnhoorn. Principal cast: Josh Gaboian, Haley Bond Peterson, Evander Duck, Nico Bell. Funded by an NYU-Sloan Production Grant.

**HARDBAT** [\(Click here to watch\)](#)  
2013. 13 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Physics (Measurement and Mathematics through Kinematics) [National/NGSS](#): Grades 9-12, Forces and Interactions (Forces and Motion, PS2.A); Engineering Design (Optimizing the Design Solution, ETS1.C)

**SUMMARY:** A physicist's obsession with ping pong disrupts a pleasant evening.

**QUESTIONS TO EXPLORE:** Why would a physicist be interested in ping pong? What is the relationship between movement and speed? In *Hardbat*, why does the physicist prefer a sponge paddle?

**RESOURCES:**

An interview with particle physicist David Kaplan about the documentary *Particle Fever*, set at the Large Hadron Collider: <http://scienceandfilm.org/articles/2442/particle-fever>

An interactive about the aerodynamic forces of lift and drag: <http://www.pbs.org/wgbh/nova/space/lift-drag.html>

A lesson plan about the physics of flight: <http://waawfoundation.org/lesson-plan-the-physics-of-flight/>



**TALENT:** Written, directed, and edited by Zack Schamberg. Produced by Charlotte Rabate. Photographed by Ben Rutkowski. Principal cast: Ronald Guttman, Jessica Renee Russell, Christina Gausas, Matt Walton, Camille Mazurek, Joseph Huffman. Funded by an NYU-Sloan Production Grant.

## **JORNADA DEL MUERTO** ([Click here to watch](#))

1999. 28 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Chemistry (Atomic Concepts, Nuclear Chemistry); Physics (Energy)  
National/NGSS: Grades 9-12, Matter and Its Interactions (Nuclear Processes, PS1.C)

**SUMMARY:** *Jornada del Muerto* is a tale of the psychological cost paid by those who worked on the atomic bomb. A scientist, wracked by guilt over the destruction and death that the bomb will cause, imagines that he has found a poor family living in a shack near the test site's ground zero.

**QUESTIONS TO EXPLORE:** What types of scientists and/or mathematicians went to work on the atomic bomb? How does an atomic bomb create such a large explosion? Why is Uranium-235 important in nuclear fission?

### **RESOURCES:**

An historical account of the Los Alamos research facility:  
<http://www.lanl.gov/about/history-innovation/index.php>

The importance of Uranium for nuclear energy:  
<http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/introduction/physics-of-nuclear-energy.aspx>

A visual depiction of Uranium-235 undergoing nuclear fission:  
<http://hyperphysics.phy-astr.gsu.edu/hbase/nucene/u235chn.html>

A book review of *The Making of the Atomic Bomb*:  
<https://www.nytimes.com/books/99/09/19/specials/rhodes-making.html>

Preview of a feature film about nuclear weapons control:  
<http://scienceandfilm.org/articles/2705/exclusive-eric-schlossers-the-bomb>



**TALENT:** Directed and written by Matthaueus Szumanski. Produced by Matthaueus Szumanski and Marc Lempert. Edited by Matthaueus Szumanski. Photographed Lisa Wiegand. Production design by Deeya Loram. Music by Daniel Bernstein. Principal cast: David Bauman, Jason Cole, Bob Thompson, Michael Sheeley, Coleen Nicholas. Funded by a UCLA-Sloan Production Grant.

**THE MONSTER AND THE PEANUT** ([Click here to watch](#))  
2004. 22 minutes.

**AGE GROUP:** High School \*Mature Content\*

**STANDARDS:** NYC: Grades 9-12, Living Environment (Scientific Inquiry); Physics (Waves) National/NGSS: Grades 9-12, Motion and Stability: Forces and Interactions (Forces and Motion, PS2.A)

**SUMMARY:** *The Monster and the Peanut* is about a man who believes the tragic death of his young daughter can be explained by the rules of traffic flow. It suggests that for some people, science (the repository of reason) becomes a substitute religion, which can explain away the troubling uncertainty of the world.

**QUESTIONS TO EXPLORE:** What principles of physics can be abstracted to relate to traffic flow? What are some changes to the system of traffic flow that could improve a city?

**RESOURCES:**

Experimental evidence for traffic jams being compounded from small errors:  
<http://iopscience.iop.org/article/10.1088/1367-2630/10/3/033001>

A three-phase traffic theory:  
[http://guava.physics.uiuc.edu/~nigel/courses/569/Essays\\_Fall2012/Files/Park.pdf/](http://guava.physics.uiuc.edu/~nigel/courses/569/Essays_Fall2012/Files/Park.pdf/)

A website dedicated to studying traffic waves:  
<http://trafficwaves.org/>



**TALENT:** Directed by Franklin Jin Rho. Written by Albert Crim. Produced by Brian Udovich. Edited by David Kashevaroff. Photographed by Darren Genet. Production design by Arjuna Imel. Music by Mark Schulz. Principal cast: Bo Foxworth, Anne Ramsey, Dean Haglund, Alyssa Baric, Pablo Moix. Funded by a AFI-Sloan Production Grant.

## **THE WORMHOLE** [\(Click here to watch\)](#)

2002. 19 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Physics (Energy)  
National/NGSS: Grades 9-12, Earth's Place in the Universe (Earth and the Solar System, ESS1.B); Motion and Stability: Forces and Interactions (Types of Interactions, PS2.B)

**SUMMARY:** Young Wally watches as his grandmother lectures her college students about wormholes, which connect black holes to white holes. As he listens, he remembers the time before his little brother was kidnapped and his own family wrenched apart.

**QUESTIONS TO EXPLORE:** What is a wormhole? Why have wormholes been so difficult for scientists to find?

### **RESOURCES:**

A video of a physicist speaking about blackholes, wormholes, and time travel:  
<https://milq.com/worldsciencefestival/black-holes-wormholes-and-time-travel-340>

An article on wormholes and time travel:  
[http://news.nationalgeographic.com/news/2005/09/0916\\_050916\\_timetravel.html](http://news.nationalgeographic.com/news/2005/09/0916_050916_timetravel.html)



**TALENT:** Written and Directed by Jessica Sharzer. Produced by Sydney Burtner and Andrij Parekh. Edited by Sharzer and Adam Walsh. Music by Christopher Libertino. Principal cast: T.J. Sullivan, T.J. Stanton, Claire Beckman, Suzanne Shepherd. Funded by an NYU-Sloan Production Grant.

**ATROCITY** [\(Click here to watch\)](#)  
2004. 7 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Living Environment (Scientific Inquiry) [National/NGSS](#): Grades 9-12, Ecosystems: Interactions, Energy, and Dynamics (Social Interactions and Group Behavior, LS2.D)

**SUMMARY:** An experiment on obedience to authority conducted at Yale University in the early 1960s, by social psychologist Stanley Milgram, was a shock to the public's notion of its own goodness. Researchers were astounded by the results, which showed the extent to which subjects would inflict harm on others at the order of the researcher.

**QUESTIONS TO EXPLORE:** Why did Stanley Milgram's peers question the ethics of his experiment? What were the resounding psychological effects of Stanley Milgram's experiment on the test subjects? What did the Milgram experiment demonstrate?

## RESOURCES:

Stanley Milgram's essay "The Perils of Obedience," which explains his experiment: <http://www.paulgraham.com/perils.html>

An article questioning the ethics behind the Milgram Experiment: <https://lareviewofbooks.org/article/psych-lies-and-audiotape-the-tarnished-legacy-of-the-milgram-shock-experiments/>

Interview with a psychologist about Milgram's experiment: <http://scienceandfilm.org/articles/2527/sundance-2015-the-notorious-milgram-and-zimbardo-experiments>

Interview with a playwright who researched Milgram: <http://scienceandfilm.org/articles/2658/interview-with-playwright-frank-basloe>



**TALENT:** Written, Directed, Photographed, and Produced by Adam Kargman. Principal cast: James Bolt, John Funk, Hollis Doherty, Linda Wilkens, Mitch Lippman, Mario Bickham, Derek Bentley, Jennifer Jessum. Funded by a USC-Sloan Production Grant.

**CRADLE** ([Click here to watch](#))  
2016. 14 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, The Human Animal, Unit; Living Environment (Genetics and Biotechnology)  
National/NGSS: Grades 6-12, Biological Evolution: Unity and Diversity (Adaptation, LS4.C; Developing Possible Solutions, ETS1.B); Heredity: Inheritance and Variation of Traits (Structure and Function, LS1.A)

**SUMMARY:** *Cradle* is an animated short film which focuses on an army veteran's return home after losing both his arms in Iraq. He has to learn to live with prosthetics and help his wife care for their newborn daughter, but also must adjust to excruciating phantom limb pain.

**QUESTIONS TO EXPLORE:** What brain areas are involved in generating the perception of a phantom limb? What are some techniques that can help relieve the pain? Why can vision help relieve the pain?

## RESOURCES:

A TED talk by neuroscientist Vilayanur Ramachandran about phantom limbs:

[https://www.ted.com/talks/vilayanur\\_ramachandran\\_on\\_your\\_mind](https://www.ted.com/talks/vilayanur_ramachandran_on_your_mind)

Curriculum program about limb loss for middle-schoolers:

<http://www.amputee-coalition.org/wp-content/uploads/2015/10/LLEAP-Manual-PDF.x18949.pdf>

An article about researchers who are studying phantom limbs: <https://www.newyorker.com/magazine/2009/05/11/brain-games>



**TALENT:** Written and Directed by Devon Manney. Produced by Matthew A. Stewart. Animated by Manney. Music by Saad Haddad. Principal cast: Devon Manney, Alexa Nikol Curran, Trevor Larson, Rosie Richards. Funded by a USC-Sloan Production Grant.

## THE DISAPPEARANCE OF ANDY WAXMAN

(Click here to watch)

2005. 24 minutes.

**AGE GROUP:** High School

**STANDARDS:** NYC: Grades 9-12, Living Environment (Evolution)  
National/NGSS: Grades 9-12, Hereditary: Inheritance and Variation of Traits (Structure and Function, LS1.A; Variation of Traits, LS3.B)

**SUMMARY:** The mystery of memory—how it disappears and what remains of our identity when we lose it—is the tragic core of *The Disappearance of Andy Waxman*. The main character loses his short-term memory after a car accident. He figures out a way to live with this brain disorder.

**QUESTIONS TO EXPLORE:** What parts of the brain are involved in forming long-term and short-term memory? What is anterograde amnesia? What causes anterograde amnesia?

### RESOURCES:

Neuroscientists talk about the brain and memory on a television panel: <https://charlierose.com/collections/3/clip/16493>

Anterograde amnesia in Disney's *Finding Dory*:  
<http://scienceandfilm.org/articles/2729/finding-dory-the-amnesic-royal-blue-tang>



**TALENT:** Written and Directed by Till Osterland. Produced by Karen Dillon, Hank Norman, Ken Kristensen, and Michael Kaufman. Edited by Garrett Tezanos. Photographed by Trish Govoni. Music by Garrett Tezanos. Production design by Don MacLean and Seth Wachtel. Principal cast: Rain Phoenix, Stephen Barker Turner. Funded by a CU-Sloan Production Grant.

## **IN VIVID DETAIL** ([Click here to watch](#))

2007. 19 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, The Human Animal; Reproduction (Heredity and Evolution)

National/NGSS: Grades 6-12, Hereditary: Inheritance and Variation of Traits (Variation of Traits, LS3.B)

**SUMMARY:** *In Vivid Detail* is a tender love story which profiles Justin—an architect who is face blind—as he begins a new romance. Similar to people who are colorblind and still see colors but are unable to tell them apart, people with face blindness (prosopagnosia) perceive faces but cannot distinguish them. Justin and Leslie must decide whether their new relationship can overcome the obstacles ahead of them as they try to cope with this rare diagnosis.

**QUESTIONS TO EXPLORE:** What part of the brain is affected in prosopagnosia? What does prosopagnosia reveal about the brains' ability to recognize faces? What is an agnosia?

### **RESOURCES:**

Neuroscientists discuss prosopagnosia on a television panel:  
<https://charlirose.com/collections/3/clip/14590>

A personal account of prosopagnosia:  
<http://www.newyorker.com/magazine/2010/08/30/face-blind>

An information page on prosopagnosia:  
<https://www.ninds.nih.gov/Disorders/All-Disorders/Prosopagnosia-Information-Page>



**TALENT:** Directed by Dara Bratt. Written by Bratt and Kieran Dick. Produced by Sharon Barnes. Edited by Bratt. Photographed by Kathryn Westergaard. Principal cast: John Ventimiglia, Piper Perabo. Funded by an NYU-Sloan Production Grant.

## **THE REALITY CLOCK** [\(Click here to watch\)](#)

2011. 7 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, The Human Animal  
National/NGSS: Grades 6-12, Hereditary: Inheritance and  
Variation of Traits (Inheritance of Traits, LS3.A)

**SUMMARY:** *The Reality Clock* is an animated portrait of a watchmakers' struggle to accept the influences of early stage dementia on his identity and sense of time. Autobiographical works by individuals with dementia inspired this impressionistic film.

**QUESTIONS TO EXPLORE:** What are common symptoms of dementia? How do doctors diagnose people with dementia? What is the relationship between emotion and memory and how can this be used to treat dementia?

### **RESOURCES:**

Information from the National Institutes of Health on Dementia:

<https://www.ninds.nih.gov/Disorders/All-Disorders/Prosopagnosia-Information-Page>

An explanation of the memory loss which is associated with dementia:

[https://www.alzheimers.org.uk/site/scripts/documents\\_info.php?documentID=123](https://www.alzheimers.org.uk/site/scripts/documents_info.php?documentID=123)

A standardized assessment for dementia:

[http://www.cloctestrcct.com/about\\_rcct.htm](http://www.cloctestrcct.com/about_rcct.htm)

An article about music and memory:

<http://www.alzfdn.org/EducationandCare/musictherapy.html>



**TALENT:** Designed, Animated, and Directed by Amanda Tasse. Fabricated by Chris Swanson. Music by Igor Nemirovsky. Principal cast: Marco Tazioli and J. Louis Reid. Funded by a USC-Sloan Production Grant.

## **THE WITNESS** (Click here to watch)

2012. 16 minutes.

**AGE GROUP:** High School \*Mature Content\*

**STANDARDS:** NYC: Grades 9-12, Living Environment (Scientific Inquiry) National/NGSS: Grades 9-12, Heredity: Inheritance and Variation of Traits (Structure and Function, LS1.A)

**SUMMARY:** Sam, a neuroscientist and specialist in neuro-imaging, is called to testify as an expert witness in a criminal trial and becomes caught in a network of intense emotions, which conflict with his scientific findings. Sam's greatest challenge is to separate his emotional allegiances and his professional ones, while staying true to both.

**QUESTIONS TO EXPLORE:** How can brain images be used in the courtroom? What areas of the brain affect moral decision-making? What are different kinds of brain imaging technologies?

### **RESOURCES:**

Neuroscientists discuss the biological basis of decision-making on a television panel:  
<https://charlierose.com/collections/3/clip/14510>

An explanation of the brain areas involved in decision-making:  
<http://healthland.time.com/2012/09/04/making-choices-how-your-brain-decides/>

A PBS program featuring neuroscientists studying the brain and how neuroscience could be used in the courtroom:  
<http://www.pbs.org/program/brains-trial/>



**TALENT:** Written and Directed by Ioana Uricaru. Produced by Andrew C. Richey, Phoebe Shackeroff, Joshua Tate, and Ioana Uricaru. Edited by Michael P. Shawve. Photographed by Skye Borgman. Music by Paul Apeltgren. Principal cast: Patrick Lander, Aric Cushing, Baadja Lyne, Mo Hine, Maeva Asare. Funded by a USC-Sloan Production Grant.

# TECHNOLOGY, COMPUTER SCIENCE

**APP** [\(Click here to watch\)](#)  
2013. 22 minutes.

**AGE GROUP:** High School \*Mature Content\*

**STANDARDS:** NYC: Grades 9-12, Information Systems  
National/NGSS: Grades 9-12, Engineering Design  
(Developing Possible Solutions, ETS1.B)

**SUMMARY:** Normally, you wouldn't catch shy software developer Paul at a trendy club. But tonight is different. Paul's new mobile dating app is ready for beta testing, but if he doesn't pay his bills by the next day, his "Siri on steroids" will be deleted. Desperate, Paul tracks down suave venture capitalist, Mike, and begs him to invest in his app. Mike takes one look at Paul and devises the perfect plan to put the app to the test: if Paul can use the app to "make it," with the beautiful Zoey, Mike will invest.

**QUESTIONS TO EXPLORE:** What is an algorithm? How do facial recognition technologies work, and how are they being used? Who are the key people involved in developing an app?

## RESOURCES:

Resources from the biological anthropologist who helped to develop the OK Cupid algorithm: <http://www.helenfisher.com/>

Educational resources from the Computer History Museum: <http://www.computerhistory.org/education/>

Comedian Chelsea Handler interviews Silicon Valley experts: <http://scienceandfilm.org/articles/2699/science-on-the-small-screen-chelsea-does>



**TALENT:** Written and Directed by Alexander Berman. Produced by Edouard de Lachomette. Edited by Jeremy Lerman. Photographed by Edward Salerno, Jr. Production design by Matthew Novak. Principal cast: Braden Lynch, Sara Sanderson, J.R. Cacia, Ashley Lambert. Funded by an AFI-Sloan Production Grant.

# TECHNOLOGY, COMPUTER ENGINEERING

## **THE KING'S PAWN** [\(Click here to watch\)](#)

2015. 17 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, Information Systems  
National/NGSS: Grades 6-12, Engineering Design (Defining and Delimiting Engineering Problems, ETS1.A; Developing Possible Solutions, ETS1.B; Optimizing the Design Solution, ETS1.C)

**SUMMARY:** *The King's Pawn* follows a former chess prodigy who challenges the world-champion with a super computer he spent his life designing. With so much media attention and such high stakes surrounding the event, is it possible that someone from the computer's side might have interfered with the match's outcome?

**QUESTIONS TO EXPLORE:** What defines a turn-taking game and why are those the easiest games to program? What happened in the 1997 Gary Kasparov vs. Deep Blue tournament? What are recent advances in the field of computer versus human gaming?

### **RESOURCES:**

The history of computer chess programs: <http://illumin.usc.edu/188/deep-blue-the-history-and-engineering-behind-computer-chess/>

A computer chess collection at the Computer History Museum: <http://www.computerhistory.org/collections/computerchess/>

An article on man versus machine: <http://www.nybooks.com/articles/2010/02/11/the-chess-master-and-the-computer/>

Interview with a computer scientist about the future of AI and the feature film *Computer Chess*: <http://scienceandfilm.org/articles/2683/science-on-screen-prof-clare-congdon-on-computer-chess>

Article about *The King's Pawn*: <http://scienceandfilm.org/articles/2748/premiere-jonah-bleichers-the-kings-pawn>



**TALENT:** Directed by Jonah Bleicher. Written by Bleicher and Darren Anderson. Produced by Rob Cristiano and Josh Cohen. Photographed by Zachary Halberd. Principal cast: Collin Ware, Jakob von Eichel, Shanga Parker, Julian Murdoch, Logan Riley Bruner. Funded by a CU-Sloan Production Grant.

**TEMMA** ([Click here to watch](#))  
2009. 17 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, Living Environment (Genetics and Biotechnology) National/NGSS: Grades 6-12, Engineering Design (Developing Possible Solutions, ETS1.B)

**SUMMARY:** As her body succumbs to a degenerative disease, renowned neuro-programmer Temma Baumgarten tries to complete a computational model of her own mind.

**QUESTIONS TO EXPLORE:** What are some of the benefits and drawbacks of creating a computerized brain simulation? Why are neuroscientists interested in modeling the human brain? What is the function of social robots?

**RESOURCES:**

Neurology concepts and classroom activities for high school students: <http://brainu.org/neuroscience-concepts-activities-grade-level-high-school-grades-9-12>

An interview with a roboticist about social robots:  
<http://scienceandfilm.org/articles/2948/robot-friends-interview-with-dr-selma-sabanovic-on-her>



**TALENT:** Written and Edited by Anya Meksin and William Gerrard.  
Directed by Meksin. Produced by Kristie Lutz. Photographed by Kamil Plocki. Production design by Neslihan Arslan. Music by Jeff McSpadden. Special Effects by Brian Walsh, Rob Cerrato, Barak Ziv, Anthony Simpson, Peihsi Kuo. Principal cast: Karen Young, Richard Bekins, Samantha Bilinkas. Funded by a CU-Sloan Production Grant.

# TECHNOLOGY, ELECTRICAL ENGINEERING

## **THREE LIGHT BULBS** [\(Click here to watch\)](#)

2012. 15 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, Energy and Simple Machines; Living Environment (Scientific Inquiry, Human Influences on the Environment); Physics (Energy, Electricity, and Magnetism); Earth Science (Climate) National/NGSS: Grades 6-12, Energy (Defining and Delimiting Engineering Problems, ETS1.A); Earth and Human Activity (Natural Resources, ESS3.A; Global Climate Change, ESS3.D); Waves and Their Applications in Technologies for Information Transfer (Energy in Chemical Processes, PS3.D)

**SUMMARY:** A girl returns to her hometown, which is a remote village in China where most young people have left for big opportunities in the city. The town has a power shortage, which she tries to alleviate by installing a solar panel. However, introducing this new technology proves more difficult than imagined.

**QUESTIONS TO EXPLORE:** How is electricity produced?  
How do solar panels draw energy from the sun?  
What causes power outages?

### **RESOURCES:**

Classroom exercises about electricity:

[https://www.fi.edu/sites/default/files/EducatorGuides\\_edguide-electricity.pdf](https://www.fi.edu/sites/default/files/EducatorGuides_edguide-electricity.pdf)

The basics of solar energy:

<http://energy.gov/eere/energybasics/articles/solar-energy-technology-basics>

The history of energy inventions:

<https://www.fi.edu/history-resources/electricity>

Some causes of blackouts:

<http://insideenergy.org/2015/04/10/ie-questions-what-causes-blackouts/>



Interview about a Museum exhibition on electricity in art:

<http://scienceandfilm.org/articles/2733/electric-paris-interview-with-curator-margarita-karasoulas>

**TALENT:** Directed by Min Ding. Written by Ding and Yen-Chiao Huang. Produced by Cindy Hu. Edited by Wei-Hsin Yang. Principal cast: Wen-Ying Tan, Yu-Zhi Tan, Man Yang, Ning Yuan, Di An. Funded by a CU-Sloan Production Grant.

**WITHOUT FIRE** ([Click here to watch](#))  
2012. 20 minutes.

**AGE GROUP:** Middle School and higher

**STANDARDS:** NYC: Grades 6-12, Physics (Energy) National/NGSS: Grades 6-12, Matter and Its Interactions (Definitions of Energy, PS3.A; Structure and Properties of Matter, PS1.A; Developing Possible Solutions, ETS1.B); Energy (Defining and Delineating an Engineering Problem, ETS1.A; Energy in Chemical Processes and Everyday Life, PS3.D; Conservations of Energy and Energy Transfer, PS3.B)

**SUMMARY:** A young Navajo girl must find a way to heat her home in order to save her asthma-stricken mother from a bitter winter storm.

**QUESTIONS TO EXPLORE:** How is energy converted into heat? How do solar panels work? In addition to solar energy, what are some ways of producing energy that do not require fossil fuels?

### RESOURCES:

A middle-school guide to solar energy:  
[https://www1.eere.energy.gov/education/pdfs/solar\\_exploringsolarenergystudent.pdf](https://www1.eere.energy.gov/education/pdfs/solar_exploringsolarenergystudent.pdf)

A TED talk about how solar panels work:  
<https://ed.ted.com/lessons/how-do-solar-panels-work-richard-komp>

Student activities related to solar circuitry:  
[https://www.nrel.gov/workingwithus/assets/pdfs/educational\\_resources/middle\\_school/solar\\_circuitry\\_ms.pdf](https://www.nrel.gov/workingwithus/assets/pdfs/educational_resources/middle_school/solar_circuitry_ms.pdf)



**TALENT:** Written and Directed by Eliza McNitt. Produced by McNitt, Jordan Fein, Garrett Yazzie, Hunter Baker. Photographed by Baker. Production design by Taylor Shung. Music by Saul Simon MacWilliams. Principal cast: Misty Upham and Magdalena Begay. Funded by an NYU-Sloan Production Grant.

# ACKNOWLEDGEMENTS

**Sonia Shechet Epstein** is the Executive Editor of *Sloan Science & Film*. She produces all content for the site. She also conducts interviews with scientists and filmmakers, commissions features from scientists, and collaborates with other publications and partner organizations. For questions or comments please email [sloanfilm@movingimage.us](mailto:sloanfilm@movingimage.us).

**The Alfred P. Sloan Foundation** is a non-profit philanthropic organization which awards approximately \$100 million per year in grants supporting original research and broad-based education in science, technology, engineering, economic performance, and mathematics. The Foundation's Public Understanding program supports the arts—awarding grants to film, theatre, radio, television, books, and new media projects to build bridges between the two cultures of science and the humanities translating science and technology for the public.

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