Q6.00003: Public Education and Outreach Through Full-Dome Video Technology

APS physics 2009

Public Education and Outreach Through Full-Dome Video Technology

John A. Pollock, Ph.D.

Associate Professor • Duquesne University

Executive Producer/Director

Regenerative Medicine Partnership in Education

A Science Education Partnership Award from the
National Center for Research Resources
A component of the National Institutes of Health

Principle funding from a
Science Education Partnership Award
National Center for Research Resources
National Institutes of Health

A Partnership of:

DUQUESNE UNIVERSITY
EDUCATION FOR THE MIND, THE HEART, & THE SOUL

McGowan Institute for Regenerative Medicine

STUDIO for Creative Inquiry
Carnegie Mellon University

Outline

Introduction:
Considering your Audience
What else to consider
Getting started
What to watch out for
Do experiments
How to pay for it

Introduction:

Reconciling your needs as the scientist/educator.

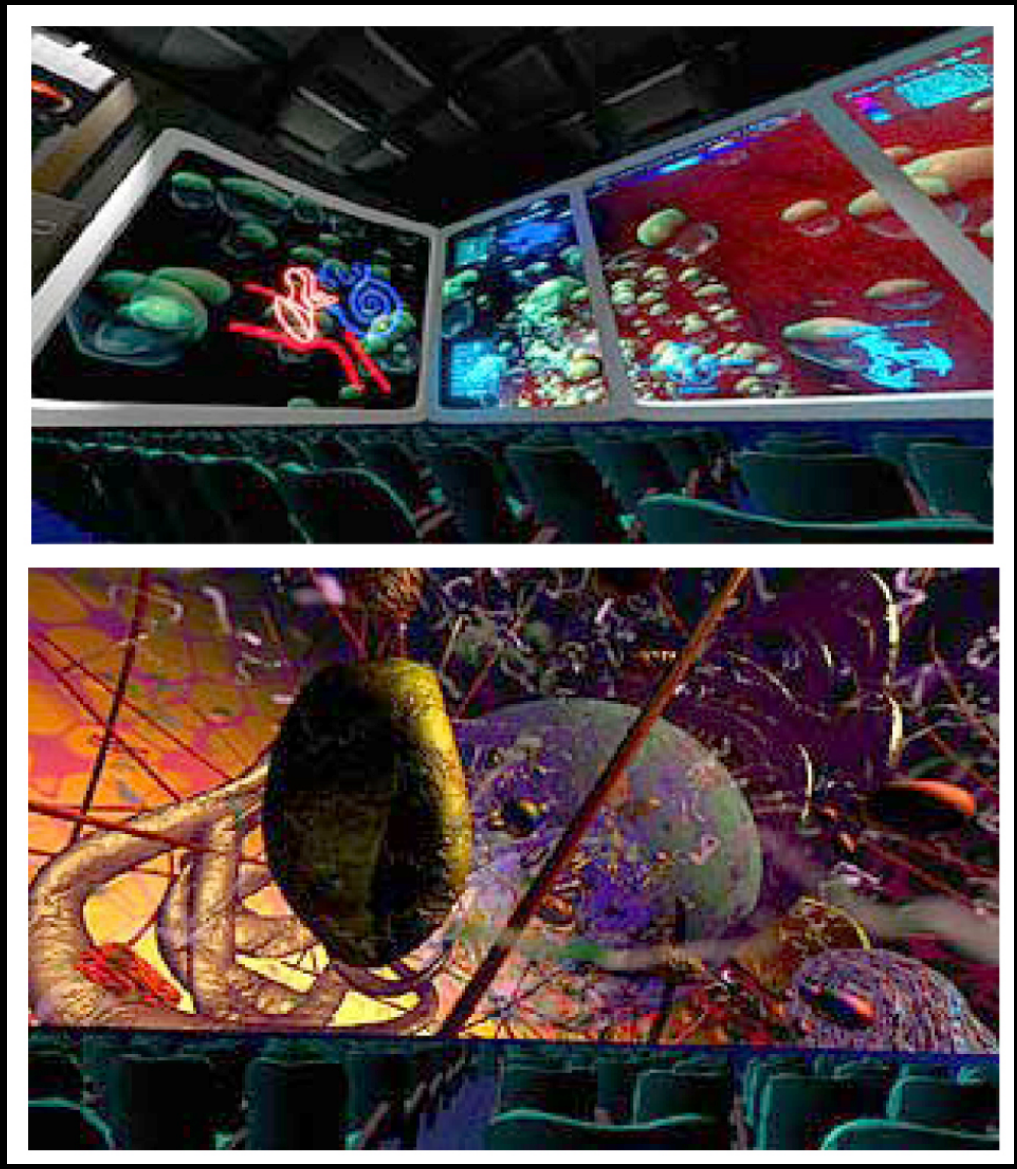
balance --

‘Two Cultures’ - C. P. Snow

&

‘Scholarship of Integration’ - Ernest Boyer

A classroom of the future?



Complements HomeRun Pictures, NLM, HHMI, Fantastic Voyage,…

Considering your Audience:

- bringing more than the text to your students

- recognizing that many of your students are outside the classroom

A little history.

4 million years ago

Images - Scientific American

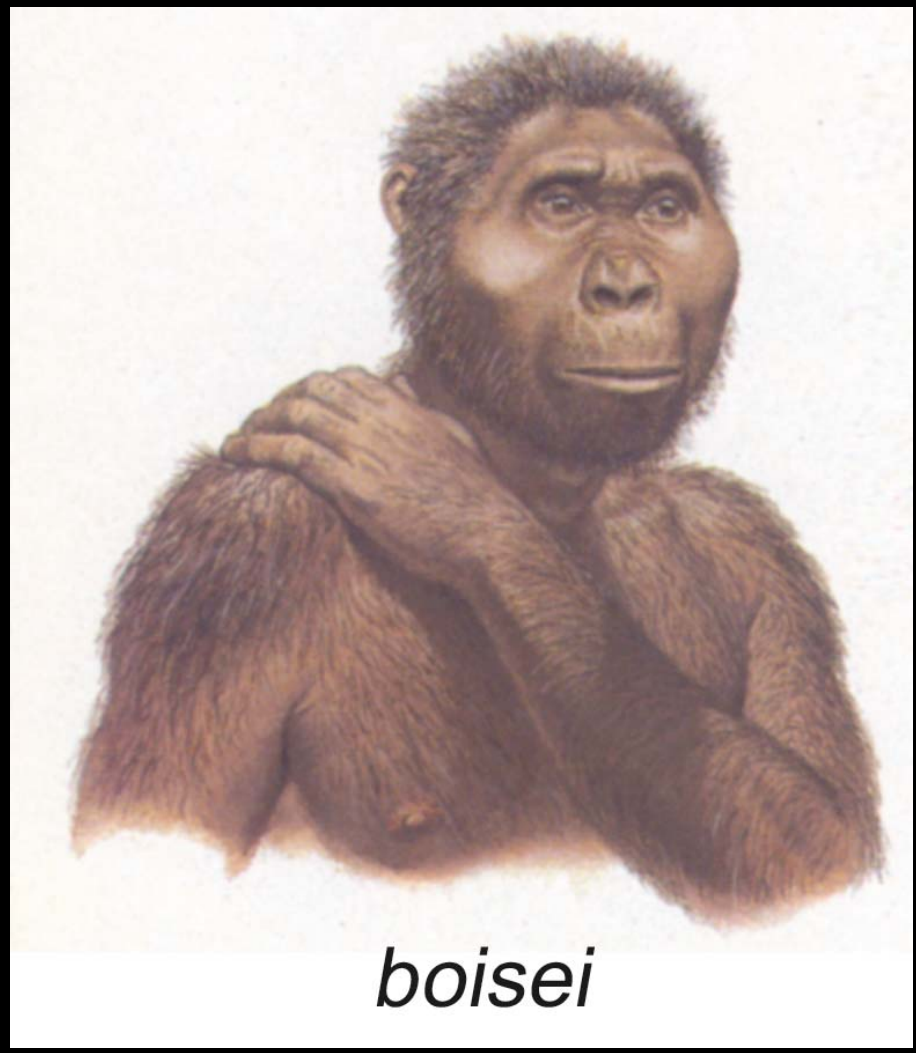


Image - Scientific American

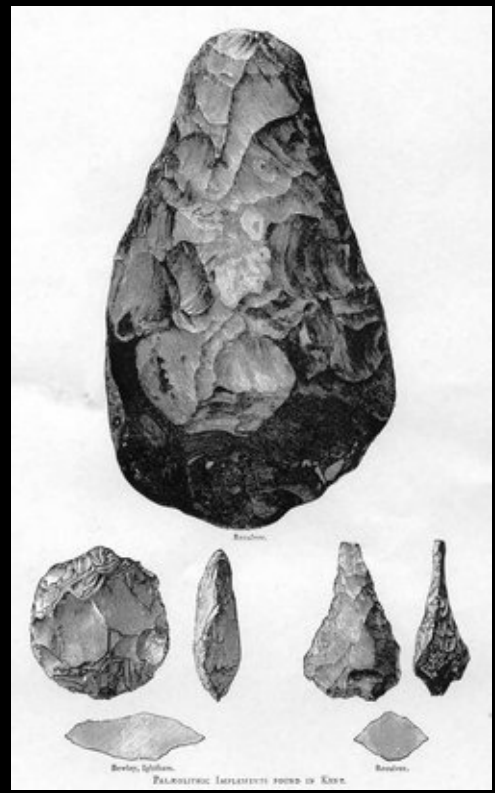
2 1/2 - 1 million years ago

Large jaw for vegetarian diet.

Simple Stone Tools

2 1/2 million years ago

1 1/2 million years ago



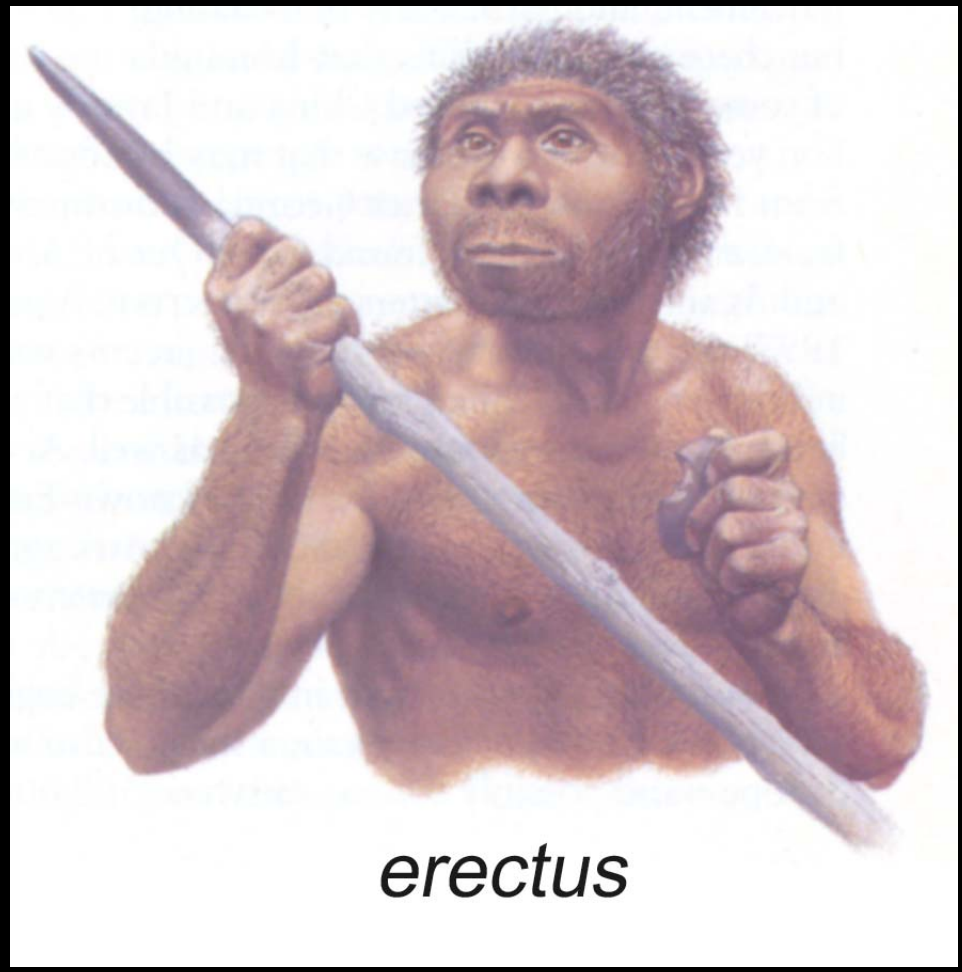


Image - Scientific American

1 1/2 million years

2009

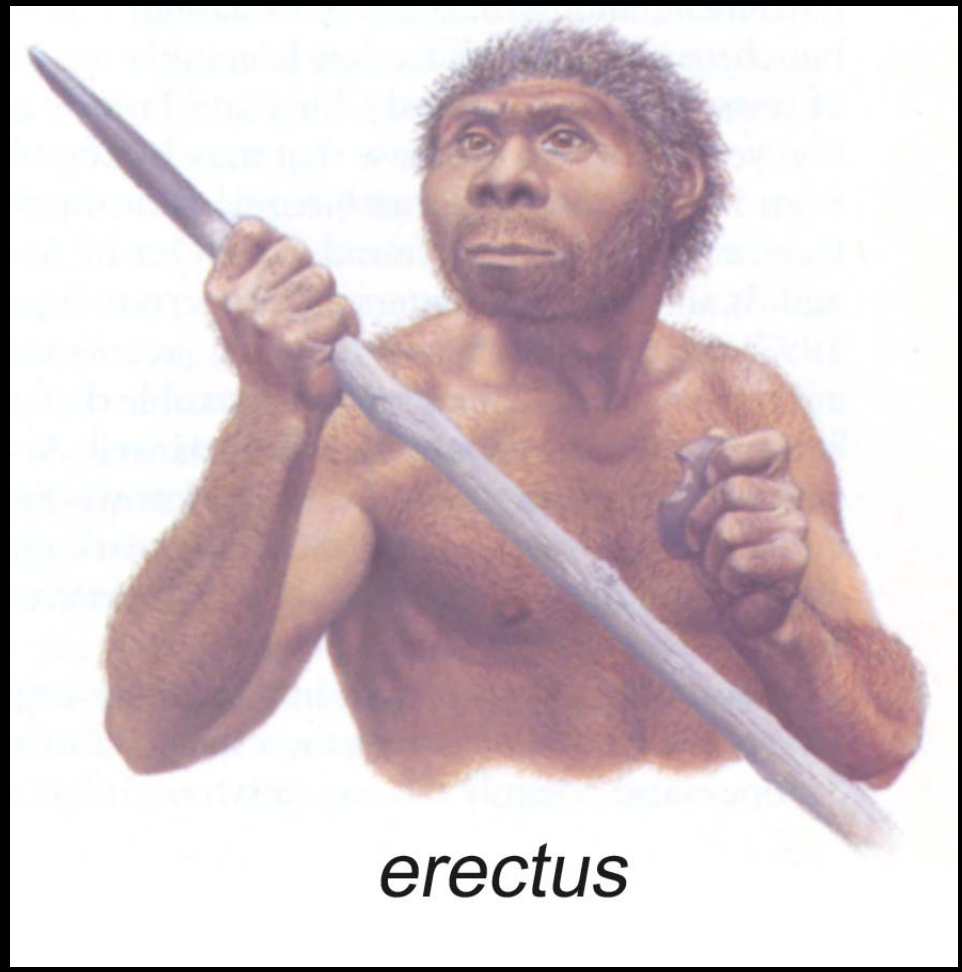


Image - Scientific American

1 1/2 million years

Better tools and …

2009

Control fire!

1 million years ago

2009

Control fire!
And story telling.

1 million years ago

2009

- A point to be made …
  - Humans love a good story.
  - Humans have been telling stories and listening for a million years.

So what's next…

APS physics

2009

APS physics

2009

- 5,000 to 6,000 years ago an age of invention
  - Wheel & plow in Mesopotamia
  - Sail in Egypt
  - Written language

Tartaria tablets - Romania 6,500 years ago

Beer recipe
6,000 years

More great writing…

- Rene' Descartes (1596-1650)

Discourse on the Method published 1637

  – Establishes the framework for the "scientific method."

Isaac Newton (1643-1728) helped by specifying the scientific method.

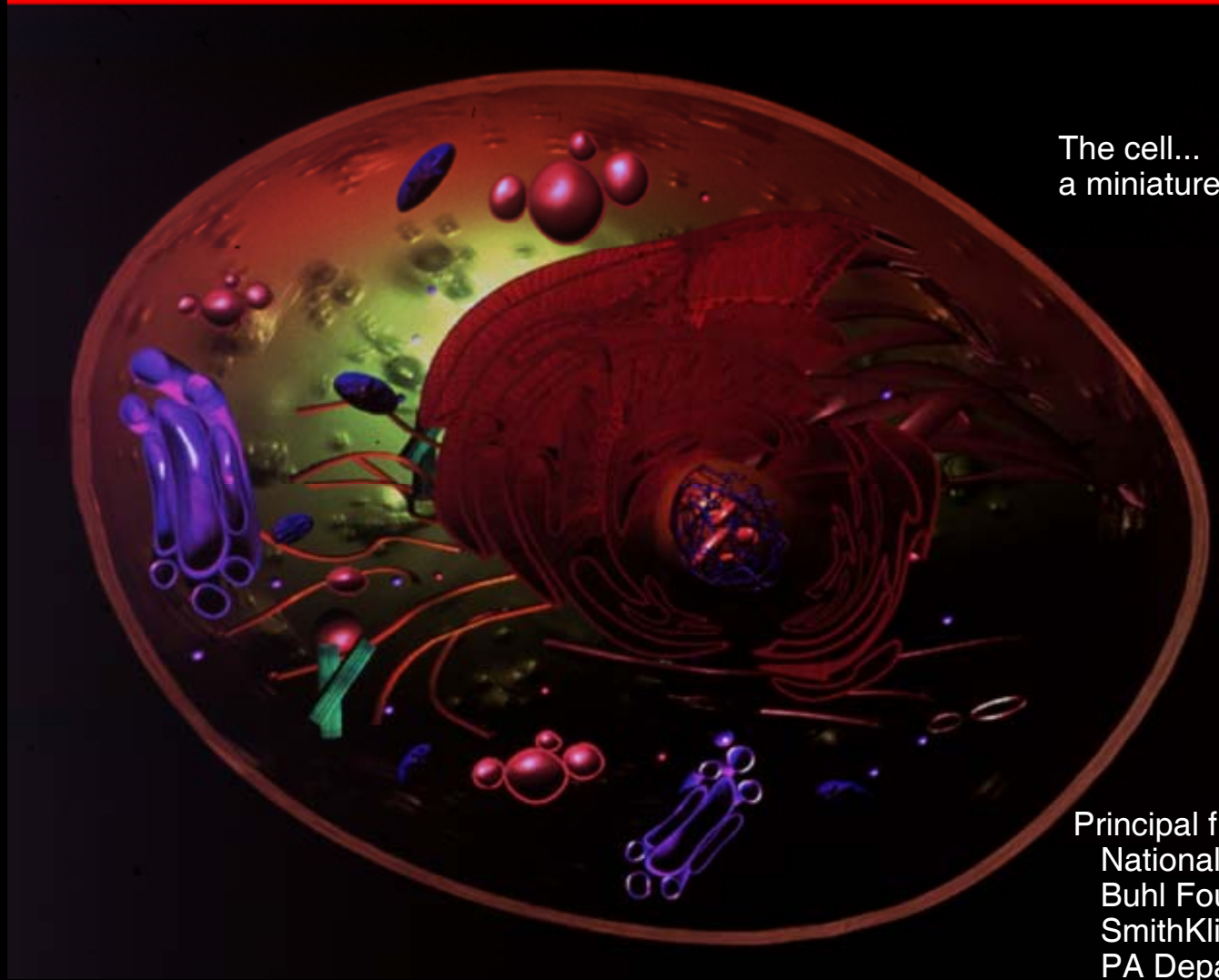
- One more point to be made now…
  - Science as we know it is about 400-500 years old.

  - So, what are our brains wired to do…

    Tell Stories… with full-dome video.

JOURNEY INTO THE LIVING CELL

The Carnegie Science Center Henry Buhl, Jr. Planetarium and Observatory



The cell...
a miniature city

Principal funding from the
National Science Foundation
Buhl Foundation
SmithKline Beecham
PA Department of Commerce

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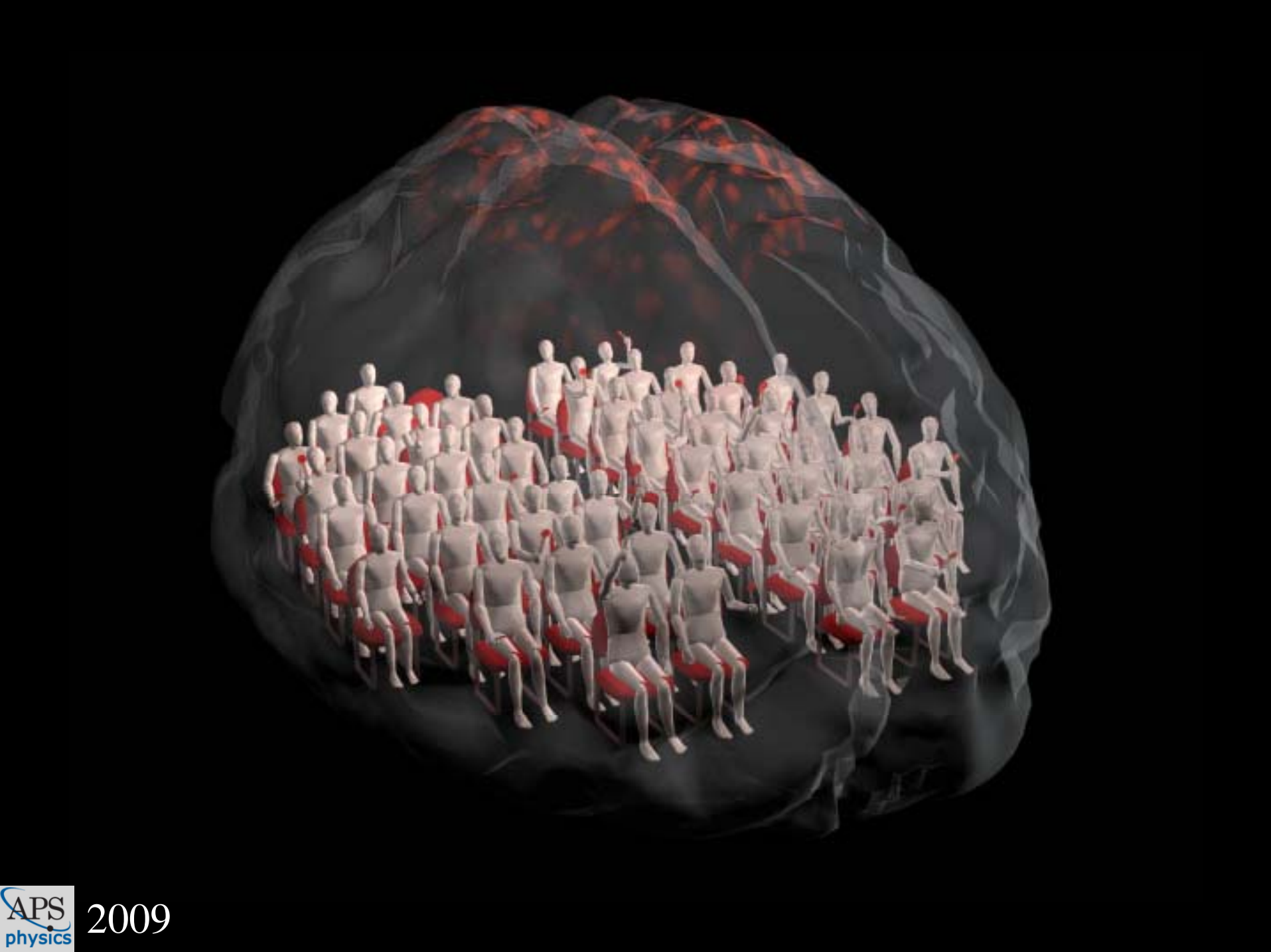

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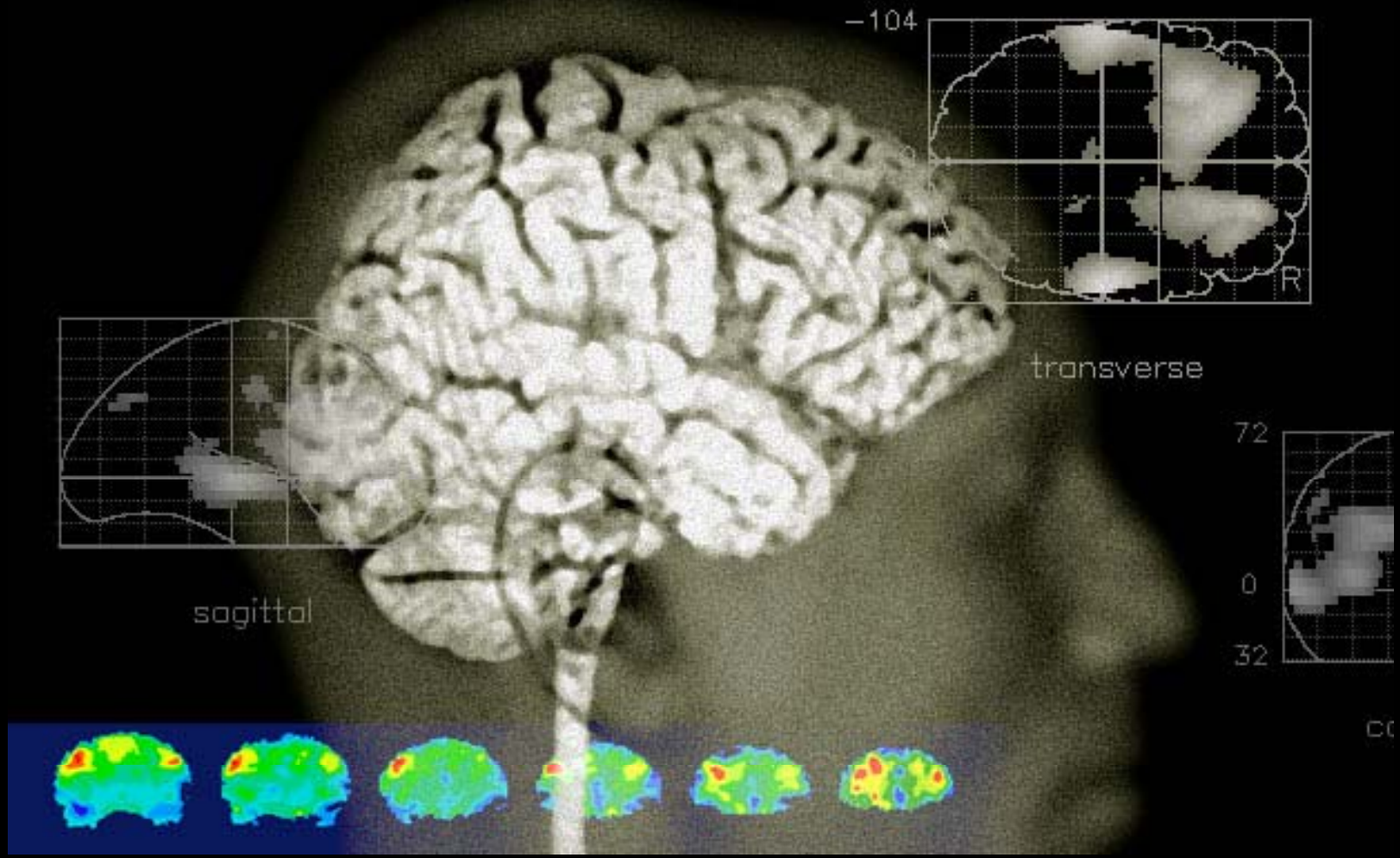
Gray Matters: The Brain Movie

an audience interactive planetarium show



Produced by Carnegie Mellon University & Carnegie Science Center

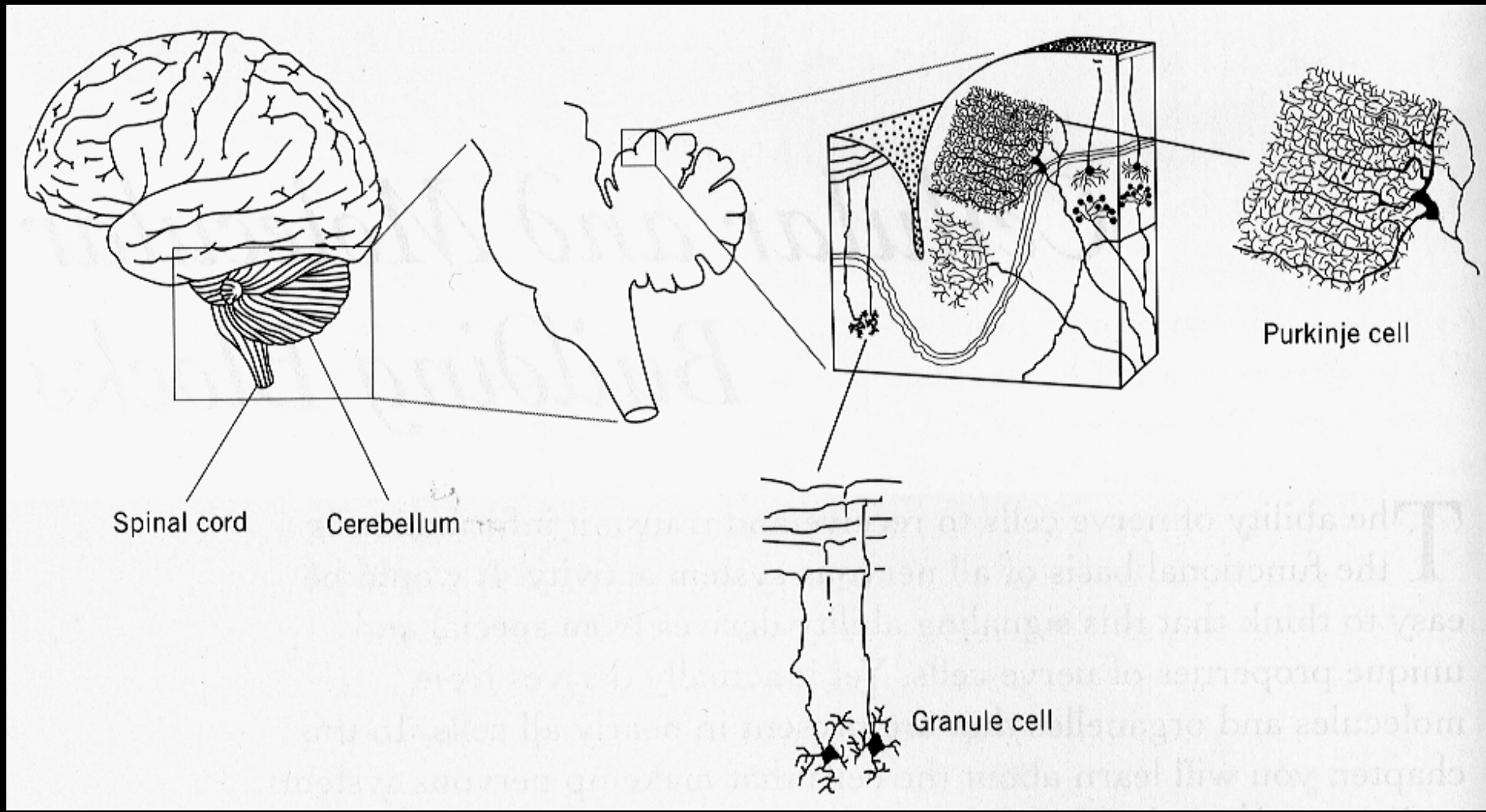
With public support from the National Science Foundation

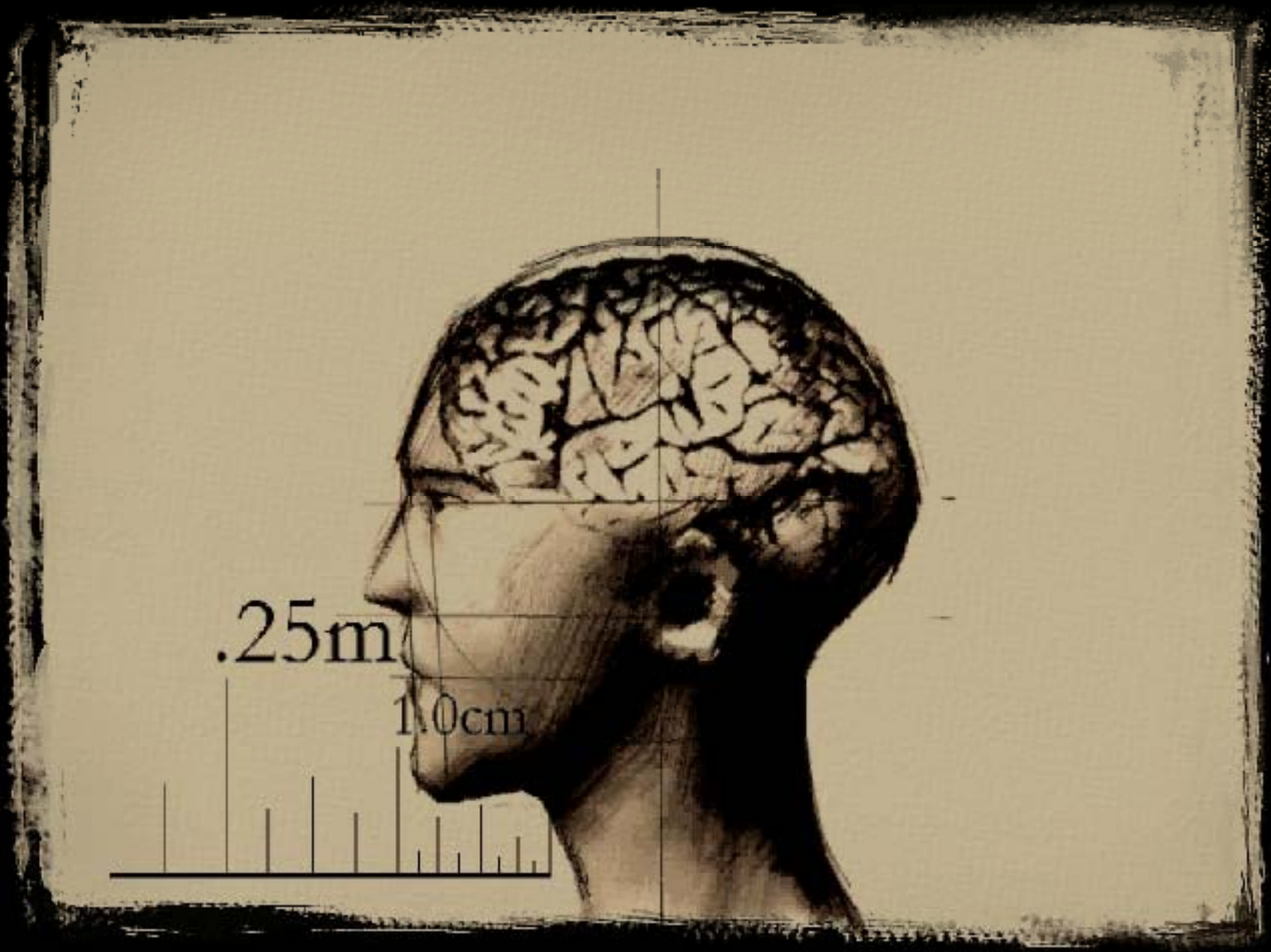
What else to consider:

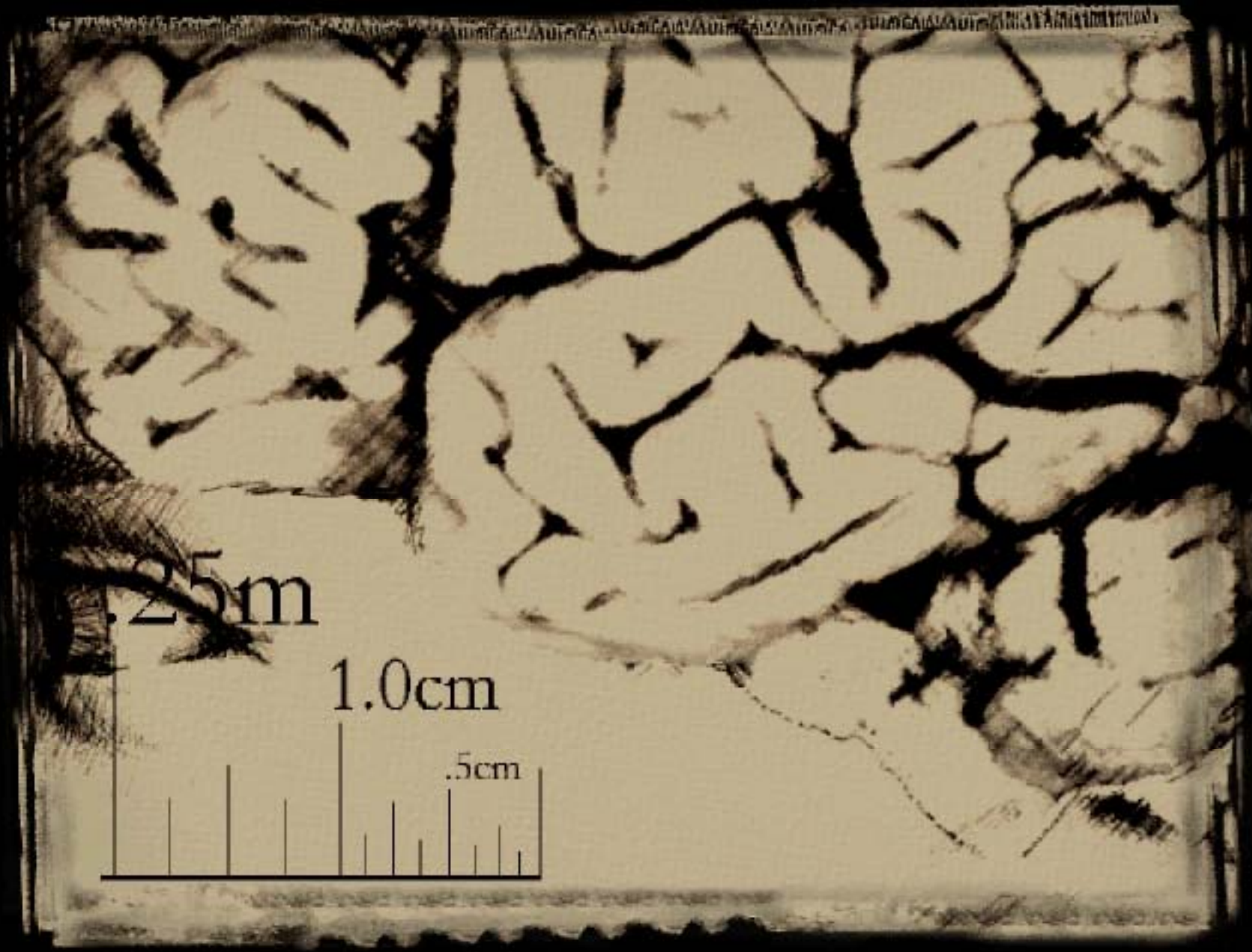
- More about your audience
  - who is really going to see this
- Why is it important that they see it
- Talk to your audience
- Show your work
- Be prepared to revise your work

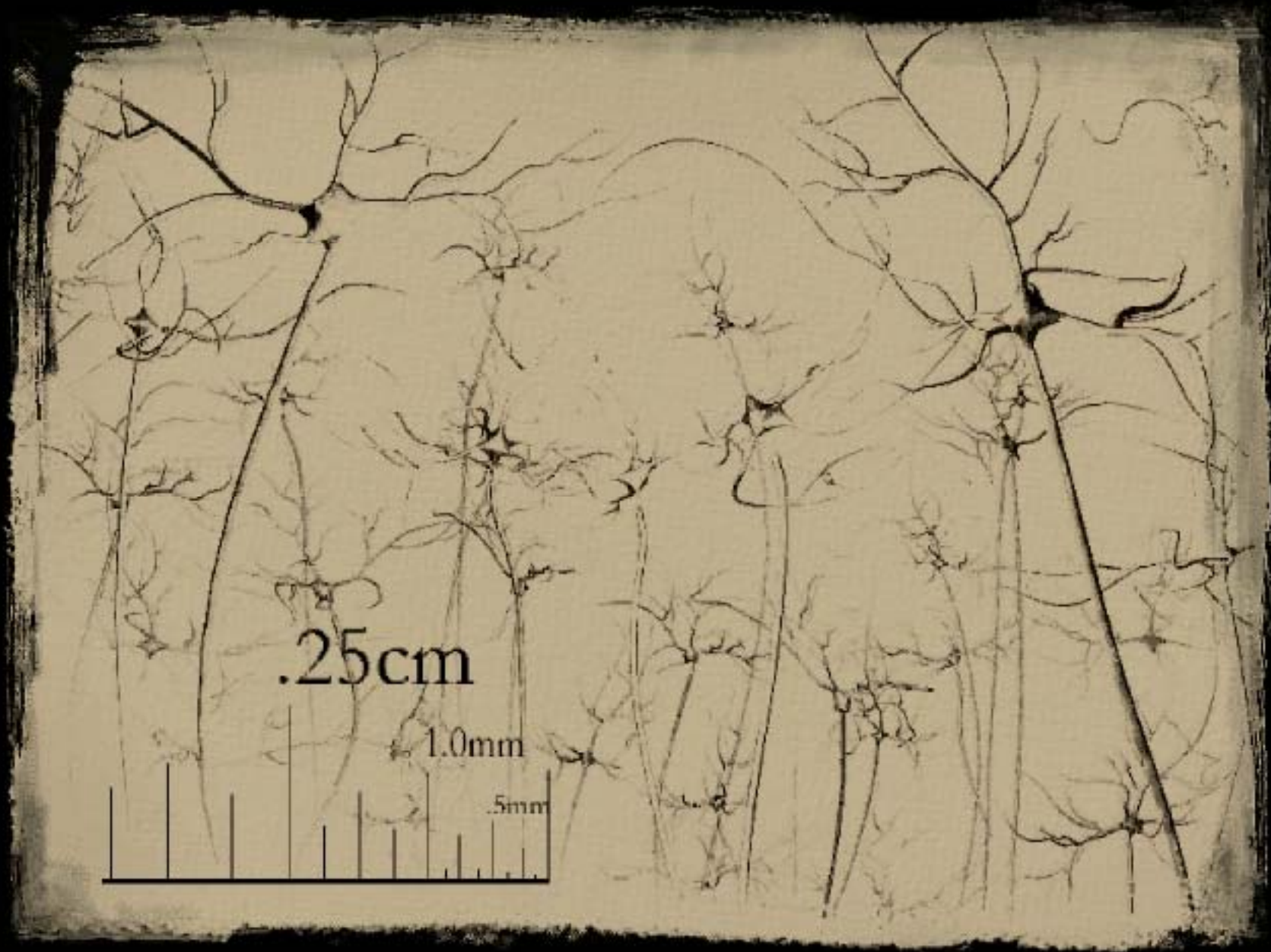
What our audiences have told us…

How Big Are Things

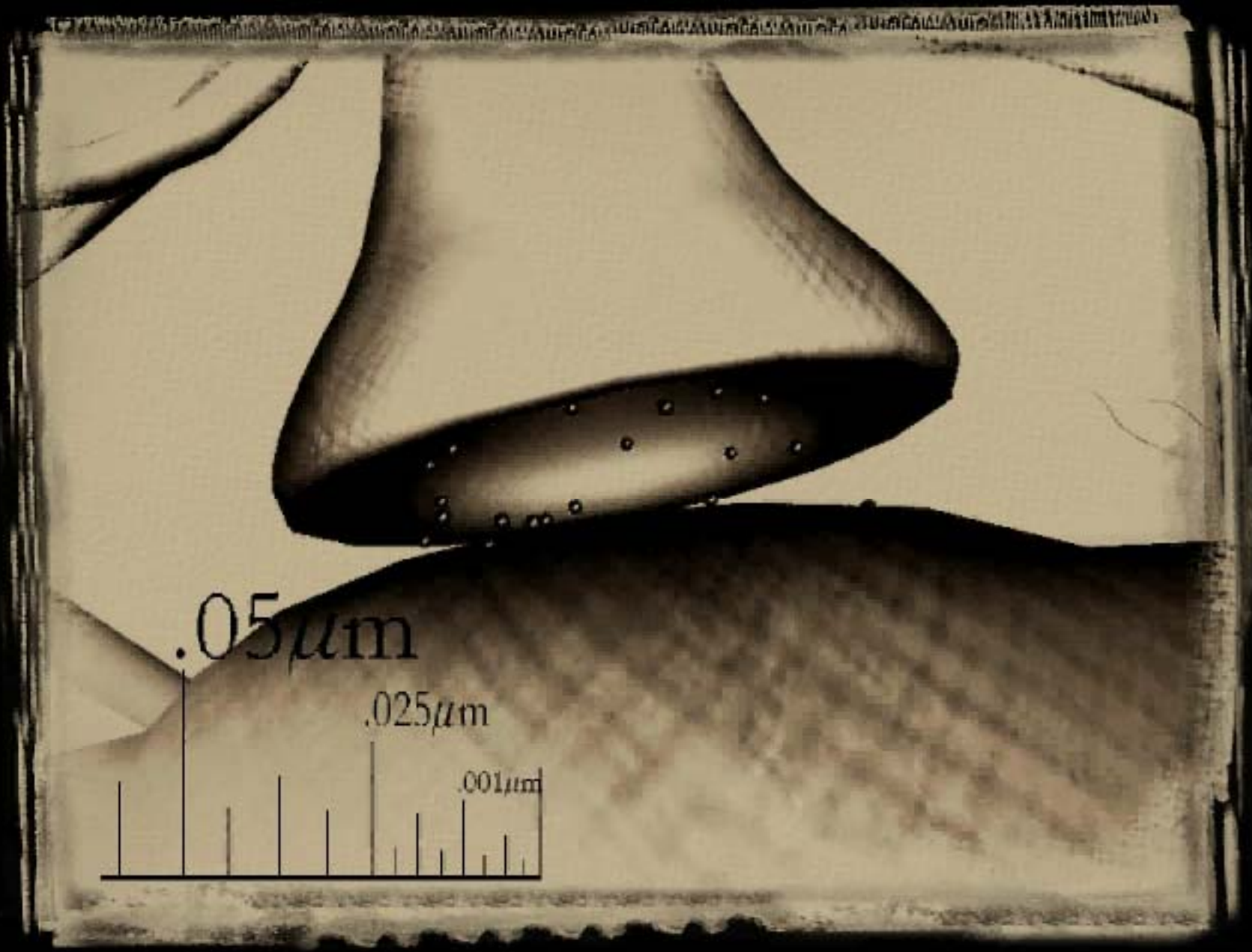



.25m
1.0cm


.25m
1.0cm
.5cm


.25cm
1.0mm
.5mm


.25mm
1.0 μm
.5μm


.05μm
.025μm
.001μm

Getting started:

- Find the path of least resistance
- Be the ‘Director’
- Craft the ‘Story-Board’
- Set goals and time-line
- ‘Hire’ your artists

Adult Visual System

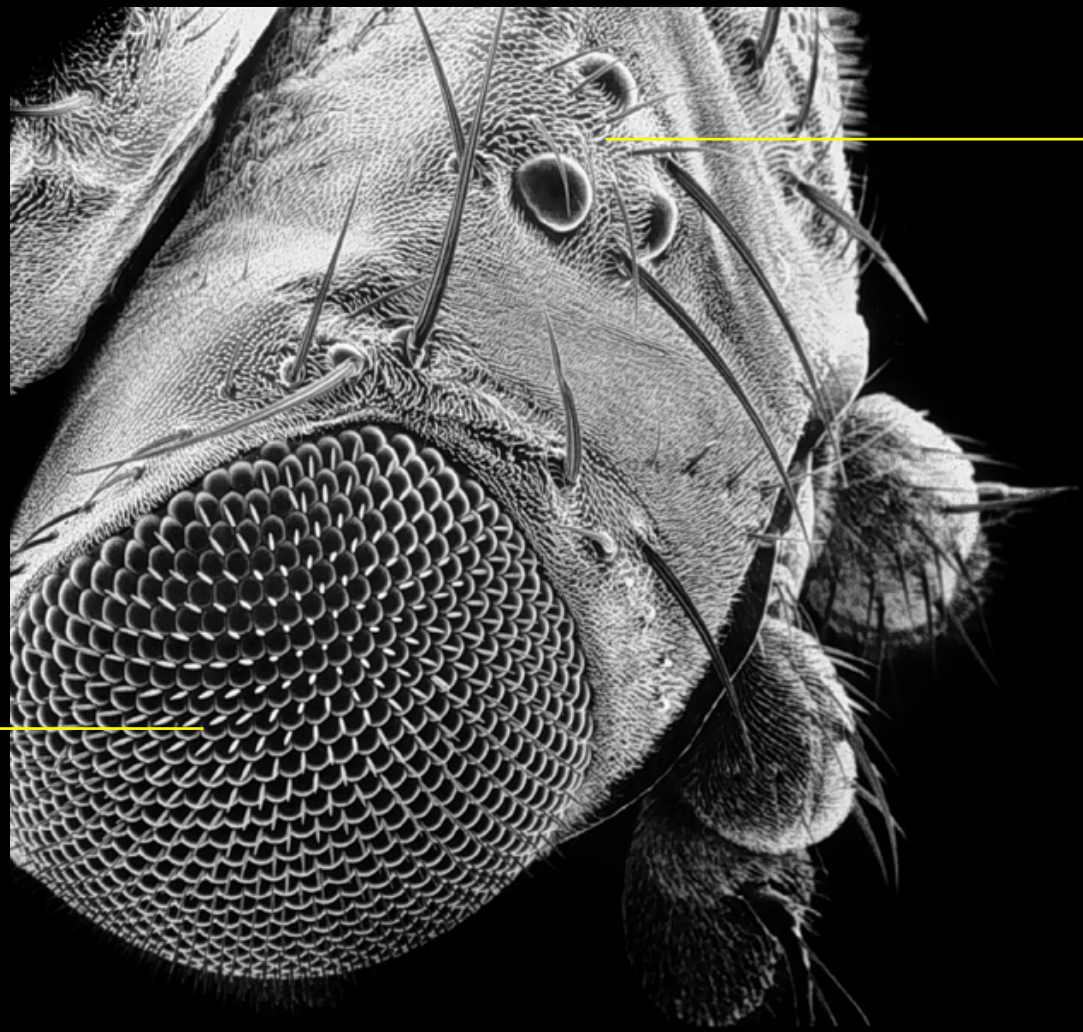
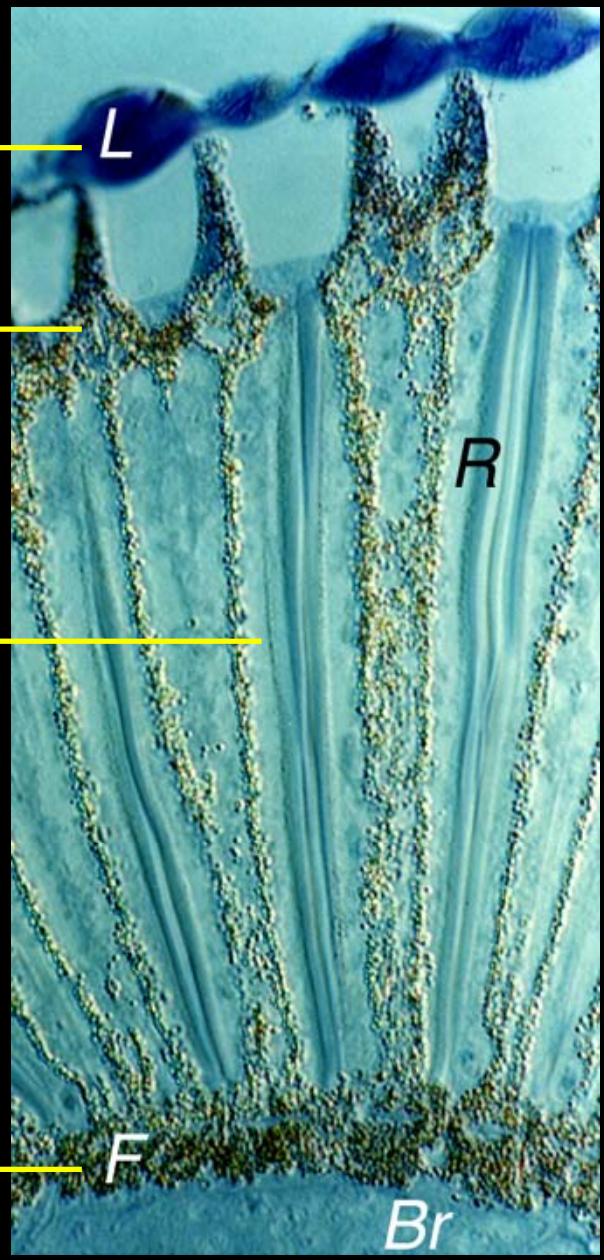


Photo by Terri Martin

Tissue Section



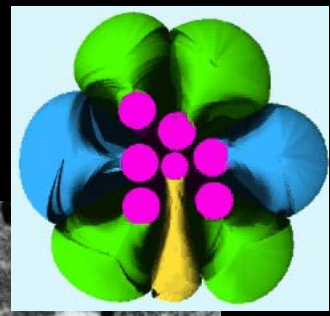
LENS

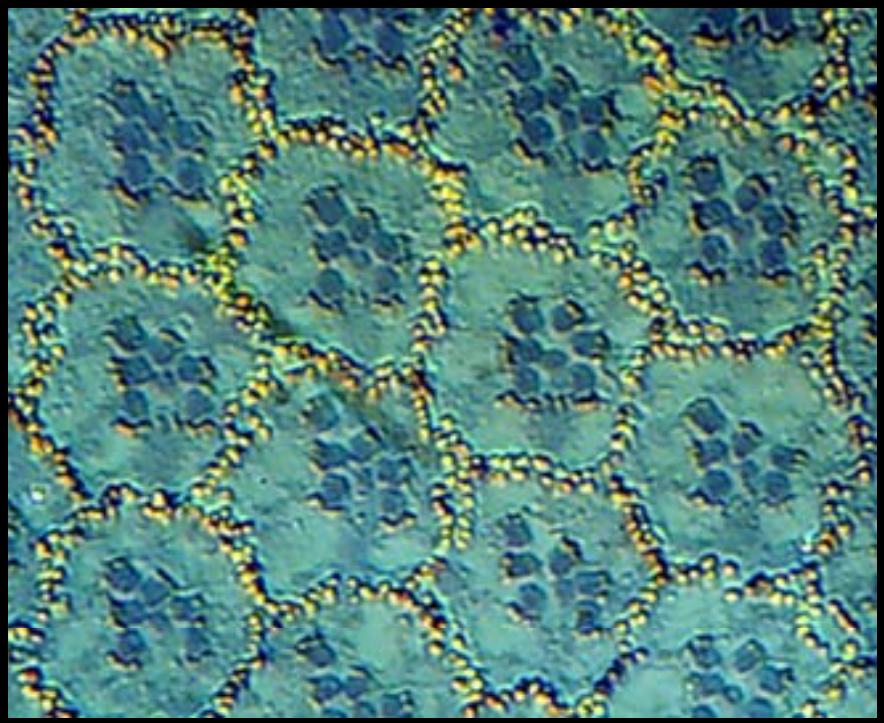
PIGMENT CELL

PHOTORECEPTOR NEURON

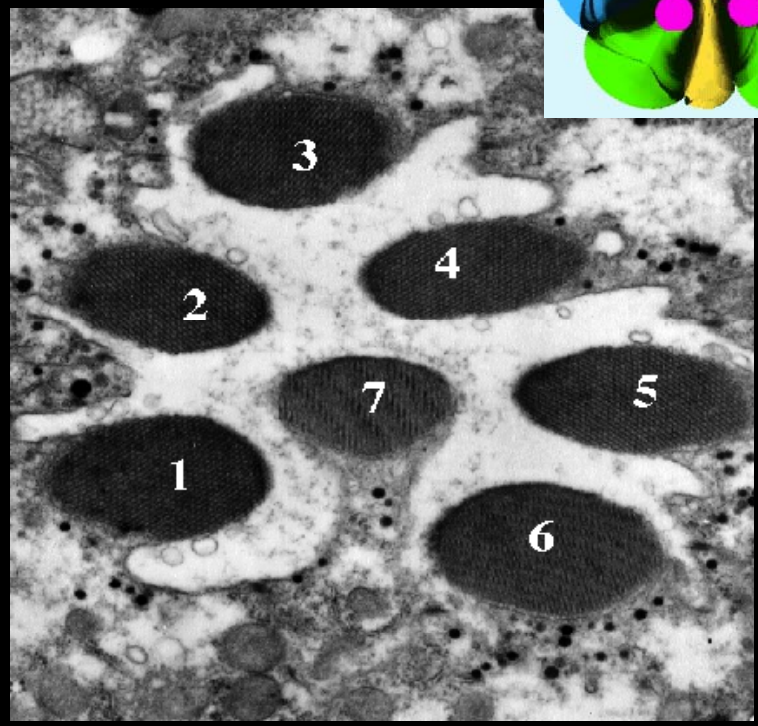
FENESTRATED MEMBRANE

Cross Section of Adult Eye





Light Micrograph

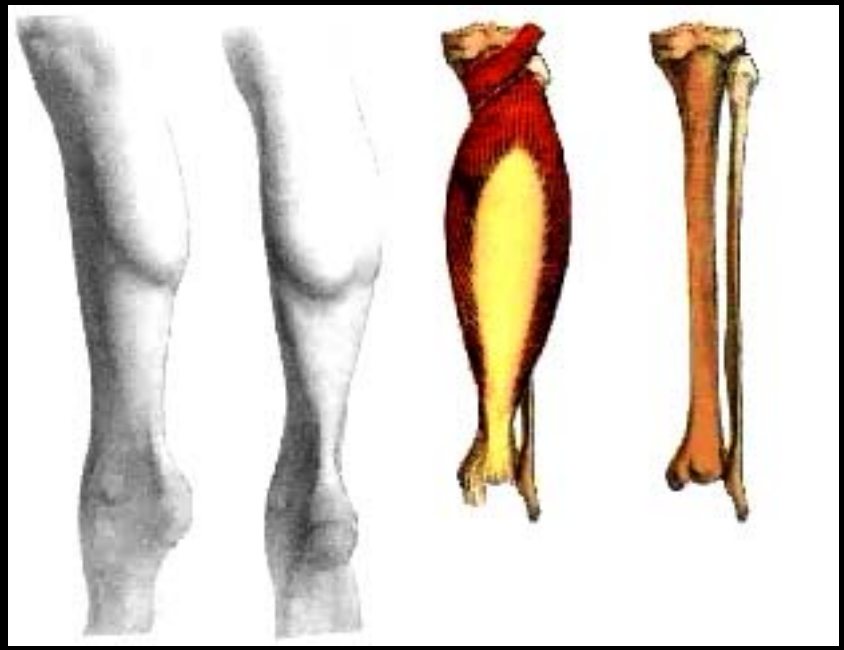


Electron Micrograph

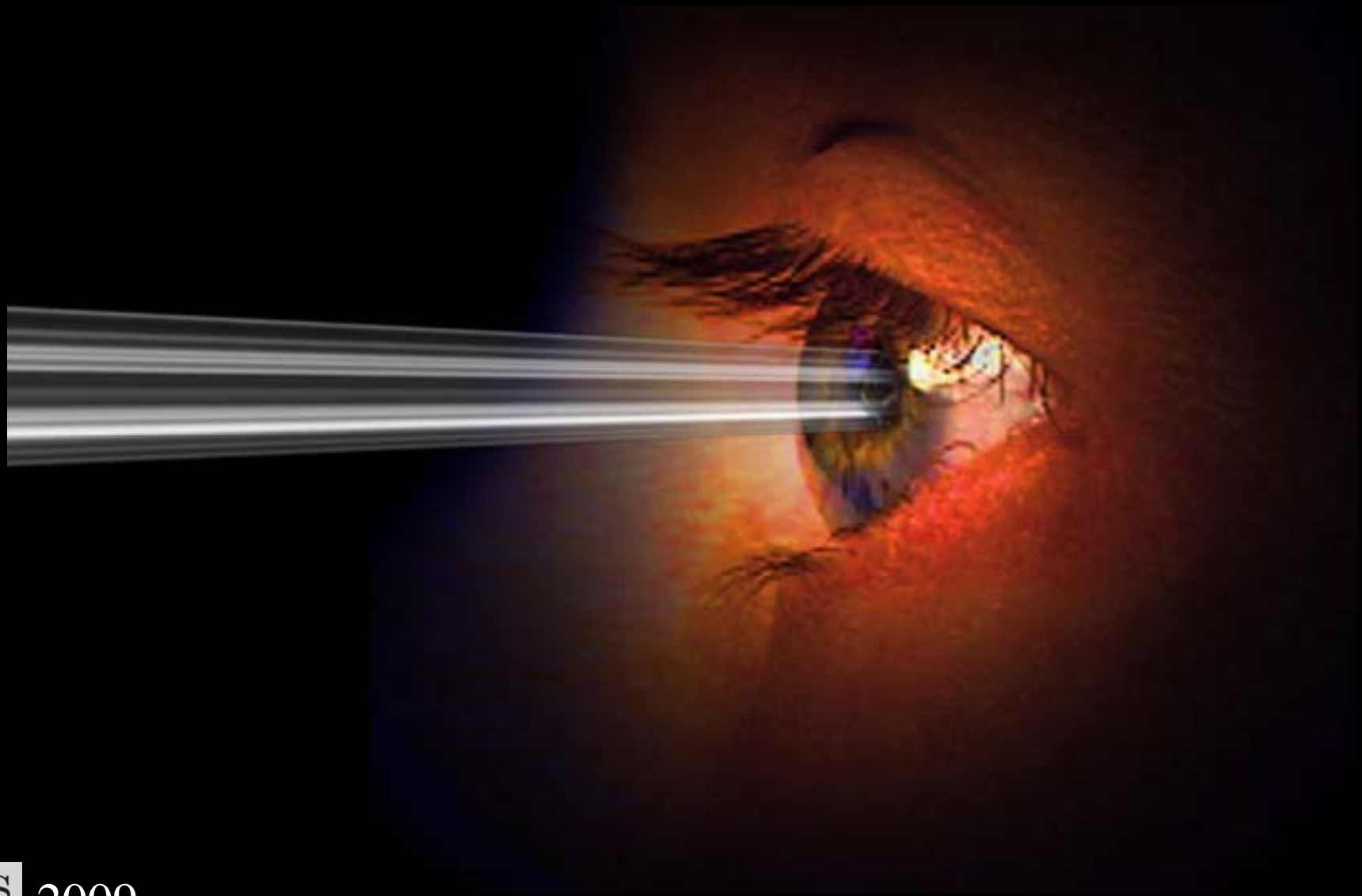
Ready and co-workers

Try Multiple Styles:

- Use different artists
- Ask your colleagues in the Fine Arts College



Visual Perception



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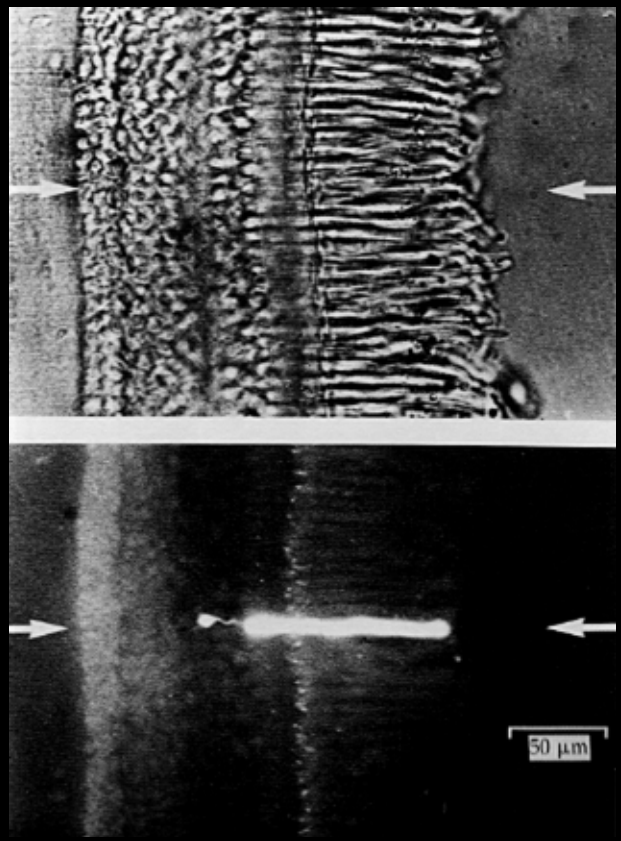
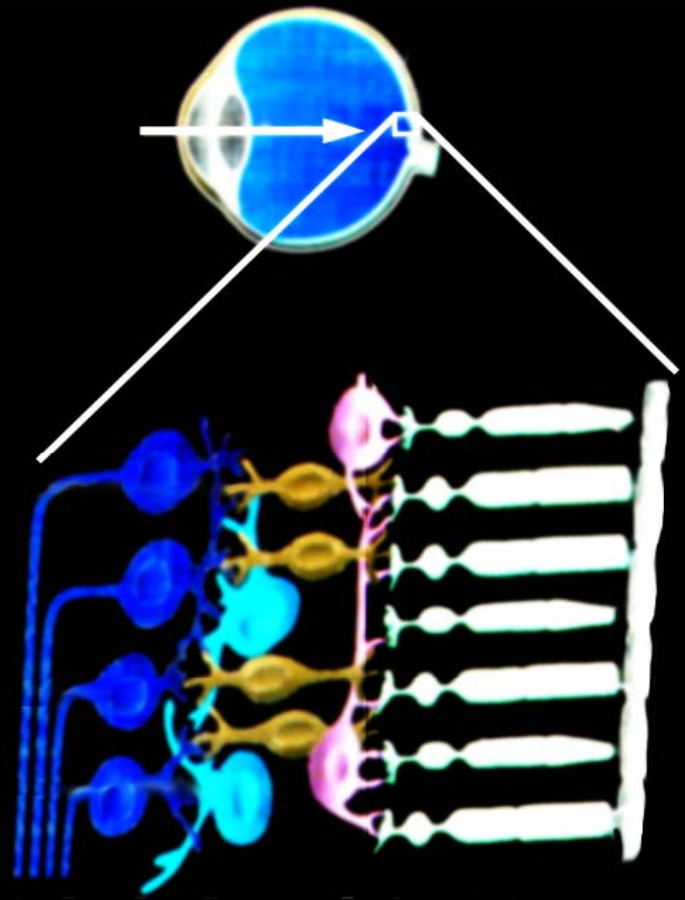

50 μm



What to watch out for

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Do Experiments:

A

The Pittsburgh Tissue Engineering Initiative presents,

Dr. Allevable's Unbelievable Laboratory!

*Join **Dr. Allevable** and **Regenerobot** for an exciting look at the science and art of **regenerative medicine***

Executive Producers
Daniel L. Farkas, PhD.
John A. Pollock, PhD.

Director
John A. Pollock, PhD.

Concept Development
John A. Pollock
Daniel L. Farkas
Alan J. Russell

Creative Director
Laura L. Gonzalez

Principal Artist
Robert Hoggard

3D Animation
Laura L. Gonzalez
Christine A. Hardtman

Texture Artists
Laura Gonzalez
Christine Hardtman
Robert Hoggard
Joseph Hocking

Computer Graphics & Effects
Jeremy Carson
Adam Drobotij
Christopher Graves
Adrian Herbez

Editing and Compositing
Christopher Graves
Laura Gonzalez

Web Development
Adam Drobotij

Original Music
Roger Dannenberg
Christopher Graves

Voices
Tina Marie Goff
Don Marinelli

Sound Development
Leah Kauffman
Arthur Menke
John A. Pollock
Laura L. Gonzalez

Research & Storyboards
Rebecca Pickard
Erin Minich
Laura Gonzalez
Linda Ortenzo
Patrick Donnelly
Jennifer Hughes
Elaine Catz

STUDIO for Creative Inquiry
Margaret Myers
Jennifer Brodt

Project Coordinators
Patrick Cantini
Lynn Banaszak
Doreen Grasso
Linda Shekhdar

Artistic Advisor
Patricia Maurides

Planetarium Production from
John G. Radzilowicz (Director)
James Hughes (Producer)
Barbara Alberts

Principle funding from Science Education Partnership Awards
National Center for Research Resources
National Institutes of Health

Additional funding from the Pittsburgh Foundation

Proudly sponsored by GlaxoSmithKline

In partnership with PTEI, DUQ, CMU, CSC

B

TISSUE ENGINEERING FOR LIFE

"The new science of Regenerative Medicine; imagination and creativity has now harnessed the body's natural powers of healing.

Principle funding from Science Education Partnership Awards
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National Institutes of Health

Additional funding from the Pittsburgh Foundation

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In partnership with PTEI, DUQ, CMU, CSC

executive producers Daniel Farkas & John A. Pollock director John A. Pollock concept development John A. Pollock, Daniel Farkas, Alan Russell creative director Laura Gonzalez principal artist Robert Hoggard original score & special sound effects Roger Dannenberg, Christopher Graves 3D animation Laura Gonzalez, Christine Hardtman computer graphics & special effects Jeremy Carson, Allison Styer, Christopher Graves, Adam Drobotij texture artists Robert Hoggard, Joe Hocking, Laura Gonzalez, Christine Hardtman narration Tina Marie Goff, Donald Marinelli, Keiko Hushlender, Katie Sesny editing & compositing Christopher Graves, Laura Gonzalez web design Adam Drobotij post-production Carnegie Science Center - Buhl Planetarium, John G. Radzilowicz (Planetarium Director), James Hughes (Producer), Barb Albert (Communications Specialist), Elaine Catz (Education Coordinator for Science Content), Linda Ortenzo (Formative Evaluation).

Did children learn from the film?

Knowledge item:	**Item type:**	**% Correct** **Before Show:**
1. What is a stem cell?	Multiple choice[a]	28
2. Where do stem cells come from?	Fill in the blank	1
3. Is there blood in your bones?	Yes/No	41
4. Where is blood made?	Fill in the blank	15
5. What is tissue engineering?	Multiple choice[a]	40
6. What does extracellular matrix mean?	Multiple choice[a]	13
7. What is a heart attack?	Multiple choice[a]	36
8. A growth factor is:	Multiple choice[a]	16

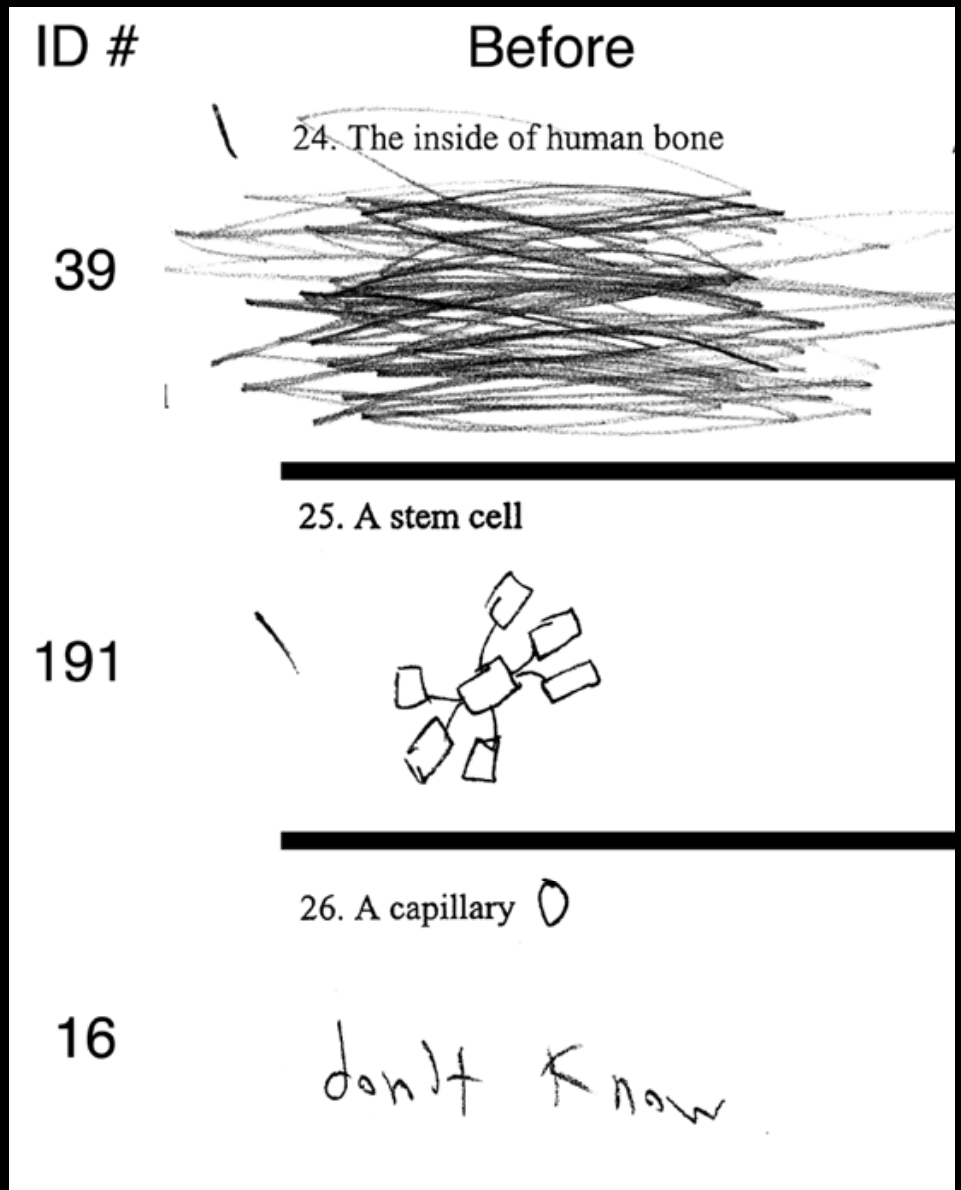
Long, Gonzalez, Pollock 2008. Evaluating the effectiveness of an art-science film on learning and attitudes for children. *Journal of Research in Science Teaching.* Submitted - in revision.

Did children learn from the film?

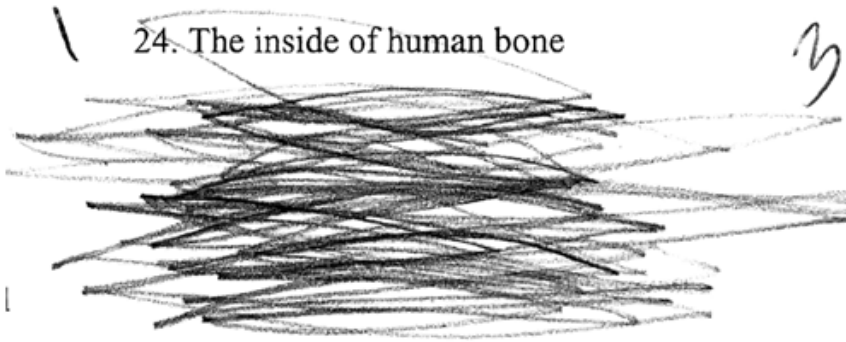
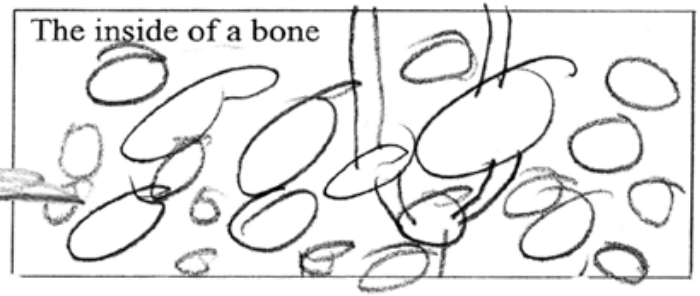
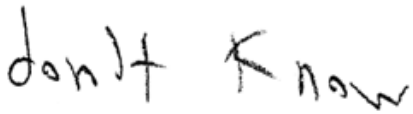
Knowledge item:	**Item type:**	**% Correct Before Show:**	**% Correct After Show:**
1. What is a stem cell?	Multiple choice[a]	28	76
2. Where do stem cells come from?	Fill in the blank	1	29
3. Is there blood in your bones?	Yes/No	41	97
4. Where is blood made?	Fill in the blank	15	41
5. What is tissue engineering?	Multiple choice[a]	40	77
6. What does extracellular matrix mean?	Multiple choice[a]	13	68
7. What is a heart attack?	Multiple choice[a]	36	52
8. A growth factor is:	Multiple choice[a]	16	38

Long, Gonzalez, Pollock 2008. Evaluating the effectiveness of an art-science film on learning and attitudes for children. *Journal of Research in Science Teaching.* Submitted - in revision.

Did children learn from the film? Children's drawings on the survey.



Did children learn from the film? Children's drawings on the survey.

ID #	Before	After
39	24. The inside of human bone 	The inside of a bone 
191	25. A stem cell 	A stem cell 
16	26. A capillary 	A capillary 

So you have decided to make your own movie.

- Think
- Ask your audience
  - what do they know
  - what do they want to know
- Show your work
- Have fun

One of our latest challenges.

Plate tectonics…

Plate Tectonics and the ‘Tree of Life’

www.scotese.com

www.ucmp.berkeley.edu/geology

The **Regenerative Medicine Partnership in Education** presents

Our Cells

Eating and Being

from the depths of the ocean...

...to inside the human body

executive producer and director John A. Pollock *creative director* Laura Lynn Gonzalez *principal artist* Robert Hoggard
script Joana Ricou, Laura Gonzalez *concept development* Laura Gonzalez, Joana Ricou, Patricia Maurides

biological visualization and animation Laura Lynn Gonzalez *modeling, rigging, animation* Taki Boumaza, Evan Miller, Nathanial Morgan
videography Allyson Quinlan *rendering* Peter Kavic and the Entertainment Technology Center

web design Joana Ricou *Duquesne University research interns* Samuel Vallentas, Amelia Possanza *soundtrack* Dae Hong Kim
post-production Carnegie Science Center - Buhl Digital Dome John G. Radzilowicz (Planetarium Director), James Hughes (Producer)

Principal funding from a
Science Education Partnership Award
National Center for Research Resources
National Institutes of Health

How to pay for it:

Be patient and find a way to do it for ‘free’

or

Partner with colleagues across campus

- use a class

Find university funding

NSF (Informal Science Education)

NSF summer supplement

NIH NCRR (SEPA R25)

What's next?

INTRODUCTION

- How to deal with cells -

Search for bad cells with your mouse- they will be outlined! Click on the outlined cell to select it

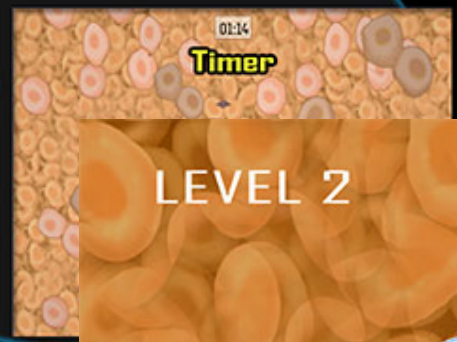
Then choose how to handle the cell by clicking on an icon

INTRODUCTION

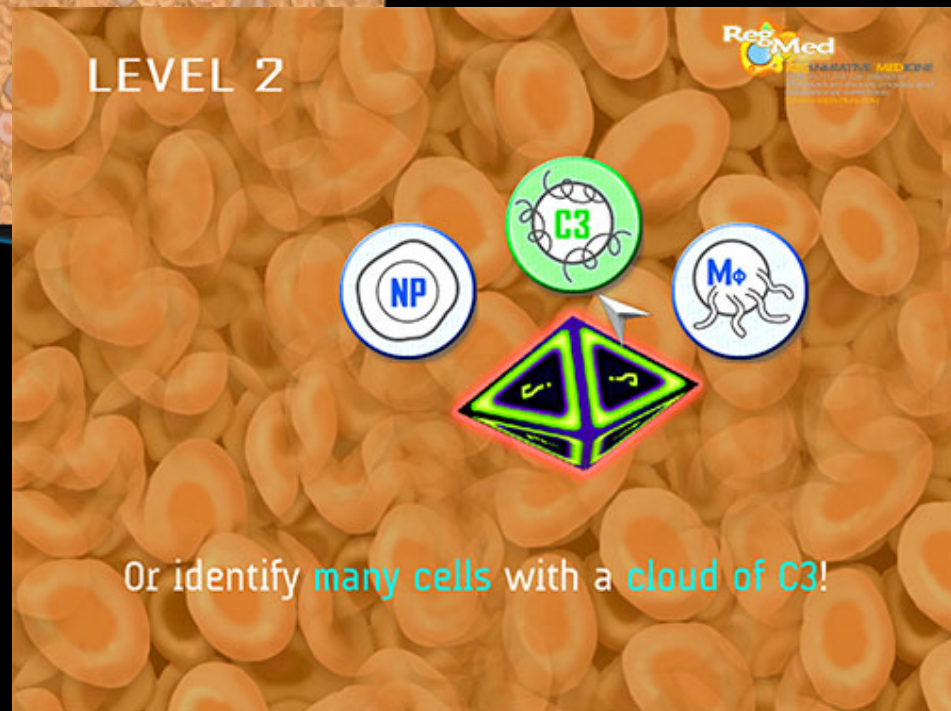
- Goals and Time -

To complete a level, you have to take care of a number of cells.

These goals are listed in the bottom-left corner



Be careful, you have limited time to meet your goals!



Immun-ologee

the video game…

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DARWIN 2009

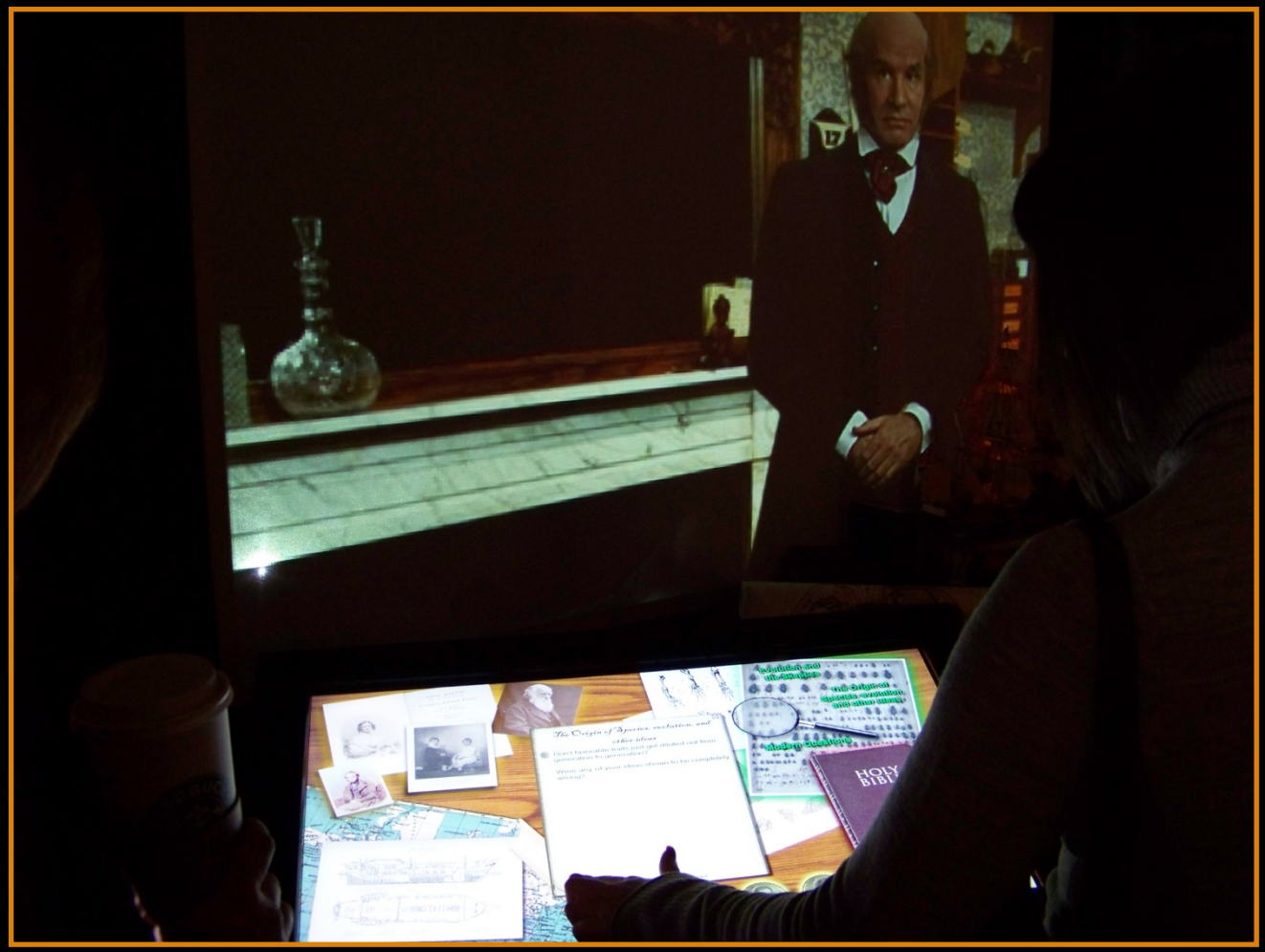
EXploration is Never EXtinct

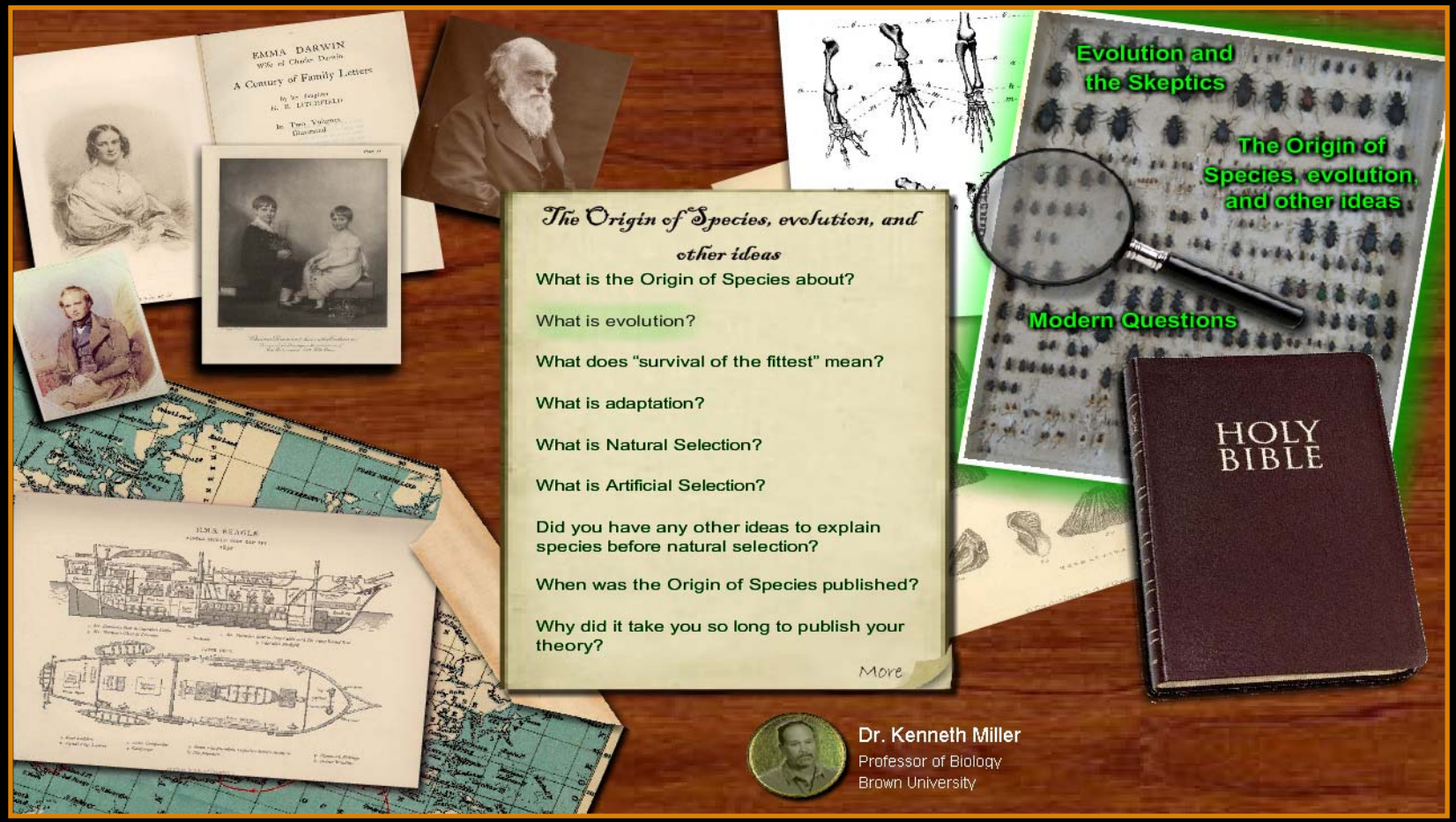
SEPA SCIENCE EDUCATION PARTNERSHIP AWARD

Supported by the National Center for Research Resources, a part of the National Institutes of Health


DARWIN 2009
Exploration is Never Extinct
presented by
DUQUESNE UNIVERSITY
Evidence for Evolution Talks
Darwin at 200: Contributions and Challenges A Duquesne Speaker Series, Spring 2009
Interactive installations, gardens, public art, activities and lesson plans at museums across the city
www.sepa.duq.edu/darwin
John Pollock - pollock@duq.edu
A Pittsburgh Partnership
PHIPPS
PITTSBURGH ZOO & PPG AQUARIUM
children's museum PITTSBURGH
CARNEGIE SCIENCE CENTER
One of the four Carnegie Museums of Pittsburgh
NATIONAL AVIARY
Carnegie Library of Pittsburgh
Carnegie Museum of Natural History


What is evolution?


The Origin of Species, evolution, and other ideas
HOLY BIBLE


EMMA DARWIN
A Century of Family Letters
The Origin of Species, evolution, and other ideas
What is the Origin of Species about?
What is evolution?
What does "survival of the fittest" mean?
What is adaptation?
What is Natural Selection?
What is Artificial Selection?
Did you have any other ideas to explain species before natural selection?
When was the Origin of Species published?
Why did it take you so long to publish your theory?
More
Evolution and the Skeptics
The Origin of Species, evolution, and other ideas
Modern Questions
HOLY BIBLE
Dr. Kenneth Miller
Professor of Biology
Brown University


Dr. Zhe-Xi Luo
Curator of Vertebrate Paleontology
Carnegie Museum of Natural History
What is adaptation?

Thank you.

www.sepa.duq.edu