

# Science on the Sphere: Attack of the Giant Cell

## LESSON #: 2

TITLE: Fantastic Voyage

OVERVIEW: Make a video “fly in” from whole body, to organ system to organs, to tissue, to cell, to inside a cell. Do research on what each looks like and use clay or painting/line drawings, or simple computer animation to do it.

### KEY CONCEPTS:

Learning about the systems of the body, students express their understanding through a variety of mediums.

### STANDARD(S)-BENCHMARK(S):

SC 7.4.3 Describe the levels of organization in organisms, or  
SC 7.5.1 Differentiate between sexual and asexual reproduction

TEACHER BACKGROUND: See these websites for ideas.

<http://hybridmedicalanimation.com/>

<http://www.random42.com/medicalanimation.html>

<http://www.highimpactlit.com/hig>

DURATION: 3-5 class periods not including self-study time.

### VOCABULARY:

**meiosis:** The process of cell division in sexually reproducing organisms that reduces the number of chromosomes in reproductive cells from diploid to haploid, leading to the production of gametes in animals and spores in plants.

#### **mitoses:**

The process in cell division by which the nucleus divides, typically consisting of four stages, prophase, metaphase, anaphase, and telophase, and normally resulting in two new nuclei, each of which contains a complete copy of the parental chromosomes. Also called *karyokinesis*.

The entire process of cell division including division of the nucleus and the cytoplasm.

*The American Heritage® Dictionary of the English Language, Fourth Edition*. Retrieved June 13, 2007, from Dictionary.com website:

<http://dictionary.reference.com/browse/Meiosis>

#### **Flipbook**

A small book consisting of a series of images that give the illusion of continuous movement when the edges of the pages are flipped quickly.

### **Hand Inking**

Prior to the late 1950's, all animation drawings were traced onto cels by hand using a quill pen or brush. A variety of inks were used, but in general, the colored ink lines were simply cel paint thinned down to the proper consistency. Contrary to popular belief, hand inking is not a lost art. It is still widely used in animated commercials, special effects shots and in publicity artwork.

### **Photographic Lines**

The Disney Studios developed a method of reproducing animation drawings to cel by means of a photographic process as early as 1936, for use on *Snow White & the Seven Dwarfs*. The technique continued to be used as late as the early 1950's. In scenes where the camera was required to focus in tight on a very small character, this process was able to produce a fine hairline which was much more accurate than could be achieved by hand inking. The animation was rendered at full size, and then would be reduced photographically to fit the scene. The photographic lines could be dyed several colors as well, but on close inspection, they sometimes appears to be slightly translucent. This technique was discontinued after the development of xerography, and very little information on how it was accomplished has survived.

### **Xerography**

In the late 1950's, the Disney Studios developed a xerographic process to transfer the animator's drawings directly onto cels. *Sleeping Beauty* was the first film to include scenes utilizing this process. At first, only black toner was used, but in the early 70's, browns, greys and other colors were developed. Xeroxed lines appear to be more sketchy than hand inked lines, but since they are transferred directly from the animator's drawings they often retain a sense of "life" and spontaneity that hand inking often lacks.

### **Dry Brush**

To create motion blurs and special textures, inkers would apply paint to the front of the cel using a small amount of thick paint. In some cases, rouge or greasepaint was drybrushed onto the cheeks of characters to simulate blush.

### **Gum Arabic Based Cel Paints**

The most common type of paint used at the various studios was a rewettable, opaque watercolor with a gum arabic binder. Some studios bought ready-made paint, but MGM and Disney custom manufactured their own paints in-house. Although most studios abandoned this type of paint in the early 1960's when synthetic binders were introduced, the Disney Studios continued to manufacture and use it in production until *The Great Mouse Detective* was released in 1986.

### **Casein Based Cel Paints**

In an effort to lower production costs, some studios, most notably the Warner Brothers cartoon studio, used a casein based paint. Made from dairy curd, this binder adhered well to the cel stock for the short term, but its high level of acidity and its tendency to become severely dehydrated made it very unstable over the long term. Almost every cel painted with this type of paint at the Warners Studio has cracked and chipped over time. Because of this, casein type of paint is unsuitable for archival restoration.

### **Vinyl and Acrylic Based Cel Paints**

Since the early 1960's, non-rewettable opaque watercolor paints with a synthetic plastic binder have become the industry standard. Although these commercially available paints are more durable and permanent than vintage gum arabic based paint formulas, they do

not have as wide a variety of pigments as the traditional Disney paint formula. In most cases, the original Disney gum arabic paint formula is preferable for archival restoration.

### **Concept Art**

Inspirational sketches or paintings used to establish the situations, color choices or mood of a particular sequence. These were rendered in a wide range of media, from pastels and graphite, to watercolor and cut paper.

### **Character Models**

Standardized renderings of characters, expressions, props and costumes. **Character Designs** would be created by concept artists or lead animators, and once they were approved, photographic stats, called **Model Sheets** would be produced and distributed to the various departments to insure absolute consistency between the sketches of all of the artists working on a project. Hundreds of photostats would be produced from a single paste-up, consisting of various drawings trimmed and applied to a board. Sometimes animators would create their own model sheets, traced from their own or other artist's drawings.

### **Storyboards**

A series of sketches, similar to a comic strip, which outlines the action and dialogue in a scene. These drawings would be pinned up on a bulletin board and arranged, re-arranged and replaced as the story took shape. Early rough storyboard sketches are referred to as **Thumbnails**, while more detailed drawings would be called **Finished** or **Final Storyboard Panels**.

### **Layout Drawings**

A detailed pencil drawing that either indicates the fielding, the character's action, or the design of the background which acts as the scenery behind the character. There are two types of layouts: **Character Layouts**, which outline the character's path of movement, expressions and action within the scene; and the **Background Layout**, which generally consists of a line drawing of the environment in which the character exists. These layouts are used as reference by the animator and the background painter, respectively.

### **Rough Animation Drawings**

The original, first generation sketch by the animators in creating the movement in a scene. Roughs can be divided into three basic types: **Key Drawings**, which were drawn by the principal animators themselves, **Break-Downs**, which were drawn by both animator and his assistant, and **Inbetweens** which were the work of the assistant animators alone. Generally, the animator would sketch out a key drawing for every five or six frames and leave the drawings between his keys for the assistants to fill in. Once the rough animation was approved, the drawings would be delivered to the assisting department for **Clean Up**. Many collectors prefer roughs to clean ups, because they are often more spontaneous and full of life, and they are more likely to be the work of a lead animator.

### **Clean-Ups**

Tracings of the original animation roughs which are often more detailed and refined than the drawings which preceded them. Created by the assisting department, these sketches represent the final stage of animation before the image is transferred to the cel via hand inking or xerography. These sketches often include colored lines to indicate different ink colors, color mark-ups to tell the painters which areas to paint which colors, and notes to

the ink & paint department about parts of the character that needed to be registered to other characters or background elements.

### **Color Model Cels**

A cel created by the Ink & Paint Department to act as an example for inkers and painters to follow. Color models may be exact duplicates of the cels appearing in the film, or may be test models, exploring various inking techniques or color palettes. Although many collectors assume that color models are less valuable than cels used under the camera, this is not always the case. Since color model cels acted as an example for the inkers and painters to follow, great care was taken to make them absolutely flawless. Cels used under the camera often had flaws due to repairs or corrections quickly done in the heat of production.

### **Animation Cels**

The individual painting on celluloid which is photographed along with other cels and a background in a setup, creating the complete image for a single frame of film. Every cel is different, but this doesn't mean that every cel is unique. Often multiple copies of a cel were created as color models, gifts or as Inker's Tests, which were created by the inkers in their free time to refine their technique and practice their skills.

### **Background Paintings**

A painting or other artwork depicting the environment in which the character operates. First, the Background Stylist made small color sketches called **Key Backgrounds**, which were created to establish the color scheme and mood. These keys acted as a model for the other background artists to follow. Key backgrounds were also referred to as

**Preliminary Backgrounds**. Backgrounds which were rejected or cut from the film were called **N.G. (No Good) Backgrounds**. Although hundreds of animation drawings and cels would be required for a scene, typically there was only one background. A setup featuring a cel and background from the same scene is often incorrectly referred to as a **Key Background Setup**, but a more accurate description would be a **Matching Background Setup**. A cel and background from the same film, but not the same scene is often referred to as a **Production Background Setup**, while a cel and background from different films is correctly referred to simply as a **Background Setup**.

### **Title Cards**

A background painting which acts as part of the the credits for an animated film. The text is often on a cel overlay. Title cards can be divided into several categories: **Series Title**, **Main Title** and **Cast and Crew Credits**.

<http://www.vintageip.com/Term.html>

### MATERIALS NEEDED:

Pens, paper, computer, camera, medical books, access to books and research materials.

### PROCEDURE:

This is better as a follow up lesson about cells and the body.

- 1) Ask students what they know about cells and the body.
- 2) Talk about layers with in the body. Medical books with clear overlay sheets are good for this concept, or see websites below.
- 3) Have the students decide what system of the body they would like to describe.
- 4) Research the topic.

- 5) Create a script of how they are going to explain the concept.
- 6) Storyboard the script.
- 7) Gather pictures and materials.
- 8) Tape or create the final product. (This may be a video, animation drawing, computer animation, stop motion animation with clay, paintings or drawings, flipbooks...)
- 9) Turn in and/or present.

#### EXTENDED ACTIVITIES:

Take students to the school library to learn about how to research their topic.

Cell Film Festival a day when the students or groups share their work, watch with popcorn and other goodies.

#### RESOURCES:

Web:

<http://www.pixar.com/howwedoit/index.html#> Pixar explains how to make an animated movie.

<http://www.vintageip.com/Term.html> vintage animation terms

<http://hybridmedicalanimation.com/>

<http://www.random42.com/medicalanimation.html>

<http://www.highimpactlit.com/hig/>

<http://www.innerbody.com/htm/body.html>

<http://dictionary.reference.com/browse/Meiosis>

#### Music ideas:

Kate Bush's "Breathing" is on "Never For Ever" album

Pearl Harbour and the Explosions "Nerves" is on the "Pearls Galore" album

Siouxsie and the Banshees "This Town ain't big enough for both of us" (heartbeat, frenetic rhythm) on "A Kiss in the Dreamhouse"

Barenaked Ladies "Stomach vs. Heart" on Born on a Pirate Ship

<http://www.lyricsnet.net/lyrics.php?id=257>

Here's a site with a number of body tunes:

<http://www.schoolhouserock.tv/Body.html>

the ever popular: (see also:<http://www.niehs.nih.gov/kids/lyrics/bones.htm>)

## **Dem Bones**

**The foot bone's connected to the leg  
bone,  
The leg bone's connected to the knee  
bone,  
The knee bone's connected to the  
thigh bone,  
The thigh bone's connected to the  
back bone,  
The back bone's connected to the neck  
bone,  
The neck bone's connected to the head  
bone,  
Oh, we know all dem bones!  
Dem bones, dem bones, dem dry  
bones  
Dem bones, dem bones, dem dry  
bones**

**Dem bones, dem bones, dem dry  
bones  
Oh, we know all dem bones!**

**The neck bone's connected to the head  
bone,  
The neck bone's connected to the back  
bone,  
The back bone's connected to the  
thigh bone,  
The thigh bone's connected to the  
knee bone,  
The knee bone's connected to the leg  
bone,  
The leg bone's connected to the foot  
bone,  
Oh, we know all dem bones!**

## album Straight Outta Lynwood by "Weird" Al Yankovich

Oooh oooh oooh ee-oooh oooh oooh	juice Flow, flow, into the duodenum	deudenum)
Ahh ahh ahh ahh ahh ahh-oooh oooh Ooooooh	Won'tcha Flow, flow, flow, pancreatic juice Flow, flow, into the duodenum Insulin, glucagon	Can't you see I love my pancreas  {Lipase, amylase, and trypsin} [Insulin, glucagon] (Won'tcha flow flow flow, pancreatic juice)
I'm always thinkin' 'bout it I don't know what I'd do without it I love, I really love My pancreas	(Won'tcha flow, flow, flow, pancreatic juice)	Golly-gee I love my pancreas
My spleen just doesn't matter Don't really care about my bladder But I don't leave home without My pancreas	Comin' from the islets of Langerhans...  (Flow flow, into the deudenum) Insulin, glucagon (Won'tcha flow flow flow, pancreatic juice)	{They gonna help with our digestion} [Comin' from the islets of Langerhans...] (Flow flow, into the deudenum)
My pancreas is always There for me Ahh-oooh	Comin' from the islets of Langerhans...	Can't you see I love my pancreas
Secreting those enzymes (bap bap bap) Secreting those hormones too Metabolizing carbohydrates Just for me	(Flow flow, into the deudenum)	{Lipase, amylase, and trypsin} [Insulin, glucagon] (Won'tcha flow flow flow, pancreatic juice)
Ba-ba ba ba-ba ba ba ba-ba ba ba My pancreas Ba-ba ba ba-ba ba ba ba-ba ba My pancreas Ba-ba ba ba-ba ba ba ba-ba ba ba My pancreas Ba-ba ba ba-ba ba ba ba-ba ba My pancreas	Lipase, amylase, and trypsin  [Insulin, glucagon]  (Won'tcha flow, flow flow, pancreatic juice)	Golly-gee I love my pancreas  {They gonna help with our digestion} [Comin' from the islets of Langerhans...] (Flow flow, into the deudenum)
Ba-ba ba ba-ba ba ba ba-ba ba ba My pancreas Ba-ba ba ba-ba ba ba ba-ba ba My pancreas Ooooooh	They gonna help with our digestion  [Comin' from the islets of Langerhans...] (Flow flow, into the deudenum)	Can't you see I love my pancreas  {Lipase, amylase, and trypsin} [Insulin, glucagon] (Won'tcha flow flow flow, pancreatic juice)
My pancreas attracts every other Pancreas in the universe With a force proportional To the product of their masses And inversely proportional To the distance between them	Lipase, amylase, and trypsin  [Insulin, glucagon] (Won'tcha flow flow flow, pancreatic juice)	Golly-gee I love my pancreas  {They gonna help with our digestion}
Woo woo woo woo	They gonna help with our digestion	[Comin' from the islets of Langerhans...] (Flow flow, into the deudenum)
Don'tcha you know you gotta Flow, flow, flow, pancreatic	[Comin' from the islets of Langerhans...] (Flow flow, into the	Can't you see I love my pancreas