

# CELLS *alive!*

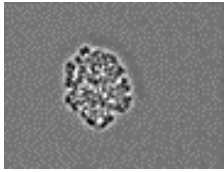
## Library of Stock Video

The following video clips are available for educational use in both VHS and CDROM format and can be purchased through [www.cellsalive.com](http://www.cellsalive.com) and Yahoo! Stores. They are also available in BetaCAM and DVCAM formats for broadcast and production.

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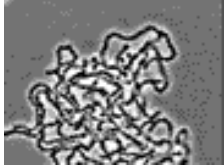
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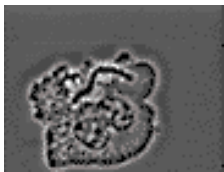
### 1.1 *Streptococcus pneumoniae*

*Strep pneumo* (aka *Pneumococcus*) are bacteria that can cause ear infections and pneumonia and are becoming resistant to antibiotics. This growth is shown at 540 times real speed.



### 1.2 Group A, beta-hemolytic *Streptococcus pyogenes*

Bacteria isolated from a patient with necrotizing fasciitis, this organism is sometimes called "flesh-eating bacteria" and can be fatal in occasional cases. Shown growing time-lapse in culture.



### 1.3 Necrosis in neutrophil eating leukotoxic *Strep*

*Streptococcus pyogenes* (Group A, beta-hemolytic) have toxins on their surface that can lyse red blood cells and can also lyse white blood cells. The white cell is eating these *Strep* and both kills the bacteria and is killed by the bacteria.



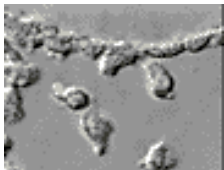
### 1.4 Apoptosis in human neutrophil

Apoptosis, also called "programmed cell death", is a process inherent in many cells of the body. In the embryo, hands start as "paddles" until cells between prospective fingers die by apoptosis. Apoptosis has been triggered in this white blood cell by turning off the cell's protein synthesis. Neutrophils are produced constantly in the marrow and leave to circulate in the blood. After 24 hours they undergo apoptosis and are eaten by other body cells.



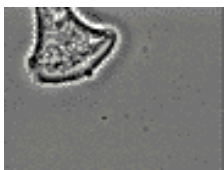
### 1.5 Penicillin killing *E. coli*

Penicillin kills bacteria by interfering with the bacteria's cell wall production. The cell wall weakens and the bacteria bursts.



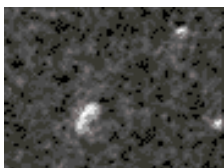
### 1.6 Chemotaxis of human PMN

White blood cells "smell" bacteria and move toward the smell by the process called "chemotaxis".



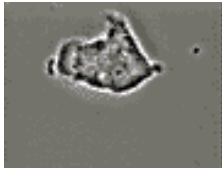
### 1.7 Neutrophil ingesting *E. coli*

This white blood cell is eating a common intestinal bacteria, *Escherichia coli*. White cells eat bacteria and kill them by a variety of methods - oxidative activity, production of hydrogen peroxide, special antibiotics etc.



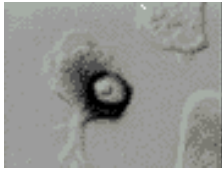
### 1.8 Capsule of *Streptococcus pneumoniae*

Besides being resistant to some antibiotics, *Stretococcus pneumoniae* has a slippery capsule on its surface that can be seen when the bacteria are suspended in India Ink.



### 1.9 The capsule of *Strep pneumo*

Besides being resistant to antibiotics, *Strep pneumo*'s capsule is slippery and helps the bacteria avoid being eaten and therefore killed by white cells.



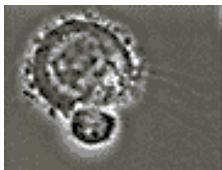
### 1.10 Neutrophil oxidative burst - NBT

One important method of killing employed by white cells is the oxidative burst. The white cell produces an anti-bacterial called "superoxide anion" and the production can be visualized by the use of a dye - nitroblue tetrazolium (NBT).



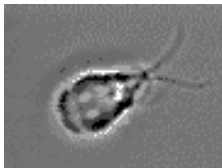
### 1.11 Human macrophage eating *Candida albicans*

Another white cell type, the macrophage, lives longer than neutrophils, sometimes inhabiting body tissues, and is here shown eating a pathogenic fungal (yeast) cell, *Candida albicans*.



### 1.12 Cytotoxic T lymphocyte killing influenza-infected cell

Lymphocytes can "learn" to recognize cells that are infected with viruses or that are cancerous. They attack and kill these cells. The smaller cell is the T cell, the larger one the infected cell. T-cells are the ones that drop in number in people with AIDS.



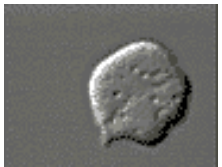
### 1.13 *Giardia lamblia*

Water-borne parasite that often infects wild/domestic animals and can infect humans that drink from streams/wells. Giardiasis also called "beaver fever" and the *Giardia* lives in the intestinal, sticking onto the intestinal wall and sometimes coating the surface. Results in weight loss.



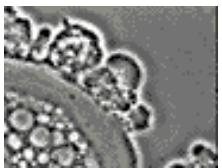
### 1.14 Excystation of *Cryptosporidium parvum*

Cysts of this water-borne parasite can be found in some public water supplies. Takes only 4-6 cysts to infect. You drink the water, the cyst passes the stomach where acid weakens the cyst wall, and in the intestine, the little caraway seed-like sporozoites invade the intestinal wall and produce more cysts. Sporozoites are shown escaping their cysts. Can be fatal in suppressed immune individuals like AIDS.



### 1.15 *Entamoeba histolytica*

Water-borne, free-living parasite, causes amoebic dysentery to invasive liver abscess.



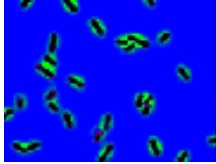
### 1.16 *Entamoeba histolytica* lysis of human neutrophils

Though much smaller, white blood cells will attack Entamoeba. But toxin(s) on the ameba's surface bursts the white cells on contact. Wave after wave of white cells are shown exploding on contact.



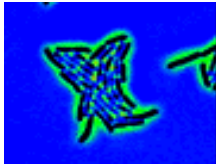
### 1.17 Human neutrophils mobbing *Trichomonas vaginalis*

White cells gang up on this vaginal parasite and tear it into pieces small enough to ingest.



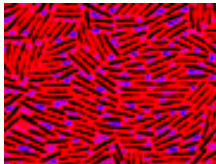
### 2.1 Motility of *E. coli*

Common intestinal bacteria in real time. They swim by means of hair-like flagellae that cannot be seen at this magnification. Color is added at time of recording by computer.



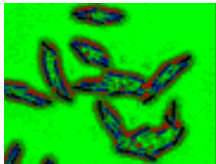
### 2.2 Growth of *E. coli* speed x440

These bacteria were grown on the microscope stage and are shown at 440 times real speed. Each bacterium can divide every 20-30 minutes.



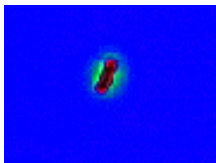
### 2.3 Motility of *Salmonella enteritidis*

Another rod-shaped bacteria, *Salmonella enteritidis* can be found in raw eggs, which have become the number one cause of food-poisoning outbreaks in the US.



### 2.4 Growth of *Salmonella enteritidis* Speed x 360

These are the same bacteria as in V2N03 but shown dividing in time-lapse at 360 times real speed.



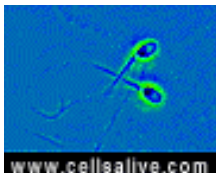
### 2.5 *Helicobacter pylori*

A bacterium just discovered in past few years and shown to be the cause of most stomach ulcers. Has led to treatment of ulcers with antibiotics rather than just antacids.



### 2.6 *Artemia*

AKA "Sea Monkeys" or Brine Shrimp shown hatching (6a), hatched nauplius (6b), at 3 days (6c) and a 15-day-old adult (6d). *Artemia* eggs can remain viable for years without water. Ordered from the back pages of magazines, and rehydrated with salt water for just a few hours, the embryos begin hatching as nauplius larvae. See them hatch, and see the nauplii swim, bob and dart.



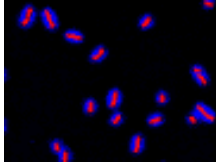
### 2.7 Human Sperm

Sperm are some of the most active cells in the body, their motility responsible for getting them to the site of an ovum for fertilization. Both black and white and colorized clips show their rapid whip-like movement, as well as their morphology: head with enclosed DNA, midpiece, and tail (flagellum).



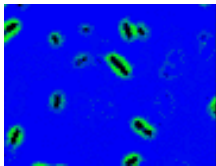
### 3.1 Human T lymphocytes attack and kill melanoma cells

T-cells learn to recognize infected or cancerous cells and attack and rid the body of those cells.



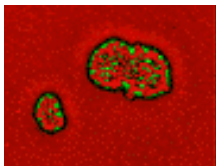
### 3.2 Motility of *Pseudomonas aeruginosa*

These bacteria are seen swimming in liquid culture.



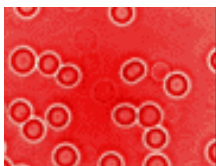
### 3.3 *Escherichia coli* + coliphage T4 Speed X 180

These bacteria were infected with a virus (coliphage T4) which injects DNA into the bacteria. The DNA is incorporated into the bacteria's DNA, makes multiple copies of the virus which burst from - and kill - the bacteria.



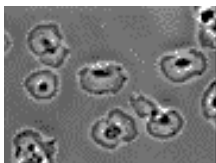
### 3.4 *Staphylococcus aureus* Speed X 600

These pathogenic bacteria are shown dividing on tryptic soy agar (TSA).



### 3.5 Lysis of Red Blood Cells by Complement and Antibody

Complement and antibodies are both components of the immune system that jointly help in fighting infection and foreign tissue. Here, antibody and complement work together to lyse these "foreign" red blood cells.



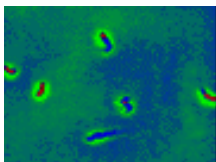
### 3.6 Human platelets crawling on glass

Platelets are important in wound healing, especially in quickly adhering to cut tissue and in the production of a blood clot. They can also be dangerous when activated because they can adhere to blood vessel walls thereby constricting blood flow.



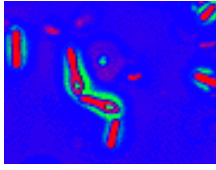
### 3.7 *Ochrobactrum anthropi*

This "oil-eating" bacterium shown swimming around large droplets of oil.



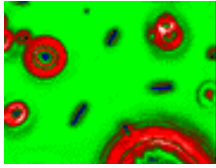
### 3.8 *Vibrio anguillarum*

Shows motility of a short curved rod-shaped bacterium. Both tumbling and swimming are evident. This organism is a known pathogen of fish.



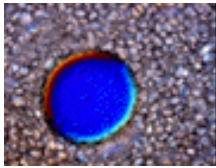
### 3.9 *Clostridium botulinum*

These bacteria produce the toxin responsible for botulism - sometimes found in under-sterilized canned foods. Some of these are shown lysing (dying) as toxin builds up over a five day period (9a), some are shown as spores (the bacteria with the bright "holes" in them, 9b). The spores are very refractile making them appear as they do. When heated, the spores germinate producing more bacteria which can then divide by binary fission.



### 3.10 *Lactobacillus sanfrancisco*

These bacteria were isolated from sourdough starter used in a San Francisco bakery that has been in business since 1849.



### 3.11 *Saccharomyces cerevisiae*

Bubbles of carbon dioxide that are released by yeast or bacteria are responsible for "rising" bread. This is a time-lapse close-up of bubble formation.

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## Volume 4 – Mitosis, cancer cells, bacteria, dust mites

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### 4.1 Mitosis in an animal cell

Cells from the Chinese Hamster Ovary are shown undergoing mitosis. Beginning with a cell spread on the substrate, follow prophase, anaphase, metaphase, telophase, cytokinesis and reattachment of the two daughter cells to the substrate.



### 4.2 Human melanoma cells growing in culture

Unlike normal cells which in culture grow only until there is one solid layer of cells, cancer cells grow over one another unchecked. Shows multiple cell divisions (mitosis) over a 48 hour period.



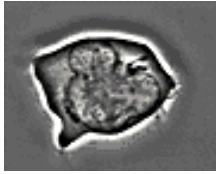
### 4.3 Human breast cancer cell

Shows a broad ruffling membrane of an individual adherent cell.

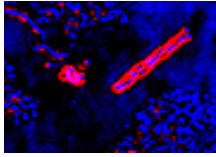


### 4.4 Human prostate cancer cells

Both a single cell and a culture showing a variety of cell shapes in which dividing cells are apparent.

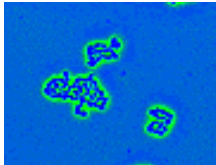


#### 4.5 Human lymphoma cells



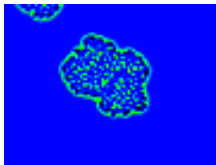
#### 4.6 *Spirillum volutans*

Illustrates the rapid darting motility of these flagellated spiral-shaped aquatic bacteria. Color-enhanced phase contrast microscopy.



#### 4.7 *Enterococcus faecalis*

These bacteria are known to become antibiotic-resistant and are shown here in time-lapse growth sequences. These were photographed using color-enhanced phase contrast microscopy.



#### 4.8 *Streptococcus pneumoniae*

Commonly becoming antibiotic-resistant. These pathogens cause ear infections and pneumonia. Color-enhanced phase contrast microscopy.



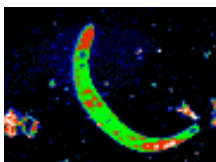
#### 4.9 *Dermatophagoides farinae* (dust mite)

Dust mites are common in household dust and are responsible for allergic responses in susceptible people. It's primarily the feces that cause problem

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## Volume 5 – Pond animals

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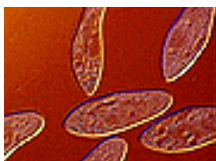
#### 5.1 Diverse organisms from a farm pond

These are shown with both optical and electronic color enhancement and include mixed populations of rotifers, ciliates, euglenoids, bacteria and more, all from a 600 sq. ft. farm impoundment.



#### 5.2 *Amoeba proteus* (Sarcodinid)

Motility of this protozoan is shown at 2x normal speed to highlight cytoplasmic flow. Visible are the nucleus, vacuole and numerous organelles and food inclusions.



#### 5.3 *Paramecium multimicronucleatum*

Sequences show the motility of this ciliated protozoan and the repetitious activity of both anterior and posterior contractile vacuoles.



#### **5.4 *Spirostomum* - ciliated protozoa**

Though they look a bit like worms, these are ciliates that move with a gentle gliding motility.



#### **5.5 *Stentor***

Shows the slow deliberate movement of this ciliate, as well as the internal structure including the string of nuclei.



#### **5.6 *Euglena***

The organelles of this flagellated alga are clear, such as the red eyespot, the chloroplasts, and the flagella. Unrestricted, *Euglena* moves in a rotating motion using its flagella. When restricted between slide and coverslip, the pellicle gives and the *Euglena* can flex using its internal contractile machinery.



#### **5.7 *Volvox* - Flagellated alga**

Shows the gentle tumbling motility of this flagellated colonial alga.



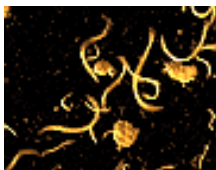
#### **5.8 *Philodina* - Rotifers**

Shows leech-like movement and the characteristic cilia from which they get the name "rotifer" and with which they procure food. Shows smaller organisms being moved by the cilia.



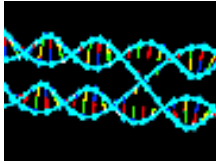
#### **5.9 *Daphnia pulex* - Crustacean**

Shows beating heart, eggs in brood pouch, and the saltatory swimming motion that gives them their common name "water flea".



#### **5.10 *Cephalobus* - Nematode**

Nematodes are roundworms and have both a mouth and anus. Some nematodes are parasitic, but most are free-living and found in soil and aquatic habitats. VERY WIGGLY!



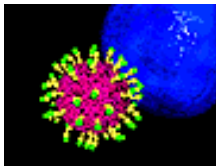
### 6.1 DNA: Homologous recombination

Two double helices exchange homologous regions, usually so that a non-homologous region farther down can be inserted. This method can be used for insertion of viral DNA into a host cell's genome.



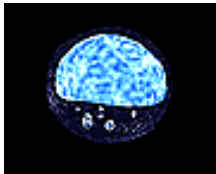
### 6.2 DNA: Gene insertion

One double helix segment being inserted into a longer helix.



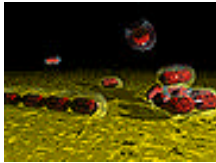
### 6.3 HIV Infection Cycle

Approach, contact, capsid entry, reverse transcription, through budding of new HIV particles from the host surface.



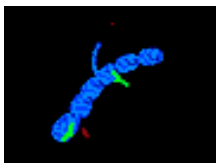
### 6.4 Lymphocyte

Shows the ruffling activity of the cell membrane, the nucleus and cell granules.



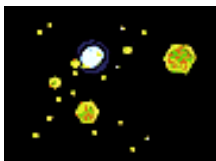
### 6.5 Bacterial motility

Bacteria move by the use of flagellae that give the bacteria a rotary, darting motion as shown in this animation.



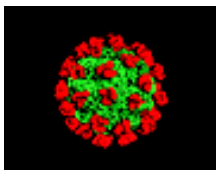
### 6.6 Antibodies and bacteria

Illustrates the attachment of antibodies onto bacteria. Antibodies help "butter" them up for white blood cells to eat.



### 6.7 Viral infection and release

A generic virus approaches a cell, enters, and the viral genome enters the host nucleus. Multiple copies of the virus are produced and burst from the infected cell.



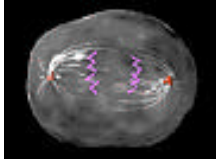
### 6.8 Viral antigens

Rotating generic virus with a variety of antigen surface structures.



### 6.9 Neurotransmitters and drugs

Illustrates normal activity as well as the effect of various drug classes on neurotransmitter activity and reuptake (e.g. selective serotonin reuptake inhibitors or SSRIs).



### 6.10 Mitosis

Shows all stages from undivided mother cell through prophase, anaphase, metaphase, telophase, and cytokinesis to form two identical daughter cells.



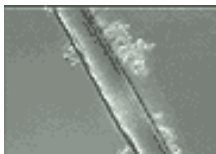
### 6.11 Antibiotic Resistance

When a population of bacteria is subjected to an antibiotic, many bacteria are killed, but a few may have the ability to evade death. If so, this ability can be passed to later generations. This sequence illustrates the phenomenon of antibiotic resistance - those bacteria that are not killed by a first wave of antibiotic continue dividing and are unaffected by later doses of the drug.

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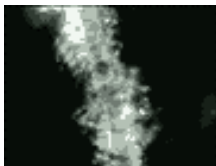
## Volume 7– Bacterial biofilm, toenail fungus, heart cells, roots

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### 7.1 Biofilm Growth - *Pseudomonas aeruginosa*

Rocks in a stream bed are often slippery due to the growth of a mixed population of attached bacteria, algae and fungi. These *Pseudomonas aeruginosa* (bacteria) are shown growing on the surface of a fiber and forming a single species biofilm.



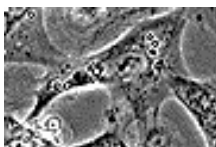
### 7.2 Biofilm Growth - *Escherichia coli*

Like *Pseudomonas*, *E. coli* can sometimes grow as a dense mat of cells on a surface. Biofilms growing on the surface of catheters in hospitalized patients can be hazardous.



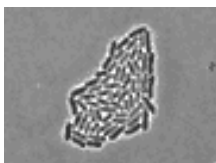
### 7.3 Toenail fungus – *Trichophyton mentagrophytes*

Conidia of a common fungus that grows on human toenails are shown sprouting hyphae.



### 7.4 Embryonic heart cells

Individual cells from the chick heart start beating spontaneously when grown in culture. Once good "electrical" connections are formed between adjacent cells, entire sheets of cells begin beating in unison.



### 7.5 Bacterial growth - *Serratia* sp

These rod-shaped bacteria commonly live in soil and water. Some species of *Serratia* are pathogenic, causing septicemia and pulmonary infection.



### **7.6 Clover root growth**

These time-lapse sequences show the advancing root tip of germinating clover seeds.  
Time-lapse: 600 X real time.



### **7.7 Clover root hairs**

Nutrient uptake is maximized in young roots by root hairs. These projections of single root cells extend into the surrounding soil and provide a much higher surface area/volume ratio in contact with the nutrient source.



### **7.8 Cytoplasmic streaming in root hairs**

Cytoplasm in the root hairs streams to the root tip and back, further increasing the efficiency of waste product removal, nutrient uptake, and transport to and from the main root structure.

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