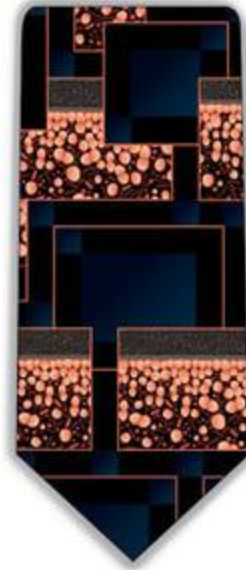


Cholera: Disease Mechanisms

Ken Teter, Ph.D. & Carly Bader

Department of Molecular Biology and Microbiology

Infectious Awareables



<http://www.iawareables.com/>

MOMA & DNA



Google: Musuem of Modern Art DNA

Creativity in the Arts & Sciences Event

The University of Florida HHMI Science For Life Program invites you to participate in the **3rd Annual Creativity in the Arts and Sciences Event (CASE)** sponsored by HHMI. This follows successful events in 2009 and 2010, each of which drew over 150 art and science undergraduate student participants from across the US and nearly 1200 guests in attendance.

We are seeking undergraduate students from Furman University, Morehouse College, Emory University, Louisiana State University, Florida International University, University of Miami and the University of Florida interested in displaying original artwork, including visual, musical, dance and theatre performances, or scientific research posters. Participants may compete for the **Science For Life Undergraduate Creativity Award** within either the Sciences or Arts categories. In addition, there is a new category this year for posters and performances/visual art that are coordinated between art and science students. This monetary award can be used to attend a scientific meeting, professional conference, workshop, art exhibition or similar opportunity as well as to purchase lab or art supplies.

When applying, you will be asked to describe how you intend to use your award.

All students who received the SFL Undergraduate Research Award in 2010 are required to participate. Due to space and time limitations, all arts and previous science students interested in participating must first apply below. Your application will be reviewed by faculty from UF within the field of the material and you will be notified by **December 7, 2010**, as to your acceptance.

Jennifer Hodges (jhodges@arts.ufl.edu).

Event Details

Date: Sunday, January 16, 2011

Time: 10:00AM - 5:00PM

Venue: The Reitz Union Grand Ballroom and The McGuire Pavilion Dance Studio

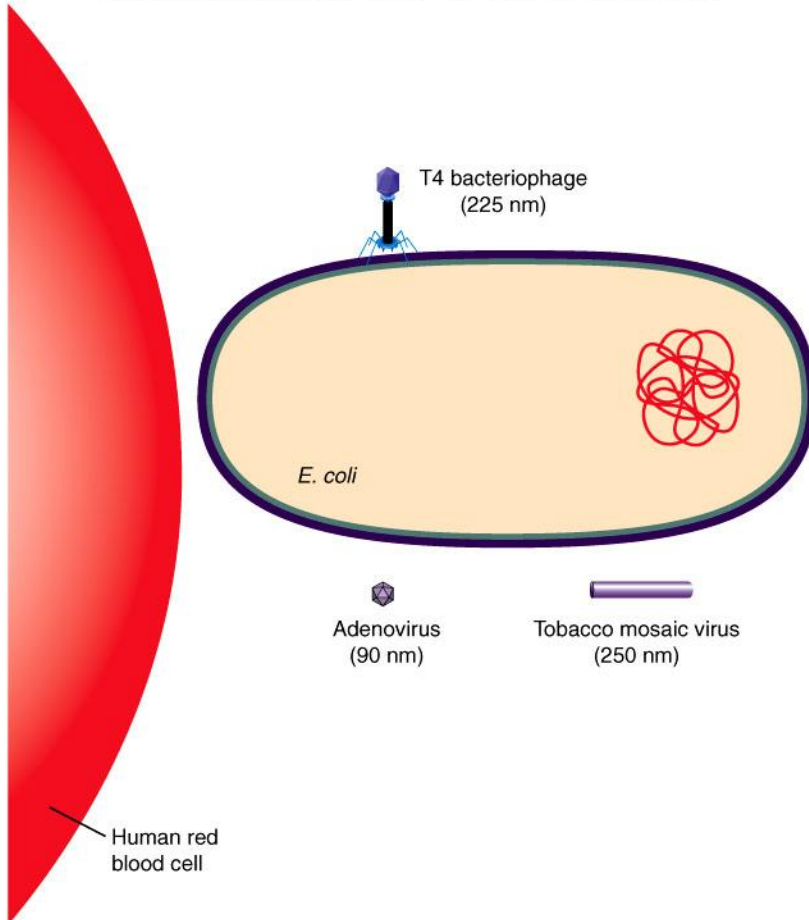
Application Deadline: Friday, November 29, 2010

Application Response: Tuesday, December 7, 2010

<http://sfl.chem.ufl.edu/index.php?link=creativity>

Infectious Disease

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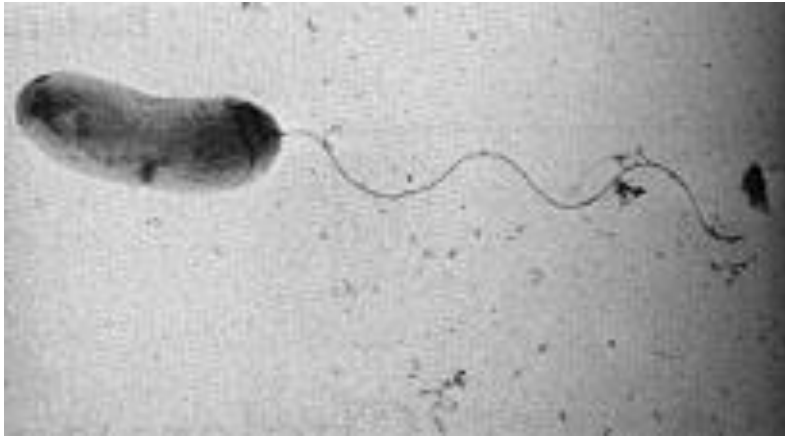


Bacteria and viruses
are not the same thing!

Even bacteria can get viral infections

The size of things...

Pathogens

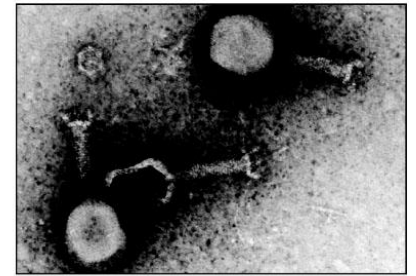
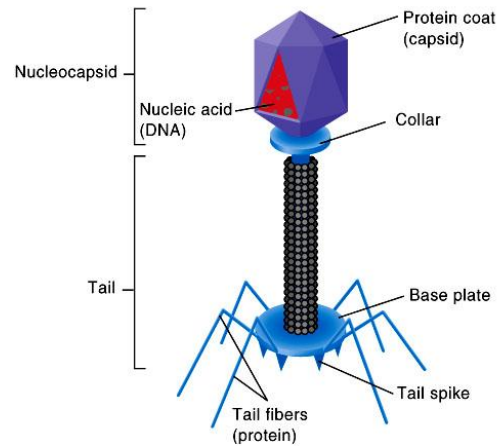


Vibrio cholerae

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(c) Complex (T4 bacteriophage)



100 nm

viruses (bacteriophage)

Cholera

Life-threatening diarrhea



FYI: most bacteria are not harmful

Symptoms

TABLE 5. Clinical response of healthy North American volunteers to various doses of *V. cholerae* El Tor Inaba strain N16961^a

Dose ^b	Clinical attack rate	Mean incubation (h)	Mean diarrheal stool vol per ill volunteer (range)	Mean no. of loose stools per ill volunteer (range)
10 ⁶	9/10 ^c	25.5	3.2 liters (0.4–13.1)	12.9 (2–39)
10 ⁵	3/5	18	3.1 (0.4–3.7)	15 (9–21)
10 ⁴	4/5	36.5	1.1 (0.6–1.5)	6.5 (4–10)
10 ³	4/6	33.3	0.9 (0.4–1.9)	5.8

^a From reference 245 with permission of the publisher.

^b Volunteers ingested 2 g of sodium bicarbonate prior to ingesting inoculum.

^c Number ill/number of volunteers challenged.

Individual genetic differences can play a important role in the severity of disease

Individuals heterozygous for deltaF508 CFTR are highly resistant to severe disease

Epidemiological Studies

Dr. John Snow, 1854 London

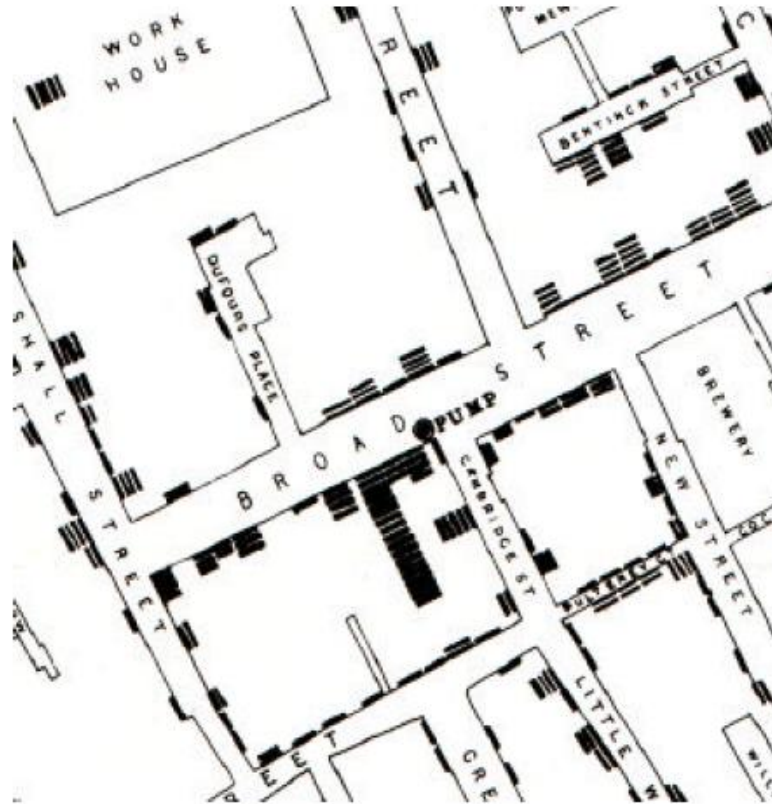
Table 1: Cholera deaths in 1854 in Snow's Grand Experiment

<i>Water Company</i>	Number of households	Cholera deaths	Deaths per 10,000 households
Southwark and Vauxhall Company <i>(inlet remained in London section of river)</i>	40,046	1,263	315
Lambeth Company <i>(had moved inlet to cleaner upriver location)</i>	26,107	98	37
<i>Rest of London</i>	256,423	1,422	59

Epidemiological Studies

The Broad Street Pump

Fig. 1. John Snow's cholera map, 1854

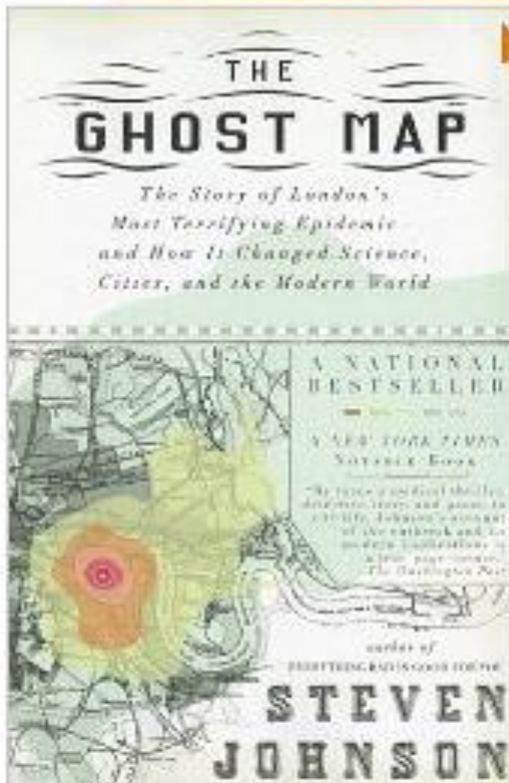


The Broad Street Pump



The Ghost Map

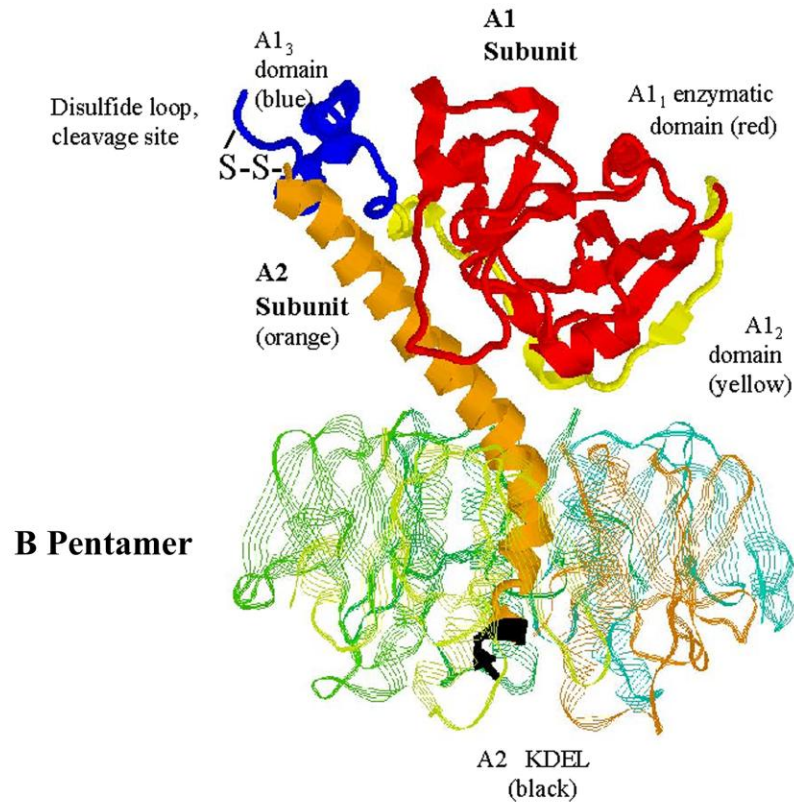
Click to **LOOK INSIDE!**



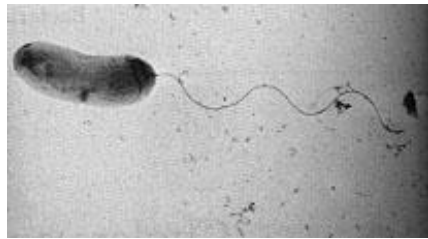
<http://johnsnow.matrix.msu.edu/index.php>

<http://www.ph.ucla.edu/epi/snow.html>

Cholera Toxin

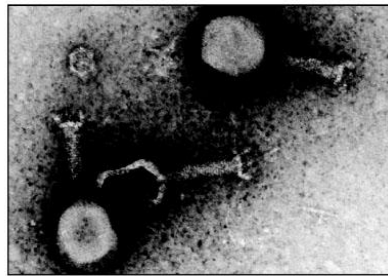


Cholera Toxin



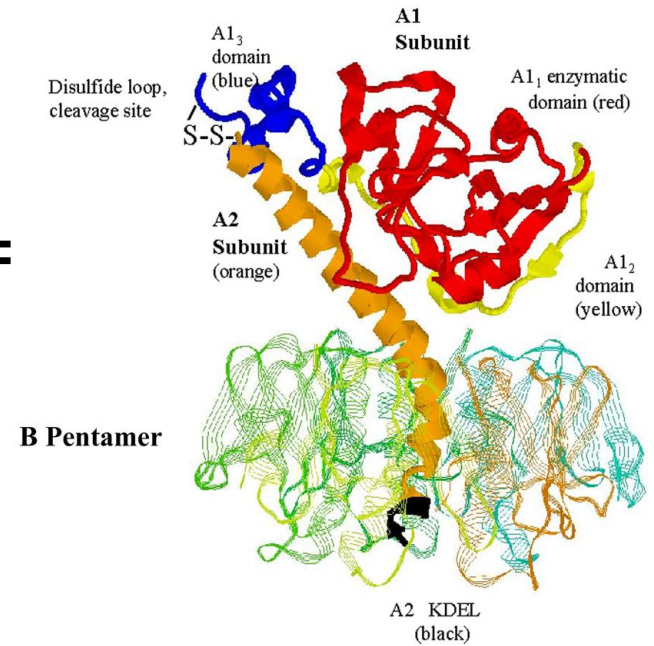
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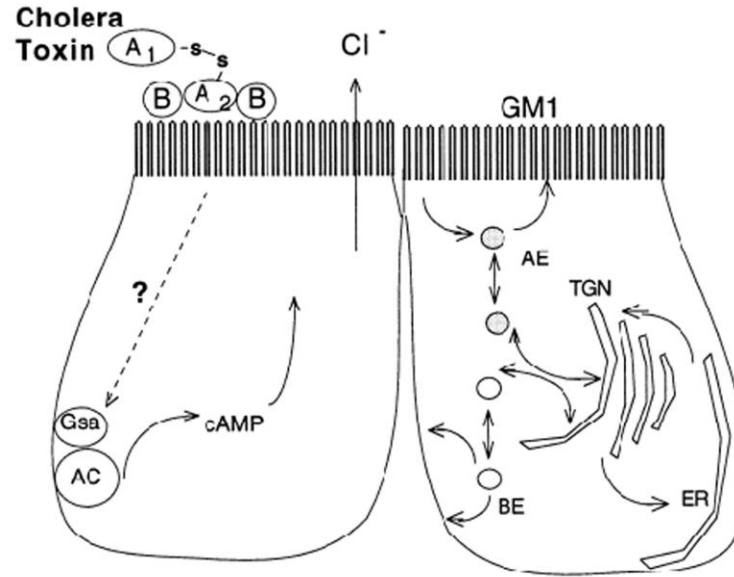
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Cholera toxin is encoded by phage DNA present in *V. cholerae*

How Cholera Toxin Works

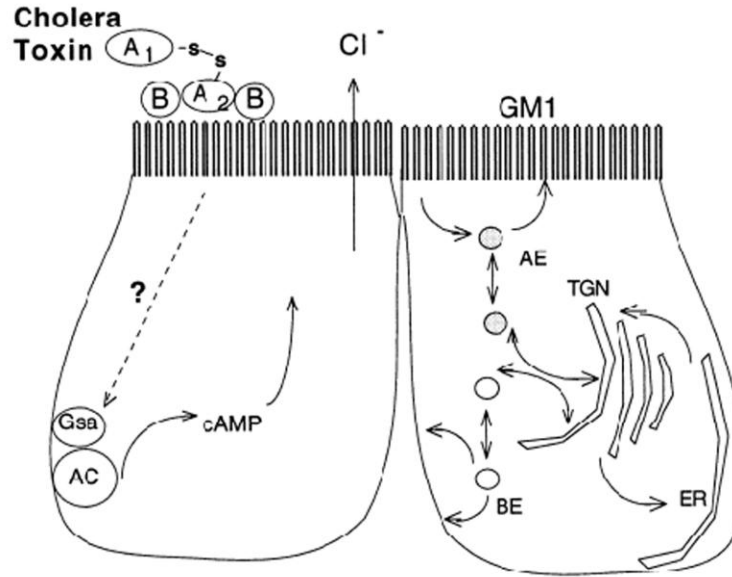


High cAMP levels trigger chloride efflux from membrane ion transporter
ion transporter = cystic fibrosis transmembrane regulator

Constitutively high cAMP levels = continual chloride efflux from intestinal cells
osmotic flow of water out of cells = diarrhea

The intestines act like a wick, drawing water out of the entire body

How Cholera Toxin Works



Cholera toxin is made outside the cell but functions inside the cell

If we understand how cholera toxin gets inside the cell, we can develop therapies to block entry into the cell (toxin is inert if outside the cell)

Many vaccines work by preventing toxins (pertussis, diphtheria, tetanus) from getting inside the cell