

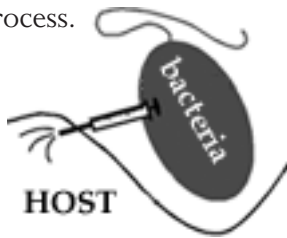
# NASTY BUGS, CLEVER BUGS

Dr. Brett Finlay studies the relationship between microorganisms and mammals. In particular, his research focuses on a number of bacteria (eg. *Salmonella* and *E. coli*) which are responsible for a variety of human gastrointestinal diseases. His lab uses a lot of microscopy and DNA techniques to look at the molecules involved in the infection process.



Dr. Brett Finlay

\* Both *Salmonella typhimurium* and Enteropathogenic *E. coli* are able to do this by delivering the recognition molecules to the host cell. These recognition molecules are one of many virulence factors the bacteria produces to aid the infection process.



Using a Type III Secretion system to inject recognition molecules so that the bacteria can now interact with and infect the host cell...

\* In order for bacteria to infiltrate a host cell, there needs to be molecules on the host cell's surface that can recognize and bind with molecules on the bacterial cell's surface. This way, there can be a strong interaction between the two, so that infection can occur.

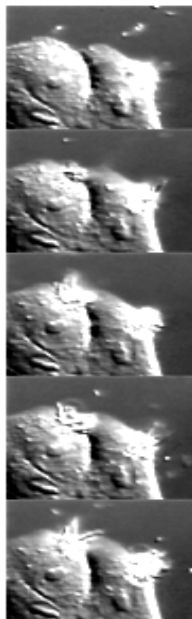


This bacterial trickery is a little like the legend of the Trojan Horse.

\* Delivery is mediated by a special molecular syringe apparatus that is referred to as a TYPE III SECRETION SYSTEM. (If you think about it, it's a rather sneaky way to force your cells into interacting with the pathogenic bacteria!!)



wash your hands!



\* *Salmonella typhimurium* is the mouse form of *Salmonella typhi*, a bacteria responsible for typhoid fever. This is a serious illness characterized by sustained fever, bacteria in the blood, and abdominal tenderness. It is prevalent in the developing world with about 12.5million cases each year.

Some of the injected factors cause spectacular changes in the host cell. Here are images depicting the creation of "finger-like" structures that grasp and swallow the bacteria (*Salmonella*) - this is how this bacteria gets in.



The infection of your cells by bacteria is a little like a battlescene in a war. Think of the bacteria as an advancing army, and your cells as a castle under siege.

\* Enteropathogenic *E. coli* (EPEC) is the major cause of neonatal diarrhea in developing countries, killing close to 1 million children each year. Interestingly, this bacteria is very similar to the "hamburger disease" bacteria (known as enterohemorrhagic *E. coli* or EHEC). One particular strain of this bacteria called "O157" is especially virulent and was responsible for the Walkerton water contamination.



Dr. Finlay's lab is currently working on a vaccine to treat cows, who are primary carriers of this deadly bacteria.

## KEY WORDS

gastrointestinal: of or relating to the stomach or intestines.

pathogen: an agent causing disease.

virulence: the degree of pathogenicity of a microorganism.

virulence factor: something provided by the pathogen to increase virulence.