Kobe Maristela
BIOL 483

Biology 483- Infection, Immunity and Evolution of Disease
Spring 2022
Homework 15

Directions: **Watch the following videos on you tube and answer the questions below.**

Evolution of virulence
https://www.youtube.com/watch?v=zl40UMgNNnc&nohtml5=False

What is a basic way to determine if one of two different strains of a pathogen is more lethal?

- Lethality of a pathogen depends on many factors such as immunity, infecting dose, host genetics, and medical treatment.
- Lethality is determined how fast the pathogen infects and kills the host

What allows natural selection to act of populations of pathogens?

- Survivability of the host allows for natural selection to act on the pathogens. Pathogens with hosts that for allows for high transmission rate are more favored since it increases survivability. Natural selection does not discriminate whether the pathogen is more lethal, rather natural selection acts on if the pathogen can be transferred before the hosts dies.

What was the "old" answer to why/how pathogens evolve to be less harmful to the host?

- The "old" answer to why pathogens evolve to be less harmful to the host was that the more harmful pathogens killed their host, thus killing themselves. In comparison, pathogens that were less harmful kept their host alive, allowing them to be easily transmitted to other hosts. With this old theory, the conclusion came that it was better for evolution in making pathogens less harmful.

Using this logic, would highly lethal pathogens be considered newer or older and why?

- Highly lethal pathogens would be considered newer as the logic supports that the lethal pathogen will evolve to become non-lethal in the future. Lethal pathogens kill their hosts, thus killing themselves which is not beneficial for its survival resulting in the pathogen to evolve into something less deadly so that the host can survive and transmit the pathogen to other hosts.
    - Lethal pathogens are considered newer
    - Non-lethal pathogens are considered older

How do vectors (like mosquitos) fit into the idea called the "Trade-off Hypothesis"?

- Cost-Benefit Argument
- Vectors, like mosquitos, fit in to the "Trade-off Hypothesis" as it allows us to weigh in the cost and benefit for a pathogen to be more virulent or not. In this case, mosquitos will only bit live hosts, which favors the less virulent pathogen. However, more virulent pathogens have been found to be better at fighting off the hosts' immune system as well as better at reproduction. Considering that the host is now weaker, vectors such as mosquitos that only bite live host, will result in more virulent pathogens to flourish as the host will be less likely to kill the mosquito allowing for greater transmission rate.

Kobe Maristela
BIOL 483

Why is the mode of transmission so important to understanding evolution of pathogens?

- For pathogens to be transferred, it must be first be transmitted by the host. Understanding the mode of transmission is important as it allows us to know how the pathogens spreads in a population. Additionally, it allows us to control the rate in which people are infected as cutting the mode of transmission overall stops the spread of the pathogen.

What are some reasons why understanding evolution in pathogens is important?

- Understanding the evolution of pathogens is important as it allows us to be able to analyze and control the spread of the pathogen. Knowing the mode of transmission, how it replicates, and how it functions greatly aids us in fighting back the pathogen, however more importantly, it helps us keep the" more virulent pathogens rare and less virulent pathogens more common."