**GERMS IN HISTORY AND HEALTH**

Germs as products of natural selection

selection favors those most effective at:

-reproduction

-spreading

strategies of spreading/broadcasting germs:

1. passive transmission to next victim (e.g. rubella, HIV/AIDS)
2. modification of anatomy (through sores which may end up in contact with others – like smallpox sores and venereal diseases)
3. or habits/behaviors of host in ways that accelerate transmission (flu, cold, cholera)

animal defensive responses to germs:

1. fever
2. immune response through build up of germ-specific antibodies
3. natural selection: in epidemics, those with genes for resistance to a particular germ are more likely to survive, and this resistance is then passed on to offspring – and thus population level resistance is established through time

characteristics of epidemics:

1. spread quickly, exposing the entire population within a short time
2. are acute illness, meaning that within a short time, you either recover completely or die
3. those who recover develop antibodies that leave them immune to the disease
4. these diseases tend to be restricted to humans

Why epidemic diseases tend to need large populations:

Since all people in the population are exposed and either die or survive fairly quickly, the germs need a human population that is sufficiently numerous, and sufficiently dense, that a numerous new crop of susceptible children is available for infection by the time the disease would otherwise be waning. Only in larger populations can the disease shift from one local area to another, thereby persisting until enough babies have been born in the originally infected area that the germ can return there.

For the previous reasons, small, isolated populations do not tend to internally develop epidemic-type diseases. They do have other infectious diseases, such as:

1. diseases carried in other animals (yellow fever in wild monkeys)
2. diseases which take a long time to kill victims, who thus continue to infect others for long periods of time (leprosy)
3. diseases which we don’t develop immunity to, meaning that we can later become reinfected (parasitic diseases such as hookworms, amoebas)

Why did the rise of agriculture launch the evolution of our crowd infectious diseases?

1. agriculture sustains much higher population densities
2. H-G groups tended to leave their feces behind, whereas farmers lived near them
3. the spreading of human wastes as fertilizers in same fields where people work
4. the rise of cities was made possible by farming, and European cities were not self-sustaining until 1900s (supplied by healthy farmers)
5. increasing significance of world trade routes
6. increasing proximity to & contact with disease bearing animals:

 cattle: measles, TB, smallpox

 pigs: flu, whooping cough

Why didn’t the largest New World cities have the germs of epidemic diseases?