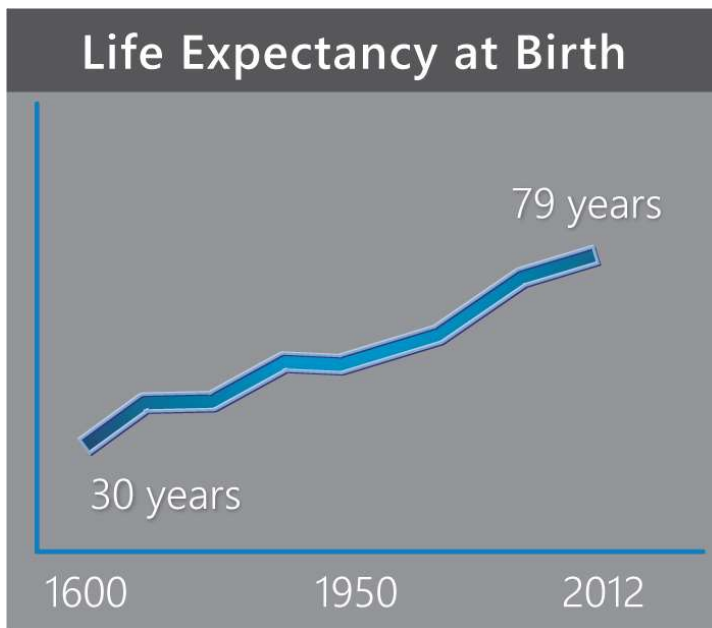


Germs vs. Humans Today: Who's Winning?

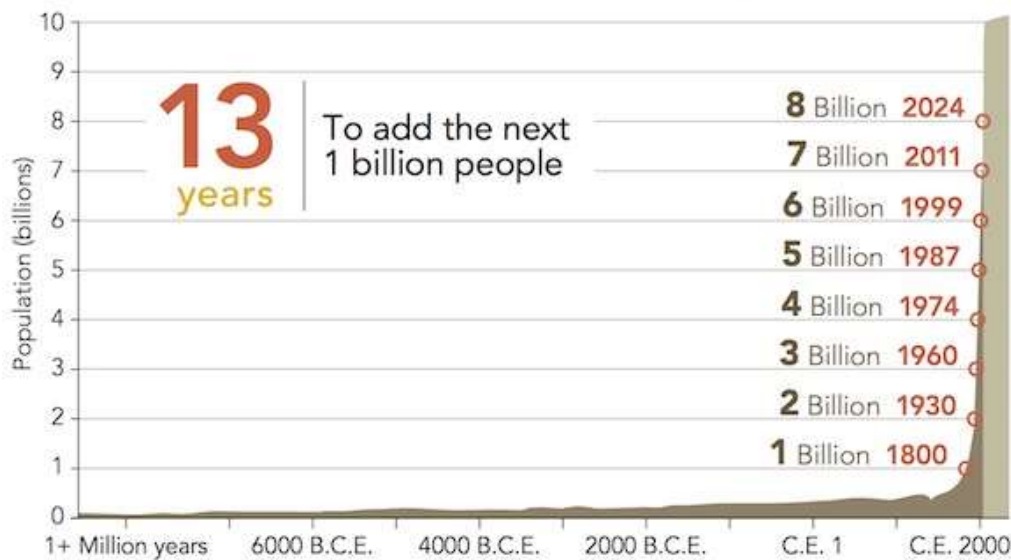
We've seen how human cultural evolution, notably the major achievements of domesticating food resources, has changed our world in many ways, providing us with a stable yet more limited food supply and promoting a considerably more sedentary lifestyle. The benefits are clear: more food equals more people.

Yet we also see that the intersections of nature and culture have caused problems that are unique to our species. While our population numbers have risen, disease and other health issues have multiplied alongside. So, what are some of the latest challenges confronting our species?

More recently, humans have increased food production by several times. Medical advances have surged at an ever-expanding rate. Innovations in the technological realm have vastly increased. The results have been not only massive population growth, but a steady increase in the average human life span.



Historic and Projected Population Growth



Above left: Average life expectancy has risen more than 100% since the 1600s. Keep in mind this is generalized data for developed countries. More detailed data illustrate substantial variation among countries with different resources. Above right: World populations rose very slightly for the majority of our existence; even the Neolithic era Agricultural Revolution gave us only a slight edge compared to the impact of the later Industrial Revolution, Green Revolution, etc. Our population is now doubling at a rapid rate.

The overall trend is that there are many, many more of us now, and we are living a whole lot longer. This helps explain why diseases related to old-age are responsible for two thirds of deaths world-wide, and 90% of deaths in developed countries. With so many more people, how are we doing

today in the war against germs? Watch the third and final video (3:36) in the series we began in the last module:

A Short History Of Humans And Germs: H...



Do germs have the evolutionary edge? Despite our efforts to find medicines to fight them, in many ways, it seems the germs are willing. Let's further explore what helps some organisms evolve so quickly. Please read this brief discussion about "[turbo-charged evolution](http://evolution.berkeley.edu/evolibrary/article/side_0_0/turboevolution_01) (http://evolution.berkeley.edu/evolibrary/article/side_0_0/turboevolution_01)" among bacteria. You will be introduced to a new process--**horizontal gene transfer**. This process is responsible for the rapid rise of many antibiotic-resistant bacteria. Where have many of these bacteria evolved? [Factory farms](https://www.cdc.gov/foodsafety/challenges/from-farm-to-table.html) (<https://www.cdc.gov/foodsafety/challenges/from-farm-to-table.html>) (link optional). And the [farm lobby](https://www.scientificamerican.com/article/how-drug-resistant-bacteria-travel-from-the-farm-to-your-table/) (<https://www.scientificamerican.com/article/how-drug-resistant-bacteria-travel-from-the-farm-to-your-table/>) has been less-than-welcoming to scientists looking to study this phenomenon (link optional). We live in a world where benefits are measured in the present, in many ways a Darwinian world.