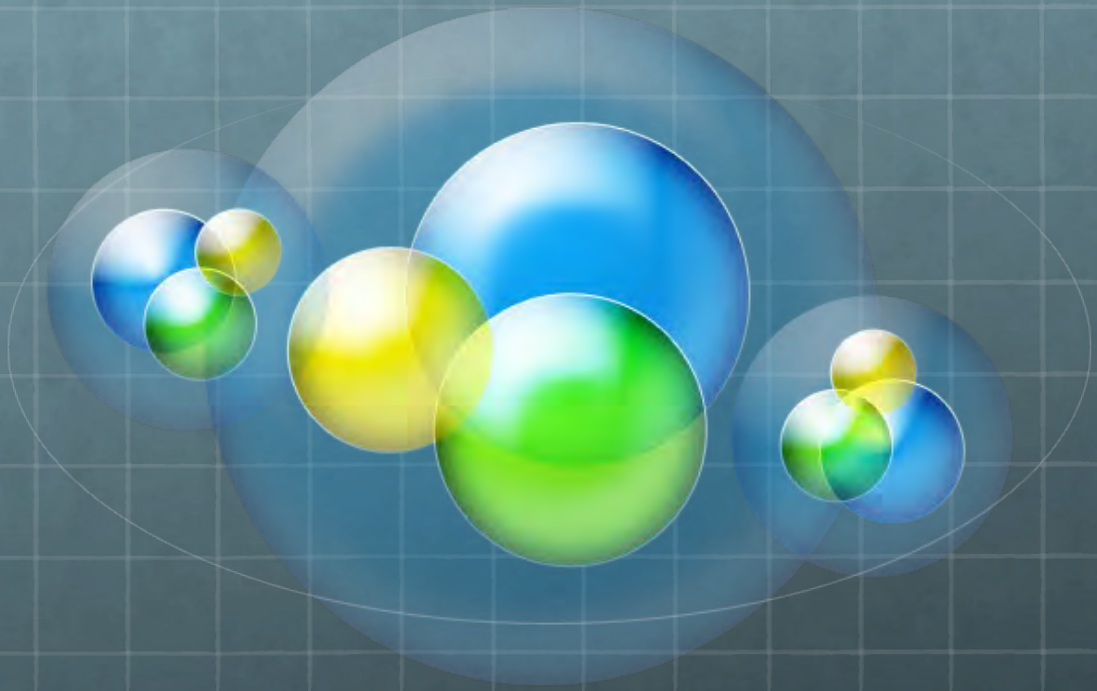


Diseases & Vaccinations

A presentation brought to you by Ariana Farmanfarmaian, David Farmanfarmaian and Eugénie Faure, from Bolingbroke Academy.

To begin…

- Our presentation will focus on three major diseases from different Plagues in the 14th century to today's modern society and the problem of the spreading Ebola Virus.
- The three diseases we will focus on are the Plague, Small pox and Rabies. But there are many more!
- We will also talk about how humanity came to terms with these diseases and the cures they found (or thought were useful).

The Plagues:
The Black Death

There were many kinds of plagues. Perhaps the most infamous ones are the Black Death and the Great Plague. The Era of the Plague lasted for over 400 years, from 1347-1750. Of course, it wasn't continuous. There were waves of infection.

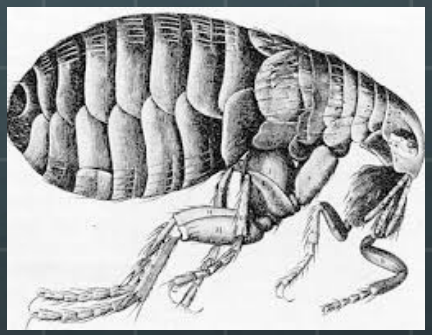
The biggest Plague of all, and the most infamous one, was the Black Death. You can see the spreading of this horrible disease through the whole of Europe, from Constantinople to London to Moscow, below. The Black Death was at its peak from 1346 to 1353. It is thought that the disease was caused by the infection by the pathogen *Yersinia pestis* bacterium, which probably caused different forms of plague.

It is thought that the Black Death originated from Central Asia and travelled along the Silk Road to end up in Europe. From that point it is most likely that it was carried by Oriental fleas of black rats that inhabited merchant ships. It has killed an estimated 75-200 million people and also estimated to have reduced the world's total population to 350-375 million people, starting with 450 million people. It took 150 years for Europe's population to recover, and it occasionally recurred in Europe until the 19th century.

The Great Plague

The Great Plague was the last major epidemic of the bubonic plague to occur in England. It happened from 1664-66 and killed an estimated 100 000 people, or 25% of London's population. It was caused by the same bacterium as the Black Death: *Yersinia pestis*. It was usually transmitted through the bite of an infected rat flea.

Even though the Great Plague happened on a much smaller scale than the Black Death, it was remembered afterwards as the 'Great' Plague mainly as it was the last widespread outbreak of bubonic plague in England.



Symptoms

Symptoms included:

- Buboes all over your body, especially in the neck, armpit and groin area
- The victim could develop a rash, feeling of lethargy and tiredness
- Increased body temperature, affecting the brain and nerves
- The disease affected speech, and the victim would become less and less intelligible, until they took the appearance of a drunk person.
- They wouldn't be able to stand straight and eventually became delirious.
- Other symptoms could occur when the buboes appeared, such as swelling or inflammation of the lymphatic gland.

The “cures” and “treatments”

People at that time didn’t have any scientific knowledge on what was happening. They thought it was God punishing them for their sins. This is why some cures are purely based on superstition of the time. There were different types of treatments thought to be useful to treat the Plague at that time. Some were totally ridiculous as doctors had no way of curing people. Examples included:

- **Arsenic**
- **Crushed emeralds**
- **Sitting in the sewers or sitting in a room between 2 enormous fires**
- **Rubbing yourself with live chickens & many others…**
- **However some doctors figures out that by bursting buboes you could get your patient to be a little better. But there were many problems with that method seeing the hygiene level of the time.**

People eating a spoon of crushed emeralds.

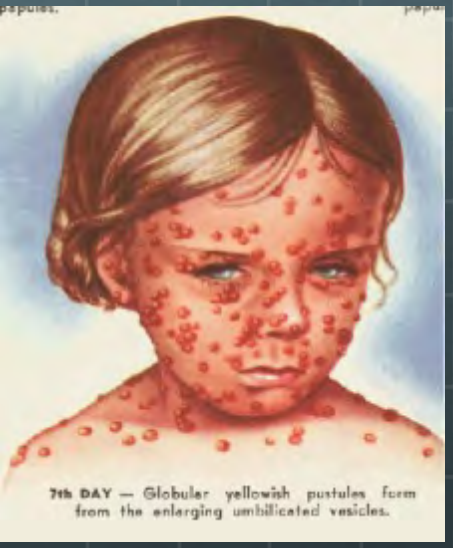
Some historians believe that the plague was never eradicated. Proof is it occasionally recurred during the 19th century. It just started to infect less people as hygiene improved. Another factor thought to have helped is the quarantine method: they would lock infected people away to stop them infecting others.

Smallpox

- Smallpox is an acute contagious disease caused by the variola virus(a member of the Genus Orthopoxvirus)
- The earliest physical evidence of smallpox is the pustular rash on the mummified body of Pharaoh Ramesses V of Egypt, who died in 1157 BC. Traders carried the disease from Egypt to India during the 1st millennium BC. From there it swept into China in the 1st century AD and reached Japan in the 6th century. Returning crusaders provided a way for smallpox to spread through Europe in the 11th and 12th centuries.
- Additionally, the Spanish inadvertently owe much of their success in conquering the Aztecs and Incas in Mexico in the 16th century to smallpox. Unlike the Spanish, the native Indians had no immunity to the disease, and so it wiped out huge numbers of them. A century later the North American Indians suffered a similar devastation. In the 18th century smallpox greatly affected the aborigines when it reached Australia, the last corner of the world to have escaped its ravages.
- Smallpox was gradually eradicated from the world, partly due to a doctor called Edward Jenner.

Smallpox Vs Chicken pox

- In the past, smallpox was frequently confused with chickenpox, due to their somewhat similar appearances.
- Smallpox and Chickenpox are caused by different viruses: Chickenpox is caused by the varicella-zoster virus, and Smallpox is caused by the variola virus.
- Additionally, both diseases last for different time periods, and have different results on the human body. Small pox infections can last around 3 to 4 weeks (however, if the infection is particularly fatal, a patient usually dies during the second week of their illness), and it can cause permanent scarring of the tissue. In contrast, Chickenpox usually lasts 7-10 days in children (adults may be sick longer) and it rarely has long term affects.



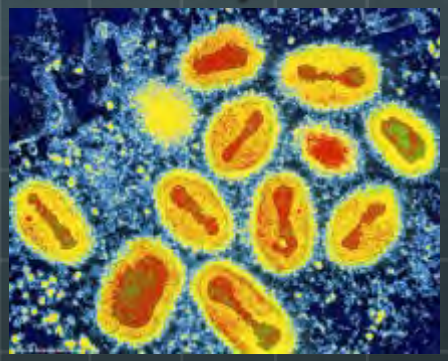
VS

Edward Jenner

- The last known natural case of Smallpox was in Somalia in 1977. Since then, the only known cases were caused by a laboratory accident in 1978. Otherwise, Smallpox has been completely eradicated. The gradual extinction of this disease is all due to one English doctor, Edward Jenner.

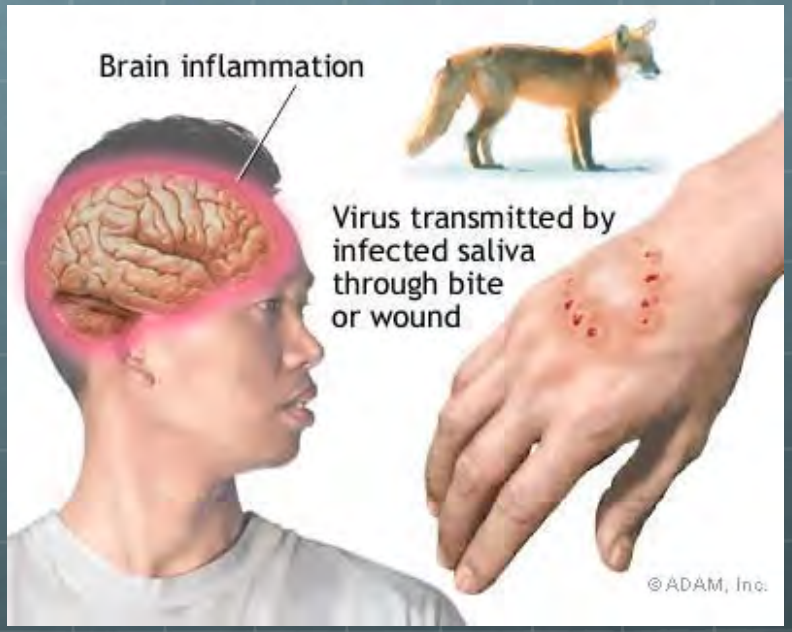
- Jenner experienced Smallpox, and being one of the sole survivors of the disease, he wanted to prevent it from affecting others like it had affected him.

- During his work, Jenner noticed that milkmaids were generally immune to smallpox, receiving instead pus filled blisters from cowpox, which seemed to protect them from smallpox. Jenner tested his hypothesis on a boy named James Phipps, the son of Jenner's gardener. He scraped pus from cowpox blisters on the hands of milkmaid Sarah Nelmes, and inserted them into both of Phipp's arms that day. Phipps produced a fever and some uneasiness, but no full-blown infection. Later, he injected Phipps with variolous material, and no disease followed. Jenner continued his research and reported it to the Royal Society, yet he was first widely ridiculed for his theory. But the obvious advantages of vaccination won out, and vaccination soon became widespread. Jenner became famous, and his vaccinations are still used today.

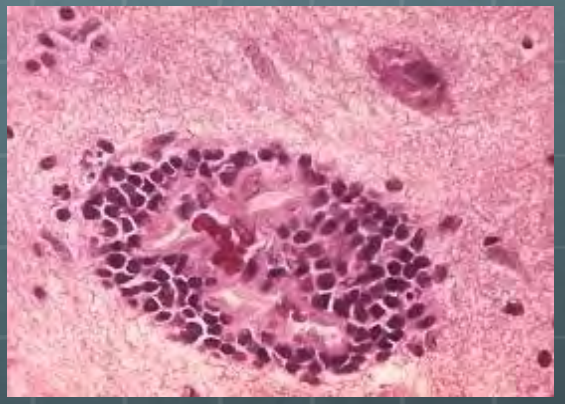


RABIES: THE VIRUS

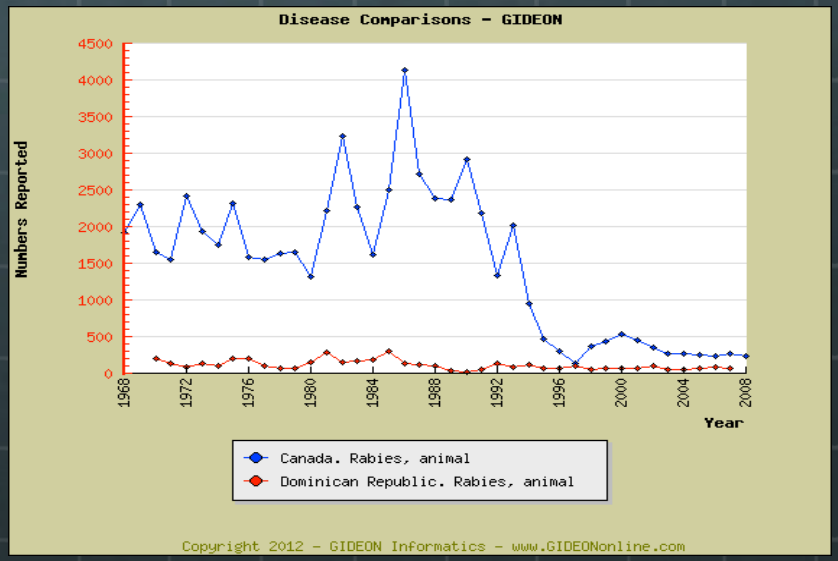
Rabies is an animal contracted viral disease, most commonly occurring in warm blooded animal species, most commonly dogs.



Rabies is a fatal disease with no cure, though there is a vaccine treatment for the pathogen. People who are diagnosed and are given the treatment soon after the exposure have a chance at survival, and premature vaccinations are recommended in most countries for humans. Dogs, by law, have to have the vaccination in nearly every country.

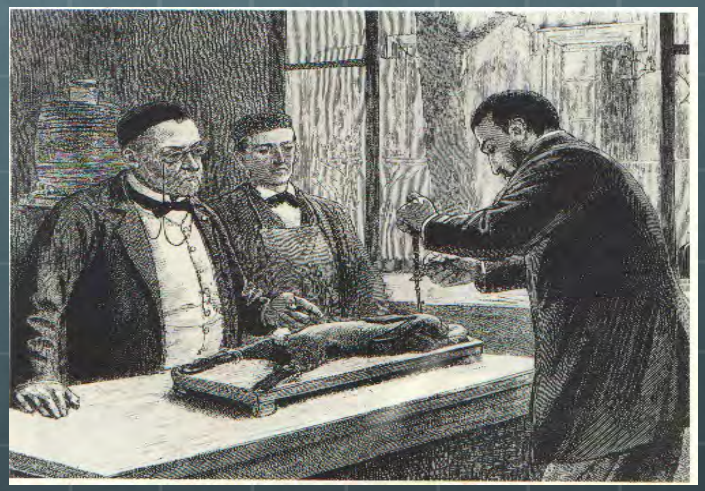


The disease's mainly affects your nervous system, causing inflammation of the brain in humans and other species afflicted with it. Early symptoms can be fever and stinging at site of exposure to virus, followed by: fear of water, violent movements, uncontrolled excitement, inability to move certain limbs



LOUIS PASTEUR

Louis was a pioneer in vaccine research, his most iconic being the TB virus and Rabies. He was the mastermind behind the use of a weak strain of the pathogen to increase your body's resistance to it, and also was the inventor of the Pasteurisation process.

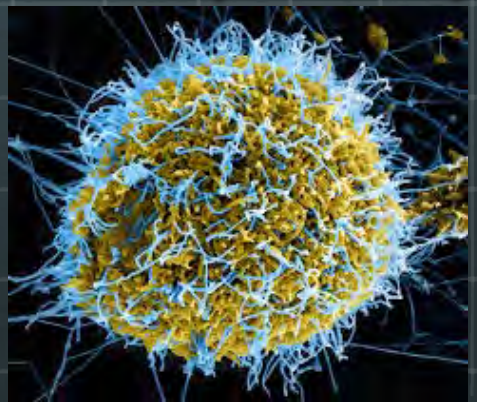


He took a close look at the disease and concluded that it affected your central nervous system, his later experiments proving this theory correct. He soon created a vaccine for dogs to prevent future outbreaks.

He then, by chance, was forced to use the vaccine on a human subject, without knowing the possible outcomes. The test surprisingly proved effective and his discovery of this 'cure' became legendary, with citizens flocking to Paris for treatment.

Diseases through Time

- Throughout History, humanity has faced different fatal diseases.
- They always have found a way (or rather, one person at first found a way) to stop them and , in some examples, eradicate them.
- Even today, we face our own problems, the most recent one being the Ebola virus.
- Symptoms include fever, diarrhea, unexplained bleeding or bruises, and many more. Ebola has already caused over 10 000 deaths in total (based on information reported by the Ministries of Health)



In conclusion…

- Ebola is just another example of this kind of disease that humanity has to fight against and scientists are looking to find a cure for it.
- Humans learn from these experiences but as the world around us carry on evolving, there will be new challenges along the way.
- This is an example of Science for Survival…