



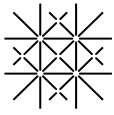
## **Allergies: When the immune system backfires**

### Historical epidemics: Some facts and figures

For centuries in human history, infectious diseases were among the most common causes of death. Among the diseases causing major epidemics in human history were the plague, syphilis, small pox, cholera, and tuberculosis.

#### **The Black Death or the plague**

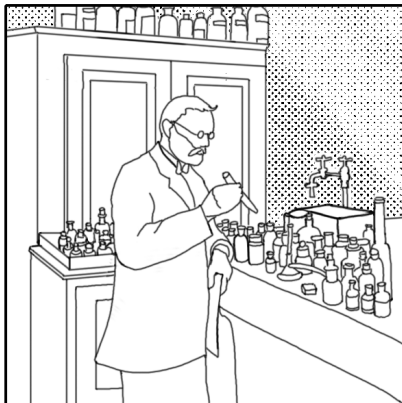
The plague caused three major pandemics. The first, the Justinian plague, started during the 1st century and killed approximately 20 million people in outbreaks over more than 200 years. The second, the Great Plague or Black Death, killed approximately 20 million people in the 14th century – about one third of Europe's population. The third, the Modern Plague, started in 1860 in China, spread to India and from there to port cities all over the world, causing approximately 10 million deaths. In 1894, the Swiss-French microbiologist Alexandre Yersin identified the bacterium, that was later called *Yersinia pestis*. The plague still causes outbreaks today, however, it can be treated with antibiotics.



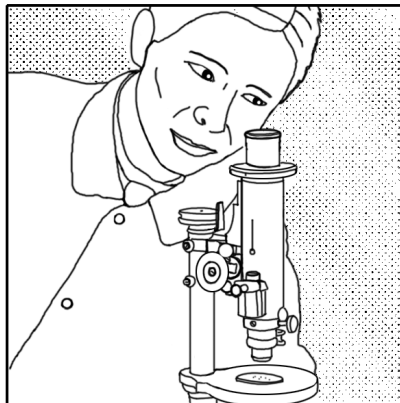
## Syphilis or Lues

According to the most widely accepted hypothesis, Syphilis or Lues was brought back by Columbus at the end of the 15<sup>th</sup> century from the New World. In the beginning, this sexually transmitted disease – also called the great pox to distinguish it from smallpox – had a very severe course and often lead to death. This new, stigmatizing and terrible disease was often named after the neighboring countries: In Italy, Germany and England, syphilis was called the French disease; in France, it was called the Neapolitan disease; in Poland, the German disease; and in Russia the Polish disease. A common therapy included application of mercury-containing pastes or the patient was exposed to mercury vapors in a sweat chamber. AT that time they often died rather from mercury intoxication than from the disease itself. Later Syphilis became less virulent and took a more chronic course. In the 19<sup>th</sup> century, many poets, painters and composers were allegedly affected by a mitigated variant. It was in 1905 only that Schaudinn and Hoffman have discovered the cause of syphilis, a spiral bacterium. They named it *Spirochaeta pallida*. The name was later changed to *Treponema pallidum*. Still, application of mercury was commonly used as remedy. In 1908 the German Paul Ehrlich was awarded the Nobel prize in Physiology or Medicine for his pioneering work in immunology. A year later he identified a first chemotherapeutic less toxic substance drug called 'Salvarsan', a derivative of arsenic, to treat Syphilis.. After the second World War, penicillin was available and Syphilis became a curable disease.

### INFECTIONS AND ALLERGY



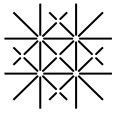
PAUL EHRLICH WAS THE FIRST WHO SYSTEMATICALLY SYNTHESIZED AND SCREENED DERIVATIVES OF ARSENIC AS POTENTIAL TREATMENT FOR SYPHILIS. THIS SYSTEMATIC APPROACH HAS THEN BEEN USED BY PHARMACEUTICAL COMPANIES FOR MANY YEARS TO COME.



AFTER MORE THAN 600 ATTEMPTS, ON AUGUST 31ST 1909 COMPOUND NUMBER 606 WAS SUCCESSFULLY TESTED AGAINST SYPHILIS IN AN ANIMAL MODEL DEVELOPED BY SAHAHIRO HATA.



THIS FIRST CHEMOTHERAPEUTIC AGENT, CALLED SALVARSAN 606 OR EHRLICH-HATA 606, WAS A MILESTONE IN THE TREATMENT OF SYPHILIS AND OTHER INFECTIOUS DISEASES. FOR THE FIRST TIME PHYSICIANS COULD TREAT PREVIOUSLY INCURABLE DISEASES.

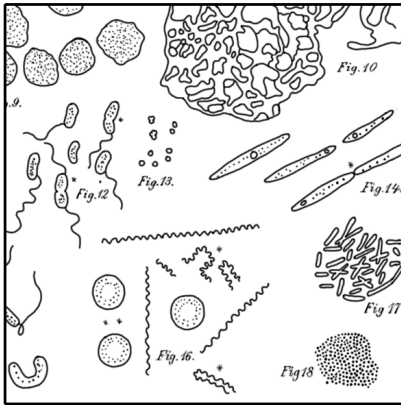


## Tuberculosis

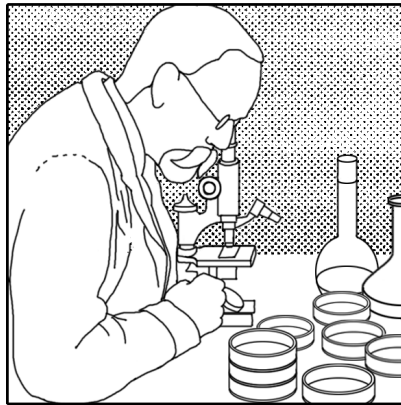
Tuberculosis is caused by the bacterium *Mycobacterium tuberculosis*. It usually lasts throughout life and causes formation of tubercles in different parts of the body. It has been hypothesized that the genus *Mycobacterium* originated more than 150 million years ago. It was already known in ancient Egypt. Hippocrates described tuberculosis as 'phthisis'. In the 17th and 18th century, the term 'consumption' was used and, due to the extreme paleness of affected patients, also the term 'white plague' was applied. In the mid-19th century, Johann Lukas Schönlein introduced the term 'tuberculosis'. Tuberculosis may affect virtually any organ: In antiquity, mostly the lungs were affected and from the middle ages, also the skin and lymph nodes of the neck. The bones, skin, kidneys and brain could further be involved. Throughout the ages, particularly in the crowded cities of the 19<sup>th</sup> and early 20<sup>th</sup> centuries, tuberculosis brought large death tolls – particularly among children and young adults.

Robert Koch was the first who isolated the bacillus. Presenting his results in 1882, he was awarded the Nobel prize in Physiology or Medicine in 1905. Following his discovery, his attempts to develop a vaccine against this deadly disease failed. The vaccine BCG, still in use today was only developed after World War I. Today, around 10 million new cases of tuberculosis are reported each year. Together with the AIDS epidemic and the appearance of multiresistant bacteria strains, it still represents a great health challenge.

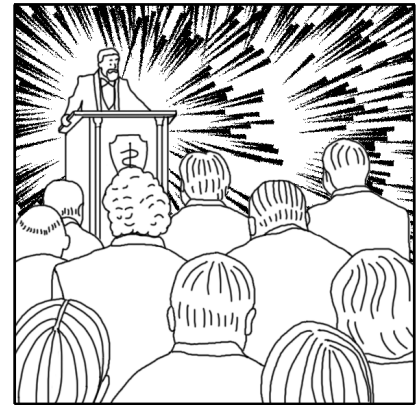
### FOUNDERS OF BACTERIOLOGY



FERDINAND JULIUS COHN WORKING IN Breslau is one of the founding fathers of modern bacteriology. He was the first who separated bacteria according to their shape into four groups, a classification still in use today.



ROBERT KOCH WAS, TOGETHER WITH THE FRENCH LOUIS PASTEUR, THE EMINENT RESEARCHER ON INFECTIOUS DISEASES IN THE 19TH CENTURY. HE DEVELOPED MICROSCOPIC AND CULTURE TECHNIQUES TO STUDY BACTERIA. HE LATER DETERMINED FOUR CRITERIA, THE SO-CALLED KOCH'S POSTULATES, THE PROOF THAT AN INFECTION IS CAUSED BY A SPECIFIC MICROORGANISM.



THE CAUSE OF THE "WHITE PLAGUE" MYCOBACTERIUM TUBERCULOSIS WAS PRESENTED BY ROBERT KOCH IN HIS FAMOUS TALK GIVEN TO THE PHYSIOLOGICAL SOCIETY OF BERLIN ON MARCH 24 1882. HIS HOPE TO DEVELOP A VACCINE, HOWEVER, WAS WITHOUT SUCCESS.

### References

Barberis, I., Bragazzi, N., Galluzzo, L. & Martini, M. (2017). The history of tuberculosis: From the first historical records to the isolation of Koch's bacillus. *Journal of preventive medicine and hygiene*, 58 (1), 9-12.