Activity 1

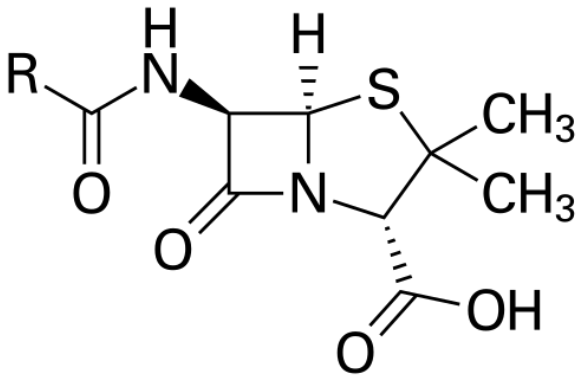
Where do antibiotics come from?

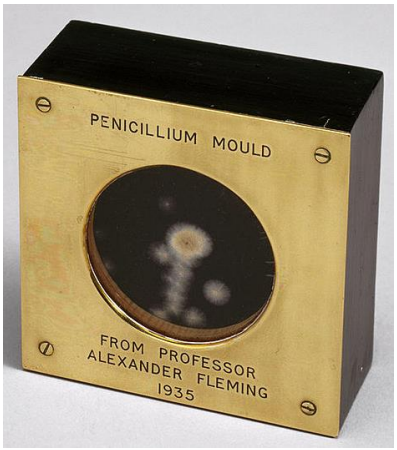
Although drugs which were able to kill bacteria were used before the discovery of penicillin, many of these drugs were almost as harmful to the patients as they were to the bacteria.

Look at this description of how doctors tried to cope without antibiotics in the First World War:

https://www.omicsonline.org/open-access/infection-in-a-preantibiotic-era-2329-8731-1000125.php?aid=60899

What was needed was something that kills bacteria but doesn't damage human or animal patients. The biochemical processes in bacteria and mammalian cells are remarkably similar and it is difficult to find chemicals that kill bacteria only. Nature has been facing this battle for millions of years. Plants, fungi and even bacteria have been dealing with other bacteria by releasing substances that kill or inactivate them. When Alexander Fleming observed the dearth of bacteria surrounding the fungus that contaminated his petri dish he was seeing this battle directly.





(https://en.wikipedia.org/wiki/Penicillin#/media/File:Penicillin_core.svg https://commons.wikimedia.org/wiki/File:Sample_of_penicillin_mould_presented_by_Alexander_Fleming_to_Douglas_Macleod,_1935_(9672239344).jpg)

The structure of penicillins (R is a variable group), and one of the first of Alexander Fleming's Penicillium cultures.

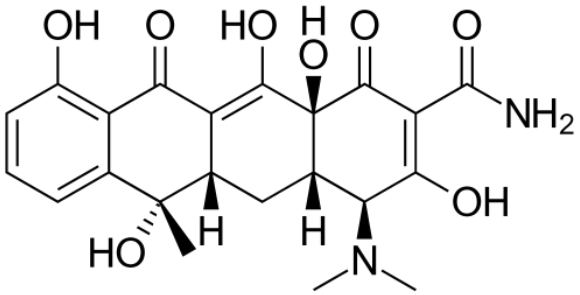
For a delightful period view of this discovery watch this video of a film made in 1964 which describes the discovery of penicillin:

https://www.youtube.com/watch?v=7qeZLLhx5kU

What about other antibiotics – where did they come from? Like penicillin (from the fungus *Penicillium*), the original trade name for oxytetracycline was 'Terramycin' ('terra' from the Greek for earth, 'mycin' indicates 'from fungi'). Oxytetracycline was discovered by culturing soil samples in various fluid growth media for a while and then taking the fluid and testing its

ability to kill bacteria. Careful examination of the things growing in the soil sample eventually identified the fungus and the chemical it produced.

Streptomycin was discovered in 1946 and is described on this website
http://scalar.usc.edu/hc/tuberculosis-exhibit/scientific-discovery-of-streptomycin



*(https://en.wikipedia.org/wiki/Tetracycline#/media/File:Tetracycline_skeletal.svg
https://en.wikipedia.org/wiki/Streptomycin#/media/File:Streptomycin2.svg)*
The structures of tetracycline (above) and streptomycin

While synthetic chemists have often improved and developed the molecules discovered in nature to make them better antibiotics there are very few types or classes of antibiotic that weren't originally found in nature.

Can you find examples of antibiotics that weren't first found in nature?