

## **The Benefits and the Harmful of bacteria :**

**I. Bacterial benefits (useful) .**

**II. Bacterial harmful and diseases .**

## I. Bacterial benefits (useful)

1. Decomposition of a dead bodies (decomposer) .
2. Fixation of the minerals in the soil (nitrogen fixation), and fertilization of soil.
3. Symbiont with other organisms (human , animals, plants, and algae).
4. Food industrial (win , chees , bread).
5. Antibiotics manufacturing .
6. Bioweapons . (B. anthracis , small pox).
7. Genetic engineering studies .

### Genetic engineering :

Genetic engineering is called molecular biology which used (applied) in medicine, animal breeding , and plant breeding . genetic engineering involves easily understood procedures ;

- 1- Cleaving the source of DNA .
- 2- Producing recombinant DNA .
- 3- Cloning copies of recombinant DNA .
- 4- Screening the cloned copies for the desired genes .
- 5- Bacteria are used to produce commercial acetone , vitamins , antibiotics, enzymes, insulin and other therapeutic proteins. *B. thuringiensis* have a greatly increasing as a biological control agent the organisms use to remove pollutants from water , air , and soil which is called bioremediation .

*Pseudomonas* sp. ( proteobacteria) are being employed to remove petroleum.

**Harmful of bacteria :**

**1- Bacteria as plant pathogens :**

Bacteria causes many disease in plant crops , vegetables , and trees , some of these disease are :

1. Blight .
2. Soft – rot and dry – rot .
3. Wilts .
4. Fire blight .

**2- Human bacterial diseases :**

<u>Disease</u>	<u>Pathogen</u>	<u>Epidemiology</u>
<b>1. anthrax</b>	Bacillus anthracis	Transmitted by contact many can be fatal .
<b>2. botulis</b>	Clostridium botulinum	Contracted through ingestion of improperly food. poison can be fatal.
<b>3. Chlamydia</b>	Chlamydia trachomatis	Urogenital infection humans (STDs).
<b>4. cholera</b>	Vibrio cholera	Causes diarrhea 50% death if untreated, human feces, plankton .
<b>5. dental caries</b>	Streptococcus mutans	This bacteria on the surface of teeth leads to secretion of acids to destroy the enamel, sugar alone will not cause caries .

<b>6.diphtheria</b>	Corynebacterium diphtheria	Spread by contact with infected individual. Vaccine available .
<b>7. gonorrhoea</b>	Neisseria gonorrhoea	STDs, on the increase world wide, usually not fatal .
<b>8. hansen disease (leprosy)</b>	Mycobacterium leprae	Spread through contact with infected individuals infected of the skin .
<b>9. lyme disease</b>	Borrelia bourgdorferi	Spread through bite of infected tick, and small rodents, followed by fever, fatigue, pain and headache .
<b>10. peptic ulcers</b>	Helicobacter pylori	Now appear to be caused by this bacterium it can be treated by anti-biotic.
<b>11. syphilis</b>	Treponema pallidum (spirochete bacterium)	STDs transmitted by during sexual intercourse or through direct contact with a human infected or from a mother to her fetus .
<b>12. plague</b>	Yersinia pestis	Endemic in wild rodent, rat fleas and squirrels, killed ¼ of the population of Europe in 14 <sup>th</sup> century .
<b>13. pneumonia</b>	Streptococcus, mycoplasma chlamydia	Acute infection of the lungs, often fatal without treatment .
<b>14. tuberculosis</b>	Mycobacterium tuberculosis	An acute bacterial infection of lungs, lymph, and meningitis .

		New strains of this bacterium are resistant to anti-biotic .
<b>15. typhoid fever</b>	Salmonella typhi	This disease spread through contaminated water and food , vaccine are available for travelers .
<b>16.typhus</b>	Rickettsia typhi	Transmitted from human to human by bite or through the bit infected lice and rat fleas. This disease mortality rate of 70%. This disease spread in crowding and poor sanitation.

### Prokaryotic metabolism :

Prokaryotes have involved many mechanisms to aquire the energy and nutrients they need for growth and reproduction :

- 1- Autotrophs : organisms that obtain their carbon from inorganic CO<sub>2</sub> . autotrophs that obtain their energy from sunlight are called photoautotrophs, while those that harvest energy from inorganic chemicals are called chemoautotrophs . other prokaryotes .
- 2- Heterotrophs : organisms that obtain at least some of their carbon from organic molecules such as glucose , heterotrophs that obtain their energy from sunlight are called photoheterotrophs , while those that harvest energy from organic molecules are called chemoheterotrophs .

<b>Diseases Caused by Bacteria</b>			
<b>Disease</b>	<b>Transmission</b>	<b>Symptoms</b>	<b>Treatment</b>
<b>Strep throat (<i>Streptococcus</i>)</b>	Inhale or ingest through mouth	Fever, sore throat, swollen neck glands	Antibiotic
<b>Tuberculosis</b>	Inhale	Fatigue, fever, night sweats, cough, weight loss, chest pain	Antibiotic
<b>Tetanus</b>	Puncture wound	Stiff jaw, muscle spasms, paralysis	Open and clean wound, antibiotic; give antitoxin
<b>Lyme disease</b>	Bite of infected tick	Rash at site of bite, chills, body aches, joint swelling	Antibiotic
<b>Dental cavities (caries)</b>	Bacteria in mouth	Destruction of tooth enamel, toothache	Remove and fill the destroyed area of tooth
<b>Diphtheria</b>	Inhale or close contact	Sore throat, fever, heart or breathing failure	Vaccination to prevent, antibiotics

*The End*