د.سهام محمد شاش

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Benha University 2nd year student Time: 2Hours

Botany Department Bacteriology 13-1-2011

(New Plan)

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Answer the following questions:-

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**1-** Give reasons:-

a-The mutant Staphylococci are resistant to penicillin.

b- Some thermopilic bacteria isolated from hot springs can grow at

90oC.

**2-** Compare between :-

a- Cell wall in Gram positive and cell wall in Gram negative.

b- Protoplast & Spheroplast.

**3-** Explain the function of each of the following:-

a) Capsule b) Cell wall

**4-**Discuss the nutritional Types of bacteria.

**5-**Complete the following sentence:-

1. All endospores contain large amounts of --------------------------------- a unique compound that is unditictable in the ----------------------------
2. The presence of bacterial nucleus was confirmed by ------------------- reagent which is specific for---------------------------
3. Frau Hess (1883) replaced ----------------by ---------------------in solid media.
4. Autotrophic purple bacteria contained sacs which are extensions of the cytoplasmic membrane are called -------------------------
5. Most bacterial capsules are composed of ------------ while a few capsules are------------- and some capsules are polymer of ---------

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GOOD LUCK

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Answers

1- Givereasones

a- The mutant Staphylococci are resistant to penicillin because of their ability to produce enzyme pencillinase which converts penicillin into peniciloic acid which is a compound devoid of antibiotic activity.

b- Some thermopilic bacteria isolated from hot springs can grow at

90oC because the proteins of thermophilic bacteria differ from the mesophilis. The sequence of amino acids in the proteins of thermophiles have strong bonds, as well as many hydrogen and other weak bonds. The strong bonds stabilize the structure of the thermophilic protein and make it thermostable.

The ribosomes of thermophilic bacteria are also thermostable.

2- Compare

a) Cell wall in Gram-positive:

It composed of three consecutive layers of murein (peptidoglycan). The layers above and below are attached through the amino acid bridge.The wall thick, strong and rigid structure. In addition there may present teichoic acid.

Cell wall in Gram-negative:

It composed of only one thin layer of murein (peptidoglycane). Therefore it can easily be broken by mechanical forces. It no contain teichoic acid.

It contains a high percentage of lipids which surrounds the murein (microcapsule).

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b)

Protoplast

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1. Complete removal of the cell wall.
2. Formed in Gram-positive bacteria.
3. Lose all the characters of the original cell.
4. The mesosomes extrude outside the cell.
5. It can not rebuild a new cell wall.

Spheroplast

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1. The cell wall is partially removed. The murein is removed and the microcapsule remains surrounding the sytoplasmic membrane.
2. Formed in Gram-negative bacteria.
3. The mesosomes do not extrude outside the cell due to the presence of lipid microcapsule.
4. The spheroplast can regenerate the cell wall.

3-

a) Function of Capsule

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1- It provide protection against drying by binding water molecules.

2- It may block attachment of bacteriophages.

3- It may be antiphagocytic. They inhibit the engalfment of pathogenic bacteria by white blood cells.

4- It may promote attachment of bacteria to adheres to the smooth surfaces of teeth, because of its secretion of a water insoluble capsular glucan

5- It may serve as reservoir of stored food or a site of disposal of waste substances.

b) Function of Cell wall

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1. Bacterial cell wall is composed on subunits not found in other place.
2. It sometimes causes symptoms of diseases
3. It causes sensitivity to certain antibiotics.
4. It is the reason of Gram-reaction.
5. It determine the shape of bacteria.
6. It protects the bacteria from any osmotic shock.

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4- The nutritional types of bacteria :

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Different nutritional types can be detected in bacteria:

Phototrophs

Among the phototrophic bacteria are species which utilize carbon dioxide as the principal source of carbon (Photolithotrophs) e.g *Chromatium spp.*

Others require an organic compound ( Photoorganotrophs), e.g. *Rhodopseudomons,* which is able to utilize alcohols, fatty acids andamino acids.

Chemotrophs:

Bacteria of the genus *Nitrobacter* are able to oxidize nitrite to nitrate and fix carbon dioxide to get energy and carbon need (Chemolithotrophs).

Other chemotrophs require organic compounds to drive energy by oxidation (Chemoorganotrophs) e.g. *E. coli* .

The chemolithotrophs and photolithotrophs are known as Autotrophs , where , photoorganotrophs and chemoorganotrophs are Heterotrophs.

5- Complete the following sentence:-

1. All endospores contain large amounts of dipicolinic acid a unique compound that is unditictable in the vegetative cells.
2. The presence of bacterial nucleus was confirmed by feulgen reagent which is specific for DNA.
3. Frau Hess (1883) replaced gelatin by agar in solid media.
4. Autotrophic purple bacteria contained sacs which are extensions of the cytoplasmic membrane are called Chromatophores.
5. Most bacterial capsules are composed of Polysaccharides while a few capsules are polypeptides and some capsules are polymer of glutamic acid.