

الاسئلة و نموذج الاجابة لمقرر البكتريا

**Benha university**  
**Faculty of Science**  
**Botany Department**  
**2013-2014**

**Bacteriology**  
**Final examination**  
**Microbiology students**  
**Second year**

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**Answer the following questions:**

**I- Explain the following:**

- a- Bacterial transformation with drawing
- b- Bacterial resistance to antibiotics
- c- Bacterial transduction with drawing

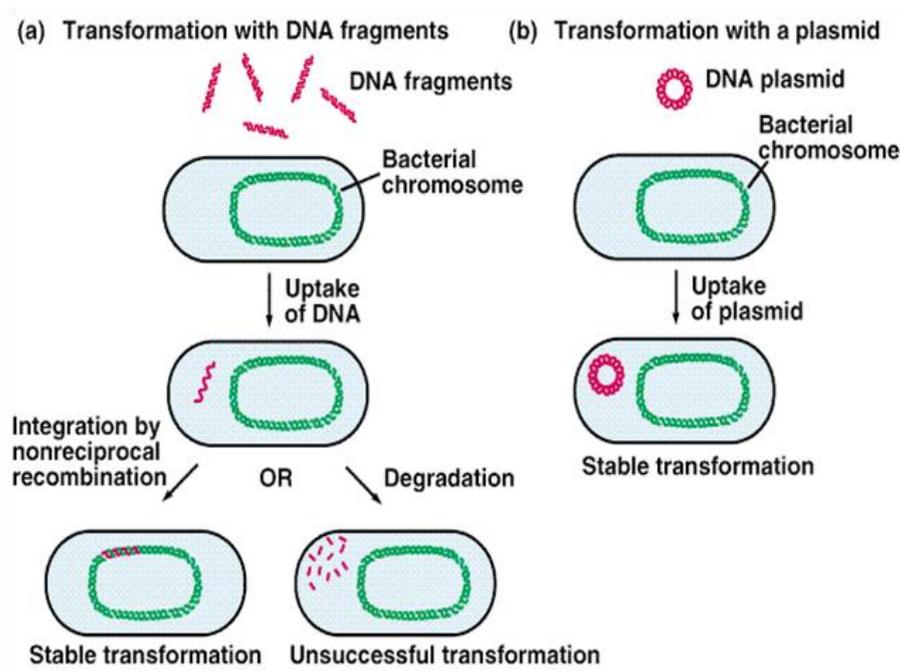
**II- Complete the following sentences:**

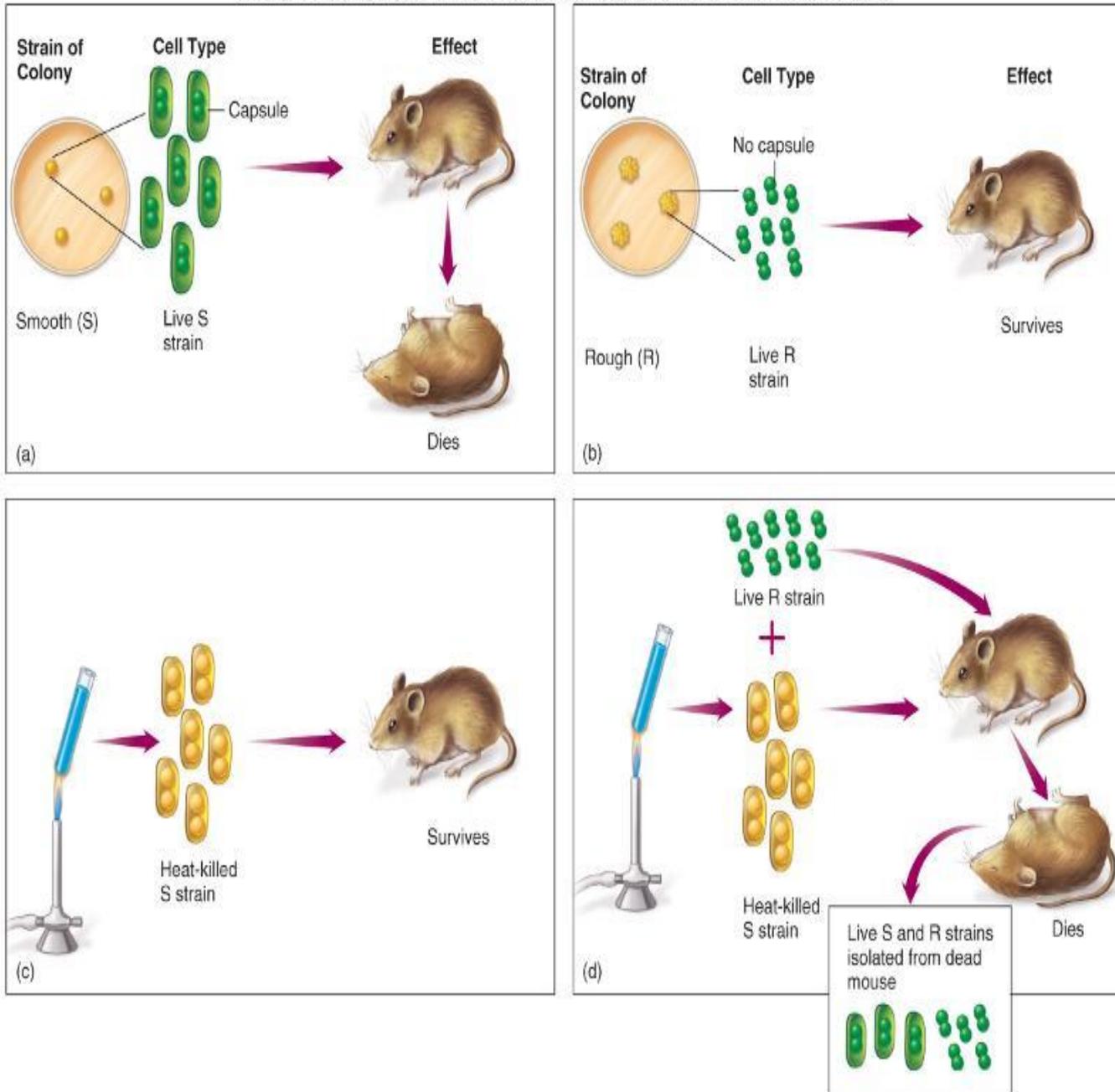
- Bacteria may produce metabolic waste products which change the conditions in a medium such as ..... , ..... and .....
- Three methods of cultivation of antibiotics producing organisms
  - 1- .....
  - 2- .....
  - 3- .....
- Antibiotics affect bacteria by
  - 1- .....
  - 2- .....
  - 3- .....
- Bacterial recombination takes place by one of three ways: ..... , ..... and .....

## Answer of first question

### a- Bacterial transformation with drawing

**Transformation** is the process by which "naked" DNA is introduced into a bacterial cell. "Naked" DNA is generated when fragments of DNA or plasmids are released from damaged or dying cells. The fragments of DNA are then taken up by a living recipient cell and recombined with the recipient cell genome.





## b- Bacterial resistance to antibiotics

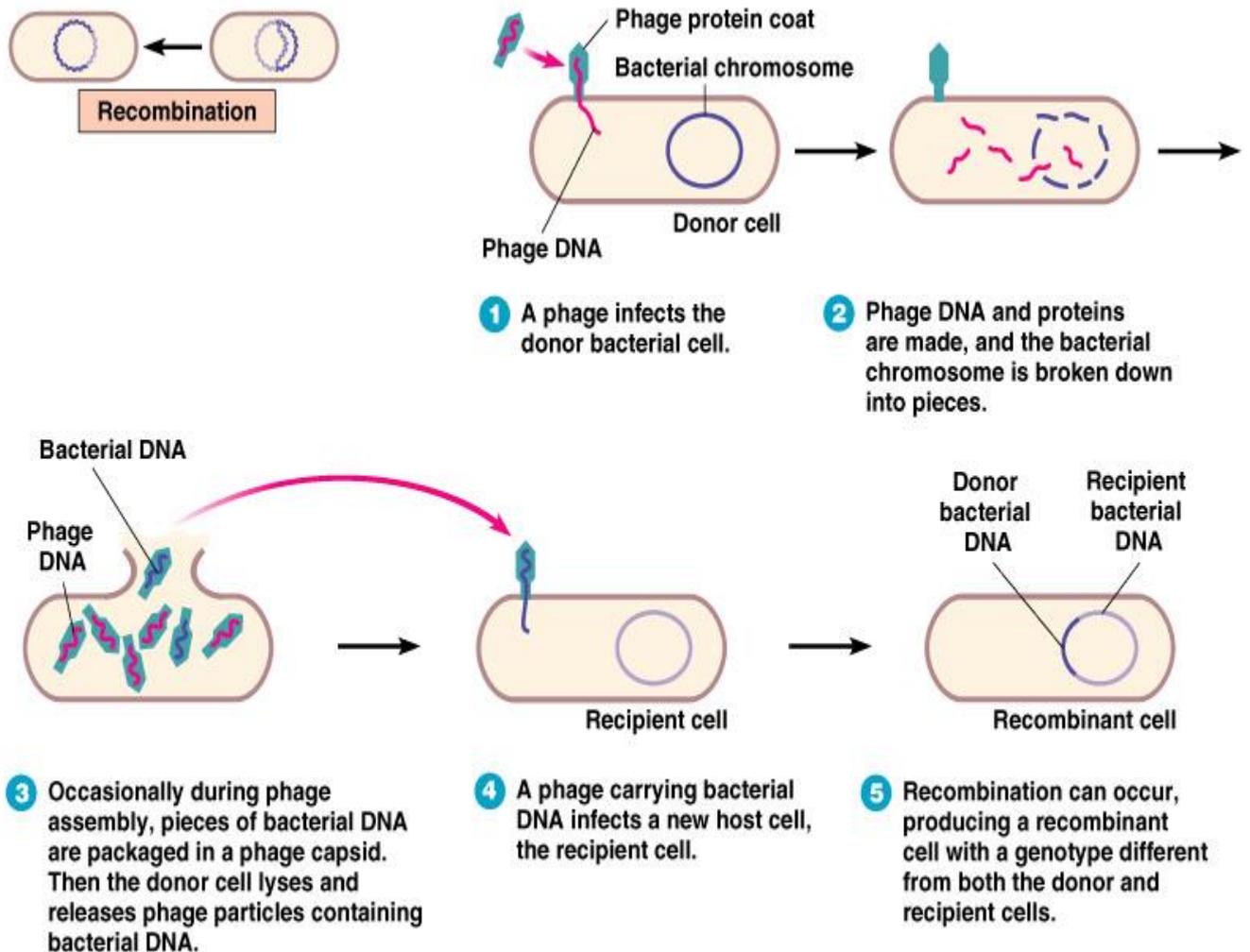
Bacteria are able to develop resistance to anti biotics. Resistance may develop slowly or rabidly, depending on the antibiotics. When an organism aquire resistanceto an antibiotics, it becomes necessary to search for a derivative of the antibiotics. Resistance to pencillin, for example, is a case of genetic adaptation. It is said that in any culture

of *S. aureus* sensitive to penicillin, about one cell in 100 million is a mutant that is resistant to penicillin. The mutant *Staphylococci* are resistant to penicillin because they produce enzyme penicillinase and convert penicillin to penicilloic acid. This is a good example of enzyme induction of adaptation. Resistance is natural when it occurs among species or strains which have had no previous contact. Resistance is acquired when a culture of a normally sensitive species or strain contains a few resistance forms which become predominant under the influence of antibiotics

### **c- Bacterial transduction with drawing**

In this process, DNA is passed from one bacterium to another in a bacteriophage and is then incorporated into the recipient's DNA.

In generalized transduction, any bacterial genes can be transferred



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## II- Complete the following sentences:

- Bacteria may produce metabolic waste products which change the conditions in a medium such as ...pH , osmotic pressure and surface tension
- Three methods of cultivation of antibiotics producing organisms
  - 1-Shallow surface cultivation
  - 2-Shallow submerged cultivation
  - 3-Deep submerged cultivation
- Antibiotics affect bacteria by
  - 1-Inhibiting cell wall synthesis
  - 2-Inhibiting protein synthesis
  - 3-Affect cytoplasmic membrane
- Bacterial recombination takes place by one of three ways:

## Transformation, conjugation and transduction

### 1- Choose the correct answer

a) All endospores of bacteria contain large amounts of (DPA - polyB hydroxy acid).

b) The majority of bacteria grow best within the rang of 20C-50C are (Mesophiles - thermophiles)

c) They are the sites of respiration in bacteria ( mesosomes - ribosomes ).

d) The bacterial shape is due to the presens of ( cell wall - cell membrane ).

e) The locomotry appendages of bacteria are called ( flagella - pilli ).

f) Bacteria which utilize carbon dioxide as a source of carbon are called ( autotrophs - heterotrophs ).

g) Bacterial nucleus is detected by ( Gram stain - fulagen reagent ).

h) Bacteria which have flagella distributed all over the cell surface ( monotrichous - peritrichous ).

### 2- Discuss the function of two of the following

a) cell wall.

b) pilli.

c) capsul.

### 3- Give reason

a) the bacterial number steadily lowered in the death (decline) phase.

b) anaerobic bacteria cannot grow in presence of oxygen.

c) some thermophilic bacteria

isolated from hot springs can grow at 90 C.

## **Answers**

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1- Complet

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- a) DPA
- b) Mesophiles
- c) Ribosomes
- d) Cell wall
- e) Flagella
- f) Autotrophs
- g) Fulagen reagent
- h) Pretrichous

2-

### **a) Functions of cell wall:**

a- it sometimes causes symptoms of diseases.

b- it so etimes causes sensitivity to certain antibiotics.

c- it is the reason of Gram-reaction.

d- it determines the shape of the cell.

e- it protects the bacteria from any osmotic shock.

f- it is composed of subunits which are no found in other place.

### **b) Functions of pili:**

1- special type of pili (F pili) or sex pili serves as the port of entry of

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genetic material DNA from one cell to another during bacterial mating.

2- other pili may serve to keep bacteria near the surface of liquid or to obtain on oxygen.

3- pili are the antigens which cause the disease in certain pathogenic bacteria.

### **c) Functions of capsule**

1- it provide a protection against temporary drying by binding water molecules.

2- it block attachment of bacteriophages.

3- it may be antiphagocytic.

4- it promote attachment of bacteria, Streptococcus mutans adheres to the smooth surfaces of teeth and cause dental caries.

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

### **3- Give reason**

a) The bacterial number steadily lowered down due to the exhaustion of essential nutrients and the accumulation of toxic materials.

b) Anaerobic bacteria cannot grow in presence of oxygen because under aerobic conditions the bacteria produce hydrogen peroxide which is toxic, bacteria form catalase enzyme which breakdown  $H_2O_2$  into water and oxygen, anaerobic bacteria lack

this enzyme and they cannot live in the presence of oxygen due to the accumulation of  $H_2O_2$  to the limit of toxicity.

c) Some thermophilic bacteria isolated from hot springs can grow at  $90^\circ C$ , because the sequence of amino acids in the proteins of thermophilic bacteria form a 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 also the ribosomes of thermophilic bacteria are thermostable due to their protein.