Anglais & Communication Scientifique

Chapitre 1: Exploration de textes scientifiques variés

1.0

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Objectifs

A la fin du chapitre l'étudiant devrait :

-être suffisamment autonome dans la lecture de textes scientifiques, acquérir une lecture rapide.

- S'entraîner à la prononciation anglaise et interagir oralement en anglais.

- être capable d'écrire et produire des textes.

-Travailler la compréhension écrite : lire des textes en anglais scientifique dans le cadre de leur formation et comprendre leur contenu

- réinvestir sa compréhension des textes.

-Développer ses compétences langagières et maîtrise de l'anglais tant à l'oral qu'à l'écrit.

Introduction

Plants, animals, fungi, protozoa, algae, bacteria, and viruses all inhabit the natural world. Biology is the study of these and other living things. Today's constantly advancing technology allows researchers to investigate nature's tiniest living organisms; this field of study is known as microbiology.

In this volume you will learn about many of the branches of biology. The sheer volume of scientific information available can be mind-boggling, but areas of specialization allow scientists to focus on certain areas, like animals (zoology) or plants (botany). Some biologists study even more specific areas, such as insects (entomology) or bacteria (bacteriology). You will also learn about the history of biology. The early Greeks were the first to formally study the natural world. During the Renaissance, Leonardo da Vinci linked human anatomy to that of animals. Swedish biologist Carolus Linnaeus devised the modern method of classifying organisms, known as taxonomy.

The development of the microscope has been and continues to be a huge scientific advancement. Scientists began to develop microscopes as early as the 1600s.

This powerful tool allowed them to study all kinds of previously unknown processes and structures, including the cell. Modern microscopes, in particular electron microscopes, have helped scientists unravel the mysteries of DNA.

Areas of microbiology you will read about include bacteriology, protozoology (the study of protozoans), phycology (algae), mycology (fungi), virology (viruses), and exobiology (life outside Earth). Some microbiologists have made great strides with pure cultures

(cultures containing the growth of a single kind of organism free from other organisms) and methods of cultivating and identifying microbes. You will also learn about the very unit that interests so many scientists: the cell. Some organisms, such as yeasts, are singlecelled, but others, such as humans, are composed of many billions of cells. Simple cells only have a few parts, but more complex cells have a variety of parts with many functions. Finally, you will learn about the rich history of cell theory. Robert Hooke first coined the term “cell” in the 1600s.

Exercice : TEST pré requis

[*Solution n°1 p 39*]

1) Bacteria grow as ---------- on an agar gel plate

○	a-140
○	b-nutrients
○	c- desinfectants
○	d-colonies

Exercice

II

[*Solution n°2 p 39*]

2) the agar gel gives the bacteria ----------they need

○	a)Flame
○	b)Mean division time
○	c)Upside down
○	d)Nutrients

Exercice

III

[*Solution n°3 p 39*]

3) ----------is a method of producing a culture of bacteria without contamination from other microorganisms

○	a-desinfectant
○	b-inoculating loop
○	c- 20 minutes
○	d-aseptic technique

Cours 1 : Microbiology

IV

Aseptic Technique	15
Cours 1	18

Microbiology , the study of single celled microscopic life. Also, microbiology is critical in today's food, medical, and biotechnical industries.

Since microbes are everywhere on our hands, our clothes, and our laboratory work surfaces a problem with many microbiology studies in the classroom or school lab is the risk of contamination of cultures by unwanted species.

Avoiding contamination is everyday work for those who use microbiology in their professions.

In medicine, researchers and technicians grow microbes from sick patients in order to identify the pathogen (disease causing agent), or to test a pathogen's antibiotic resistance.

This work with known or potential pathogens requires special laboratory procedures for handling, containment, and

disposal. These procedures are also used in the food and biotechnology industries, where workers carefully monitor microbe strains and populations (e.g., the milk supply is regularly tested for harmful microbes.)

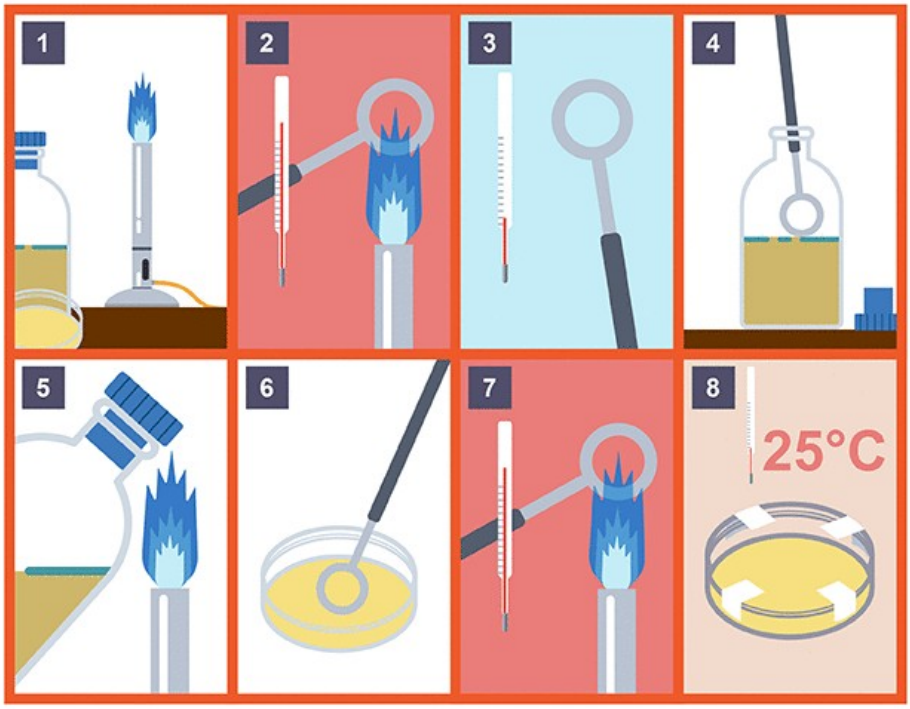
A. Aseptic Technique

Méthode : Aseptic Technique

Aseptic Technique :

To deal with the problem of contamination, microbiologists follow a basic set of procedures known as sterile or aseptic technique Sterile technique is used for

culturing and transferring cultures, and for streaking plates to isolate and purify strains.

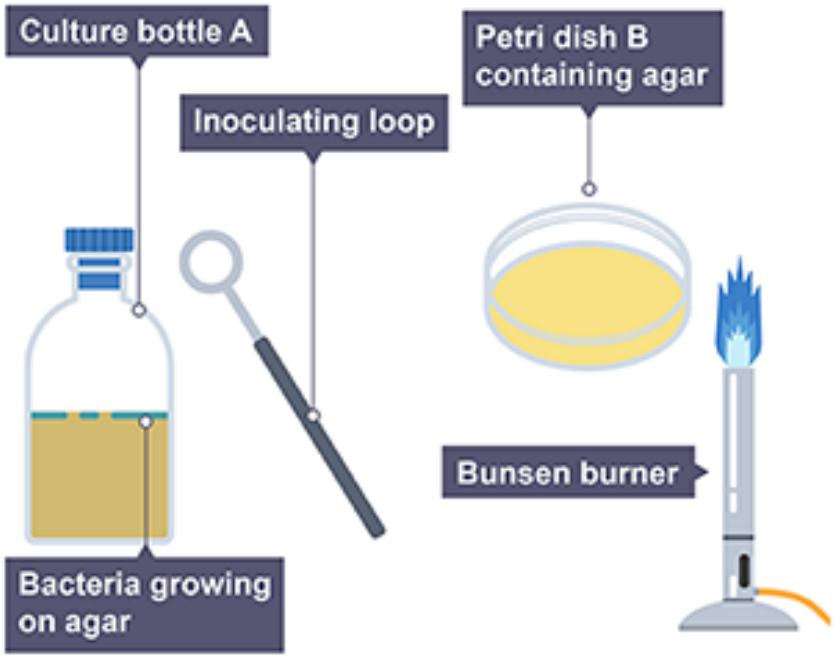


Aseptic technique

While learning sterile technique, another important microbiology skill is plate streaking. The purpose of streaking agar plates is to generate individual colonies for examination or study.

The technique is also used to isolate individual microbial species from a mixture of microbes in a sample. In order to generate single colonies on a plate by streaking, you must have good streaking technique.

Consider that an inoculating loop dipped into a pure culture of Halobacterium may pick up 10,000,000 cells. If a plate is streaked correctly, some of these cells will be spread out enough to grow individual colonies.



Bacteria growing on agar

Définition : Halobacterium sp. NRC 1

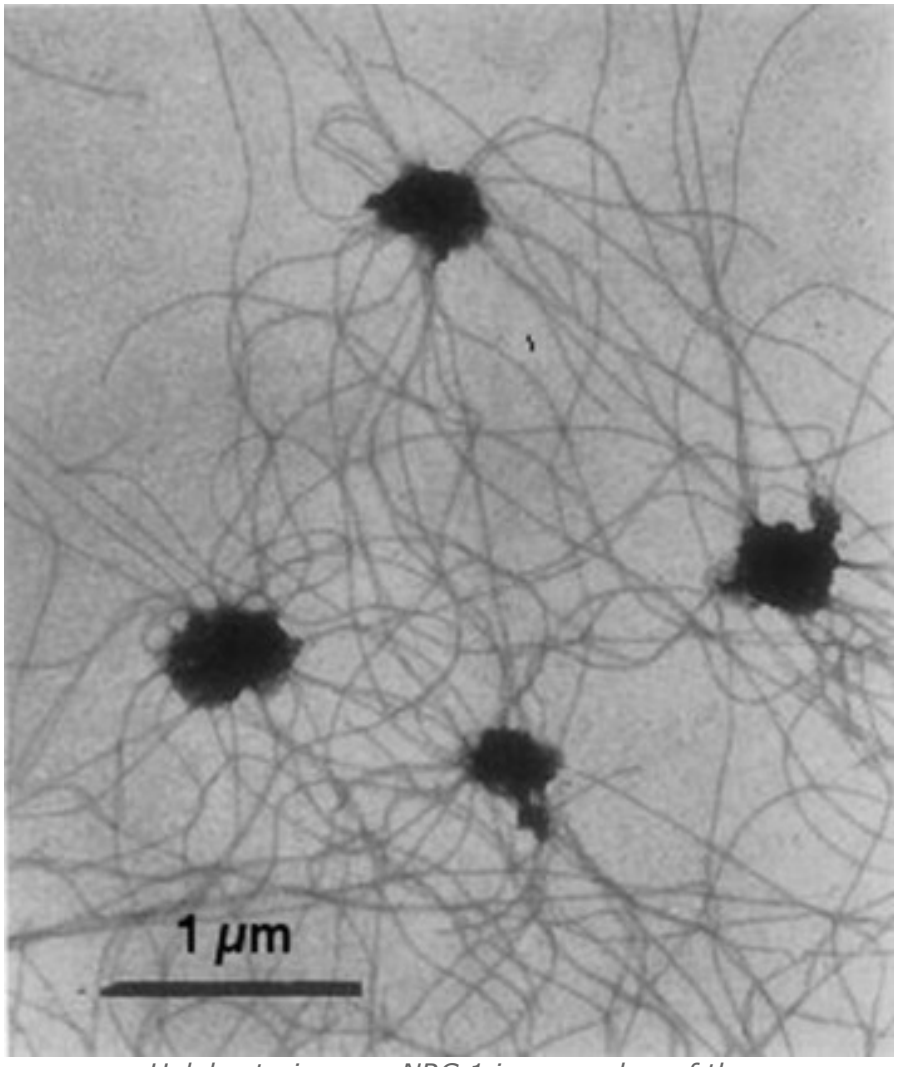
Halobacterium sp. NRC 1 is a member of the Archaea and grows in extremely salty environments including salt marshes, hypersaline lakes (e.g., the Great Salt Lake).

Halobacterium is grown on medium so salty that few other organisms would survive it. In fact, Halobacterium will lyse at total salinities below 1.0 2.0 M. (For

comparison, sea water has a total salinity of 0.6 M, while human blood contains only 0.14 M NaCl).

For these reasons and the fact that Halobacterium is not known to cause any human disease, these microbes are ideal for beginning practice of sterile technique. Using these microbes allows students to practice the hand motions of sterile technique without the concern that they will culture a pathogen or contaminate their workspace with the microbe they are using.

It is essential to learn good sterile technique and use the same precautions as if working with a known pathogen.



Halobacterium sp. NRC 1 is a member of the

Méthode : Materials

Included in the kit

40 petri dishes

8 bottles Halobacterium Agar, 135 mL each

Halobacterium liquid culture

128 sterile inoculating loops

autoclavable disposal bag

hand lenses, or dissecting microscope(s)

wax markers or lab pens

Bunsen burners

resealable plastic bags or plastic food storage boxes

Incubator, 42 or 37

Disinfectant for benchtop (e.g., alcohol or bleach solution) If an incubator is not available, the plates may

be stored on the lab bench. If the plates are incubated at 42 C, results may be obtained in 7 days, and if at 37 C, 7 14 days. If the plates are incubated at room

temperature on the bench, it may take 2 weeks or longer to see the results, depending on the temperature of your lab.

Preparing Media Plates

Preparing Media Plates

1. To melt the medium, slightly loosen the cap(s) and set the bottle(s) of medium in a pot of water and bring it to a boil. Make sure the water level is even with the level of the medium in the bottle(s). Leave the bottle in the boiling water until the medium has completely melted. This will take approximately 30 minutes.

2. Allow the medium to cool to 55 C either by allowing the pot of water to cool to that temperature or by letting the bottle(s) sit for several minutes at room

temperature. The bottle(s) should feel comfortably hot to the touch when around 55 C.

3. Disinfect the work surface. Wash your hands thoroughly. Unpack the petri dishes, being careful not to disturb their sterility. Align the sterile plates along the edge of a clean, level tabletop away from any draft or breeze.

4. Remove the cap and flame the mouth of a bottle of medium. Lift the lid of a petri plate just enough to pour in the molten medium. Carefully, pour to a

depth of about 5 mm per plate. Replace the lid immediately to prevent contamination.

5. Repeat Step 4 with the other bottle(s) of medium.

6. Let the petri plates stand undisturbed until they solidify (about 1 hour). Let the plates sit out until any condensation on the lid evaporates.

7. Dispose of the empty bottles in an autoclave disposal bag.

Microbiology (cf. Microbiology)

B. Cours 1

Microbiology (cf. Microbiology)

Cours 2 : Fermentation

V

Cours 2 20
Exercice : Reorder the following sentences to get a coherent paragraph. 20

The term “fermentation” was first used by Pasteur to define respiration in the absence of free molecular oxygen. Fermentation can be broadly defined as respiration that occurs in the dark (no photosynthesis) and does not involve the use of free molecular oxygen, nitrate ions, or nitrite ions as the final electron acceptors of degraded organic compounds. Therefore, respiration may occur through several fermentative pathways including sulfate reduction, mixed acid production, and methane production. Fermentation is a form of anaerobic respiration. The bacteria that perform fermentation are facultative anaerobes and anaerobes. Fermentation involves the transformation of organic compounds to various inorganic and organic products. During fermentation a portion of an organic compound may be oxidized while another portion is reduced. It is from this oxidation-reduction of organic compounds that fermenting bacteria obtain their energy and produce numerous simplistic and soluble organic compounds. Fermentative bacteria are capable of performing a variety of oxidation-reduction reactions involving organic compounds, carbon dioxide, carbon monoxide (CO), molecular hydrogen, and sulfur compounds. Fermentative bacteria include facultative anaerobes, aerotolerant anaerobes, and strict anaerobes. Some fermentative bacteria such as the clostridia and Escherichia coli produce a large variety of products, whereas other fermentative bacteria such as Acetobacterium produce a very small number of products. As environmental or operational conditions change, for example, pH and temperature, the bacteria that are active and inactive also change. These changes in activity are responsible for changes in the types and quantities of compounds that are produced through fermentation.

cours 2.pdf (cf. cours 2)

The Microbiology of Anaerobic Digesters, by Michael H. Gerardi 693-8 Copyright © 2003 by John Wiley & Sons, Inc

A. Cours 2

cours 2.pdf (cf. cours 2)

B. Exercice : Reorder the following sentences to get a coherent paragraph.

[*Solution n°4 p 39*]

1. b- Fermentation is a biotechnology that promotes and controls the growth of microorganisms and their metabolic activities for the preservation and transformation of raw food materials.
2. a- Therefore, today, when one considers fermented foods, it is not surprising that the focus is on foods in which microbial activity plays an essential role in obtaining the required stability, safety and sensory properties
3. c- However, when the discussion comes to the virtues of fermentation as a preservative, it is almost always related to those foods where lactic acid bacteria (LAB) play a central role in the production process
4. d- This discussion excludes those products that are often described as fermented but are largely the product of non microbial, enzymatic processes, such as black tea and Southeast Asian fish sauces.

Réponse : ___ ___ ___ ___

VI

Cours 3 : Emerging issues in probiotic safety: 2023 perspectives

Cours 3 22
Activité d'apprentissage 22

ABSTRACT

Probiotics are used for both generally healthy consumers and in clinical settings. However, theoretical and proven adverse events from probiotic consumption exist. New probiotic strains and products, as well as expanding use of probiotics into vulnerable populations, warrants concise, and actionable recommendations on how to work toward their safe and effective use. The International Scientific Association for Probiotics and Prebiotics convened a meeting to discuss and produce evidence-based recommendations on potential acute and long-term risks, risks to vulnerable populations, the importance for probiotic product quality to match the needs of vulnerable populations, and the need for adverse event reporting related to probiotic use. The importance of whole genome sequencing, which enables determination of virulence, toxin, and antibiotic resistance genes, as well as clear assignment of species and strain identity, is emphasized. We present recommendations to guide the scientific and medical community on judging probiotic safety.

What is the context? Probiotics, available to healthy consumers as both dietary supplements and foods, are also used by some patient populations. The goal of this paper is to determine if any new factors have emerged that would impact current views about probiotic safety for both these populations.

They also make recommendations regarding emerging safety considerations. Probiotics targeted for patient populations should undergo stringent testing to meet quality standards appropriate for that population, preferably verified by an independent third party.

The safety of probiotics derived from species without a history of safe use must be considered on a case-by-case basis. Research is needed to address some gaps, for example which best animal models to use for safety assessment of live microbes,

the possibility of antibiotic resistance gene transfer via transformation, and potential impact of probiotic-induced changes in microbiomes, interactions with drugs, and probiotic colonization.

Cours 3 (cf. Cours 3)

A. Cours 3

Cours 3 (cf. Cours 3)

B. Activité d'apprentissage

1. Questions

Questions

Questions:

Summarize the text in 250 words.

Find 6 keywords.

Cours 4 : Aflatoxins

VII

Cours 4 : Aflatoxins	24
Activité d'apprentissage	24

AFLATOXINS :

Aflatoxins are one of the most potent and dangerous groups of mycotoxins worldwide. Over four billion people in developing countries are repeatedly exposed to aflatoxins, contributing to greater than 40 percent of the disease burden in these countries. Aflatoxins are produced primarily by the fungi Aspergillus flavus and Aspergillus parasiticus. There are four main types of aflatoxins: B1, B2, G1, and G2. Aflatoxin B1 is the major toxin produced, and is regulated in the United States in agricultural products that may be used in human food. The clinical effects of aflatoxins may include death, liver cancer, reproductive problems, anemia, immune system suppression, and jaundice. Nursing animals may be severely affected by a toxic derivative of aflatoxin (aflatoxin M1) that can be passed through milk. Aflatoxin contamination is economically important in crops such as maize, peanuts, cottonseed, and tree nuts. Powdery, grey-green spores may develop on the surface of maize ears, and aflatoxins may be produced by the fungus until the kernel moisture reaches about 15 percent. High temperatures, drought stress, and insect injury may contribute to increased aflatoxin contamination in maize. Cottonseed, an important food source for dairy cattle, may become contaminated with aflatoxins if the seed-bearing capsules (bolls) are damaged, followed by high humidity and warm temperatures before or after harvest. Tree nuts such as pistachios and almonds may become contaminated with aflatoxins during injury, such as the splitting of hulls.

Cours 4 : Aflatoxins (cf. Cours 4 : Aflatoxins)

Schmale, D.G., and G.P. Munkvold. 2009. Mycotoxins in Crops. The Plant Health Instructor. DOI: 10.1094/PHI-I-2009-0715-01. Reviewed 2014.

A. Cours 4 : Aflatoxins

Cours 4 : Aflatoxins (cf. Cours 4 : Aflatoxins)

B. Activité d'apprentissage

1. Exercice

[*Solution n°5 p 40*]

1- Aflatoxin G1 is the main toxin produced

- ○ a)True
- ○ b)false

2. Exercice

Question 1

[*Solution n°6 p 40*]

2) Find in the text words or phrases that are closest in meaning to the following :

a) strong

b) infection

c) produce

Question 2

[*Solution n°7 p 40*]

3) Find in the text words that are opposites of the following :

a) low

b) insignificant

c) slightly

Question 3

[*Solution n°8 p 40*]

4) Answer the following questions according to the text:

a- Which fungy mainly responsible for the production of aflatoxins?

b- Can aflatoxins contaminate cottonseeds and can high humidity and high temperatures damage them?

c- How animals can be poisoned by the aflatoxin M1 derivative

TD 1

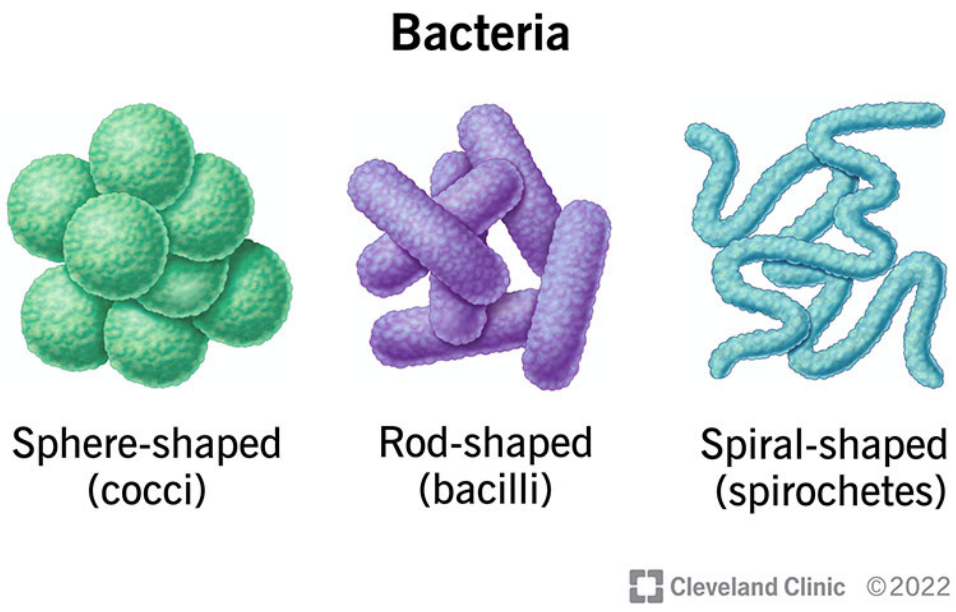
VIII

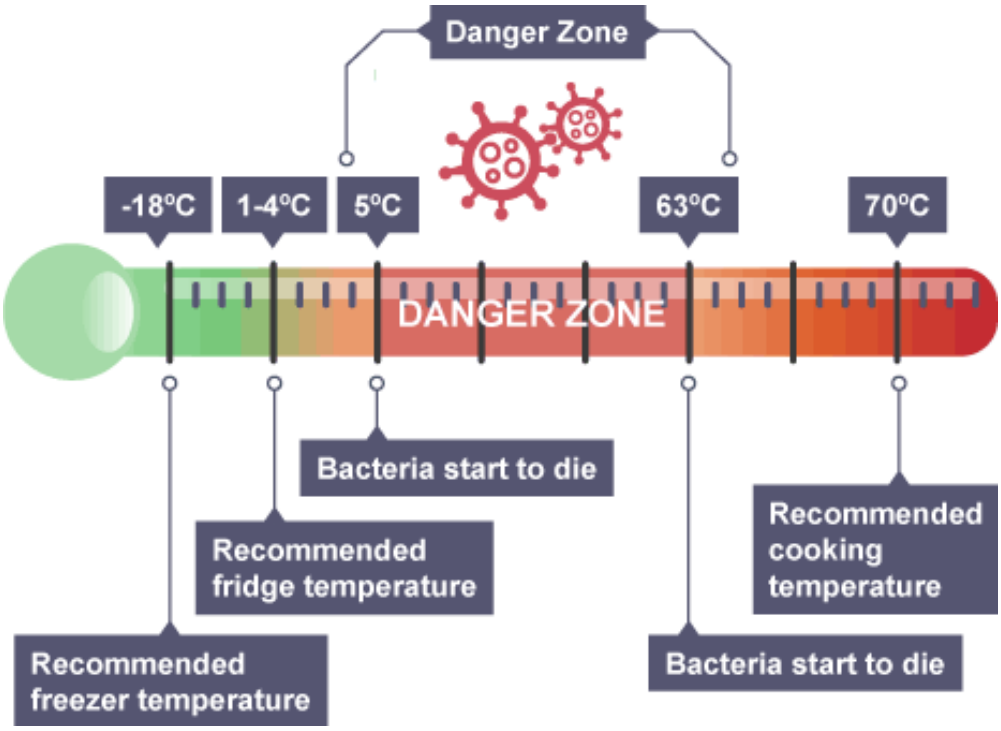
Exercice : 1/ Fill in the missing words: Archaea, molecular biology, bacteria, microorganisms, 26

Bacteria

Bacteria are tiny, single-celled living organisms. There are millions of different types of bacteria. Many can be found in and on your body and are beneficial to you. These bacteria make up your microbiome, which keeps your body healthy. Other bacteria can make you sick. Healthcare providers can treat many bacterial infections with antibiotics.

TD 1 micro bio.pdf (cf. TD 1 micro bio)





A. Exercice : 1/ Fill in the missing words: Archaea, molecular biology, bacteria, microorganisms,

[*Solution n°9 p 40*]

After the discovery of----------, scientists tried to classify them among the living beings. With the development of ----------techniques. Woese CR in 1978 proposed a more precise classification based on an objective and phylogenetic criterion, he managed to divide living organisms in three areas. The domain of ----------or (Eubacteria) which is characterized by the presence of a cell wall with peptidoglycan, the domain of ----------(Archaea) whose wall is distinct and different from that of eubacteria. The field of Eukaryotes which includes animals, plants, fungi (molds and yeasts) and protists.

TD 2

IX

Structure and function of bacterial cell

Structure and function of bacterial cell: A bacterial cell have essential structural components : cell wall, cytoplasm membrane , intra cytoplasm structure and cell surface appendages (capsule , flagella , fimbriae , spore). The biochemical compositions of these structures are macromolecules are arranged or sequenced in primary – structure of molecule in which the subunits are put together such as:

DNA, RNA ---------- Nucleotides

Protein ---------- amino acid

Phospholipid -------- fatty acid

Polysaccharide ------- sugars

Cell wall

The bacteria are surrounding by rigid cell wall. The principle structural component of cell wall is peptidoglycan. The cell wall consists of polymer of two sugar derivatives N- acetylglucosamine and N- acetylmuramic acid cross linked by short chains of amino acids (peptide), this molecule is a type of peptidoglycan called murein Peptidoglycan (PG) is complex of polysaccharide and polypeptide. Most bacteria are classified according to reaction of Gram stain with components of cell wall into major groups; Gram positive & Gram negative bacteria based on staining properties. Gram stain developed in 1884 by Christian Gram ,the most widely employed in bacteriology lab.

Gram positive bacteria cell wall composed of :

-Peptidoglycan This layer is very thick in G +ve bacteria constituting 50-80nm of cell wall and responsible for the rigidity of cell wall and retention of crystal violet dyes during the Gram stain procedure. The large amounts of PG make Gram positive bacteria susceptible to antibiotics (penicillin) that inhibit cell wall synthesis.

-Teichoic acid and thin layer of lipid

Gram negative bacteria cell wall composed of :

-Inner layer of peptidoglcan

This layer is thin constituting of (5-10) nm of cell wall which cannot retain the crystal violet stain.

-Outer layer of lipopolysaccharides (LPS)

cotaining of lipid A (endotoxin) and polysaccharide (fig.).

-Periplasmic space between the inner and outer layers

It is filled with gel and is crossed by lipoprotein molecules to link the peptidoglycan layer and LPS layer, and no teichoic acid.

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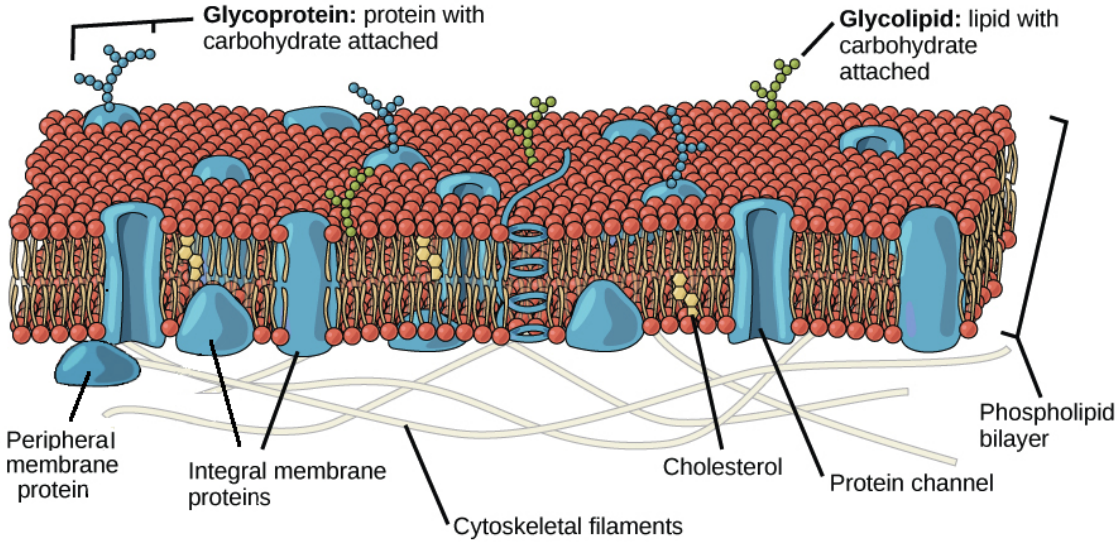

A. TD 2

Td 2(1).pdf (cf. Td 2(1))

TD 3

Function of cell membrane

1-Control on inflow of metabolites from cell by control on active transport of molecules into cell because it has selective permeability.

2-Energy generation by oxidative phosphorylation.

3-Secretion of enzyme and toxin.

Synthesis of precursors of cell wall (have important role in synthesis of cell wall).

Nucleoid :- The bacterial genome consists of a single chromosome. It is not surrounded by nuclear membrane. Some bacteria have small, circular of DNA (plasmid) as free in cytoplasm.

Ribosome:- It is composed of several RNA and proteins. The 70s unit is composed of two small subunits (50s and 30s), while eukaryotic ribosome is consist of 80s (60s

and 40s).

Function of cell wall:

-Protection the internal structures.

-It maintains the shape of bacterial cell.

-Contain component which toxic to host cell.

- It plays a role in cell division

sujet TD 3 Master 2.pdf (cf. sujet TD 3 Master 2)

A. TD 3

sujet TD 3 Master 2.pdf (cf. sujet TD 3 Master 2)

TD 4

XI

TD 4 MCQ.pdf (cf. TD 4 MCQ)

A. TD 4

TD 4 MCQ.pdf (cf. TD 4 MCQ)

TEST n° 1

XII

TEST n°1 (cf. TEST n°1) (cf. TEST n°1)

A. TEST n°1

TEST n°1 (cf. TEST n°1)

Système de sortie

XIII

A. Exercice : Clostridium botulinum

[Solution n°10 p 41]

Clostridium botulinum

Botulinum toxin is considered the most powerful poison to date. Botulinum toxin A is the most active. The lethal dose in an adult male is estimated at 70 µg orally. In general, the single ingestion of a few grams of food containing botulinum toxin is sufficient to trigger botulism. In a newborn or young child, the ingestion of ten to a hundred spores is capable of causing toxic infection, i.e. the quantity of spores that could be contained in a few mg of a food such as honey or a few dust. Food raw materials are contaminated with neurotoxigenic Clostridium bacteria/spores from the environment. Certain foods can be contaminated through spices or condiments (pepper, garlic, etc.). The conditions of preparation and storage of foodstuffs then determine possible germination of spores, growth of bacteria as well as toxinogenesis. The presence of botulinum toxin in low-acid manufactured foods is often due to a lack of control of the canning process (in particular cooking/sterilization temperature, pH, aw, recontamination after heat treatment). Botulinum toxin is stable in foods over a long period of time. Foods at risk for the consumer are preserved foods with low acidity.

Choose the wrong answers:

1- Botulinum toxin is not considered a poison.

2- orally, a dose of 70 is considered a lethal dose

3- Botulism does not occur directly following the ingestion of a few grams of food containing botulinum toxin.

4- All foods are contaminated through spices or condiments.

5- The presence of botulinum toxin in low-acid manufactured foods is linked only to pH and sterilization

Translate what follow into French

Translate what follow into French

In general, the single ingestion of a few grams of food containing botulinum toxin is sufficient to trigger botulism.

Conclusion

The Microbiology deals with microscopic organisms, such as bacteria, fungi, algae, protozoa, & viruses. Microbiology students study microbial growth, survival, metabolism, genetics, and physiology, while examining the organism's relationship to the environment, biotechnology, and diseases. Many microbiologist focus on a specialized field in microbiology that can be used in hospital/clinical laboratories, the environment, the food industry, research laboratories.

Solution des exercices

> Solution n°1 *(exercice p. 9)*

○	a-140
○	b-nutrients
○	c- desinfectants
◉	d-colonies

d-colonies

> Solution n°2 *(exercice p. 11)*

○	a)Flame
○	b)Mean division time
○	c)Upside down
◉	d)Nutrients

d)Nutrients

> Solution n°3 *(exercice p. 13)*

○	a-desinfectant
○	b-inoculating loop
○	c- 20 minutes
◉	d-aseptic technique

d-aseptic technique

> Solution n°4 *(exercice p. 20)*

1. a- Therefore, today, when one considers fermented foods, it is not surprising that the focus is on foods in which microbial activity plays an essential role in obtaining the required stability, safety and sensory properties
2. b- Fermentation is a biotechnology that promotes and controls the growth of microorganisms and their metabolic activities for the preservation and

transformation of raw food materials.

3. c- However, when the discussion comes to the virtues of fermentation as a preservative, it is almost always related to those foods where lactic acid bacteria (LAB) play a central role in the production process
4. d- This discussion excludes those products that are often described as fermented but are largely the product of non microbial, enzymatic processes, such as black tea and Southeast Asian fish sauces.

b-c-d-a

> Solution n°5 *(exercice p. 24)*

◉	a)True
○	b)false

> Solution n°6 *(exercice p. 24)*

Words or phrases that are closest in meaning to the following :

a) strong = potent

b) infection = contamination

c) produce = generate

> Solution n°7 *(exercice p. 24)*

Words that are opposites of the following are :

a) low/high

b) insignificant/significant

c) slightly/significantly

> Solution n°8 *(exercice p. 24)*

a-The fungi primarily responsible for the production of aflatoxins are Aspergillus flavus and Aspergillus parasiticus

b- Yes, aflatoxins can contaminate cottonseeds. High humidity and high temperatures before or after harvest can contribute to the damage of cottonseed capsules (bolls) and subsequent aflatoxin contamination.

c- Nursing animals can be poisoned by the aflatoxin M1 derivative through the consumption of contaminated milk from the affected animals.

> Solution n°9 *(exercice p. 26)*

After the discovery of----------, scientists tried to classify them among the living beings. With the development of ----------techniques. Woese CR in 1978 proposed a more precise classification based on an objective and phylogenetic criterion, he managed to divide living organisms in three areas. The domain of ----------or (Eubacteria) which is characterized by the presence of a cell wall with peptidoglycan, the domain of ----------(Archaea) whose wall is distinct and different from that of eubacteria. The field of Eukaryotes which includes animals, plants, fungi (molds and yeasts) and protists.

After the discovery of---- **microorganisms** --------, scientists tried to classify them among the living beings. With the development of ------ **molecular biology**

---techniques. Woese CR in 1978 proposed a more precise classification based on an objective and phylogenetic criterion, he managed to divide living organisms in three areas. The domain of ---- **bacteria** ----or (Eubacteria) which is characterized by the presence of a cell wall with peptidoglycan, the domain of -- **Archaea** ---- (Archaea) whose wall is distinct and different from that of eubacteria. The field of Eukaryotes which includes animals, plants, fungi (molds and yeasts) and protists.

> Solution n°10 *(exercice p. 35)*

Translate what follow into French

En général, l'ingestion de quelques grammes d'aliments contenant de la toxine botulique suffit à déclencher le botulisme.