Subject: Scientific English

Lever: Third year biology Microbiology

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**Microorganisms and their classification**

Microorganisms are tiny living organisms that are too small to be seen with the naked eye. They play a critical role in various ecological and biological processes and are classified into several major groups based on their characteristics, including their cellular structure, metabolism, and genetic. The primary groups of microorganisms are:

1. Bacteria:
   * Bacteria are single-celled prokaryotic organisms with no membrane-bound nucleus.
   * They have a diverse range of shapes, such as cocci (spherical), bacilli (rod-shaped), and spirilla (spiral).
   * Bacteria can be classified based on their staining properties (Gram-positive and Gram-negative), shape, and metabolic processes.
2. Archaea:
   * Archaea are also prokaryotic microorganisms, but they are distinct from bacteria and have unique genetic and metabolic features.
   * They often thrive in extreme environments, such as high temperatures, extreme acidity or alkalinity, and high salt concentrations.
3. Viruses:
   * Viruses are not considered living organisms because they lack cellular structure and cannot carry out metabolic processes independently.
   * They are essentially genetic material (either DNA or RNA) surrounded by a protein coat, and they require a host cell to replicate and propagate.
4. Fungi:
   * Fungi are eukaryotic microorganisms with a well-defined nucleus and membrane-bound organelles.
   * They include yeasts, molds, and mushrooms and are important decomposers and pathogens in various ecosystems.
5. Protists:
   * Protists are a diverse group of eukaryotic microorganisms that do not fit into the categories of fungi, plants, or animals.
   * They include single-celled organisms like amoebas and paramecia, as well as multicellular algae and protozoa.
6. Algae:
   * Algae are photosynthetic protists that range from single-celled species to large multicellular seaweeds.
   * They play a crucial role in aquatic ecosystems and are an essential part of the food chain.
7. Protozoa:
   * Protozoa are single-celled, eukaryotic microorganisms that are often classified as a type of protist.
   * They can be free-living or parasitic and are commonly found in aquatic environments.
8. Helminths:
   * Helminths are multicellular parasitic worms, including roundworms (nematodes) and flatworms (platyhelminths).
   * They can cause various diseases in humans and animals.

Microorganisms can also be classified based on their ecological roles (e.g., symbionts, decomposers, pathogens) and metabolic pathways (e.g., autotrophs, heterotrophs). Understanding the classification and characteristics of microorganisms is essential for various scientific fields, including microbiology, ecology, and biotechnology.

Microbial cell structure and function is a fundamental topic in microbiology. Understanding the structure and function of microbial cells is crucial for comprehending their roles in various biological processes, including disease, environmental cycling, and biotechnology.

1.Cell Membrane (Plasma Membrane):

* **Function:** It serves as a selective barrier that controls the passage of molecules into and out of the cell. It is also involved in energy production.
* **Structure:** Composed of a lipid bilayer with embedded proteins and various transporters.

2. Cell Wall (Bacterial Cell Wall):

* Function: Provides structural support and protection to the cell.
* Structure: In bacteria, it can be composed of peptidoglycan (Gram-positive) or an outer membrane with peptidoglycan (Gram-negative).

3. Cytoplasm:

* Function: Houses the cell's metabolic processes and contains various organelles.
* Structure: A gel-like substance containing water, ions, enzymes, and other molecules.

4. Nucleoid (in Prokaryotes) or Nucleus (in Eukaryotes):

* **Function:** Contains genetic material (DNA) and controls cellular activities.
* **Structure:** In prokaryotes, the DNA is present in a nucleoid region, whereas in eukaryotes, it is enclosed within a membrane-bound nucleus.

5. Ribosomes:

* **Function:** Site of protein synthesis.
* **Structure:** Composed of ribosomal RNA (rRNA) and proteins.

6. Plasmids (in Bacteria):

* **Function**: Extra-chromosomal genetic material that can carry genes for specific functions, like antibiotic resistance.
* **Structure**: Small, circular DNA molecules.

**Key words:**

* cellular structure: البنية الخلوية
* metabolism: الأيض
* single-celled prokaryotic: بدائية النواة وحيدة الخلية
* membrane-bound nucleus: نواة مرتبطة بغشاء
* cocci (spherical): المكورات (كروية
* bacilli (rod-shaped): العصيات (على شكل قضيب)
* spirilla (spiral): (حلزوني)
* metabolic features: ميزات التمثيل الغذائي
* thrive: يزدهر
* protein coat: بغلاف بروتيني
* host cell: الخلية المضيفة
* replicate: استنساخ
* propagate: ينتشر
* eukaryotic: حقيقية النواة
* well-defined nucleus: نواة محددة جيدا
* membrane-bound organelles: غشاء ملزمة العضيات
* yeasts: الخمائر
* molds: قوالب
* pathogens: مسببات الأمراض
* multicellular: متعدد الخلايا
* photosynthetic: البناء الضوئي
* roundworms: الديدان المستديرة
* flatworms: الديدان المسطحة
* Cell Membrane : غشاء الخلية
* selective barrier: حاجز انتقائي
* molecules: جزيئات
* lipid bilayer: الدهون طبقة ثنائية
* embedded proteins: البروتينات المدمجة
* protein synthesis: تخليق البروتين
* Extra-chromosomal genetic: وراثي خارج الصبغي

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