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Subject: **Systematic**

lecture : **1**



Ramadan Kareem
Islamic Festival

The dictionary

- prokaryotic :	بدائية النواة	- pigment :	الصبغة
- Eukaryotic :	حقيقية النواة	- parasites :	الطفيليات
- autotrophic :	ذاتية التغذية	- saprotrophic :	كائنات تتغذى على الجراثيم
- heterotrophic :	غيرية التغذية	- Bryophytes :	النباتات الطحلبية
- locomotion :	الحركة	- Pteridophytes :	النباتات السرخسية
- flagella :	الأسواط	- Gymnosperms :	عاريات البذور
- cilia :	الأهداب	- Angiosperms :	كاسيات البذور
- phytoplanktons :	العوالق النباتية	- ingestion :	الابتلاع
- photosynthetically :	التمثيل الضوئي	- chemoautotrophic:	ذاتية التغذية الكيميائية
- chitin :	الكيتين	- Absorptive :	الامتصاص
- moulds :	العفن	- individuals :	الأفراد
- mushrooms :	الفطر	- resemble :	التشابه
- toad stools :	فضلات الضفدع	- interbreed :	التزاوج
- puffballs :	فطريات البافبول	- fertile :	الخصوبة
- bracket :	القوس	- offspring's :	النسل

- inert :	خامل – polarity :	- القطبية
- precipitated :	مترسب – sequence :	- التسلسل
- mutations :	طفرات – icosahedral :	- عشريني (له عشرين وجه)
- exhibit :	تعرض / تظهر – helical :	- حلزوني
- strains :	سلالات – capsomer :	- غلاف قشري
- races :	أعراق – filamentous :	- خيطي
- infectious :	معدي – omnipresent :	- موجود في كل مكان
- obligate :	إلزامي – commensals :	- متعايش
- intracellular :	داخل الخلايا – symbionts :	- متكافل / متعايش
- viral :	فيروسى – flagellum :	- سوطي
- initiate :	مبتدئ – tufts :	- خصلات / حزم
- entry :	دخول – flagella :	- أسواط
- shell :	غلاف – dispersed :	- متناثر
- segmented :	مجزأ – stimulus :	- مثير
- several :	عدة – repellant :	- طارد
- randomly :	عشوائيا –	صباح الفل، إقرأ المعاني قبل ما تبدأ في المذاكرة وبالتوفيق

Systematic Botany

deals with the classification of the plant Kingdom into groups according certain systems of classification.

● The Five Kingdom System of Classification (Whittaker 1969)

This classification takes into account the following important criteria :

1- Complexity of Cell structure :

prokaryote

Eukaryote

2- Mode of nutrition :

autotrophs

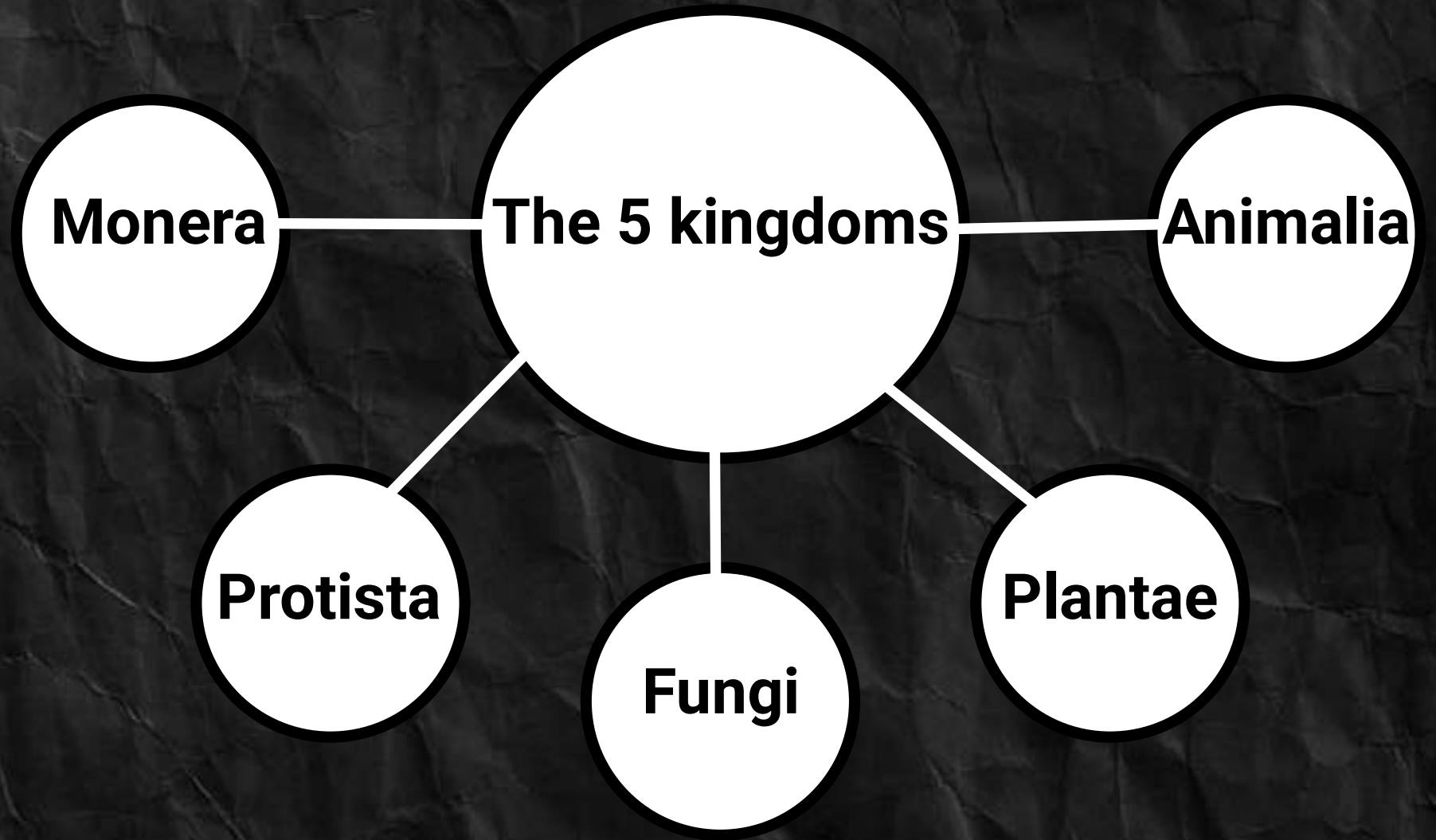
heterotrophs

3- Body organization :

unicellular

multi-cellular

4- Phylogenetic or evolutionary relationship .



● Kingdom Monera

This kingdom includes all prokaryotic organisms

i.e. mycoplasma, bacteria, actinomycetes (filamentous bacteria) and cyanobacteria (blue green Algae).

1. microscopic.

2. They do not possess a true nucleus.

3. They lack membrane bound organelles.

4. Their mode of nutrition is autotrophic or heterotrophic.

5. Some monerans like Archaeobacteria can live in extreme environmental conditions like absence of oxygen (anaerobic), high salt condition, high temperature like 80°C or above and highly acidic soils.

● Kingdom Protista

1. Autotrophs.

2. Eukaryotic.

3. They often bear cilia or flagella for locomotion.

4. They form the chief producers of food in oceans and in fresh water.

**5. All unicellular plants are collectively called as
phytoplanktons.**

- Phytoplanktons are photosynthetically active and have cell wall.

● Kingdom Fungi

1. Eukaryotic.

2. Their body is made up of numerous filamentous structures called hyphae.

3. Their cell wall is made up of chitin.

4. This kingdom includes moulds, mushrooms, toad stools, puffballs and bracket fungi.

5. Unicellular or multi-cellular organisms.

6. Their mode of nutrition is heterotrophic (they lack the green pigment chlorophyll. Some fungi like **Puccinia are parasites while others like **Rhizopus** are saprotrophic and feed on dead organic matter.**

● Kingdom Plantae

1. Major groups of Bryophytes, Pteridophytes, Gymnosperms and Angiosperms belong to this kingdom.

2. It includes all multicellular plants of land and water.

3. The cells have a rigid cell wall made up of **cellulose**.

4. Most of them are **autotrophs** since they have chlorophyll.

● Kingdom Animalia

1. Eukaryotic.

2. Heterotrophic.

3. The cell wall is absent.

4. Mostly Multicellular organisms.

5. The nutrition is mostly by ingestion.

6. Mostly Motile (It has the ability to movement).



● Major differences among five kingdoms

Property	Monera	Protista	Plantae	Fungi	Animalia
Cell type	Prokaryotic	Eukaryotic	Eukaryotic	Eukaryotic	Eukaryotic
Cell organization	Mostly unicellular	Mostly unicellular	Multicellular and unicellular	Mostly Multicellular	Mostly Multicellular
Cell wall	Present in most	Present in some, absent in others	Present	Present	absent
Motility	Motile or non-motile	Motile or non-motile	Nonmotile	Mostly nonmotile	Mostly Motile
Mode of nutrition	Absorptive	Absorptive or ingestive	Absorptive	Mostly Absorptive	Mostly ingestive
Nutritional class	Phototrophic, heterotrophic or chemoautotrophic	Heterotrophic and phototrophic	Heterotrophic	phototrophic	Heterotrophic

● Species

- Species is the basic unit of Classification .

- It is defined as the group of individuals which resemble in their morphological and reproductive characters and interbreed among themselves and produce fertile offspring's.

The seven main categories



● Viruses



• The nature of viruses :

- Are viruses living or nonliving ?

1- Non-living Characters of Viruses : 2- Living characters of viruses :

1- They can be crystallized.

2- Outside the cell, they behave like inert chemicals.

3- They do not show development, growth, nutrition, reproduction, etc.

4- They can be precipitated.

1- They multiply within host cells.

2- They possess genetic material, either DNA or RNA.

3- There are definite races or strains.

4- They exhibit mutations.

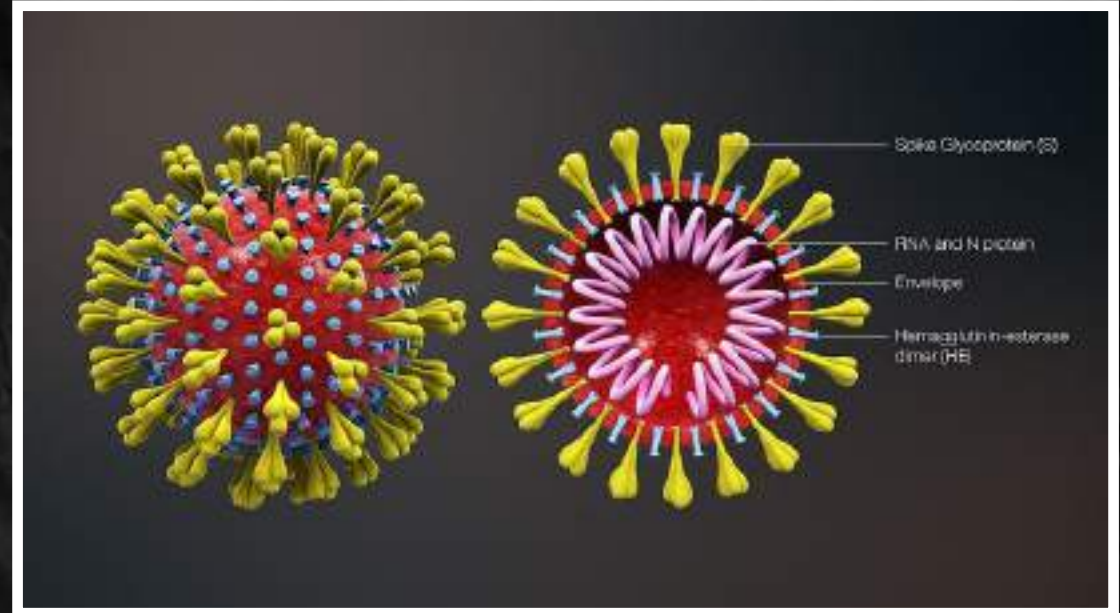
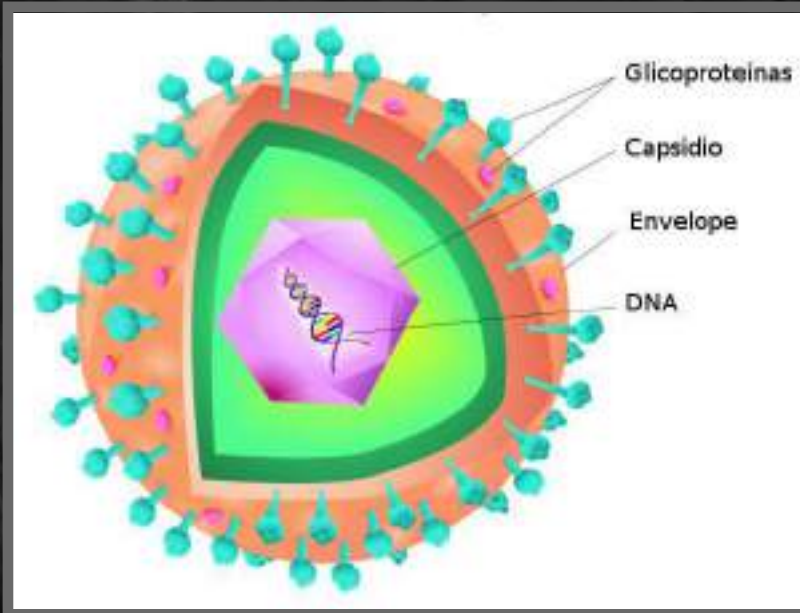
Because of the above reasons, viruses form unique bridge between living and non-living things

● General characters common to all viruses

- Virus is an **infectious agent** and **obligate intracellular parasite**
- They are small size (20-300 nm in diameter), Cannot seen by light microscope and can seen by Electron microscope.
- Virus infectious cycle includes a phase in which the agent consists of a virion. **The virion consists of RNA or DNA** coated with one or more proteins
- Viruses carry genetic information in the form of RNA or DNA.
- Compared with a cell genome, **viral genomes are small.**
- Viruses can only reproduce in living cells.
- A virus can initiate another infection when transferred to a suitable host.
- The outermost proteins of the virus particle allow the virus to recognize the correct host cell and gain entry into its cytoplasm.

• The structure of viruses:

A complete virus particle, known as **a virion**, consists of **nucleic acid** surrounded by a protective coat of protein called **a capsid**. These are formed from identical protein subunits called **capsomeres**.



1- Genome : the viral nucleic acid carries the genetic information in either DNA or RNA, which is considered as the fingerprints of the virus.

2- Capsid (Protein coat) : is the protein shell, which encloses the nucleic acid. It is formed of small units called capsomeres.

• **Functions of the capsid:**

1. Protects the viral genome against extracellular environments.
2. It carries the viral attachment proteins (VAP), which are glycoproteins that attach the virus on specific receptors on the target cell.
3. Determine the antigenic characters of the virus.

● Viral nucleic acid:

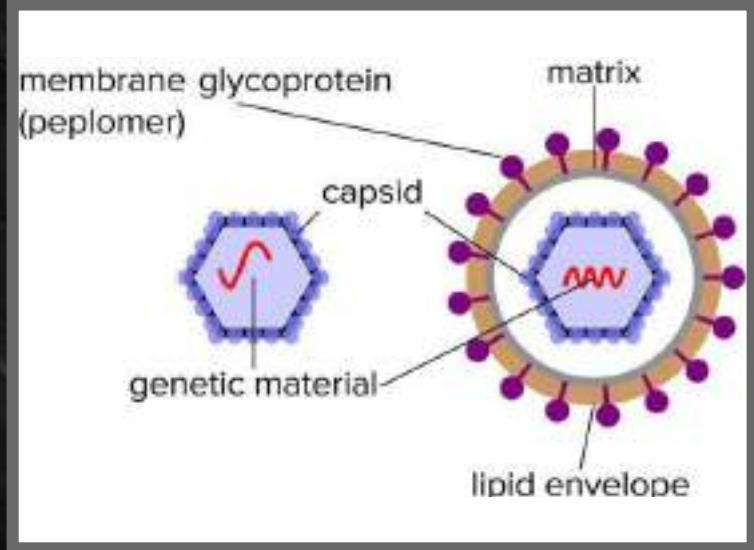
- The viral nucleic acid is located internally and can be either single- or doublestranded RNA or DNA. The nucleic acid can be either linear or circular.

- The DNA is always a single molecule; the RNA can exist either as a single molecule or in several pieces (segmented).

• Some RNA viruses are positive polarity and others are negative polarity.

• Positive polarity is defined as RNA with same base sequence as the mRNA.

• Negative polarity has a base sequence that is complementary to the mRNA.



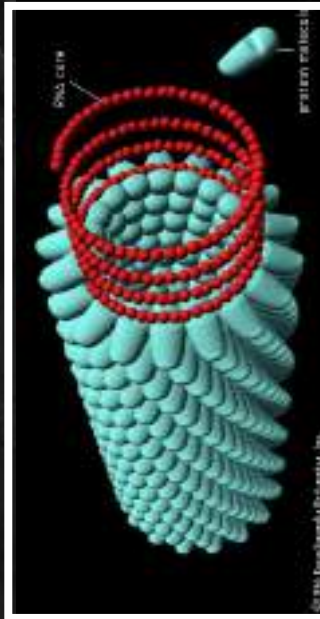
● Virus's symmetry

[shapes and sizes]

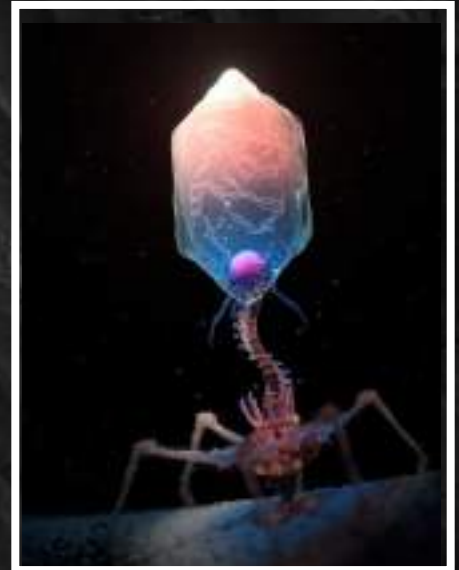
icosahedral



helical



complex



1- icosahedral :

These viruses appear spherical in shape,

2- helical :

- Composed of a single type of capsomer stacked around a central axis to form a helical structure, which may have a central cavity.**

- This arrangement results in rod-shaped or filamentous virions**

3- Complex :

These virus structures have a combination of icosahedral and helical shape and may have a complex outer wall or head-tail morphology.

● Bacteria

Bacteria are omnipresent. They are found in all environments, where organic matter is present. They are found in air, water, soil and also in or on the bodies of plants and animals.

- Some of the bacteria live as commensals (eg. Escherichia coli in the human intestine)

- some live as symbionts (eg. Rhizobium) in the root nodules of leguminous plants.

- Size : Most between 0.5 to 1 micron in diameter and about 3 to 5 microns in length.



Cocci bacteria appear in several characteristic arrangements depending on their plane of division.

a. Diplococci :

Cells divide in one plane and remain attached in pairs.

b. Streptococci :

cells divide in one plane and remain attached to form chains.

c. Tetrads :

Cells divide in two planes and form group of four cells.

d. Staphylococci :

cells divide in three planes, in an irregular pattern, producing bunches of cocci.

e. Sarcinae :

cells divide in three planes, in a regular pattern, producing a cuboidal arrangement of cells.

● Bacilli

Bacilli forms occur singly or in pairs (**diplobacilli**) or form chains (**streptobacilli**). In "*Corynebacterium diphtheriae*" which is a bacillus species, the cells are arranged side by side like match sticks (palisade arrangement).

• Flagellation in Bacteria

- All spirilla, about half of the bacilli and a small number of cocci are flagellated.

1- In a polar arrangement

Monotrichous

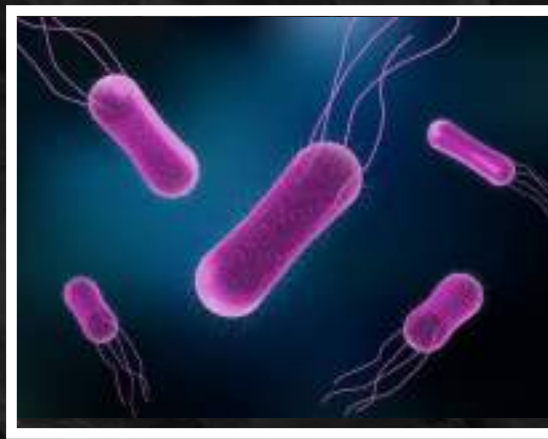
with a single
flagellum

Lophotrichous

with small bunches or
tufts of flagella
emerging from one end

Amphitrichous

with flagella at both
poles of the cell



2- In a peritrichous arrangement

flagella are dispersed randomly over the surface of the cell.



3- Atrichous bacteria

lack flagellum .

● Function of Flagella:

They can detect and move in response to chemical signals, a type of behaviour called **chemotaxis**.

- Positive chemotaxis is movement of cell in the direction of a favourable chemical stimulus **(usually a nutrient)**.

- Negative chemotaxis is movement away from a repellant **(potentially harmful)** compound.

■ Finished ■

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَمَا لَنَا إِلَّا أَنْتَ وَكَلَّ عَلَى اللَّهِ وَقَدْ هَدَيْنَا سُبُلَنَا

وَلَنَصْبِرَنَّ عَلَى مَا آذَيْتُمُونَا وَعَلَى اللَّهِ فَلْيَتَوَكَّلِ الْمُتَوَكِّلُونَ ﴿١٢﴾ {إِبْرَاهِيمَ}

Click

بقولك يا دكتور، هدية صغيرة كذا جدهنا منا.