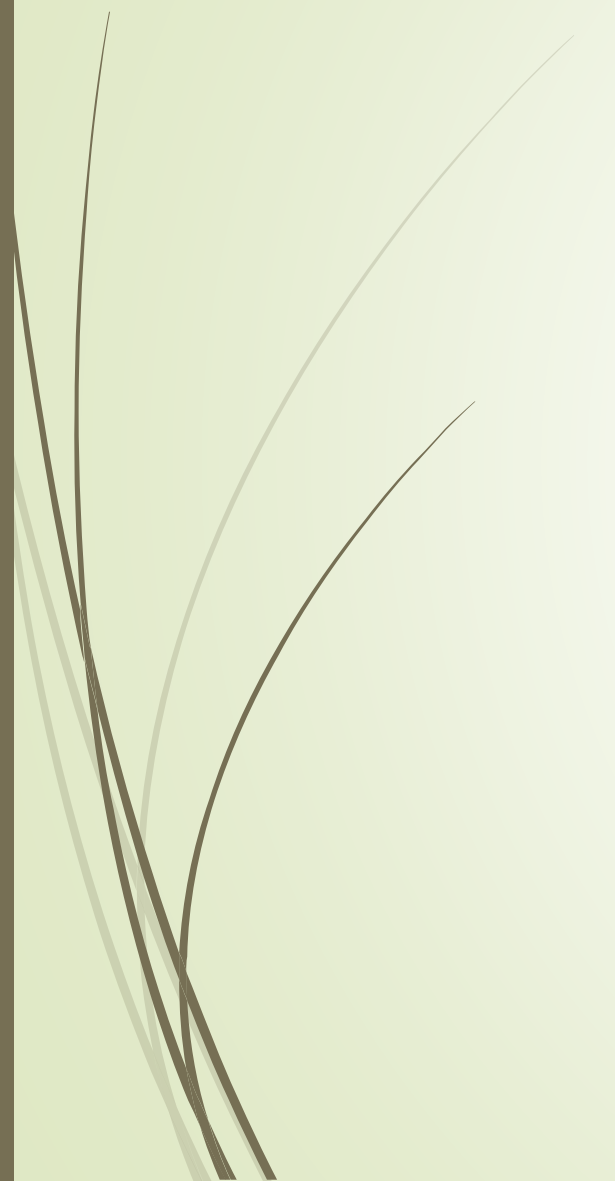





Mavzu:

**Mikroorganizmlar dunyosida viruslarning
tutgan o‘rni**





Viruses may be generalized to define as 'very small sized etiological agents of disease that are **capable of passing through filters** that retain even bacteria, **increase only in the presence of living cells**, and give rise to new strains by mutation'.

Mayer (1886) showed that the juice from the infected plants of tobacco could reproduce the disease if applied to healthy plants.

The Russian botanist **Dimitri Ivanowski (1892)**, demonstrated that the causal organism of tobacco mosaic could even pass through the finest porcelain filter that **with holds bacteria**.

Ivanowski also showed that this filtrate was capable of transmitting the disease to healthy susceptible plants. He also indicated that these causal organism were even smaller than bacteria.

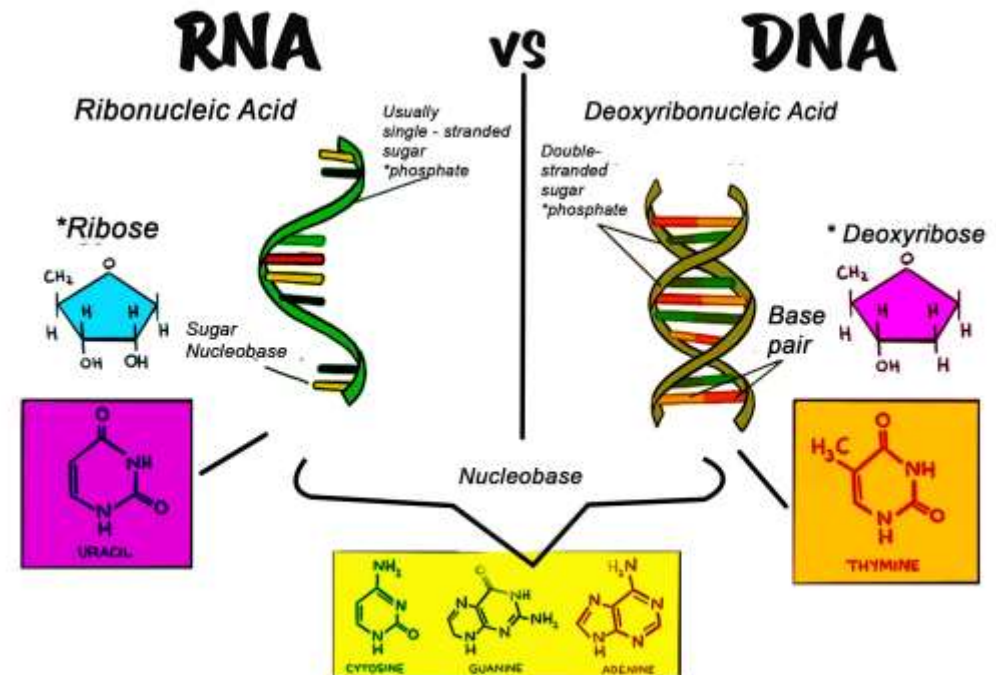
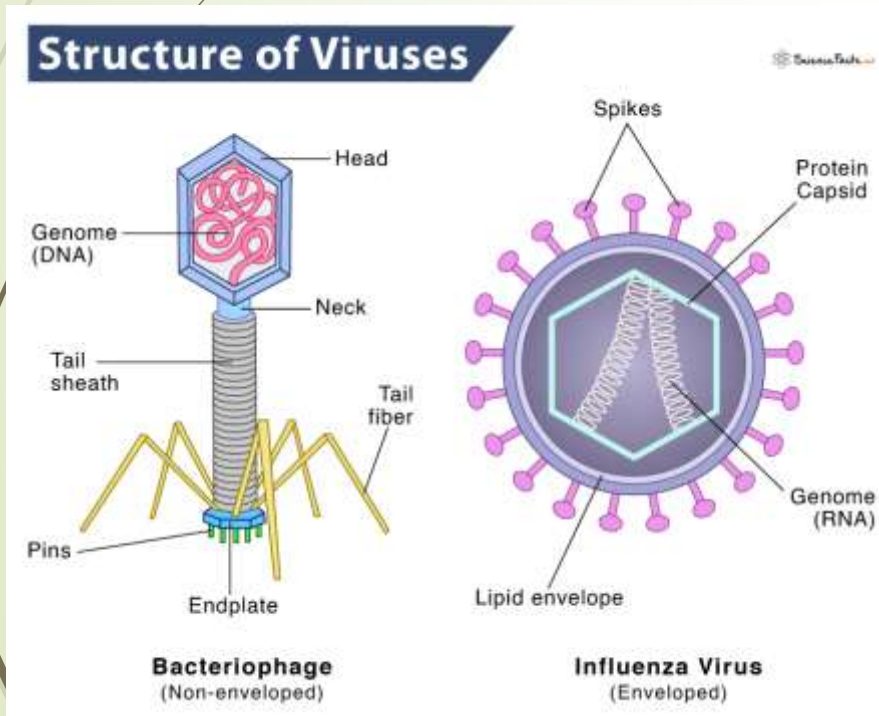


Schelsinger (1933) was the first to **determine the decomposition** of virus. He showed that a bacteriophage **consist of only protein and DNA**.

The nucleic acid fraction of the virus is the actual **infectious agent** was **first shown** by **Gierrer and Schramm (1956)**.

GENERAL CHARACTERS OF VIRUSES

- (1) They do not **occur-mavjud free in nature** but act as obligate intracellular parasite.
- (2) They are extreme microscopic structure which can only be seen by **electron microscope**.
- (3) Mainly the **size** ranges from 100-2000 millimicron.
- (4) They can not be **filtered by bacterial** filters.
- (5) The genetic material is **either DNA or RNA** which **occurs** in the form of **single** molecule and can be **single or double** stranded.





(6) A **single virus particle-bo'lagi** is known as **virion** which lacks functional autonomy.

(7) They **lack** their **own enzyme system** but interact with the host enzyme system and **synthesize new virus particles**. Thus they have a .master and slave relationship.

(8) **Outer capsid** of virus is **proteinaceous** and harmless-zararsiz and provide cellular specificity to the virus.

(9) They are intracellular obligate parasite and **can't be cultured on artificial culture media**.

(10) All animal and plant viruses have a narrow host range while others show a broad host range.



(11) **They show replication.**

(12) They are **highly infectious** and **spread disease-kasallik very quickly.**

(13) They show **special kind of pathogenecity** i.e. they cause disease at particular temperature. Most of virus become inert at 56-69°C (for 30 minutes)

(14) **They are haploid.**


(15) **They are uneffected by antibiotics.**

(16) They show life between **5-9 pH.**

(17) They remain active for a long time when kept in 50% glycerol solution.

(18) The extract of virus become **inert** at high **pressure** and **high sound** frequency.

(19) They get precipitated-cho'kmoq with **ethyl alcohol and acetone.**

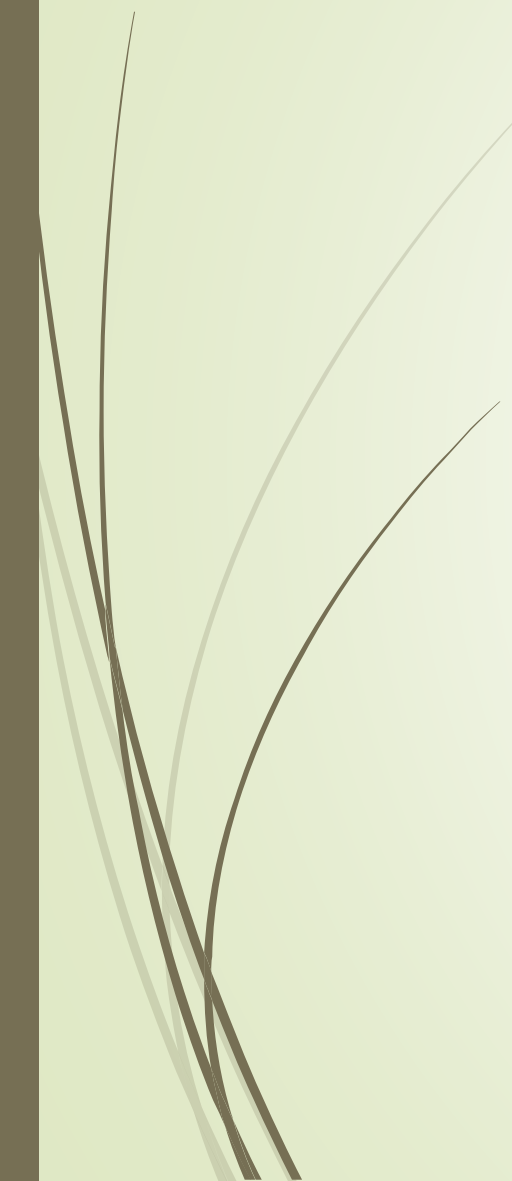


(20) They can be inerted by treatment with ultraviolet rays, pyridine, reagent grade and hydrogen peroxide.

(21) **They can be crystallized.**

(22) They show **response-toward** temperature, radiation and chemical substances.

(23) They **lack cell wall, nucleus, protoplasm and cell organelles.**





How do Virus differ from Bacteria? Viruses differ from bacteria and mycoplasmas in


:

- (i) not possessing any cellular organization.**
- (ii) Not growing on inanimate media.**
- (iii) not multiply by binary fission.**
- (iv) Not possessing both DNA and RNA together.**
- (v) Not possessing ribosome.**
- (vi) Not showing any sensitivity to antibiotics.**
- (vii) Showing sensitivity to interferon.**



Viruses are non-living because:

- (i) They can be crystallized (Stanley, 1935)
- (ii) They behave-bo'ladi as inert chemicals outside the host cell.**
- (iii) A cell wall or cell membrane of any type is **absent** in viruses.
- (iv) They do not show functional autonomy.**
- (v) They do not **respire-nafas olish** or **excrete-moddalarni chiqarish** or they do not show any sign of metabolism except reproduction.
- (vi) They lack any energy producing enzyme system.**



Virion-virusning yuqumli zarrasi: A single infective particle of virus is called as virion. It consists of nucleic acid core surrounded by a protein coat or capsid. The capsid with enclosed nucleic acid is called nucleocapsid.

Viroids-virusni eng kichik yuqumli zarrasi(N/K): These are the smallest infectious agents causing diseases in host. They consist solely of a protein free low molecular weight (75,000 - 1,25,000 dalton) with 243-360 nucleotides and small fragments of double stranded RNA molecules. They are also known as naked virus, meta virus or pathogene



The size of viruses is variable. Most viruses are much **smaller than bacteria**.

Their size ranges from 10 nm - 250 nm. The size of viruses is determined by electron microscopy, ultra centrifugation and by filtration through colloid ion membrane of known pore diameter.

The **smallest virus** is *coliphage F2* measuring about 2 nm.

The **smallest plant virus** is *satellite tobacco* necrosis virus measuring 17nm.

The **longest known plant virus** is *citrus tristeza* virus-rod shaped measuring 2000 x 12 nm.

Foot and mouth *virus of cattle* is the **smallest animal virus** measuring about 10 nm.

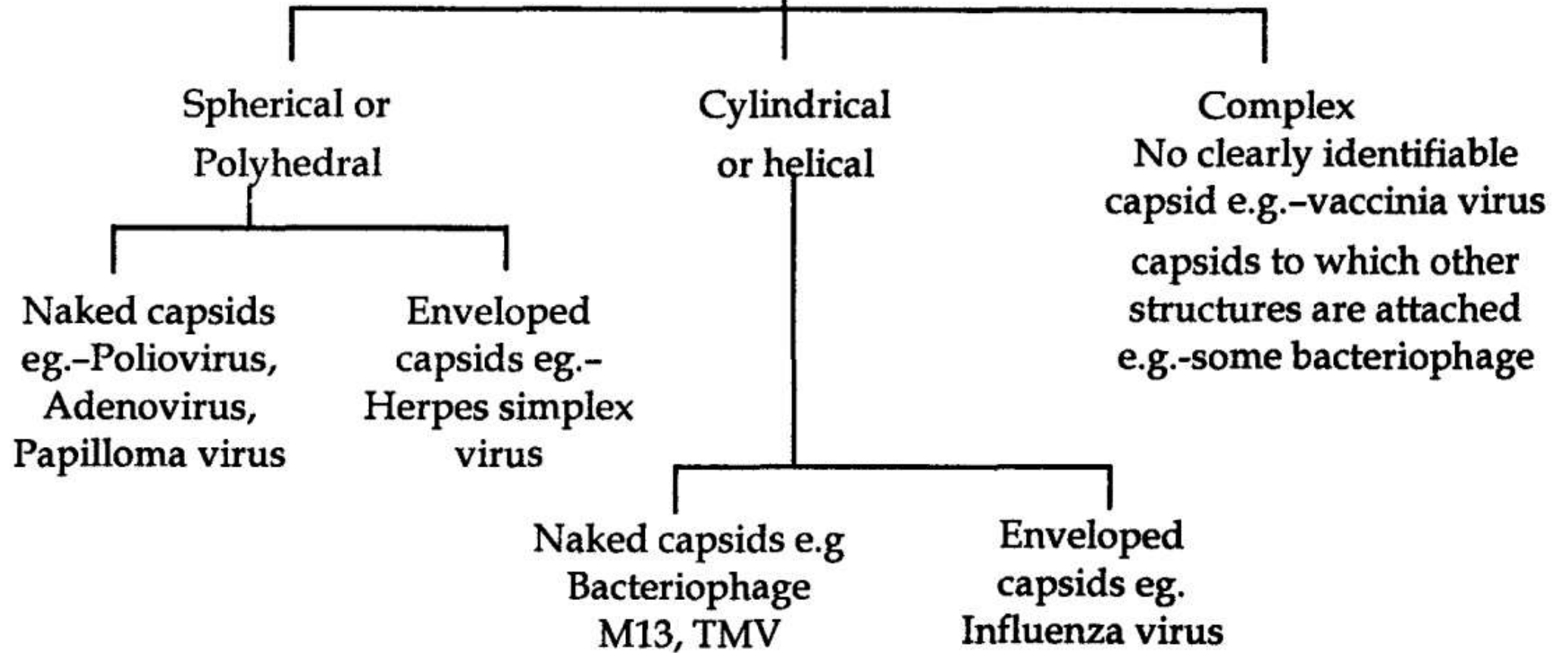
Pox viruses are the largest and most complex animal viruses.

Parrot fever virus measuring 400 nm.

Characters of Mycoplasmas and Viruses

Properties	Virus	Mycoplasma
1. Growth on culture medium	-	+
2. Cell wall/cell wall Peptidoglycan lack	+	+
3. Generate metabolic energy	-	+
4. Depends on host cell nucleic acid for multiplication	+	-
5. Can synthesize protein by own enzyme	-	+
6. Require sterols	-	+
7. Visible in optical microscope x 1500	-	+
8. Filterable through 450 nm filters	+	+
9. Contains both RNA and DNA	-	+
10. Growth inhibited by antibody alone	-	+
11. Growth inhibited by antibiotics	-	+
12. Action on protein synthesis + positive action, negative action	-	+

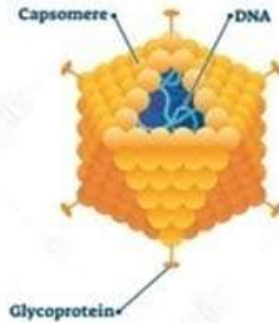
Viruses occur in three main shapes



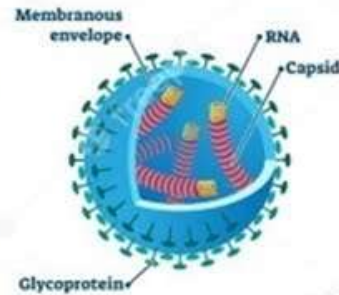
VIRUS



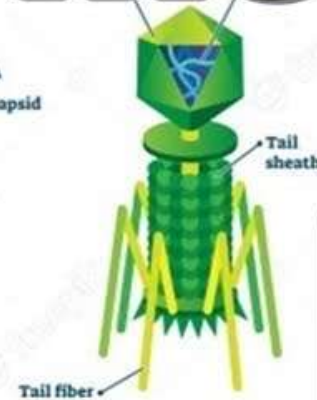
HELICAL
Tobacco Mosaic Virus



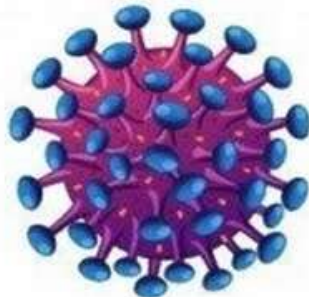
POLYHEDRAL
Adenovirus



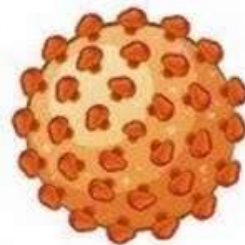
SPHERICAL
Influenza Virus



COMPLEX
Bacteriophage



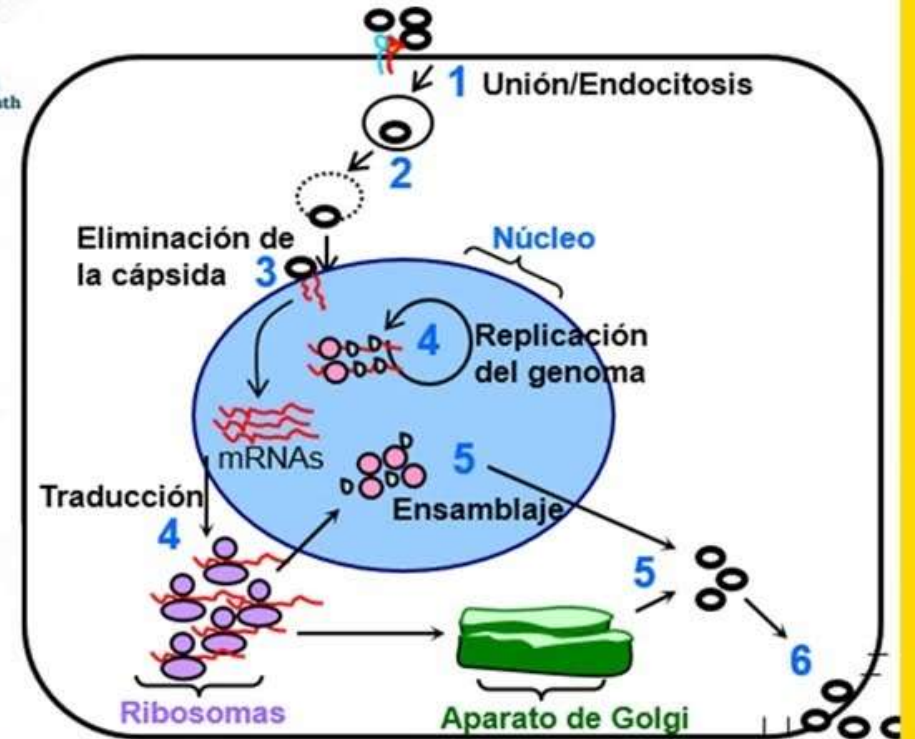
HIV



Hepatitis B



Ebola Virus



BACTERIAL VIRUSES

Bacteriophages T2, T4, and T6 are closely related viruses, but T4 is the most **extensively studied**.

The virion of phage T4 is **structurally complex**. It consists of an elongated icosahedral head whose overall dimensions are 85 x 110 nm. To this head is attached a complex tail consisting of a helical tube (25 x 110 nm) to which are connected a sheath, a connecting "neck" with "collar", and a complex end plate, to which are attached long, jointed tail fibers. Altogether, the virus contain over 25 distinct types of structural proteins.

The length of DNA contained in these bacteriophages is only about 6% that contained in E.coli.

The bacteriophages has enough DNA for over 100 genes.

The genome of T4 is a double-stranded linear DNA molecule of 168,903 base pairs.

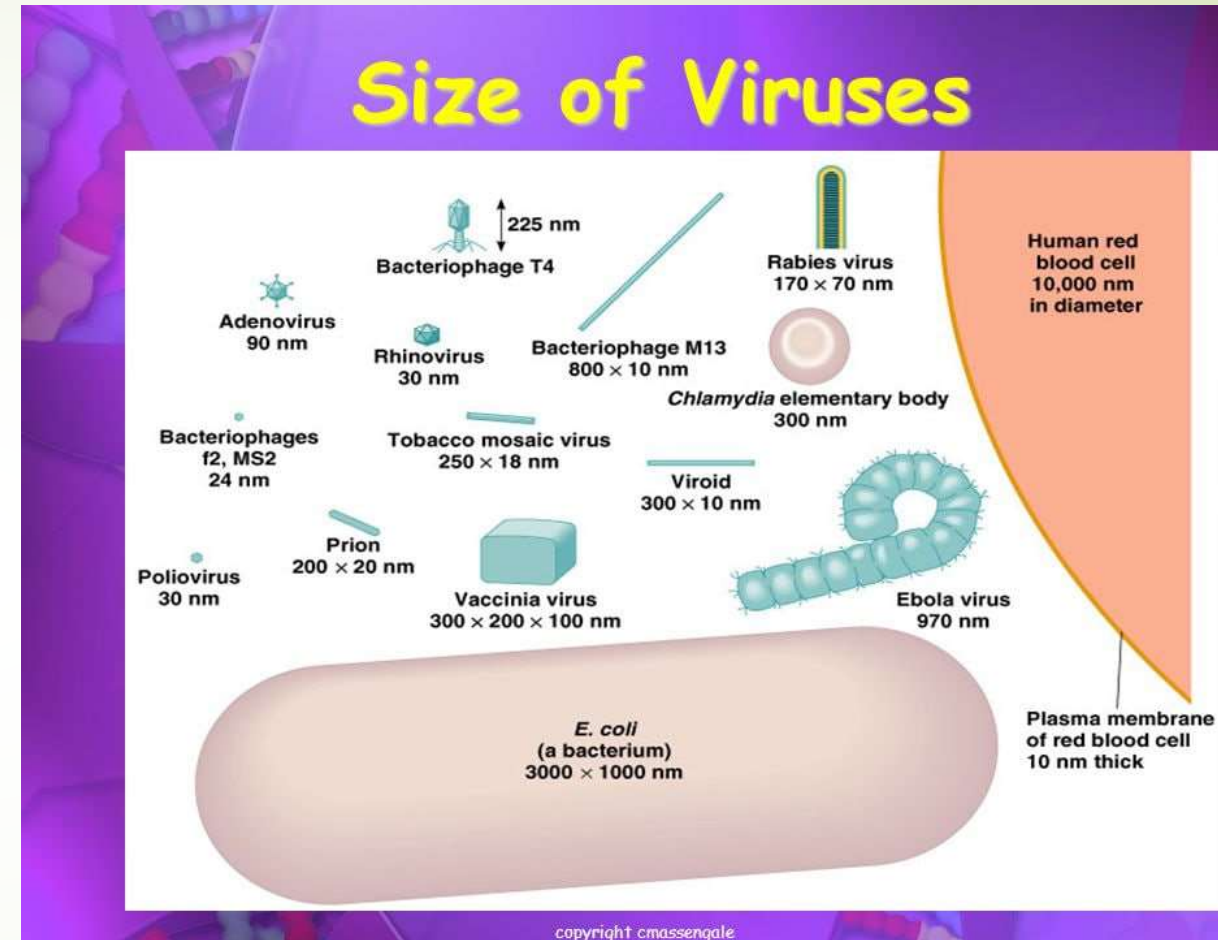
The T4 genome encodes over 250 different proteins, and although no known virus encodes its own translational apparatus,

T4 does encode several of its own tRNAs. While the T4 genome has a unique linear sequence, the genome in one virion may not be exactly the same as that of another.

This is because the DNA of phage T4 is **circularly permuted**.

Molecules that are circularly permuted appear to have been linearized by opening a circle, but at different locations.

In addition to circular permutation, the DNA in each T4 virion has repeated sequences at each end called terminal repeats of about 3-6 kbp. Both of these factors affect genome packaging.



Viruslar ikki guruhga:

Tarkibida DNK saqlovchi (**5 ta oila**) va **RNK saqlovchi (10 ta oila)**ga ajratiladi.

Shakliga ko'ra viruslar 4 ta guruhga ajratiladi.

- **sferik (gripp virusi, leykoz)**
- tayoqchasimon (tamaki mozaikasi kasalligi)**
- kubsimon (chin chechak)**
- spermatozoidsimon (fag)**

Hozirgacha viruslarning **300 ga** yaqin turi aniqlanib, ular **5 ta sinf, 21 ta oilaga 8 ta turga birlashtirilgan.**



Tarkibida DNK bo‘lgan viruslar:

1. Poksviruslar (ichak viruslari).
2. Chin chechak virusi.
3. Gerpes (uchuq) virusi.
4. Suv chechak virusi;
5. Adenovirus infeksiyasini vujudga keltiruvchilar, adenoviruslar.

Faglar:

1. Bakteriofaglar (bakteriyalar virusi).
2. Sianofaglar (ko‘k-yashil suv o‘tlar virusi).
3. Aktinofaglar (aktinomitstlar virusi),








Tarkibida RNK bo‘lgan viruslar:

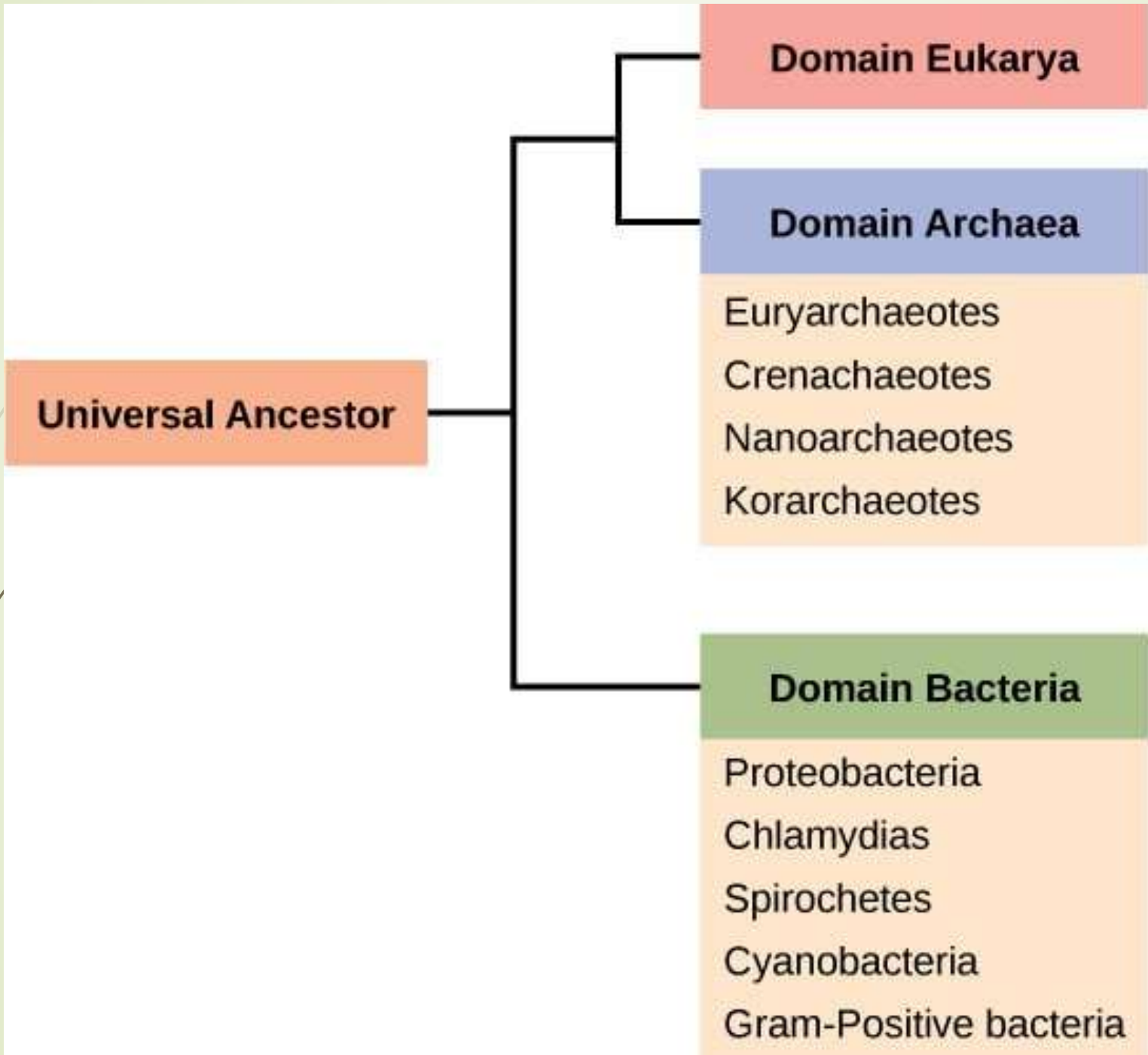
1. Gripp virusi.
2. Qizaiiiiik virusi.
3. Q uturish virusi.
4. Pikomoviruslar.
5. Oqsil virusi.
6. Arboviruslar.
7. Afrika o ‘lati.

Baltimore Classification of Viruses



microbenotes.com

Group	Example	Genetic Material Processing
Group 1 dsDNA	 Smallpox	dsDNA → mRNA
Group 2 +ssDNA	 Parvovirus	+ssDNA → dsDNA → mRNA
Group 3 dsRNA	 Rotaviruses	dsRNA → mRNA
Group 4 +ssRNA	 Coronaviruses	+ssRNA → -ssRNA → mRNA
Group 5 -ssRNA	 Measles	-ssRNA → mRNA
Group 6 +ssRNA-RT	 HIV	+ssRNA → dsRNA \xrightarrow{RT} dsDNA → mRNA
Group 7 dsDNA-RT	 Hepatitis B	dsDNA-RT → +ssRNA → dsRNA \xrightarrow{RT} dsDNA → mRNA



Universal Ancestor

Domain Eukarya

Domain Archaea

Euryarchaeotes

Crenarchaeotes

Nanoarchaeotes

Korarchaeotes

Domain Bacteria

Proteobacteria

Chlamydias

Spirochetes

Cyanobacteria

Gram-Positive bacteria