

نبذة تاريخية عن الأبحاث الفيروسية

Chronology of Virus Research

18-19 Century: “Golden Age of Bacteriology” -establish bacteriological and immunological technique-foundation of virology: Pasteur, Koch, Lister, Erlich.

1700's **Smallpox - variolation**

1798 **Jenner- cowpox**

1885 **Pasteur - rabies**

1890's **Mayer, Iwanowski, Bijerinck**

TMV - filtrate experiments

1910-1920

Rous- Ellermann Bang – tumor virus of chickens

Rous- initial tissue culture studies

Twort and D;Herrelle- 1st bacterial virus

1930-1940

Burnet - embryonated egg

Elford - collodian filters

Ruska - electron microscope

1940-1950

Modern Day Virology

Electron microscope

Antibodies - Tissue culture - new fields:

Ultra-centrifuge

Radioisotopes

Federal Grants (RSA,NIH.....)

**Vaccinology
Endocrinology Cell
Biology
Developmental
Biology Molecular
Biology Biochemistry**

1960-1970's

Understanding DNA Helix

Reverse transcriptase

Molecular hybridization

DNA + RNA synthesis

protein synthesis (triplet cod)

1980's

Recombinant DNA technology

Oncogenes

Cellular regulation

1990's

Gene Therapy - 1st approves -
human genetic disease

الصفات العامة للفيروسات

GENERAL PROPERTIES OF VIRUSES

Terms:	Definition:	Example:
Viruses	Obligate intracellular parasite	DNA or RNA + Protein coat
Pathogenic	Human immunodeficiency Virus	HIV
	Acquired immunodeficiency Syndrome	AIDS
Vector	Arthropod - borne virus	Arbovirus
		Yellow fever
		West Nile Fever

الصفات العامة للفيروسات

GENERAL PROPERTIES OF VIRUSES

Terms:	Definition:	Example:
Size	Small	20-300 nm
Structure	Simple	
A	Nucleic acid Genome	DNA or RNA
	Single – Double Segmented – Non segmented Linear – Circular Polarity (-) or (+)	
B	Protein	Capsid
	Protective protein	
Enveloped - Lipid	Human + Animal Viruses	

الصفات العامة للفيروسات

GENERAL PROPERTIES OF VIRUSES

Terms:	Definition:	Example:
Effect and infection		
Morphology	Different forms	

VIRUS

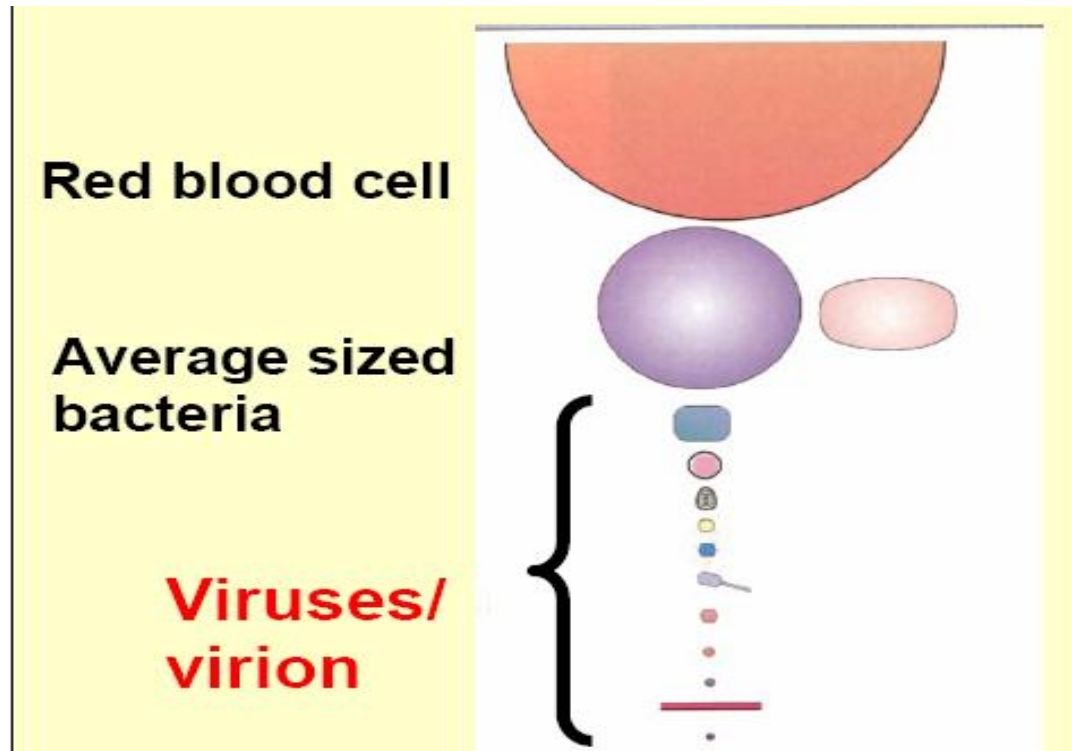
Morphology

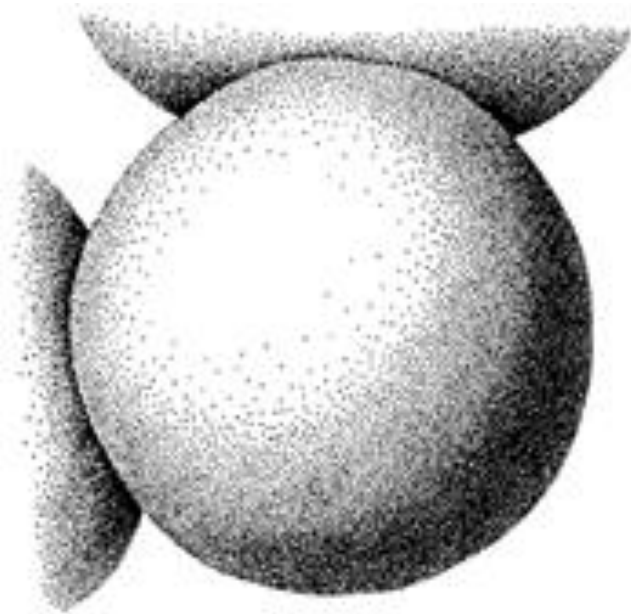
- Structure of virion is diverse

Varies in: size, shape,
chemical composition

Size 20 nm to 300 nm (Smallpox 200 nm)

SIZE





STAPHYLOCOCCUS



HERPES VIRUS



**CHLAMYDIA
ELEMENTARY
BODY**

0.2 μm



POX VIRUS

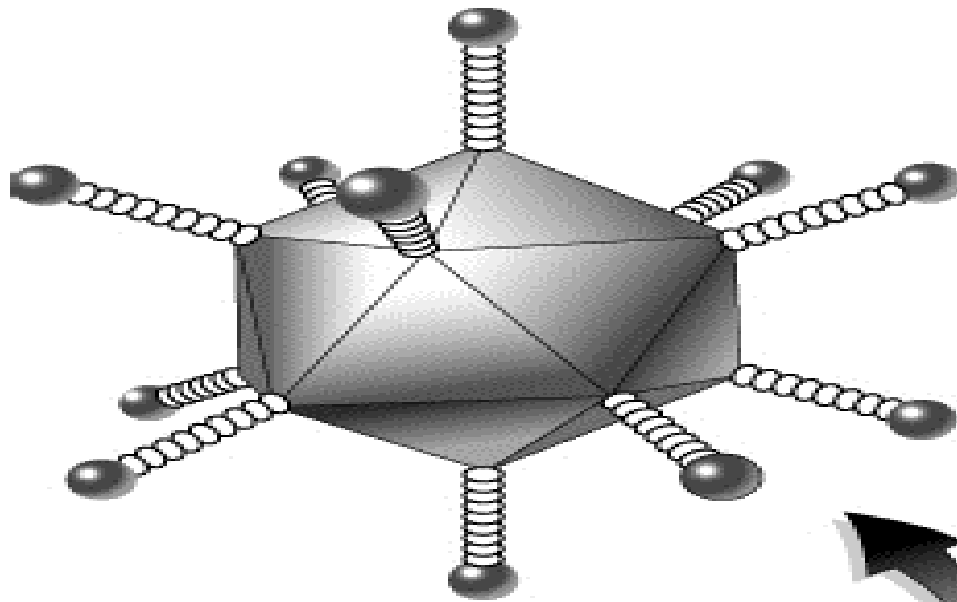


INFLUENZA VIRUS



POLIO VIRUS

Examples of Virus Structures



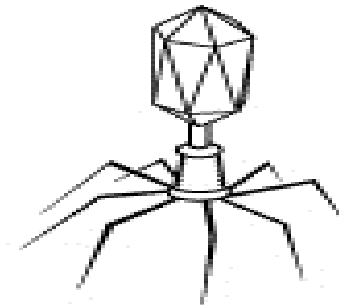
Types of viruses



Adenovirus



Human Immunodeficiency Virus

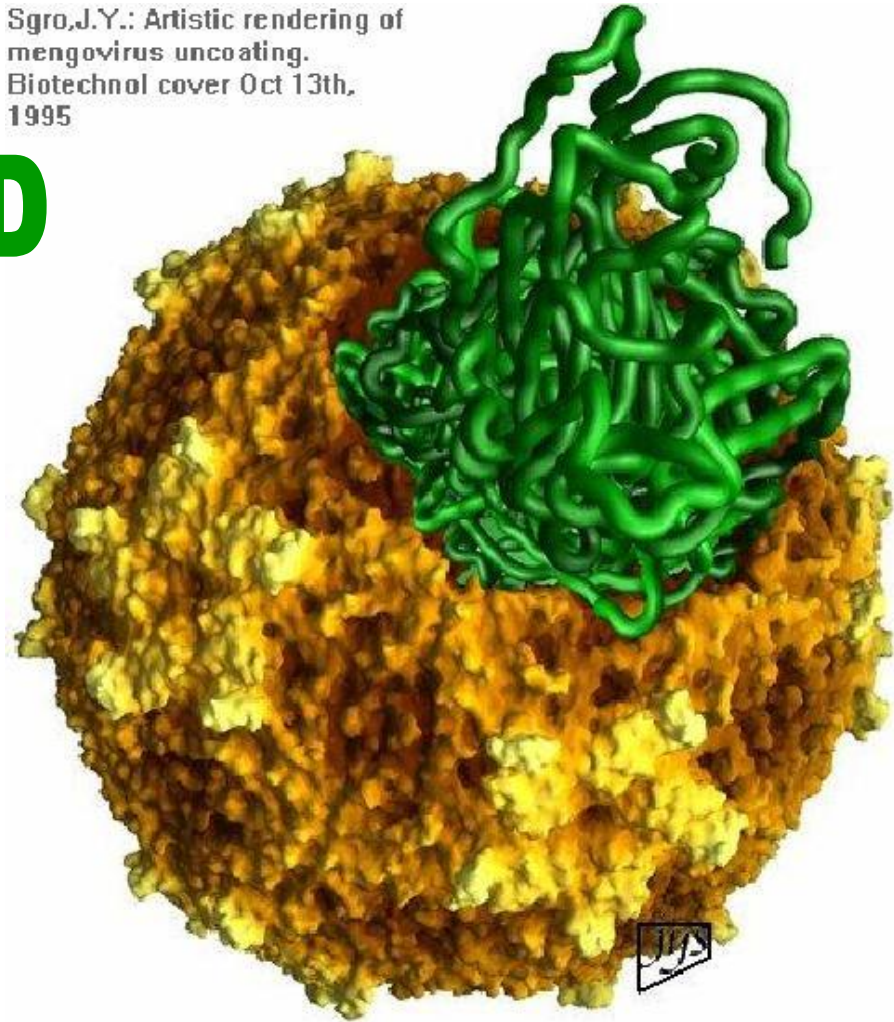


Bacteriophage

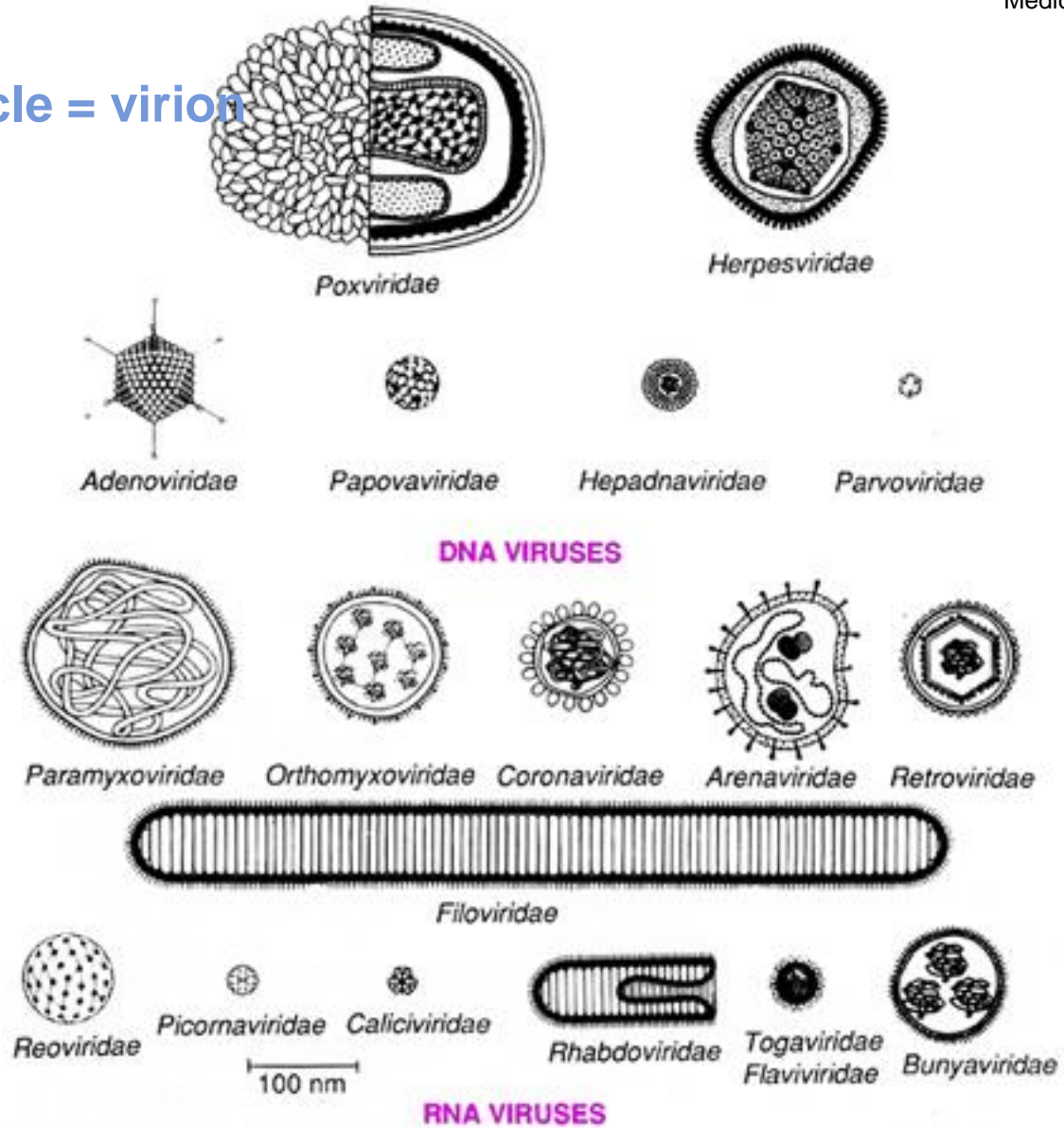
ICOSAHEDRAL SYMMETRY

**NUCLEIC ACID
IS INSIDE**

Sgro, J.Y.: Artistic rendering of
mengovirus uncoating.
Biotechnol cover Oct 13th,
1995



Virus particle = virion



Differences between virus and bacteria

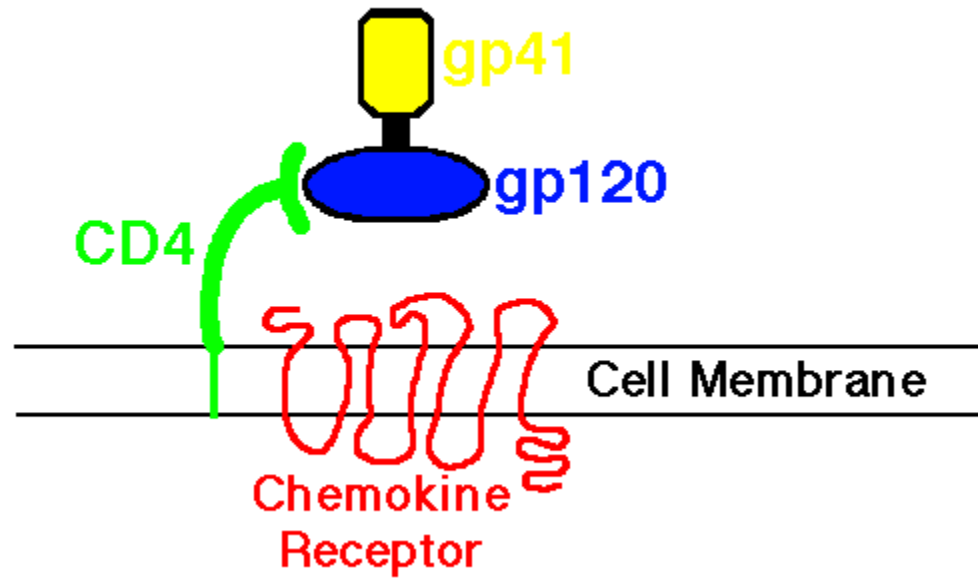
No.	Item	Bacteria	Virus
1	Cell wall	+ve	-ve
2	Organelles	+ve	-ve
3	Nuclear membrane	+ve	-ve
4	Metabolism	+ve	-ve
5	Type of nucleic acid	DNA and RNA	DNA or RNA
6	Infectious nucleic acid	-ve	+ve
7	Size	Over 300 nm	Under 300 nm
8	Sensitivity to interferon	-ve	+ve
9	Sensitivity to antibiotics	+ve	-ve
10	Replication	Binary fission	Host cell dependant

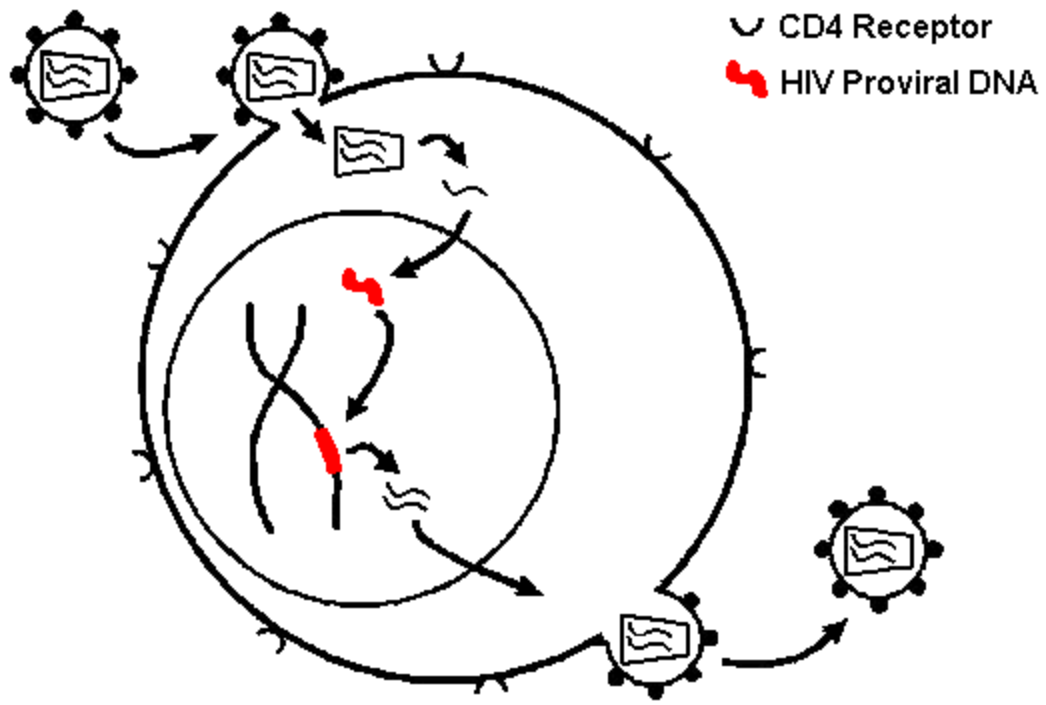
الصفات العامة للفيروسات

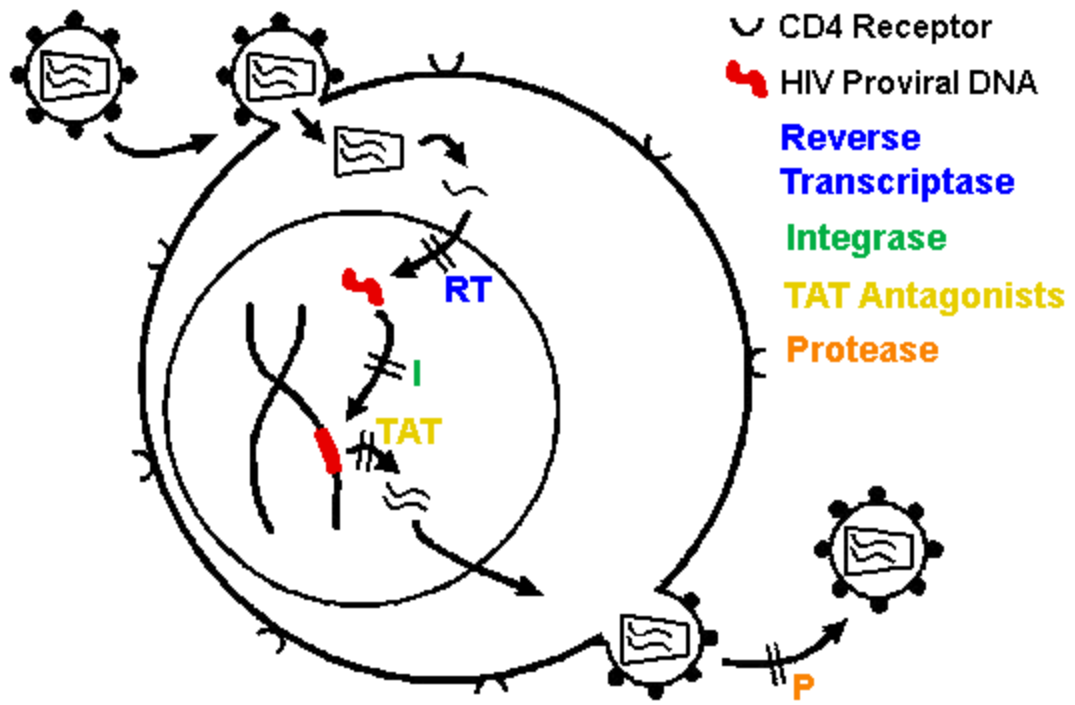
GENERAL PROPERTIES OF VIRUSES

Terms:	Definition:	Example:
Cultivation of viruses	Cell - culture	Hela Cells Vero
	Chick - embryo	SPF - Eggs
	Lab- animals	Mice
Replication
State of life cycle	Carrier state / vector	Arbovirus
	Latent State	HSV
	Integration [Transformation]	HIV

HIV - Biology







الصفات العامة للفيروسات

GENERAL PROPERTIES OF VIRUSES

Terms:	Definition:	Example:
Bacteriophage	Lysogenic	الاندماج
	Lytic cycle	التحلل
Molecular Weight		
Host Range	Human	Measles
		AIDS
		Poliomyelitis
	Human- Animal	Rabies
	Many hosts	Influenza viruses

الصفات العامة للفيروسات

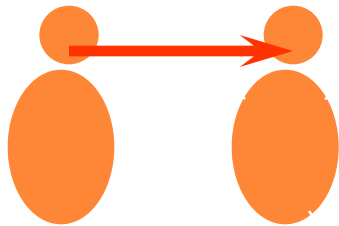
GENERAL PROPERTIES OF VIRUSES

Terms:	Definition:	Example:
Virus & Host interaction	Virus Type	
	Host	
	Conditions	
Chemical & Physical Effects		

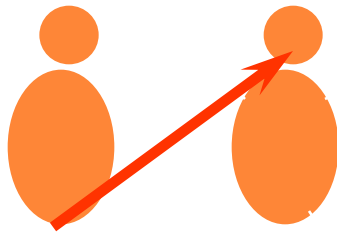
Transmission + dissemination in nature •

- 1) Virus**
- 2) Time**
- 3) Place**

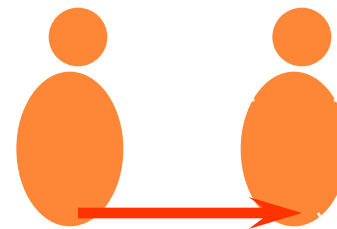
TRANSMISSION OF VIRUSES



Respiratory route
eg. Influenza A

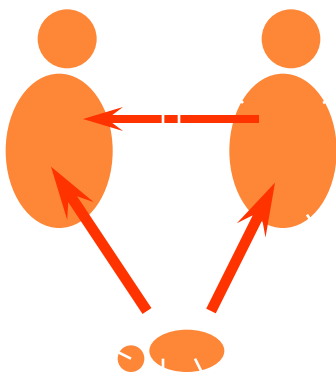


Fecal-oral route
eg. Hepatitis A

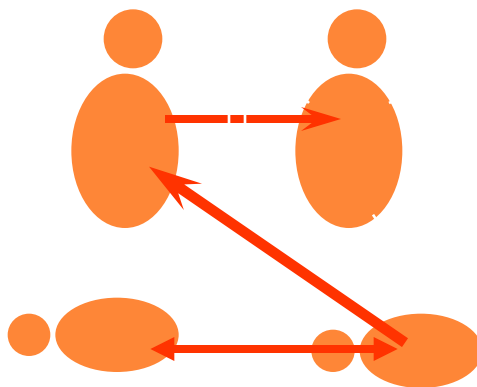


Sexually transmitted
route, eg. papillomaviruses

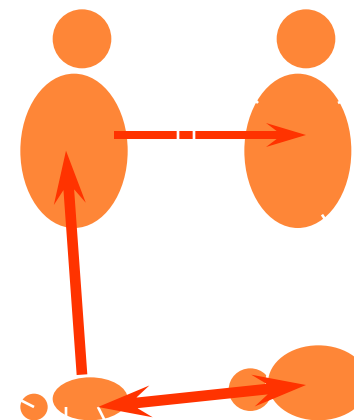
Zoonotic Infections



Yellow Fever Virus



Rabies Virus



Flaviviruses

الصفات العامة للفيروسات

GENERAL PROPERTIES OF VIRUSES

Terms:	Definition:	Example:
Transmission		
Mutation	<i>Antigenic Drift</i>	
	<i>Antigenic Shift</i>	
	Genetic Reassortment	

GENETIC REASSORTMENT :

إعادة التوزيع الجيني

Shift
drift

Antigenic
Antigenic

Antigenic Drift

U



Mutation

C



Transcription

G

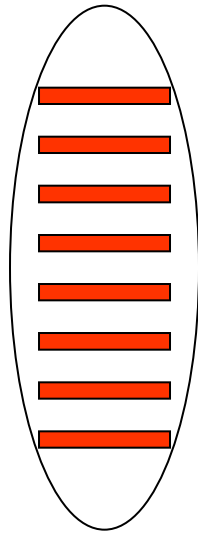


Translation

Ser Cys **Glu** Arg

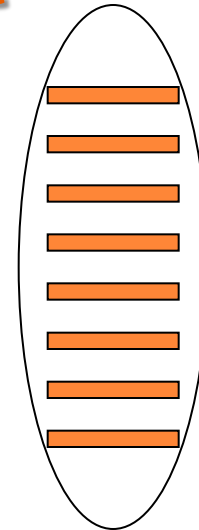
Antigenic Drift 256 possible

Reassortment



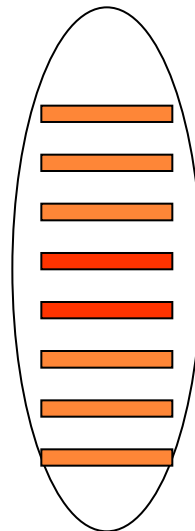
PB1
PB2
PA
HA
NA
NP
M1 & 2
NS1 & 2

Human isolate



PB1
PB2
PA
HA
NA
NP
M1 & 2
NS1 & 2

Avian isolate



PB1
PB2
PA
HA
NA
NP
M1 & 2
NS1 & 2

Reassorted virus

الصفات العامة للفيروسات

GENERAL PROPERTIES OF VIRUSES

Terms:	Definition:	Example:
Virus Structure		

VIRION STRUCTURE

