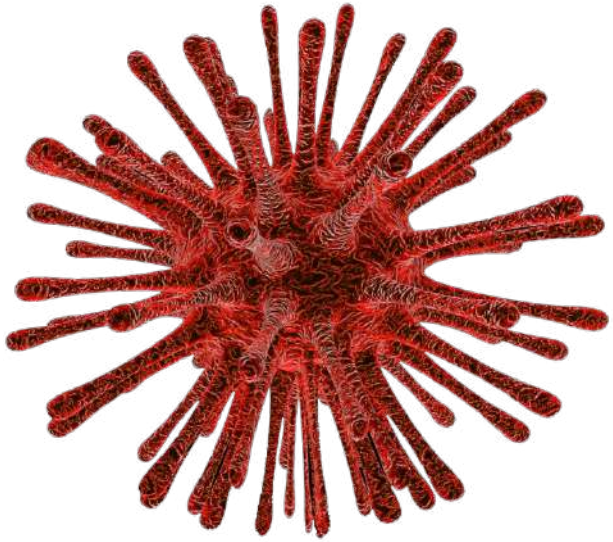
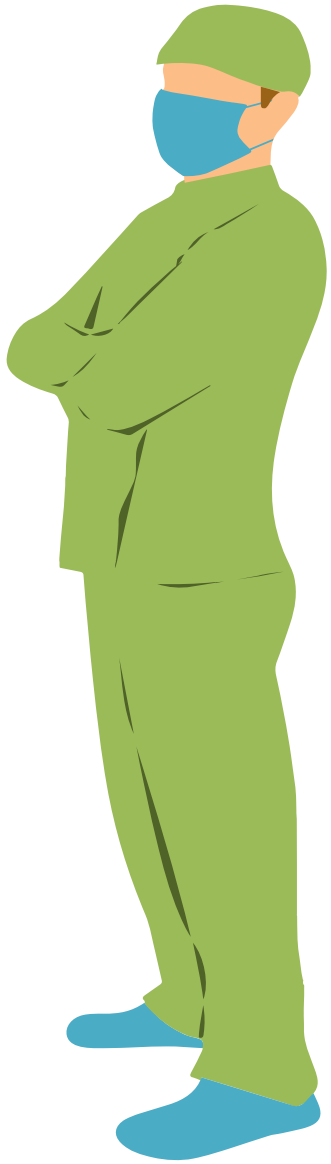


Virus

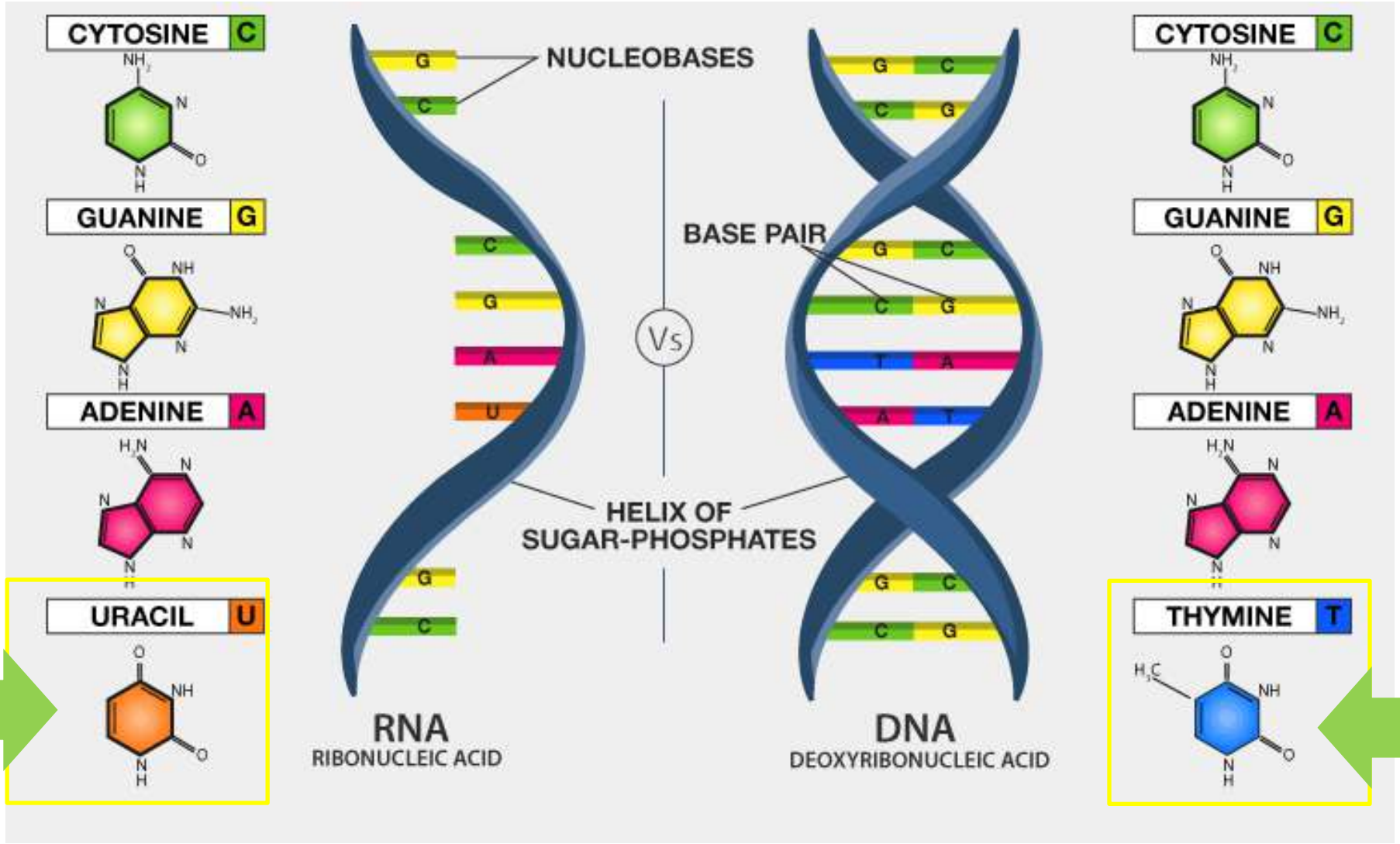


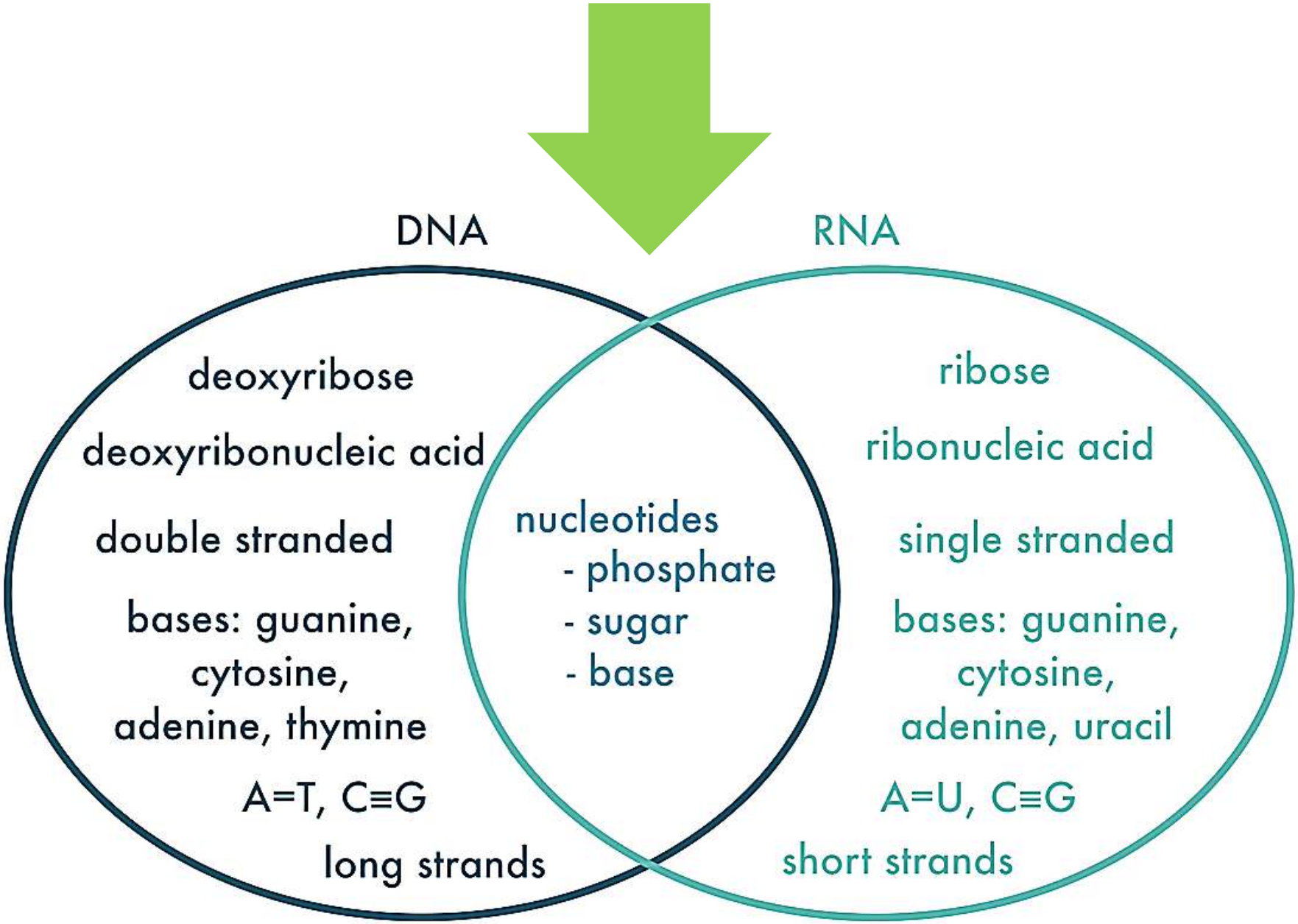
Achmad Arifiyanto, S.Si.,M.Si.

Diskusi kelompok

- Jenis virus
- Gejala infeksi (symptoms)
- Cara pencegahan

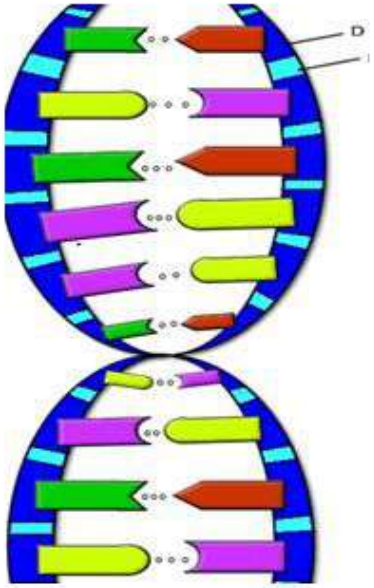
Difference between RNA & DNA



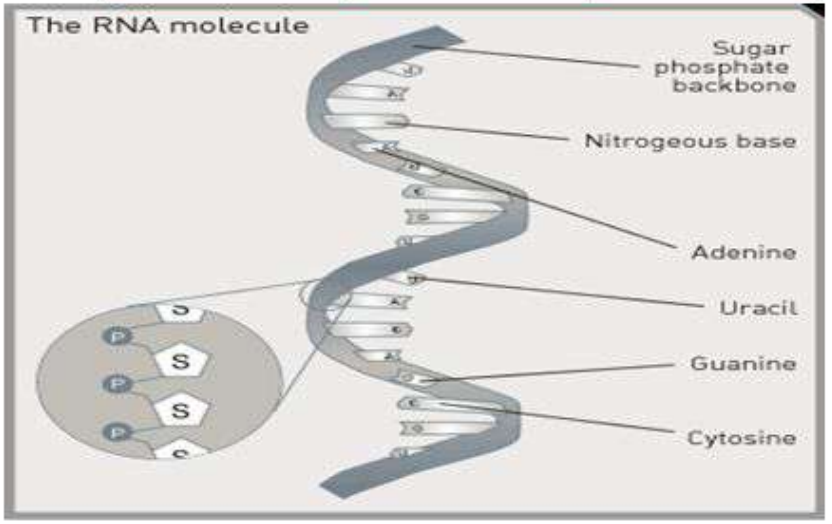

DNA
RNA
deoxyribose
deoxyribonucleic acid
double stranded
bases: guanine,
cytosine,
adenine, thymine
A=T, C≡G
long strands
nucleotides
- phosphate
- sugar
- base
ribose
ribonucleic acid
single stranded
bases: guanine,
cytosine,
adenine, uracil
A=U, C≡G
short strands

DNA vs. RNA

- Double stranded
- Deoxyribose sugar
- Bases: C,G A,T
- Self replicate

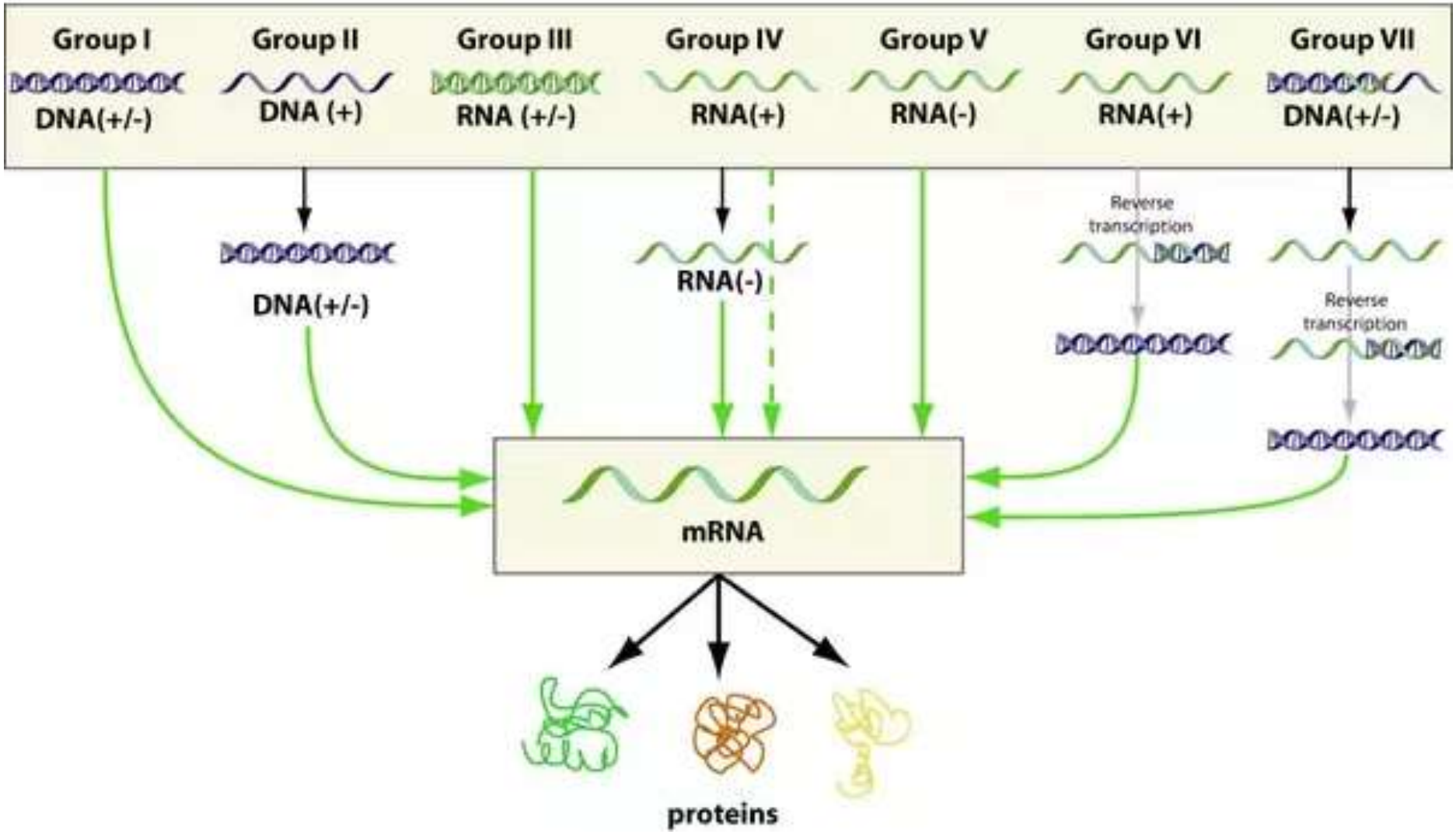


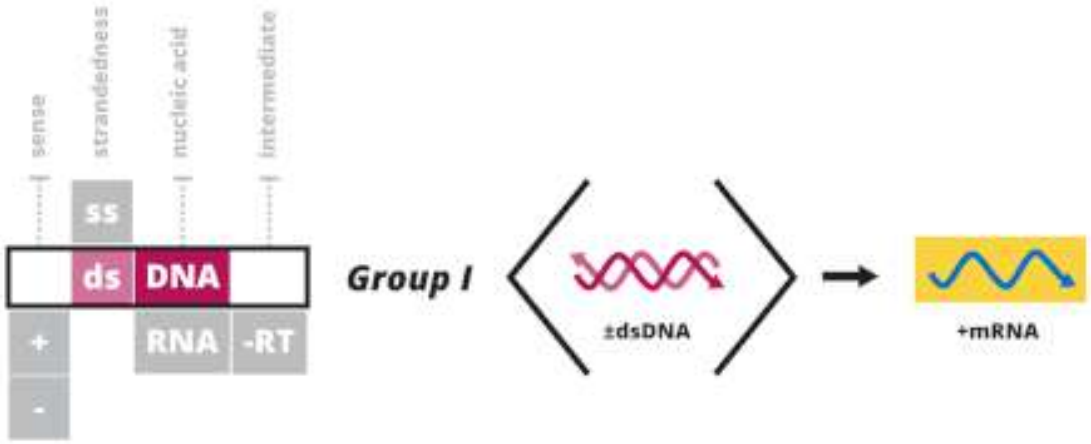
- Single stranded
- Ribose sugar
- Bases: C,G,A,U
- Can't self replicate
- mRNA, tRNA, rRNA



Both contain a sugar, phosphate, and base.

Genetic material present in the virion





I: **dsDNA viruses** (e.g. Adenoviruses, Herpesviruses, Poxviruses)
II: **ssDNA viruses** (+ strand or "sense") DNA (e.g. Parvoviruses)
III: **dsRNA viruses** (e.g. Reoviruses)
IV: **(+)ssRNA viruses** (+ strand or sense) RNA
(e.g. Coronaviruses, Picornaviruses, Togaviruses)
V: **(−)ssRNA viruses** (− strand or antisense) RNA
(e.g. Orthomyxoviruses, Rhabdoviruses)
VI: **ssRNA-RT viruses** (+ strand or sense) RNA with DNA intermediate in life-cycle (e.g. Retroviruses)
VII: **dsDNA-RT viruses** DNA with RNA intermediate in life-cycle
(e.g. Hepadnaviruses)

RNA

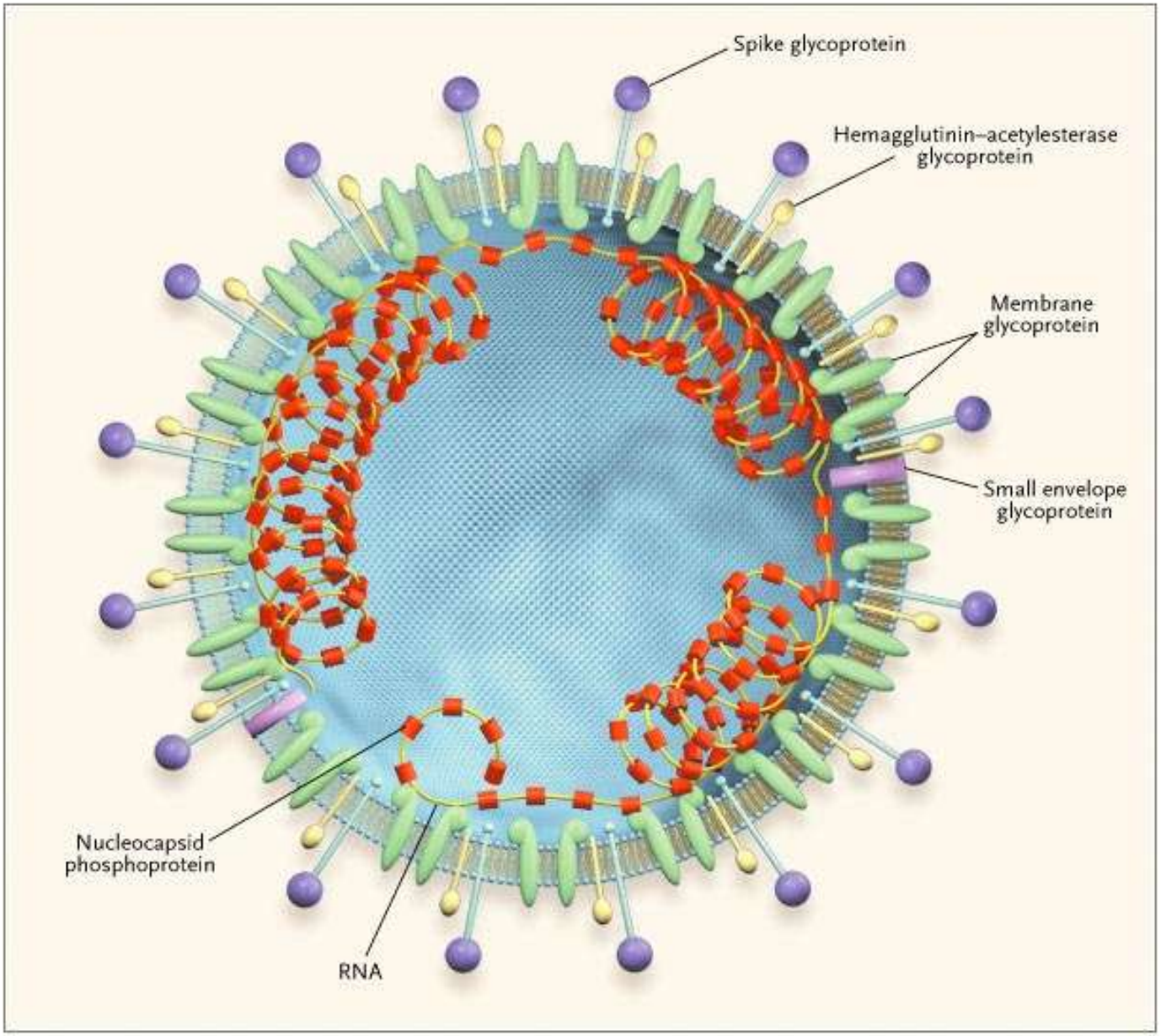
Examples of RNA viruses

Virus Family	Examples (common names)	Capsid naked/enveloped	Capsid Symmetry	Nucleic acid type	Group
1. *Reoviridae*	Reovirus, rotavirus	Naked	Icosahedral	ds	III
2. *Picornaviridae*	Enterovirus, rhinovirus, hepatovirus, cardiovirus, aphthovirus, poliovirus, parechovirus, erbovirus, kobuvirus, teschovirus, coxsackie	Naked	Icosahedral	ss	IV
3. *Caliciviridae*	Norwalk virus	Naked	Icosahedral	ss	IV
4. *Togaviridae*	Eastern equine encephalitis	Enveloped	Icosahedral	ss	IV
5. *Arenaviridae*	Lymphocytic choriomeningitis virus, Lassa fever	Enveloped	Complex	ss(-)	V
6. *Flaviviridae*	Dengue virus, hepatitis C virus, yellow fever virus, Zika virus	Enveloped	Icosahedral	ss	IV
7. *Orthomyxoviridae*	Influenzavirus A, influenzavirus B, influenzavirus C, isavirus, thogotovirus	Enveloped	Helical	ss(-)	V
8. *Paramyxoviridae*	Measles virus, mumps virus, respiratory syncytial virus, Rinderpest virus, canine distemper virus	Enveloped	Helical	ss(-)	V
9. *Bunyaviridae*	California encephalitis virus, Sin nombre virus	Enveloped	Helical	ss(-)	V
10. *Rhabdoviridae*	Rabies virus, Vesicular stomatitis	Enveloped	Helical	ss(-)	V
11. *Filoviridae*	Ebola virus, Marburg virus	Enveloped	Helical	ss(-)	V
12. *Coronaviridae*	SARS-CoV-2, MERS	Enveloped	Helical	ss	IV
13. *Astroviridae*	Astrovirus	Naked	Icosahedral	ss	IV
14. *Bornaviridae*	Borna disease virus	Enveloped	Helical	ss(-)	V
15. *Arteriviridae*	Arterivirus, equine arteritis virus	Enveloped	Icosahedral	ss	IV
16. *Hepeviridae*	Hepatitis E virus	Naked	Icosahedral	ss	IV

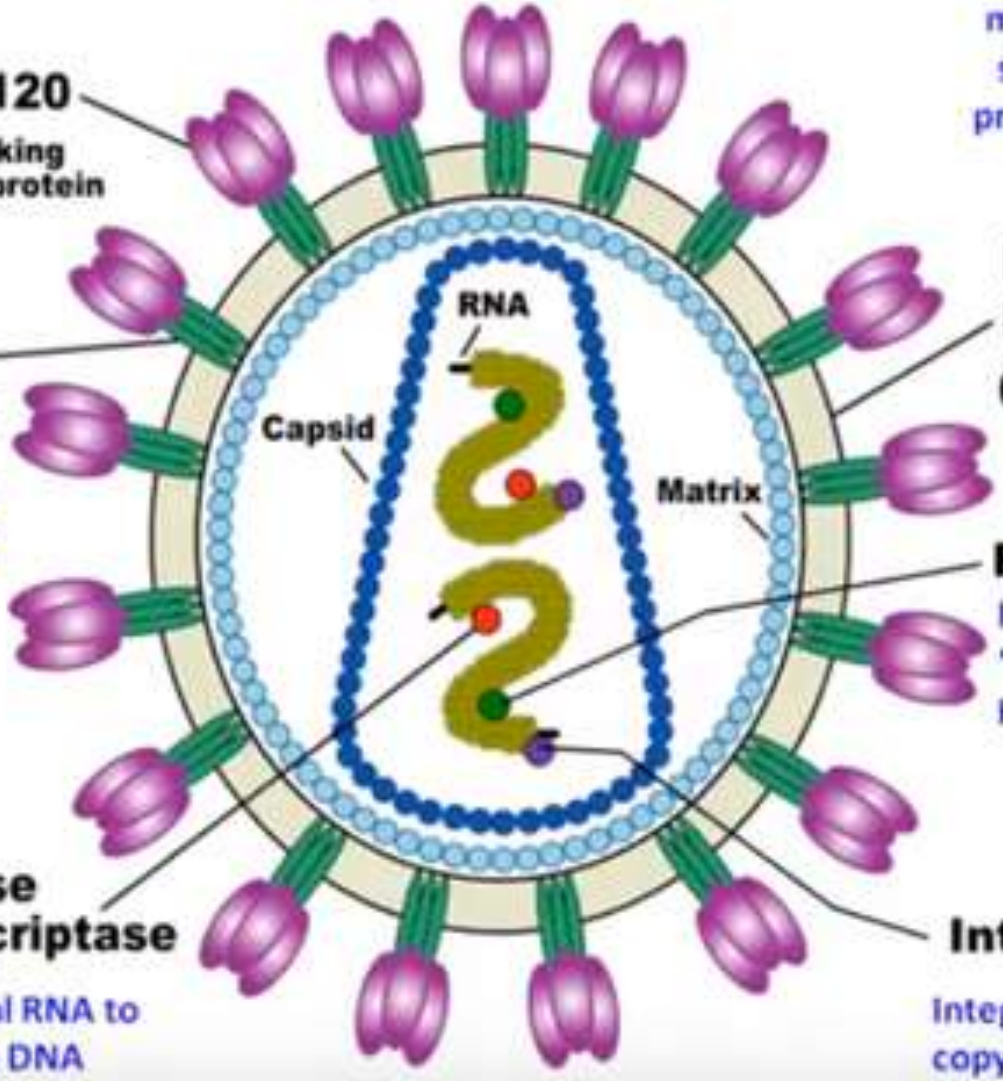
DNA

Examples of DNA viruses

Virus family	Examples (common names)	Virion naked/enveloped	Capsid symmetry	Nucleic acid type	Group
1. *Adenoviridae*	Canine hepatitis virus, Some types of the common cold	Naked	Icosahedral	ds	I
2. *Papovaviridae*	JC virus, HPV	Naked	Icosahedral	ds circular	I
3. *Parvoviridae*	Human parvovirus B19, canine parvovirus	Naked	Icosahedral	ss	II
4. *Herpesviridae*	Herpes simplex virus, varicella-zoster virus, cytomegalovirus, Epstein–Barr virus	Enveloped	Icosahedral	ds	I
5. *Poxviridae*	Smallpox virus, cowpox, myxoma virus, monkeypox, vaccinia virus	Complex coats	Complex	ds	I
6. *Anelloviridae*	Torque teno virus	Naked	Icosahedral	ss circular	II
7. *Pleolipoviridae*	HHPV1, HRPV1	Enveloped		ss/ds linear/circular	I/II


Spike glycoprotein
Hemagglutinin–acetylesterase glycoprotein
Membrane glycoprotein
Small envelope glycoprotein
Nucleocapsid phosphoprotein
RNA

Basic structure of HIV



gp120
Docking Glycoprotein

Allows virus to bind to host cell

gp41
Transmembrane Glycoprotein

Allows viral envelope to fuse with host cell membrane

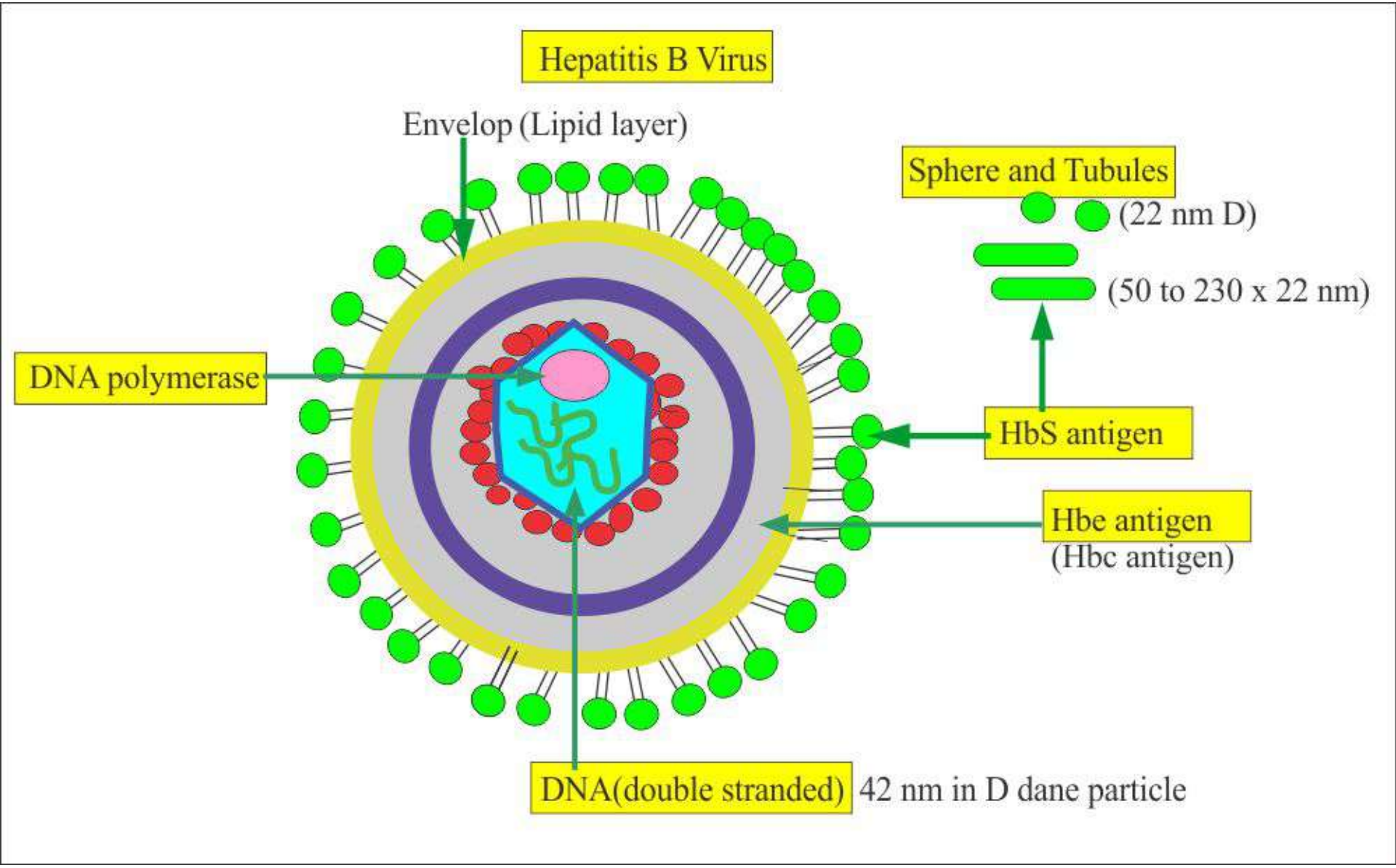
Capsid and matrix maintains viral structure and protects genetic material

Lipid Membrane (Envelope)

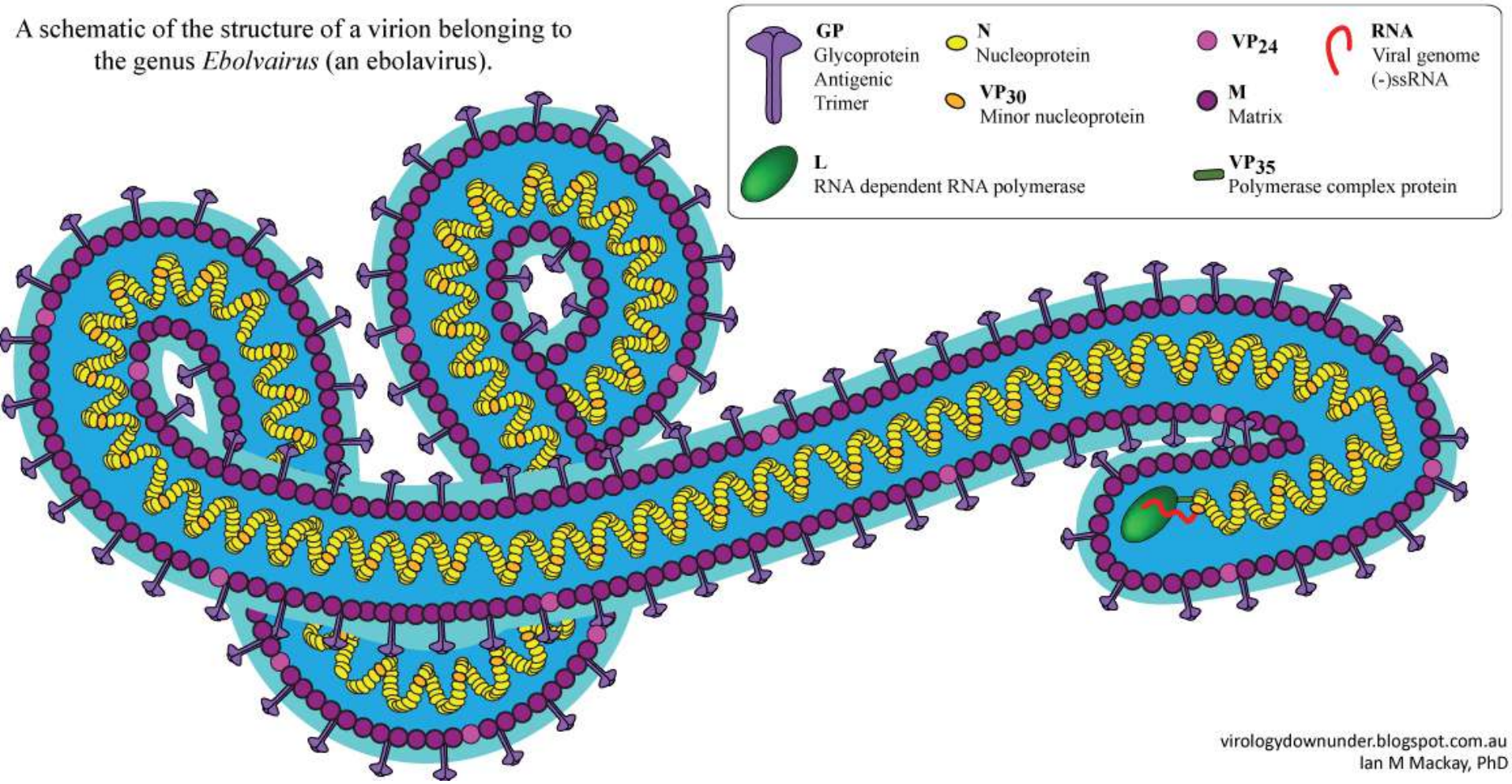
Protease
Involved in making "final versions" of HIV proteins

Reverse Transcriptase
Reads viral RNA to produce a DNA copy

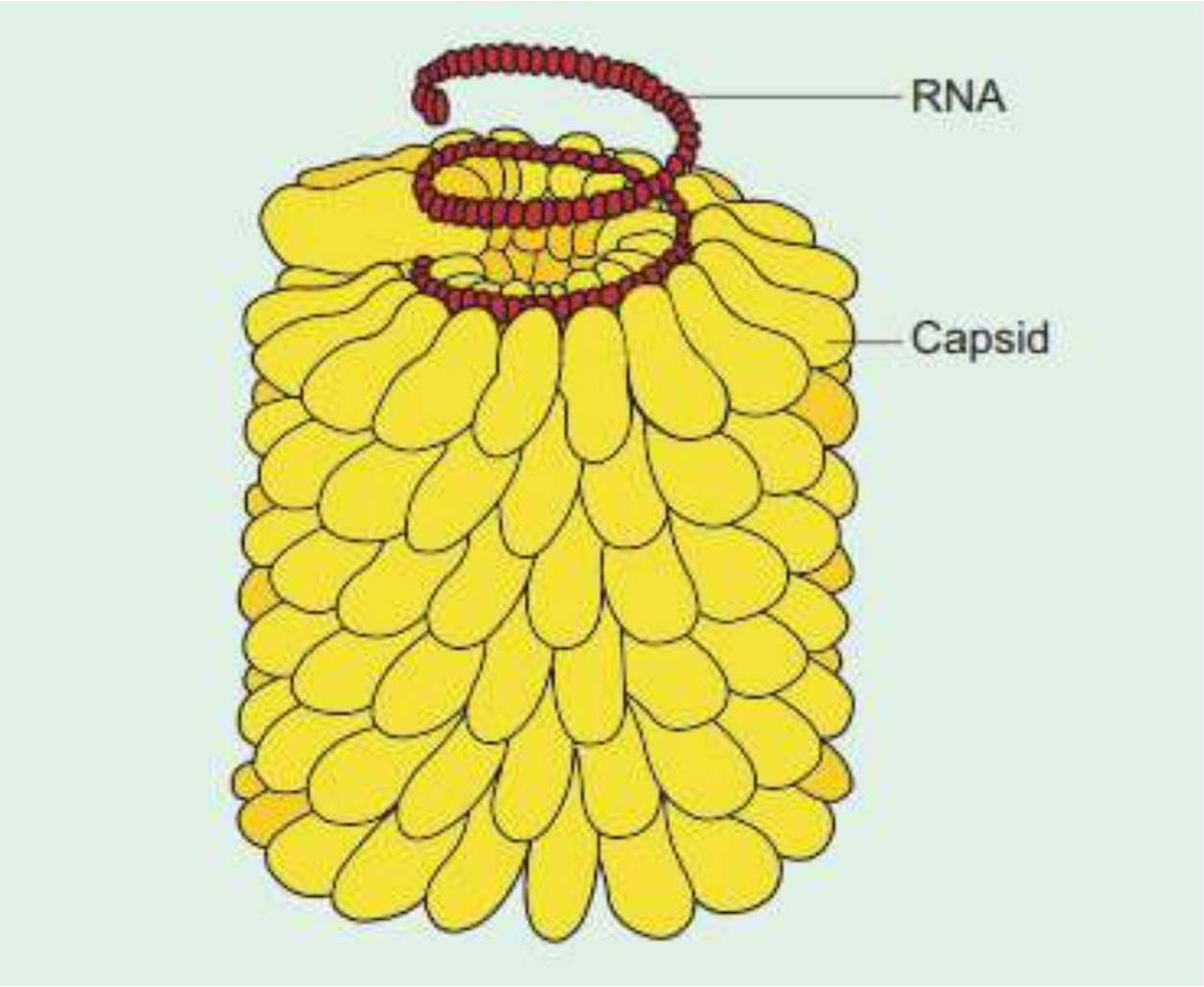
Integrase
Integrates DNA copy of viral genome into host cell's DNA

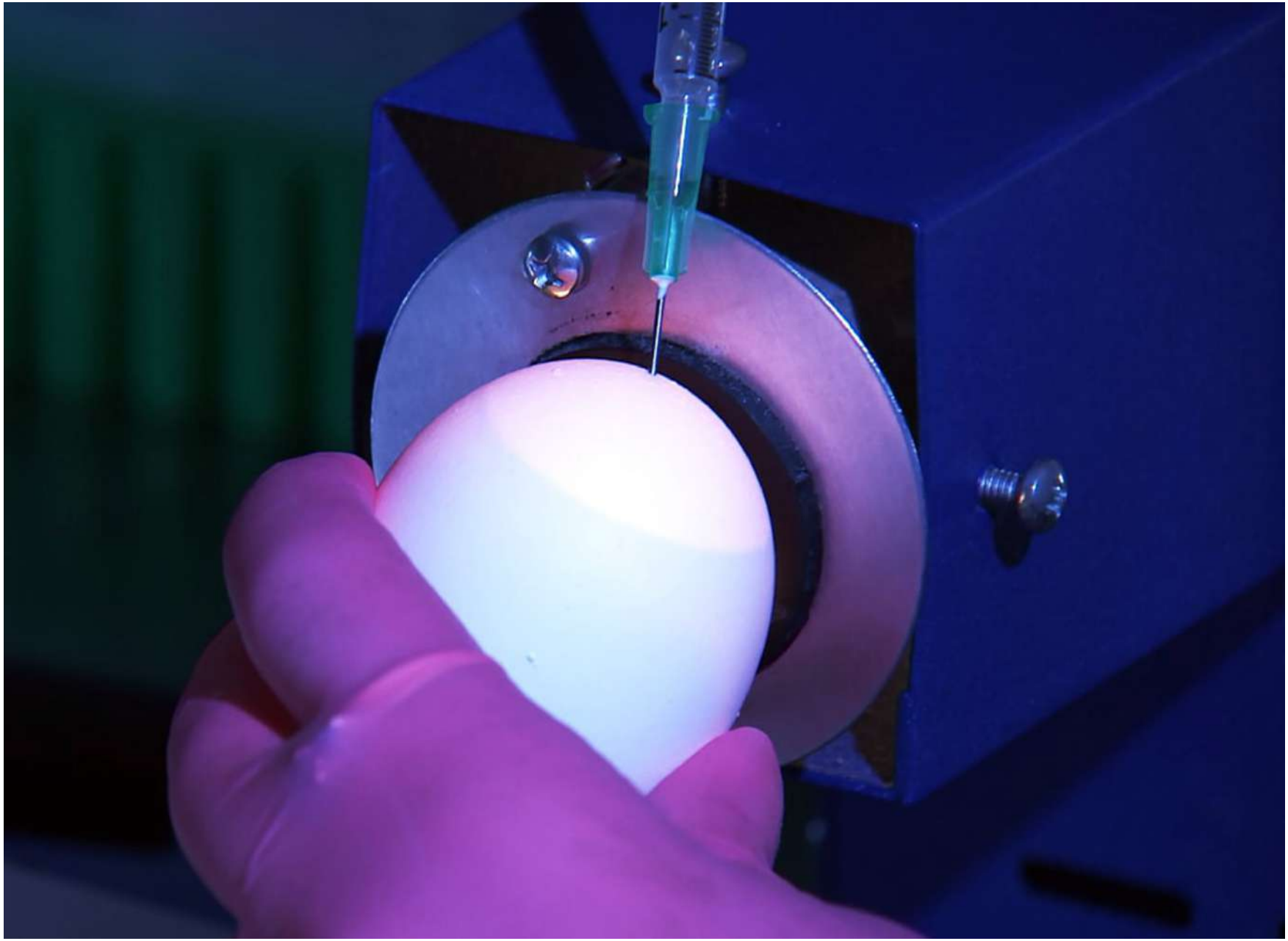

Hepatitis B Virus
Envelop (Lipid layer)
Sphere and Tubules
(22 nm D)
(50 to 230 x 22 nm)
DNA polymerase
HbS antigen
Hbe antigen
(Hbc antigen)
DNA(double stranded)
42 nm in D dane particle

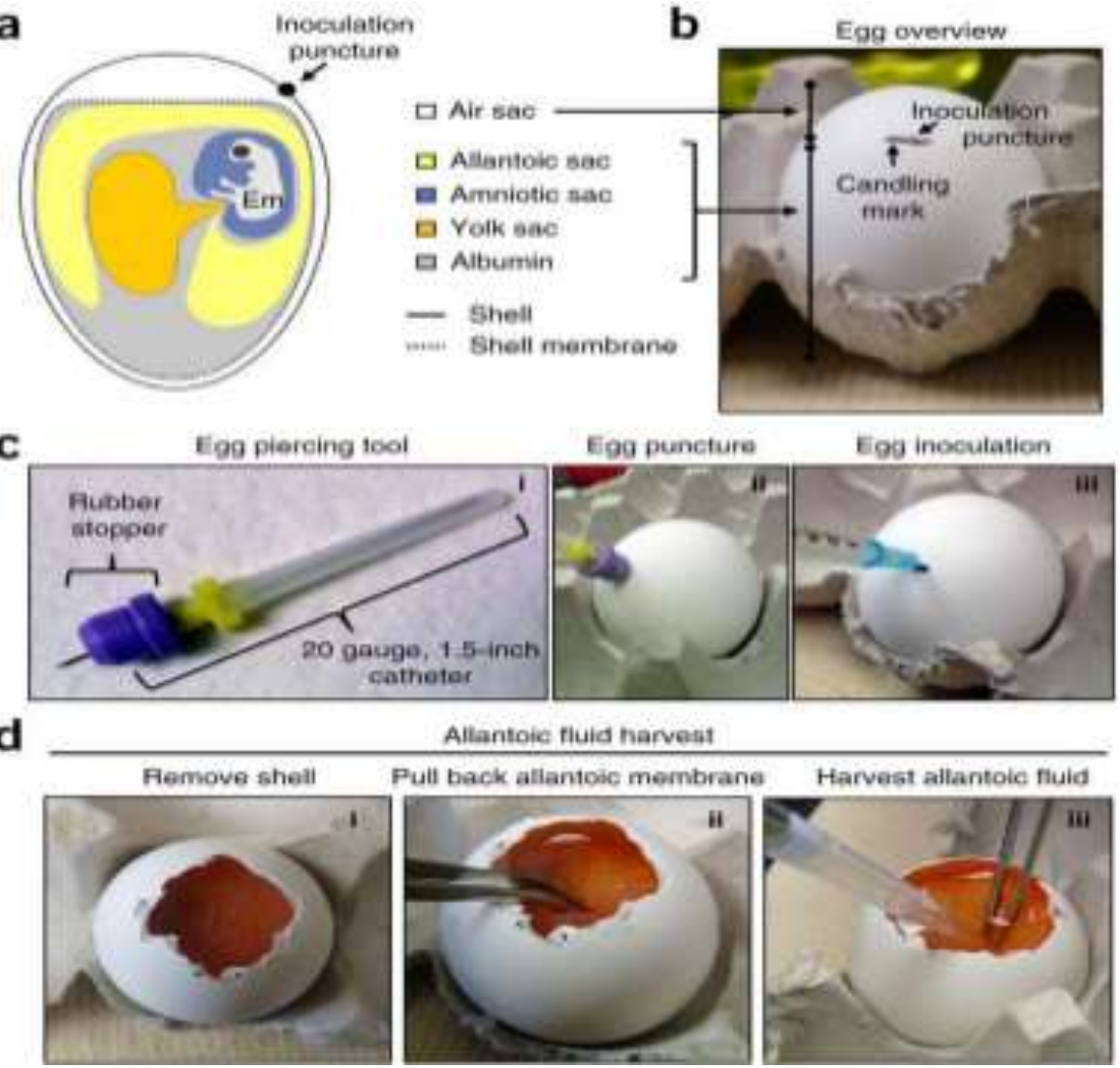
A schematic of the structure of a virion belonging to the genus *Ebolvairus* (an ebolavirus).



virologydownunder.blogspot.com.au
Ian M Mackay, PhD

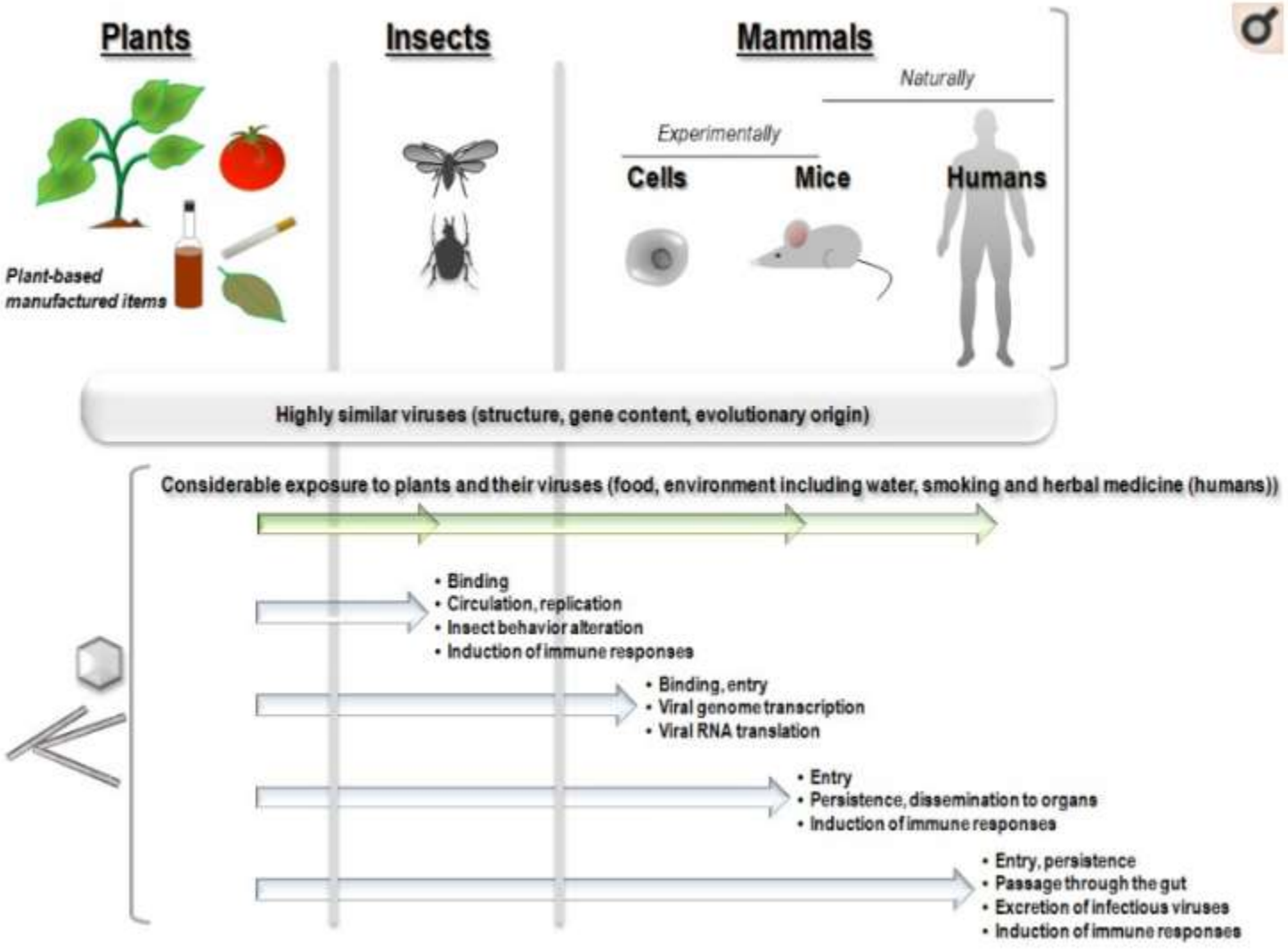

RNA
Capsid





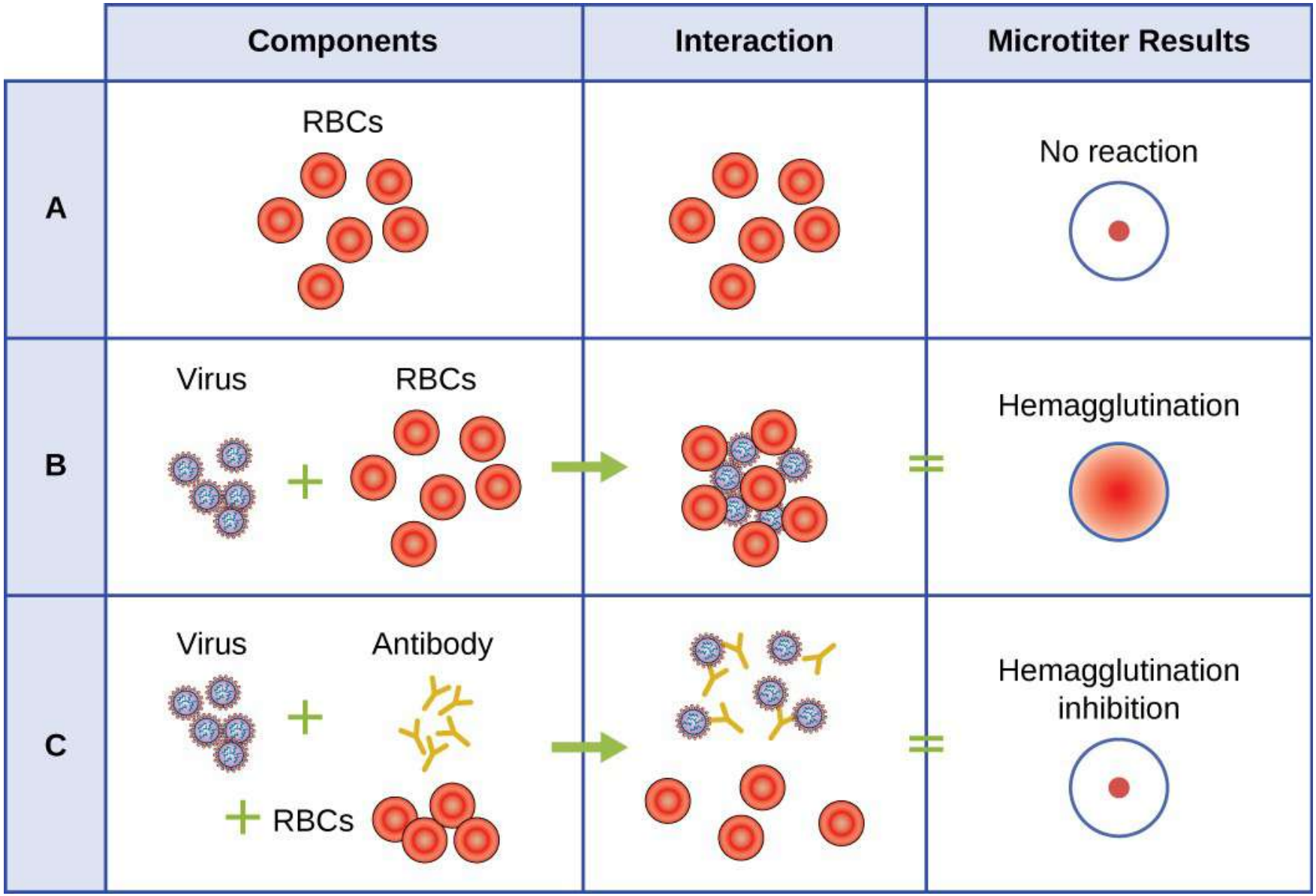
Francis Peyton Rou

Rous sarcoma virus


Plants
Insects
Mammals
Naturally
Experimentally
Cells
Mice
Humans
Plant-based manufactured items
Highly similar viruses (structure, gene content, evolutionary origin)
Considerable exposure to plants and their viruses (food, environment including water, smoking and herbal medicine (humans))
• Binding
• Circulation, replication
• Insect behavior alteration
• Induction of immune responses
• Binding, entry
• Viral genome transcription
• Viral RNA translation
• Entry
• Persistence, dissemination to organs
• Induction of immune responses
• Entry, persistence
• Passage through the gut
• Excretion of infectious viruses
• Induction of immune responses

VS

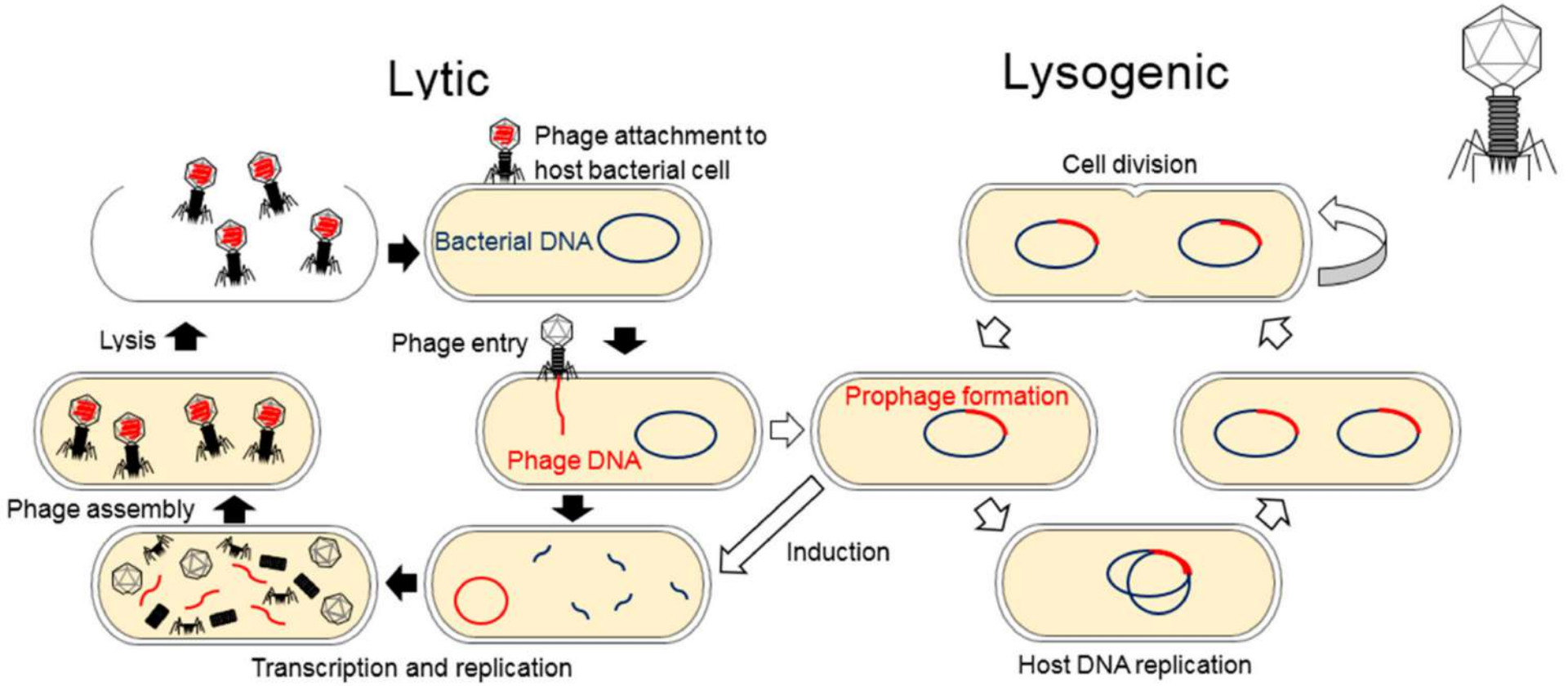
What is this?

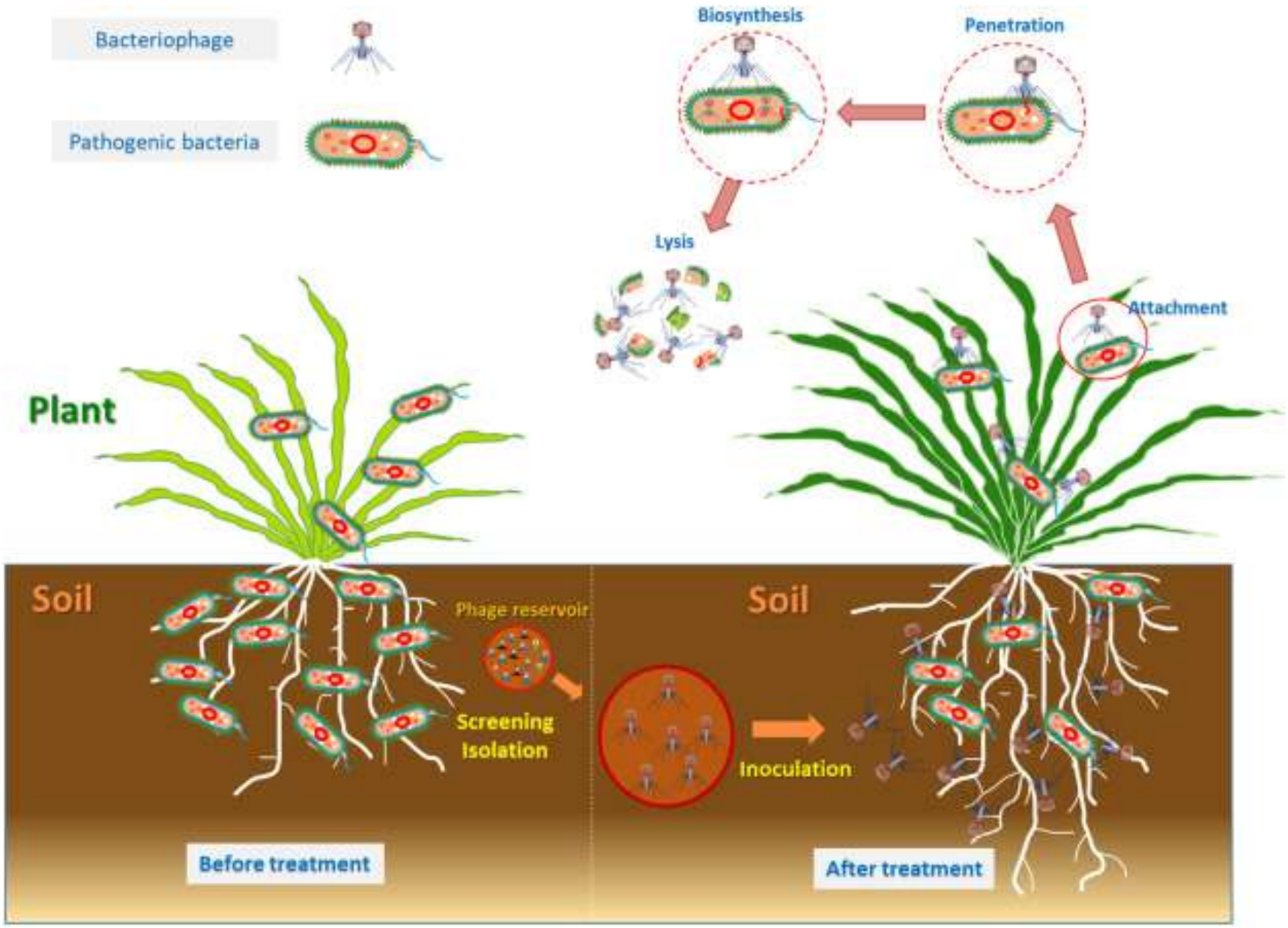

Components
Interaction
Microtiter Results
A
RBCs
No reaction
B
Virus
RBCs
Hemagglutination
C
Virus
Antibody
RBCs
Hemagglutination inhibition

Rapid test?


COVID-19
C
T
Result
Lab Test
COVID-19
Negative
Address :
Requested date/Time
NaF blood
Sex :

Life cycle


Lytic
Lysogenic
Phage attachment to host bacterial cell
Bacterial DNA
Cell division
Lysis
Phage entry
Prophage formation
Phage DNA
Phage assembly
Induction
Transcription and replication
Host DNA replication


Bacteriophage
Pathogenic bacteria
Biosynthesis
Penetration
Lysis
Attachment
Plant
Soil
Phage reservoir
Screening
Isolation
Soil
Inoculation
Before treatment
After treatment

Challenging issues in phage application

Advantages

- Specific to the target bacteria
- Abundance in nature
- Minor side effect
- Low selective pressure
- Harmless to human
- Rapid production of new phages
- Phage-based detection methods

Disadvantages

- Bacterial resistance
- Immunogenicity
- Narrow host range
- Regulatory approval
- Co-evolutionary dynamics
- Difficulty in phage delivery to the target site


vielen
dank