

LATIN = POISON



In 1892, Dmitri Iwanowski performed an experiment to try to isolate the cause of a disease that commonly wiped out tobacco crops.

He filtered the sap of diseased plants through a porcelain filter that was designed to trap bacteria.



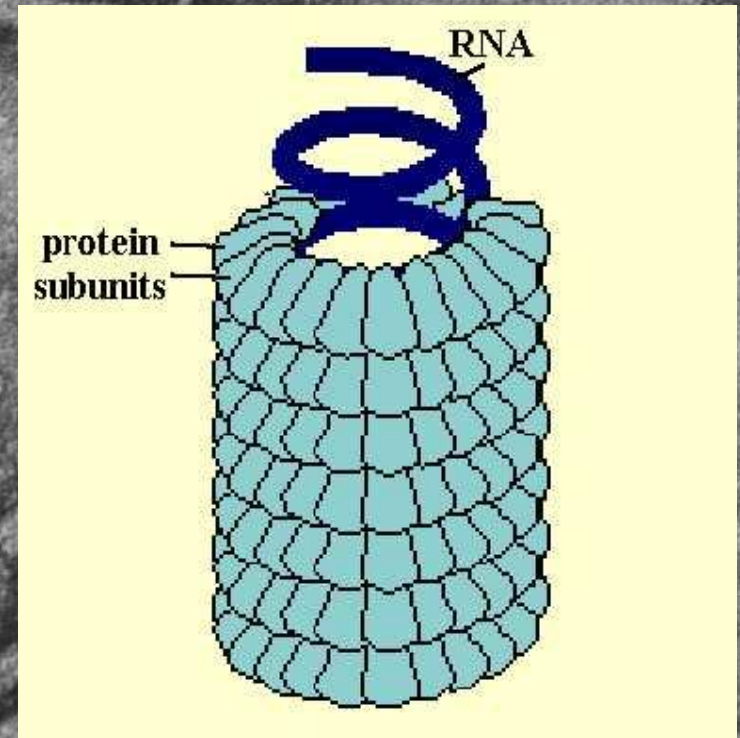
When healthy plants were injected with the fluid that passed through the filter they became diseased. Whatever the infectious agent was, it passed right through the porcelain filter. It was something much smaller than a bacterium.

It was still a number of years before scientists came to agreement that these very small infectious agents, which were much smaller than most common bacteria, were, in fact, NOT bacteria.

Martinus Beijerinck conducted many viral studies to illustrate the key ways these infectious agents operated differently than bacteria



These very small unseen infectious agents that were the cause of a variety of diseases in plants and animals were classified as VIRUSES.



In 1935, a chemist named Wendell Stanley, isolated the Tobacco Mosaic Virus, making it possible for the first time to carry out chemical and structural studies on the purified virus.

VIRUSES can infect members from all **SIX Kingdoms**:

ARCHAE

EUBACTERIA

PROTISTA

FUNGI

PLANTAE

ANIMALIA



WHY STUDY VIRUSES

- Viruses cause the disease and death of millions and millions of people each year.

Human papilloma virus (HPV)

Sexually transmitted HPV infections are common and often asymptomatic, untreated cases in women are the main cause of cervical cancer

- A sexually transmitted virus that causes cancer
- More than 100 types of HPV have been found so far
- 15 have been identified as putting women at high risk for cervical cancer

Cervical cancer

- 1** Virus in cervix enters cells through micro-abrasions
Infects cells
- 2** HPV replicates
Several weeks later
90 percent of cases heal within two years
Infection spreads
- 3** 0.8 percent of cases develop cancer
10-30 years later
HPV invades deeper layer of tissues and turns cancerous

AFP Source: Nobel/FDA

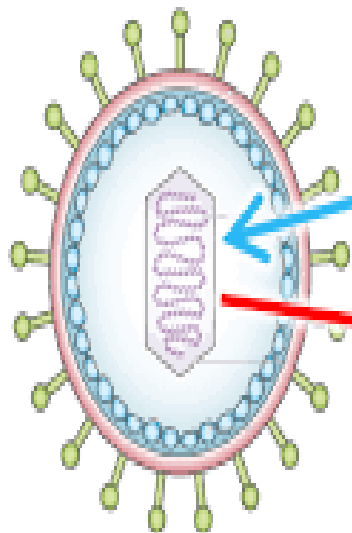


- Recent studies are linking viruses to the cause of about 20% of all cancers. Example **HUMAN PAPILLOMA VIRUS**

WHY STUDY VIRUSES

- Medically we are using viruses and bacteria for genetic modification of various crops and livestock.

Oncolytic Virus

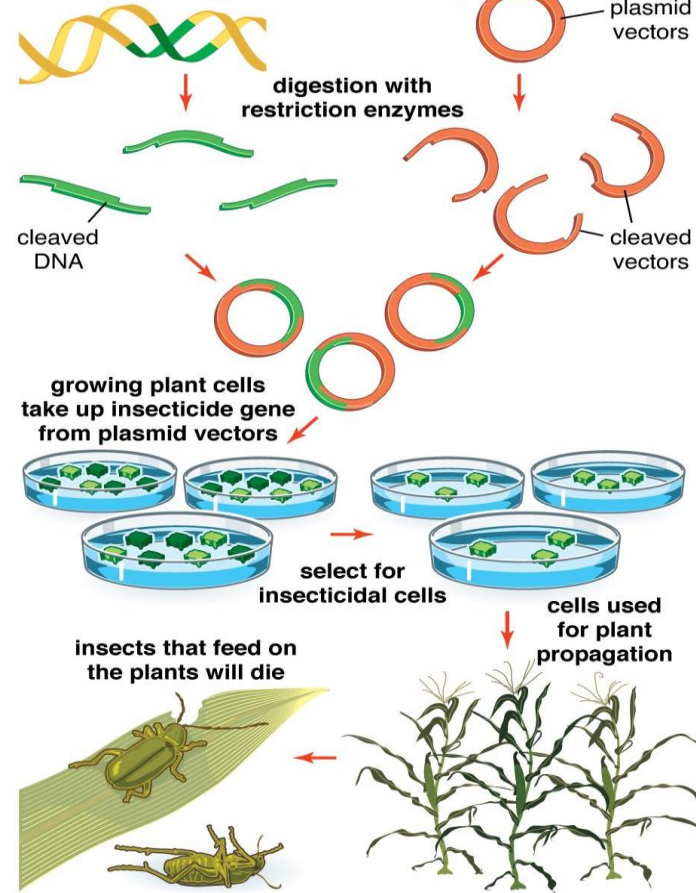


(+) INSERT
Immune-stimulating genes

(-) REMOVE
Disease-causing genes
(selective targeting of tumors)

Genetically modified organism

insecticide gene created using recombinant DNA technology



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- New cutting-edge cancer treatments include the use of viruses to kill cancerous cells

DO ANY OF THESE SOUND FAMILIAR?

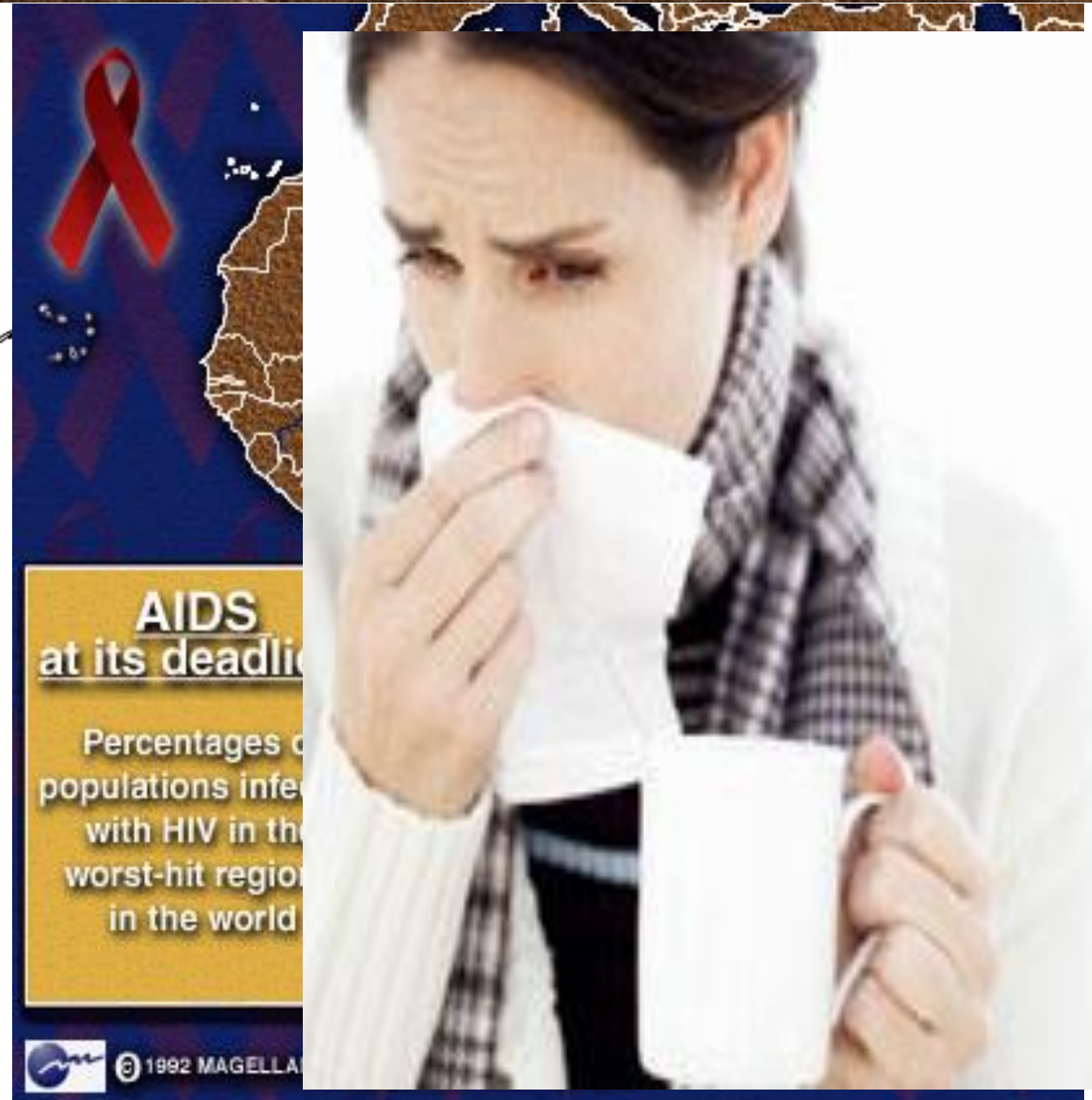
CHICKEN POX

WEST NILE VIRUS

INFLUENZA

A.I.D.S.

COMMON
COLD



AIDS
at its deadliest

Percentages of populations infected with HIV in the worst-hit regions in the world

© 1992 MAGELLAN

The image is a composite. On the left, there is a vertical banner with a red AIDS awareness ribbon at the top, a map of Africa in the middle, and a yellow box containing the text 'AIDS at its deadliest' and 'Percentages of populations infected with HIV in the worst-hit regions in the world'. At the bottom of the banner is a logo and the text '© 1992 MAGELLAN'. On the right, there is a photograph of a woman with dark hair, wearing a white shirt and a black and white checkered scarf, coughing into a white tissue.

**HOLD IT!..... SOMEBODY TOLD ME THAT VIRUSES
CAN'T EVEN MOVE.**



**One More Reason To Properly Wash Your Hands Frequently -
80% of Common Infections Are Passed From Your Hands!**

What's SMALLER ? ? ? ?

Relative sizes of microbes

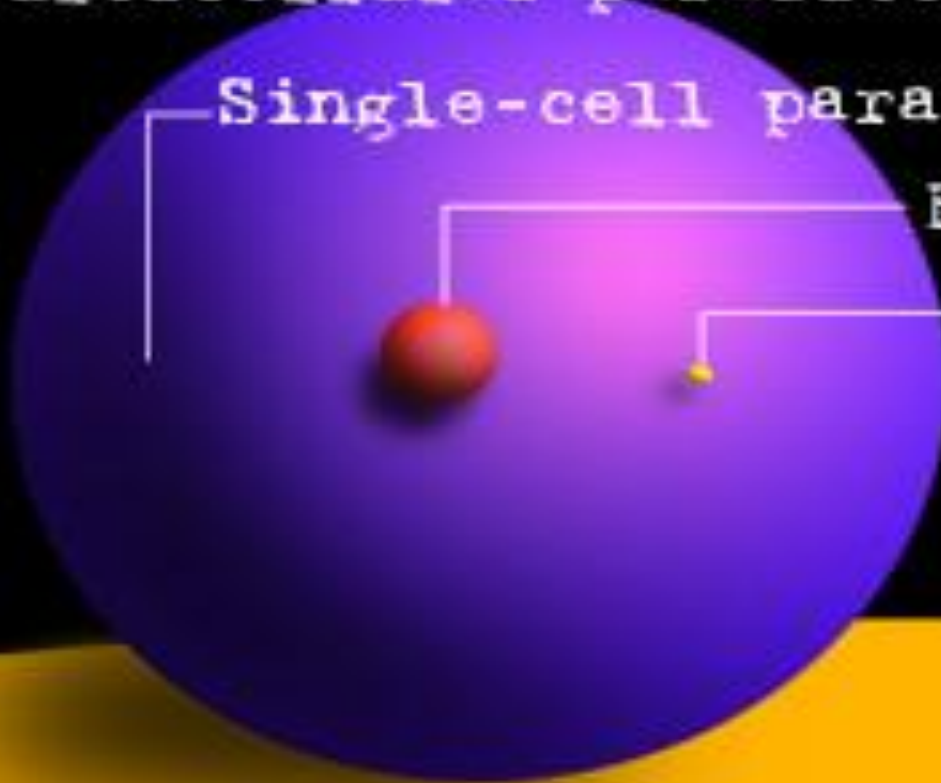
Multicellular parasite

Single-cell parasite

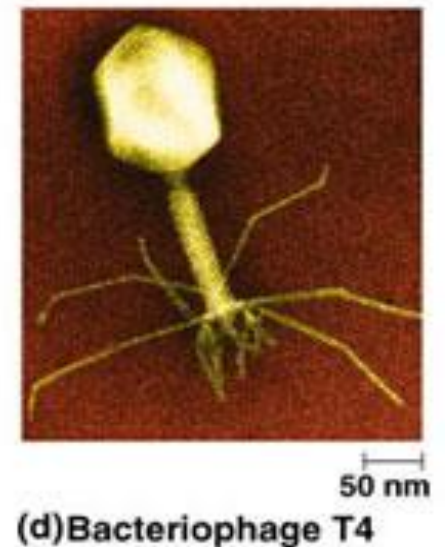
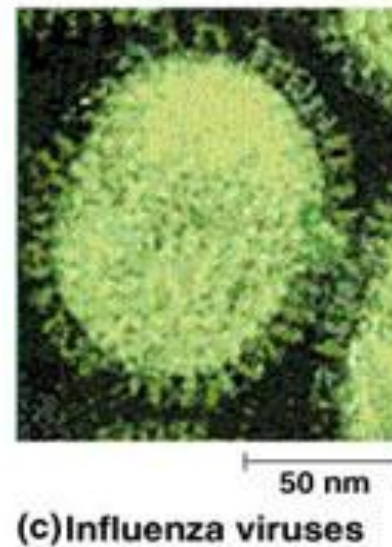
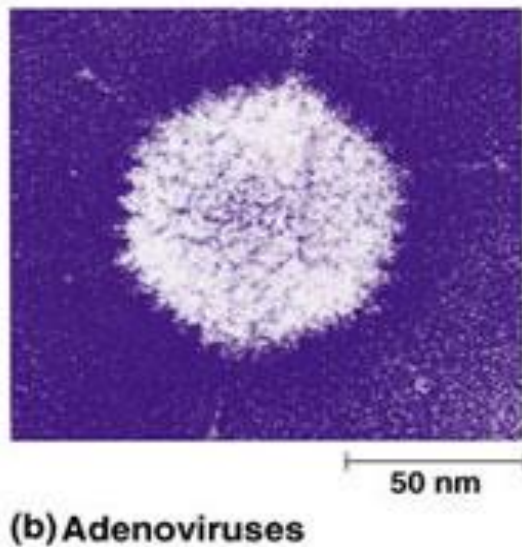
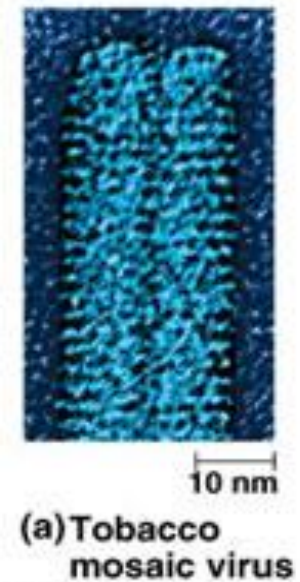
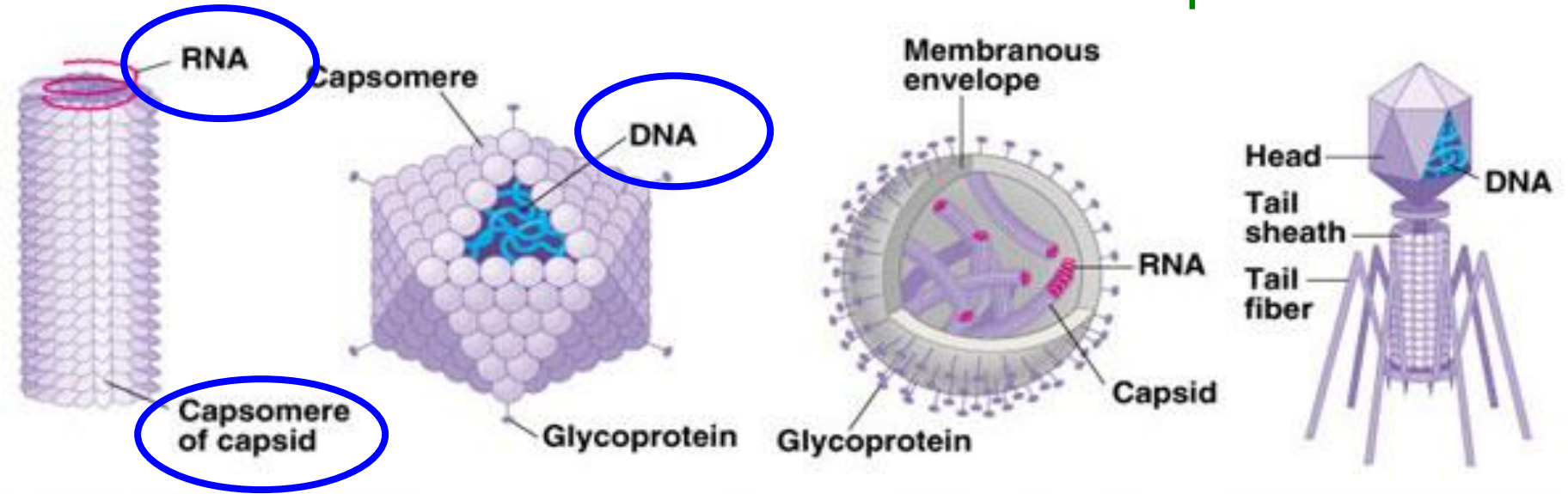
Bacterium

Virus

If this purple sphere represented a red blood cell, a RBC has a diameter of about $2 \mu\text{m} = 0.002 \text{ mm}$



VIRUS STRUCTURE and Shapes



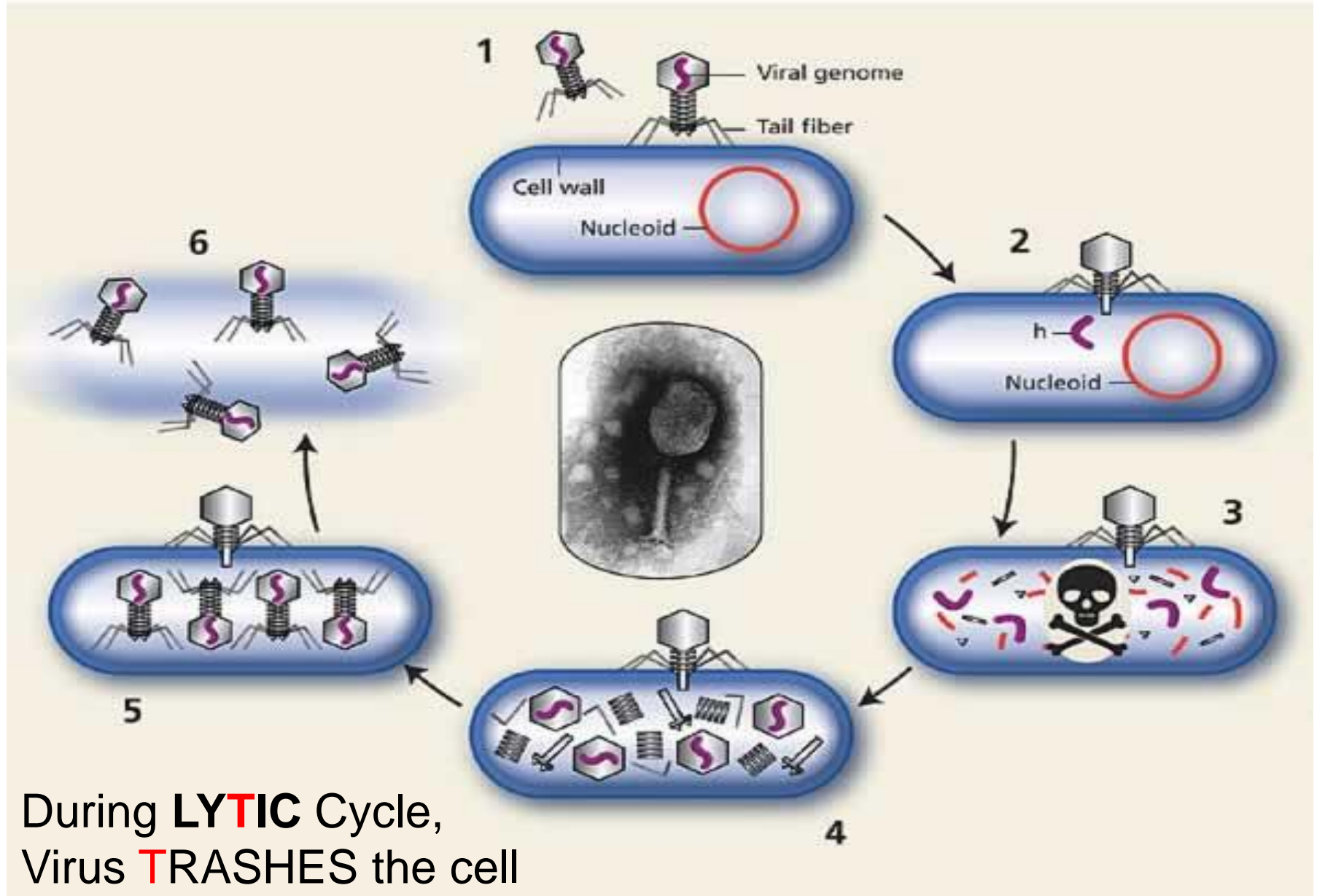
HELICAL

POLYHEDRAL

SPHERICAL

COMPLEX

BACTERIOPHAGE VIRUS – LIFE CYCLE PATTERNS



LYSOGENIC PATTERN

