

Departamento de Microbiologia
Disciplina de Virologia Básica

ESTRUTURA DOS VÍRUS

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Mestrando do PPG em Microbiologia Agrícola e do Ambiente

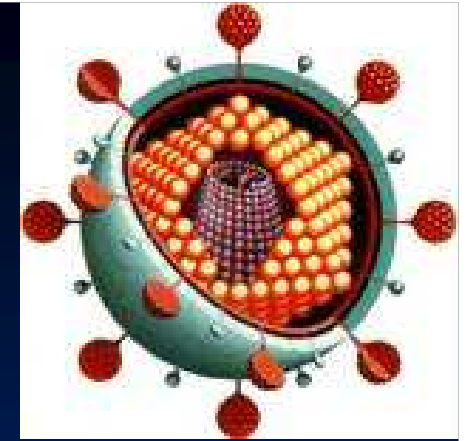
Adaptado Prof. Dr. Paulo Roehle

EXISTEM VÍRUS EM TODAS AS ESPÉCIES !

- BACTÉRIAS
- PLANTAS
- ANIMAIS

Mas afinal, o que é um vírus?

DEFINIÇÃO DE UM VÍRUS

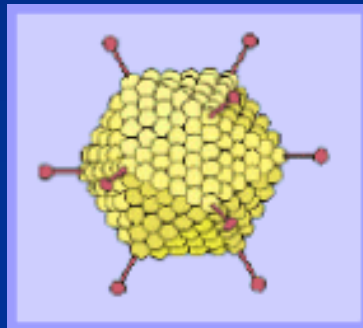


- Microorganismos que se multiplicam:
 - Dentro de células vivas
 - Usam (em maior ou menor grau) o sistema de síntese das células
 - Induzem a síntese de ácido nucléico viral e proteínas,
 - Capazes de auxiliá-los a infectar novas células
 - Seu único objetivo é perpetuar-se na natureza !

O QUE É UM “VÍRION” ?

É UMA PARTÍCULA VIRAL
COMPLETA,
OU SEJA,

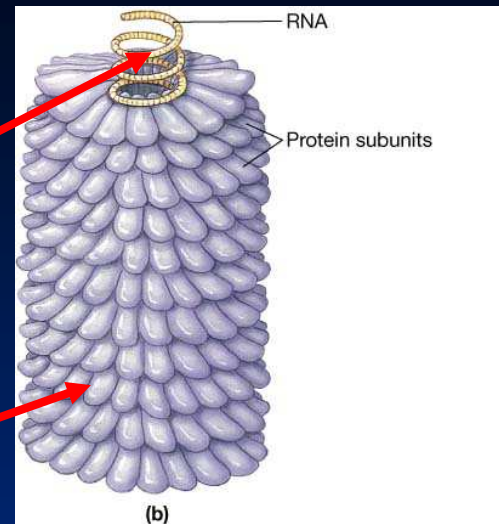
UMA PARTÍCULA VIRAL
INFECCIOSA



UM VÍRION (ADENOVÍRUS)

ESTRUTURA DOS VÍRUS

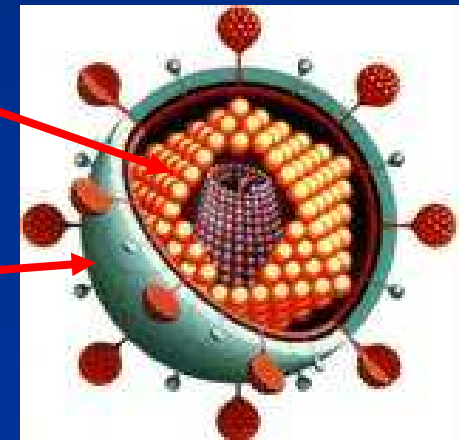
Núcleo (é o genoma)



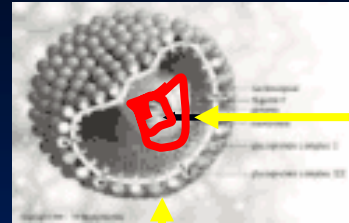
Capsídeo (composto por capsômeros)

Alguns vírus tem ainda:

Envelope (derivado de membranas, com proteínas codificadas pelo vírus)

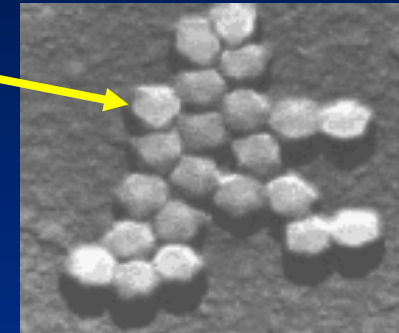
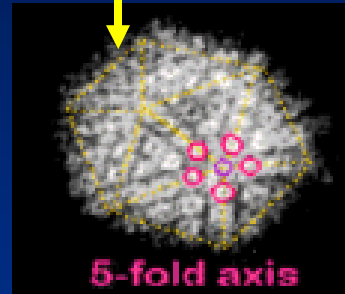
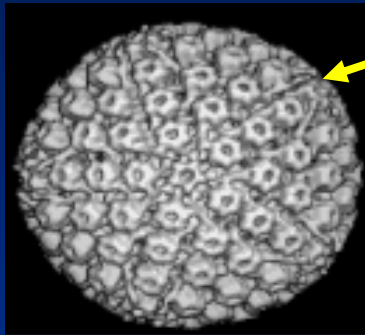


ESTRUTURA DOS VÍRUS

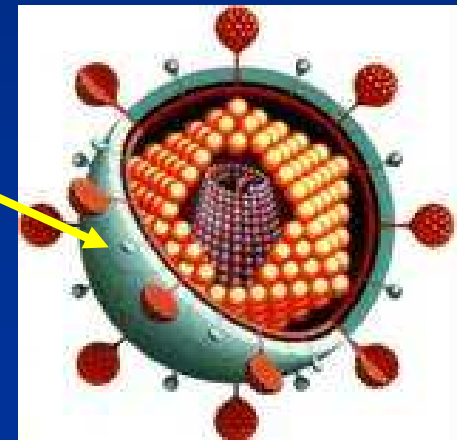
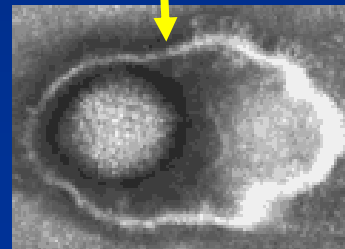
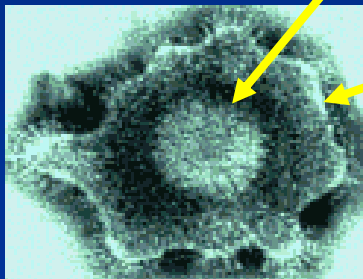


NÚCLEO (GENOMA)

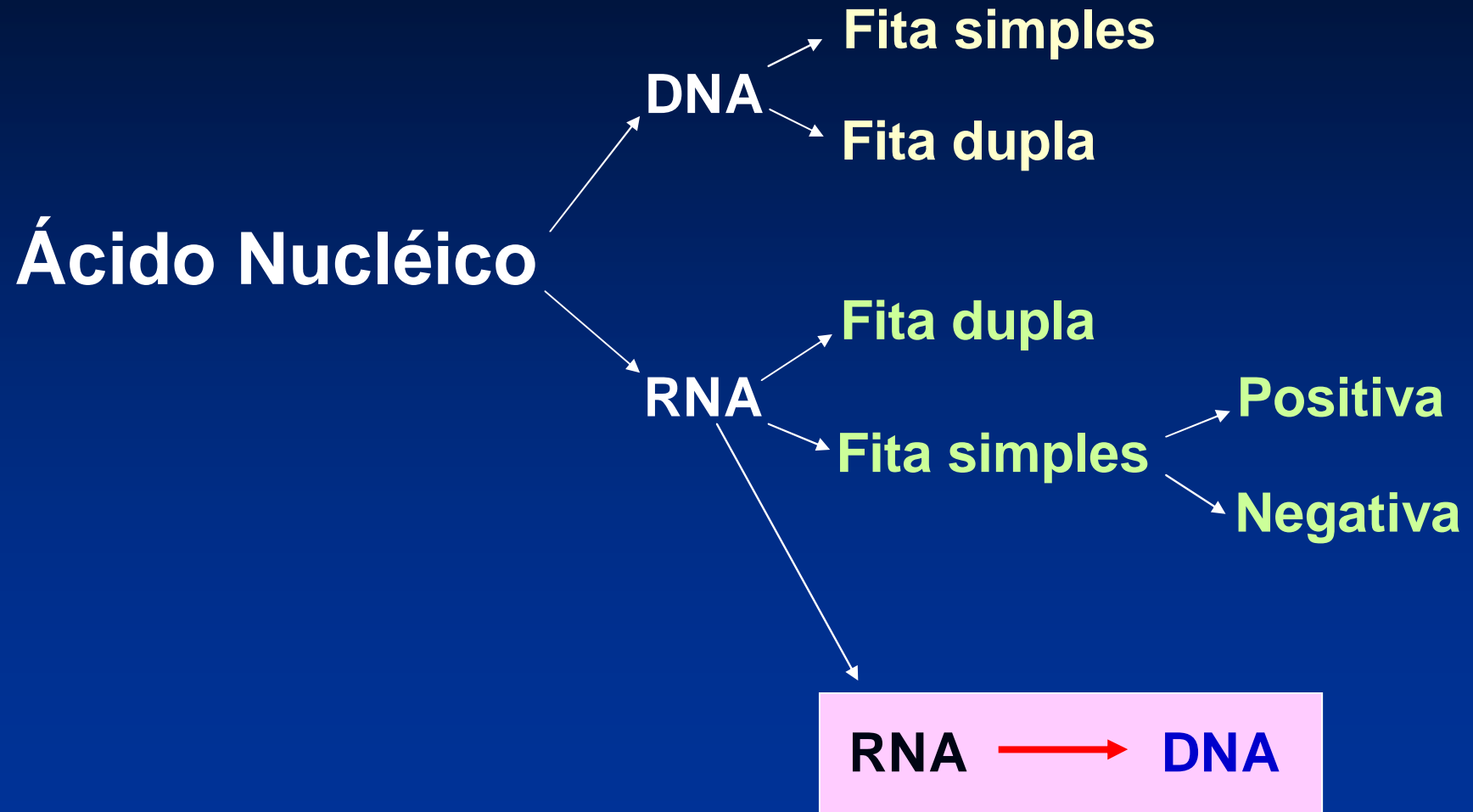
CAPSÍDEO



ENVELOPE



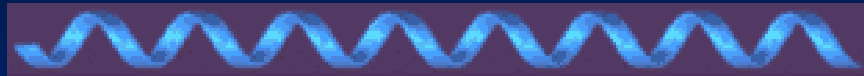
GENOMAS VIRAIS



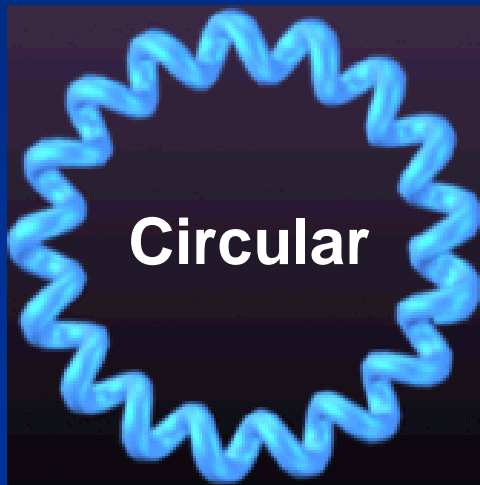
GENOMAS VIRAIS

DNA

Fita simples (single stranded)



Fita dupla (double stranded)



RNA

+ ou -



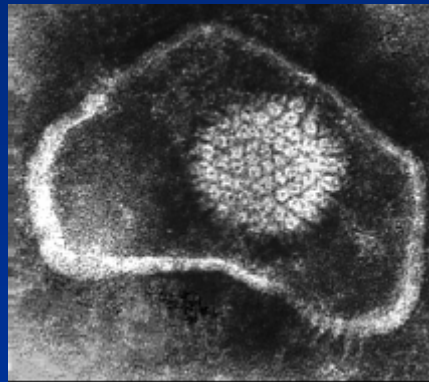
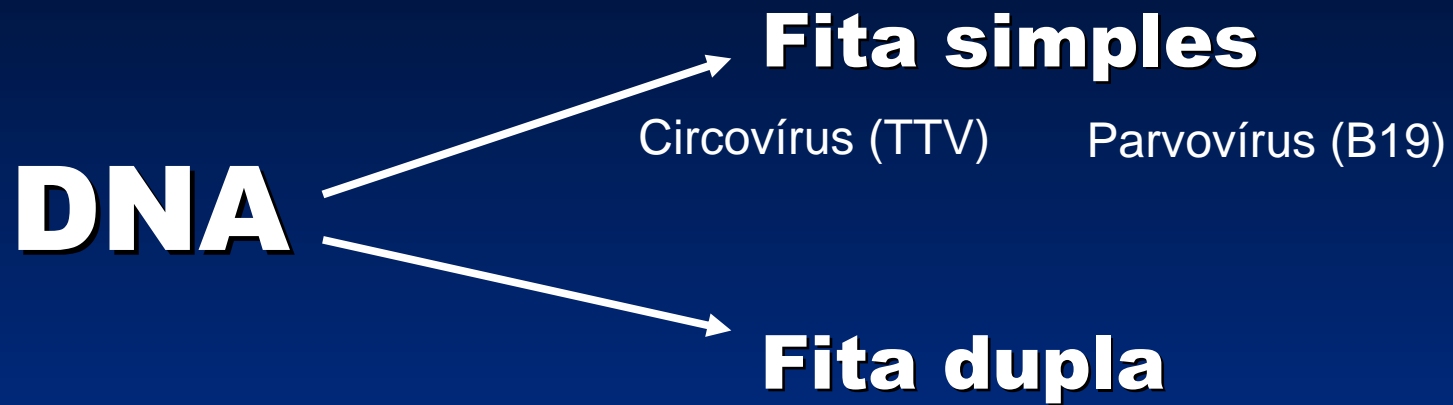
Segmentado



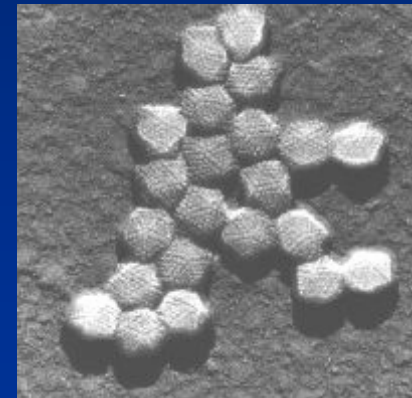
Dupla fita segmentado



GENOMAS DE DNA



Herpesvírus



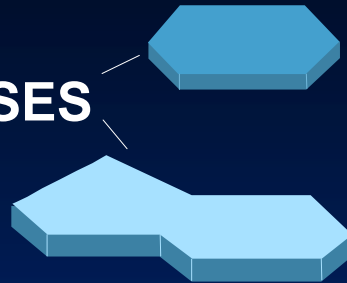
Adenovírus



SUGAR



BASES

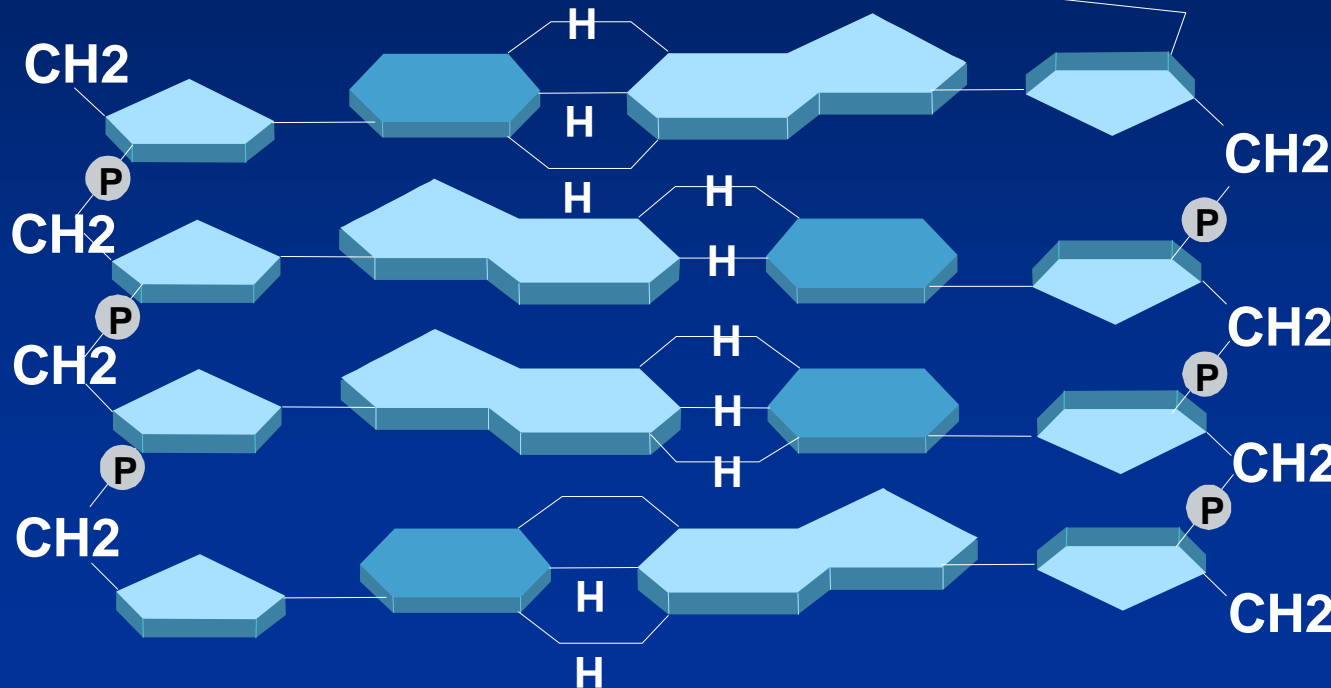


PHOSPHATE GROUP **P**



DNA

1. Fita dupla
2. Contém desoxiribose
3. Contém timidina



GENOMAS DE RNA

RNA

Fita simples

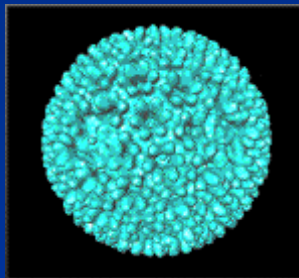


Ebóla

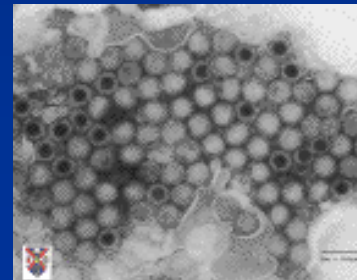


RSV

Fita dupla



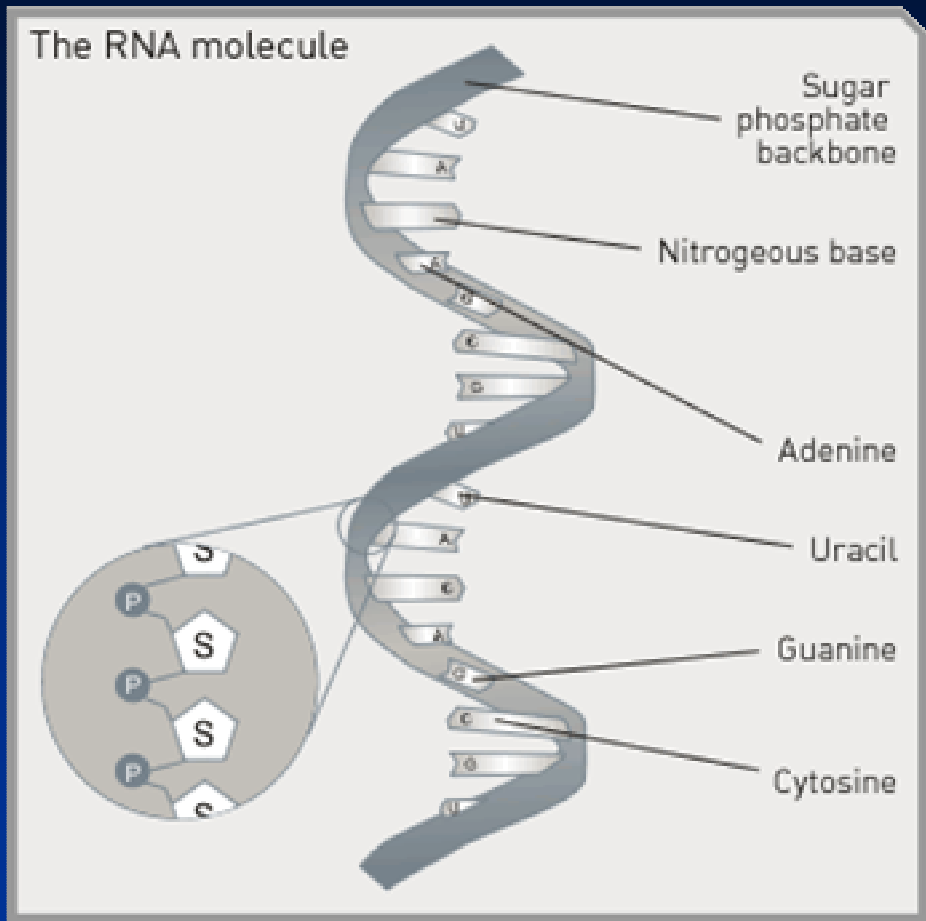
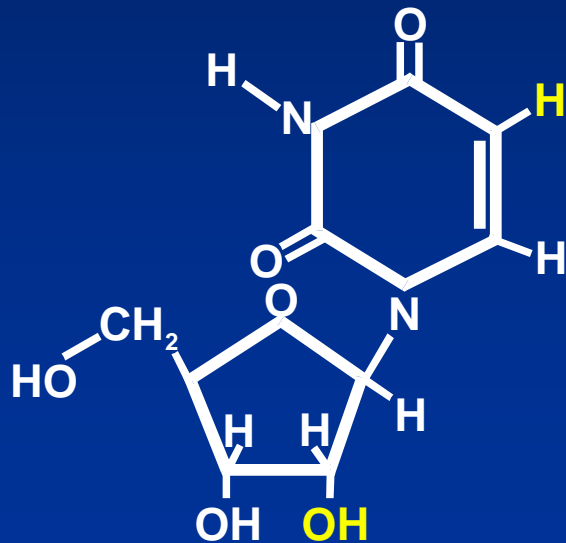
Rotavírus



Reovírus

RNA

1. Usualmente fita simples
2. Contém ribose
3. Contém uridina



GENOMAS DE RNA

POLARIDADE

= mRNA: há tradução

Tradução

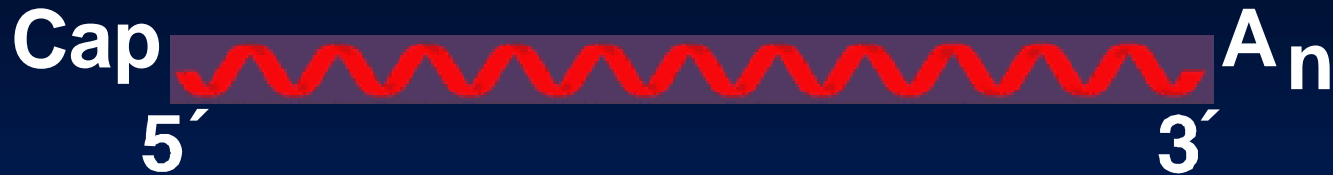
Positiva: AUG GCA CGA → MET ALA ARG

Necessita
transcrição

~~↗~~ ≠mRNA: não há tradução

Negativa: UAC CGU GCU

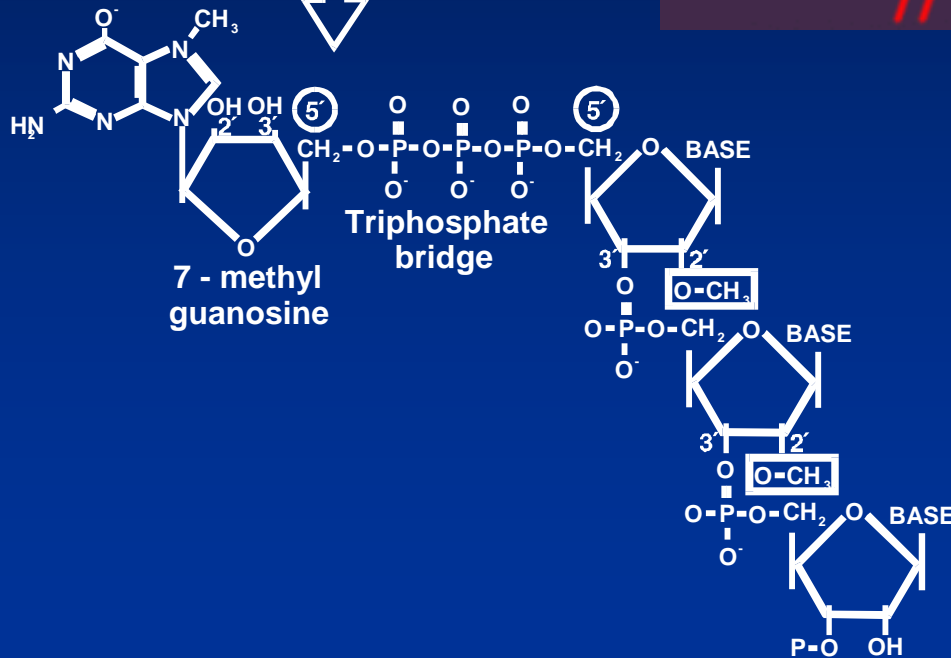
ESTRUTURA DO mRNA



$m^7Gppp Nm (Nm) N$



AAAAAAAAOH
(Poly A)



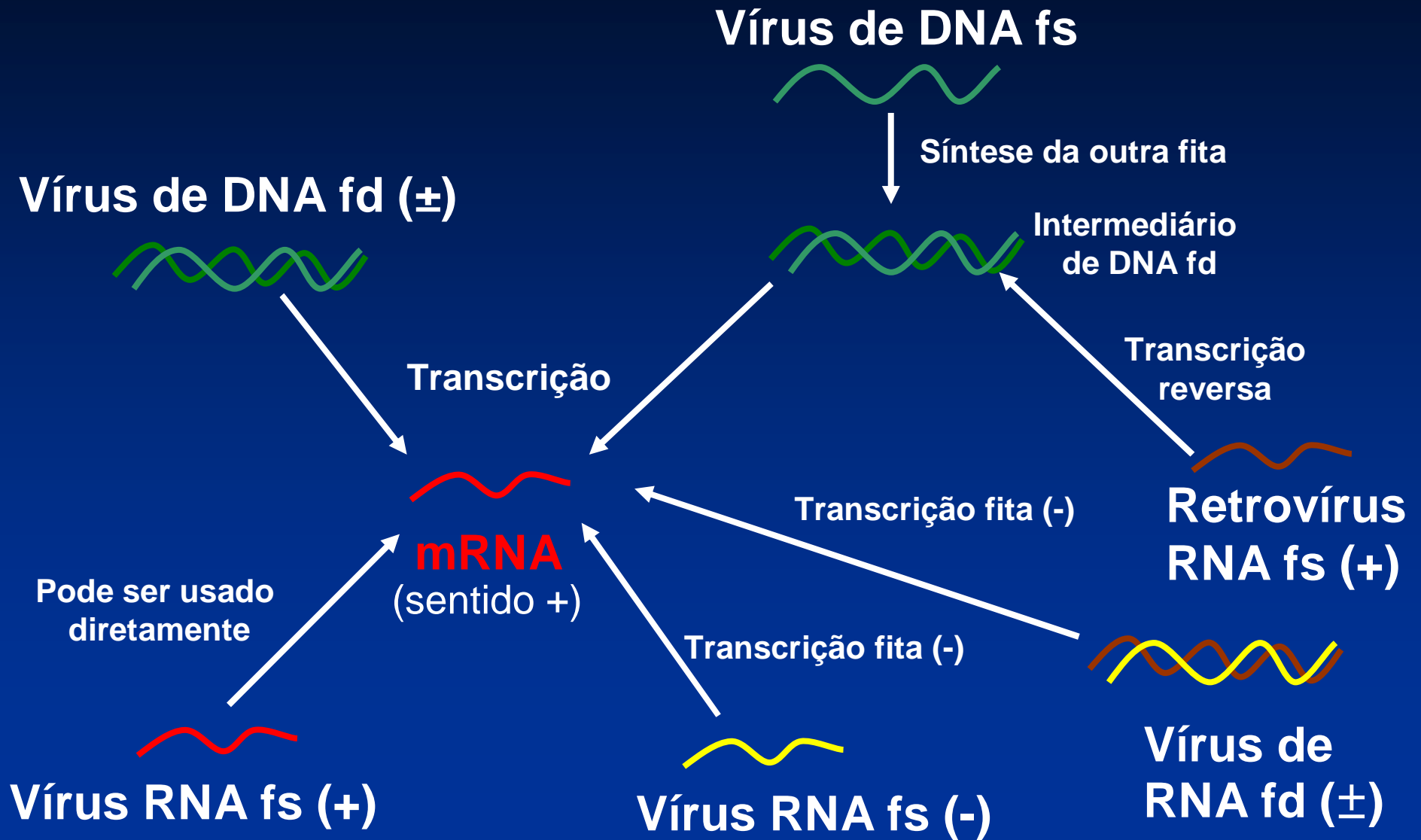
VÍRUS COM TRANSCRIPTASE REVERSA



Hepadnaviridae → Hepatite B (DNA → RNA^{RT} → DNA)

GENOMAS VIRAIS

Classificação de Baltimore (1975)

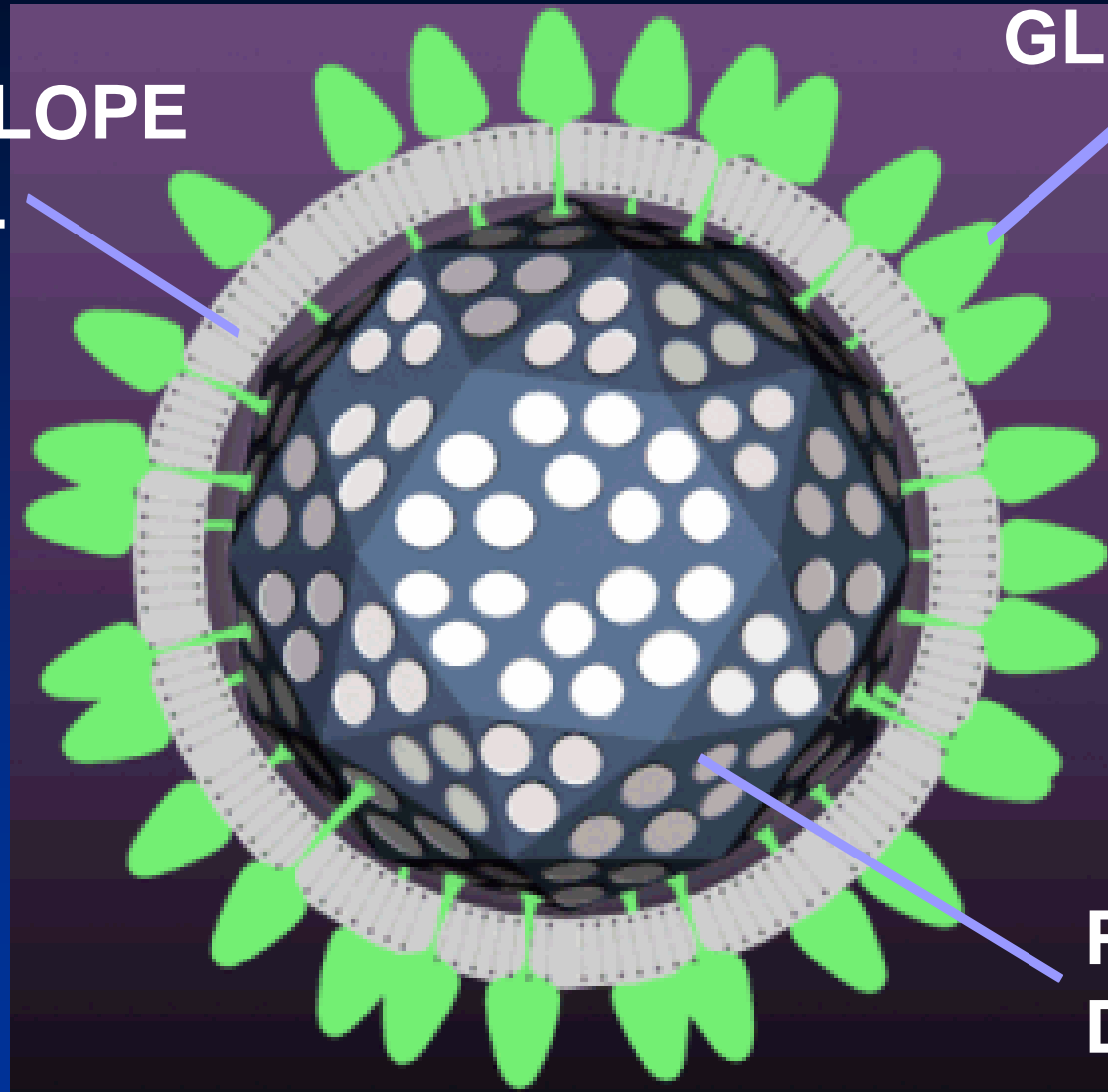


Fonte: Madigan, 2004.

PROTEÍNAS VIRAIS

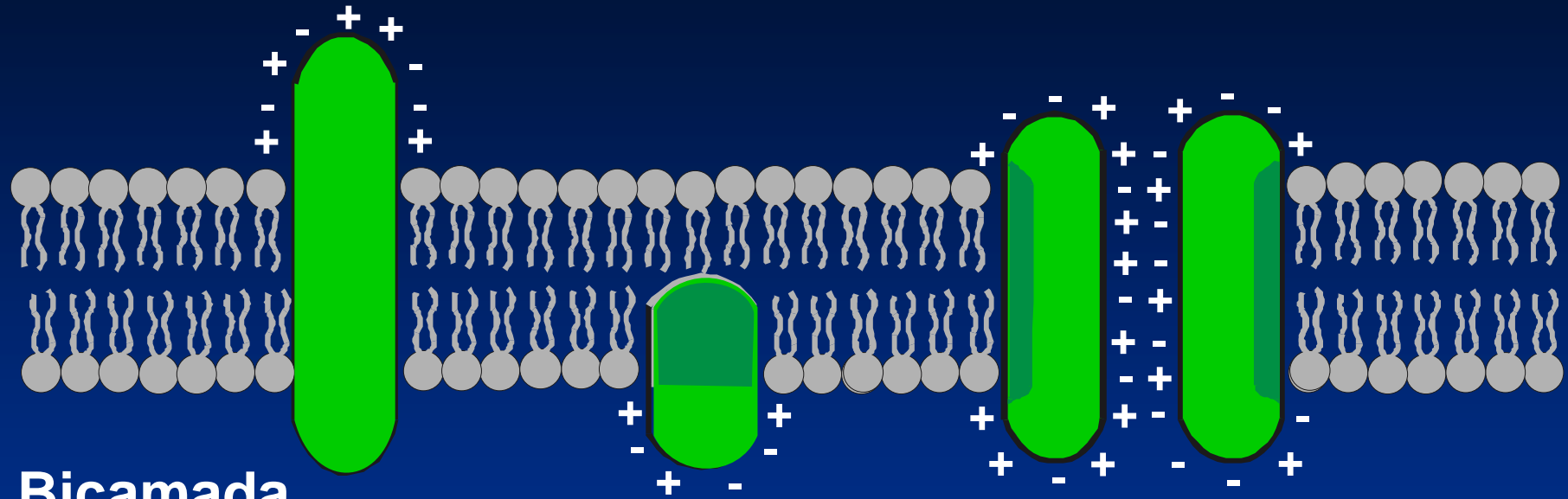
ENVELOPE
VIRAL

GLICOPROTEINA



PROTEINAS
DO CAPSÍDEO

MEMBRANA DA CÉLULA HOSPEDEIRA



Bicamada
Lipídica

PROTEINAS CELULARES

PEPLÔMERO (GLICOPROTEÍNA)

PROTEÍNA

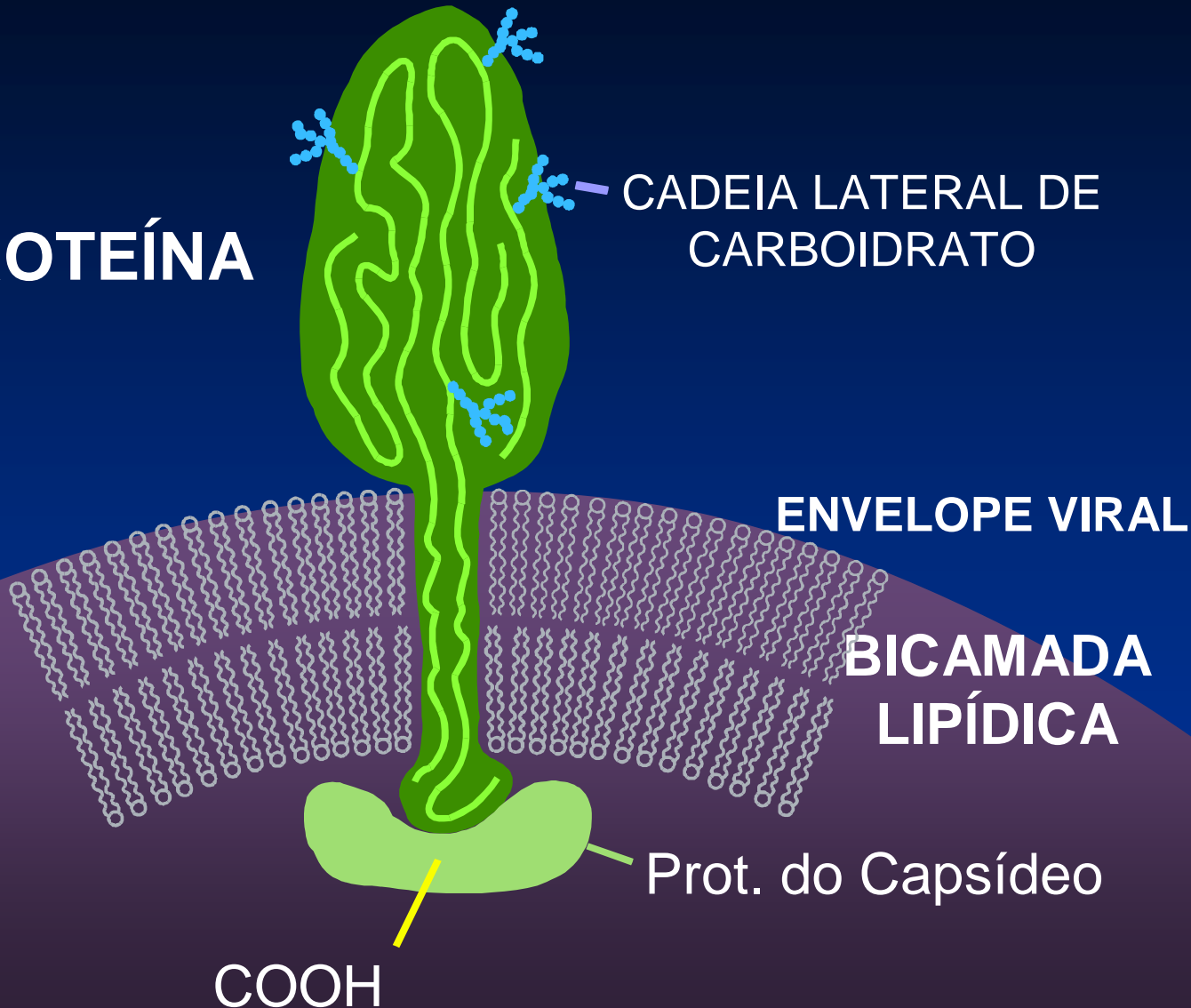
CADEIA LATERAL DE CARBOIDRATO

ENVELOPE VIRAL

BICAMADA LIPÍDICA

Prot. do Capsídeo

COOH

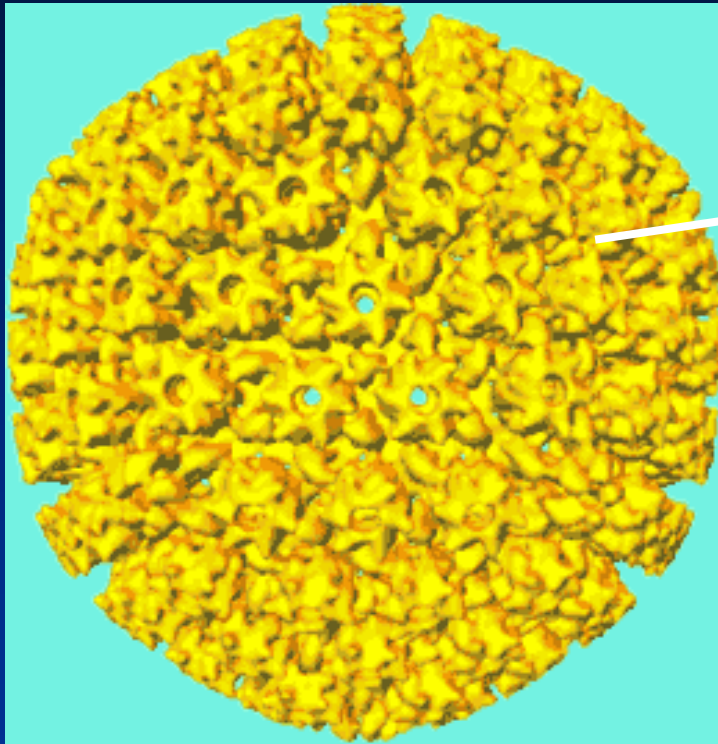


PROTEÍNAS ESTRUTURAIS E NÃO-ESTRUTURAIS

➤ Funções das proteínas virais

- Protegem o ácido nucléico
- Ligam-se a receptores nas células
- Penetram na membrana celular
- Ajudam a replicar o ácido nucléico (alguns)
- Iniciam o programa de replicação (alguns)
- Modificam a célula hospedeira (alguns)

CAPSÍDEO VIRAL

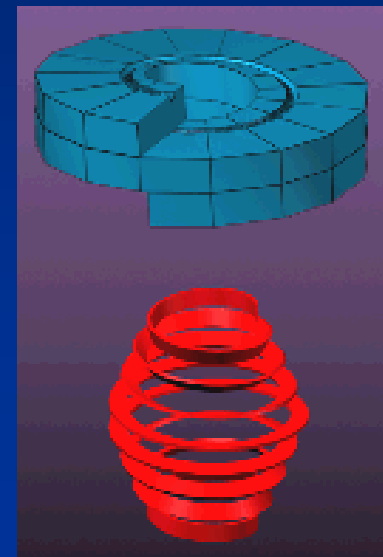


Capsômeros

Nucleocapsídeo:
Genoma + Capsídeo

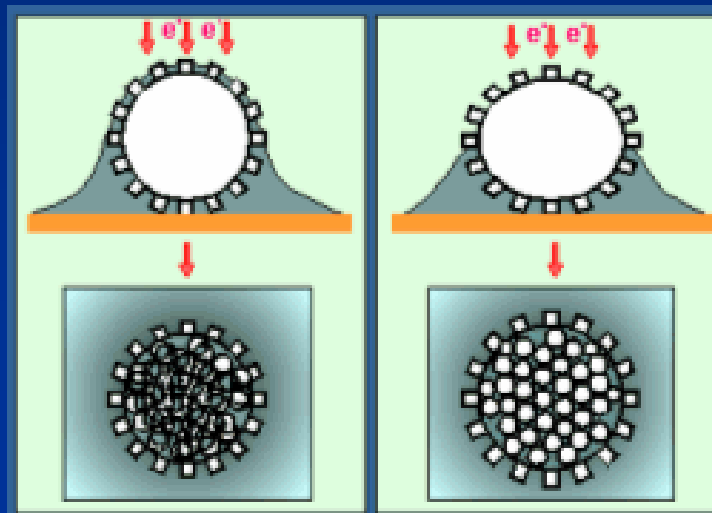
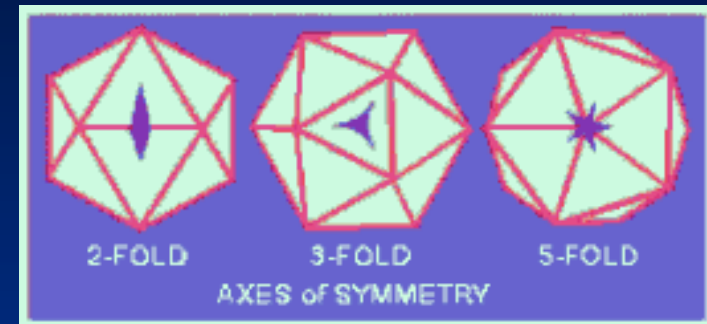
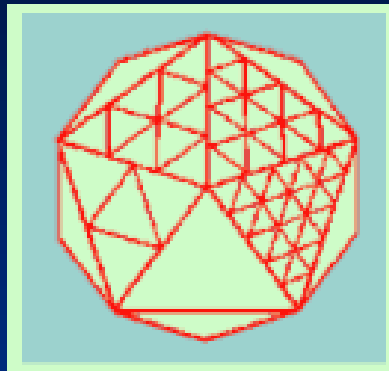
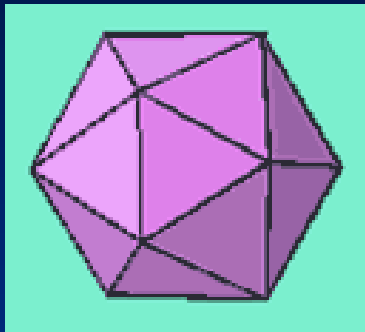
FUNÇÕES DO CAPSÍDEO

- Empacotamento
- Proteção do ácido nucléico
- Transporte do ácido nucléico para outras células
- Fornece a especificidade para a adsorção



SIMETRIA DO NUCLEOCAPSÍDEO

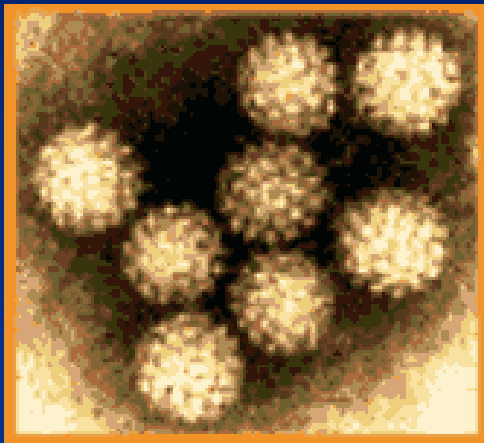
1- Icosaédrica ou cúbica



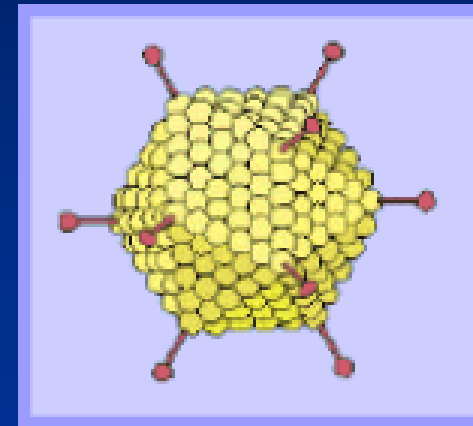
SIMETRIA DO NUCLEOCAPSÍDEO

1- Icosaédrica

Exemplos:

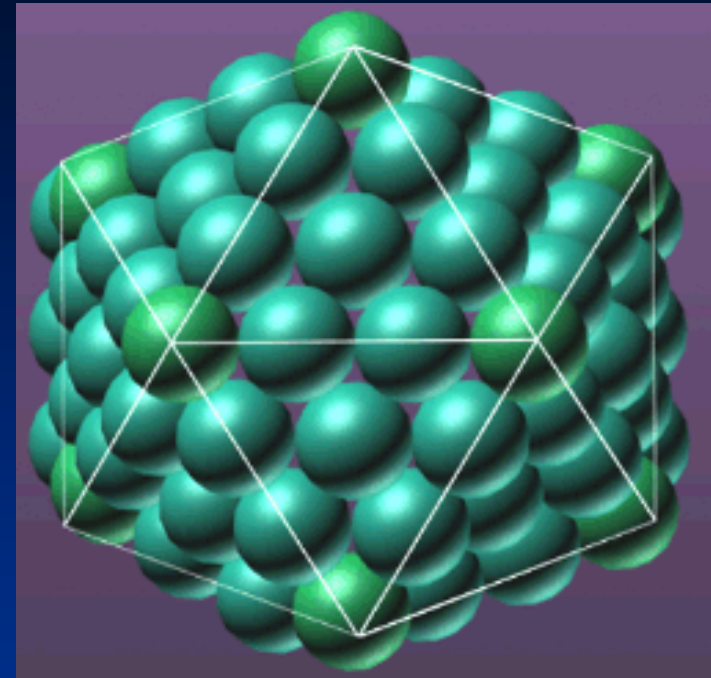
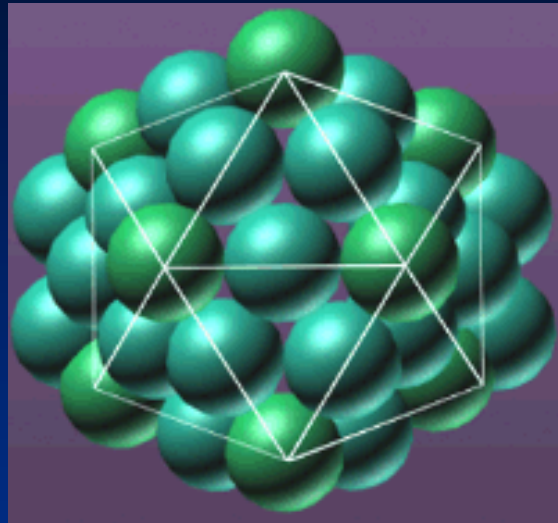


Picornavírus

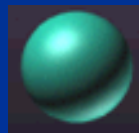


Adenovírus

ARRANJO DOS CAPSÔMEROS



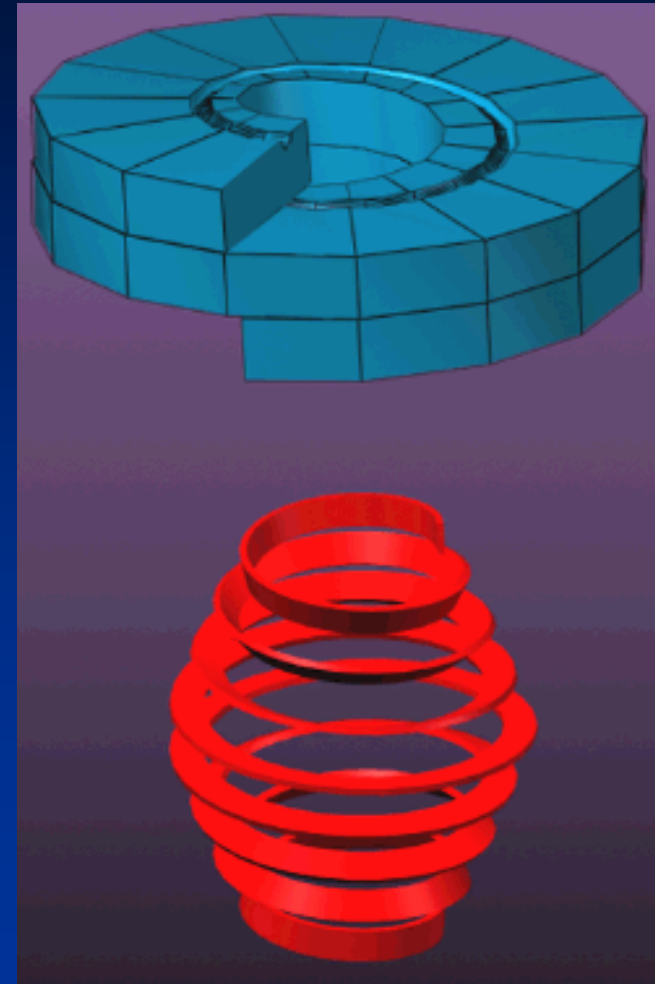
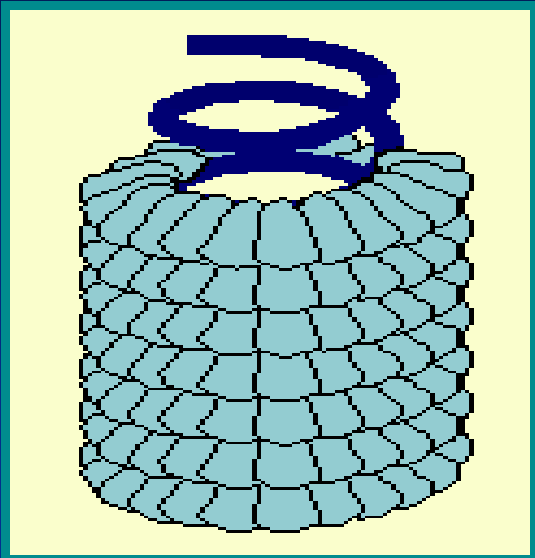
Penton (5 unidades em torno)



Hexon (6 unidades em torno)

SIMETRIA DO NUCLEOCAPSÍDEO

2- Helicoidal

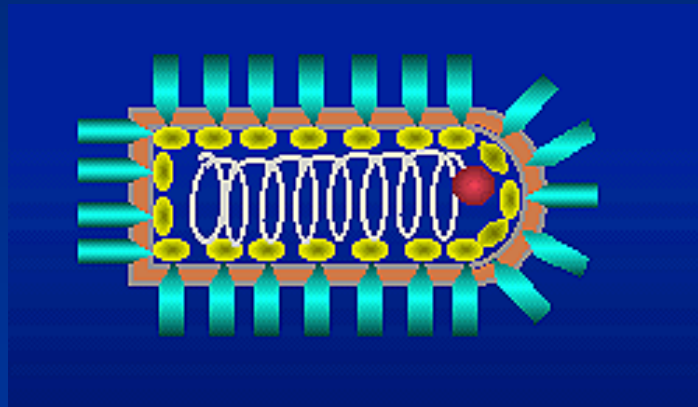


SIMETRIA DO NUCLEOCAPSÍDEO

2- Helicoidal

Exemplos:

Rhabdovírus



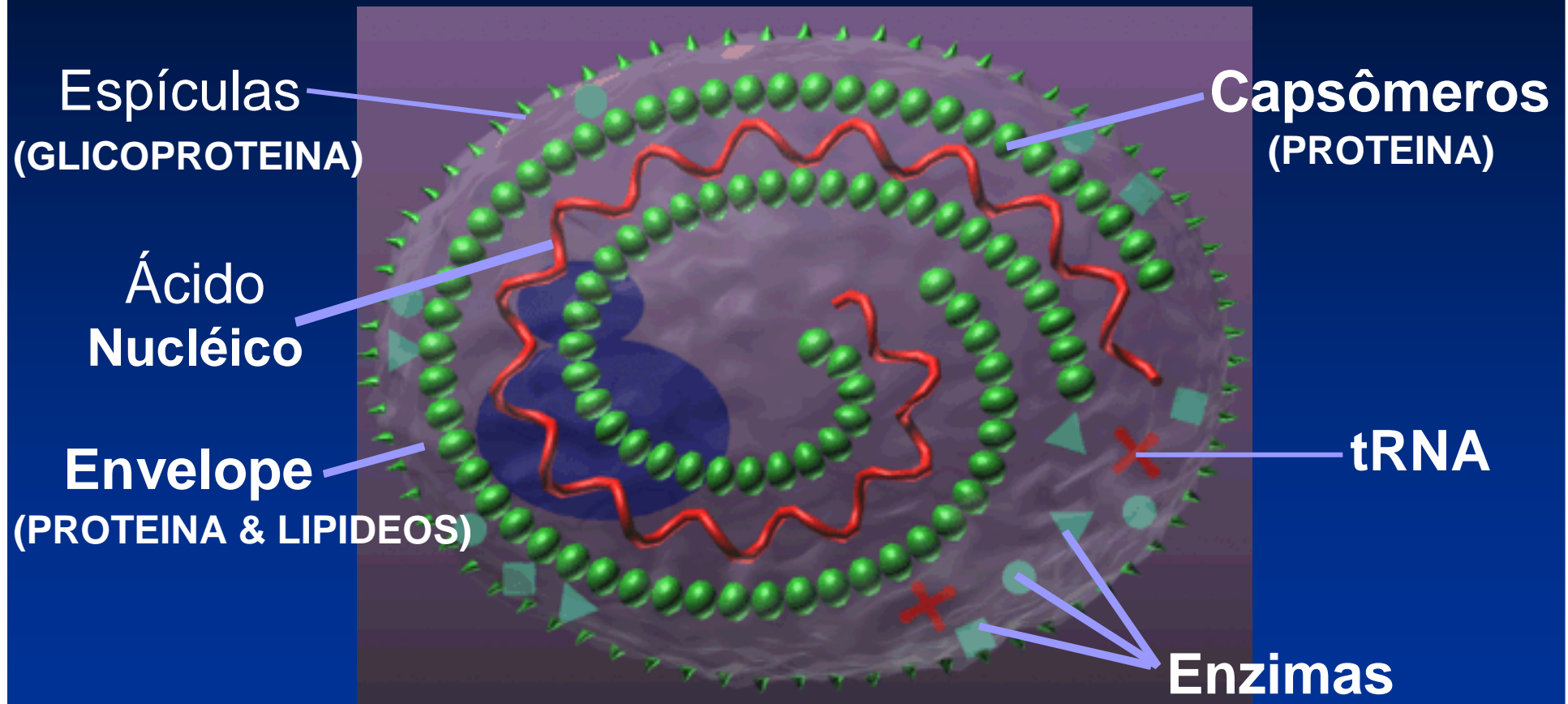
Raiva (não segmentado)

Orthomyxovírus



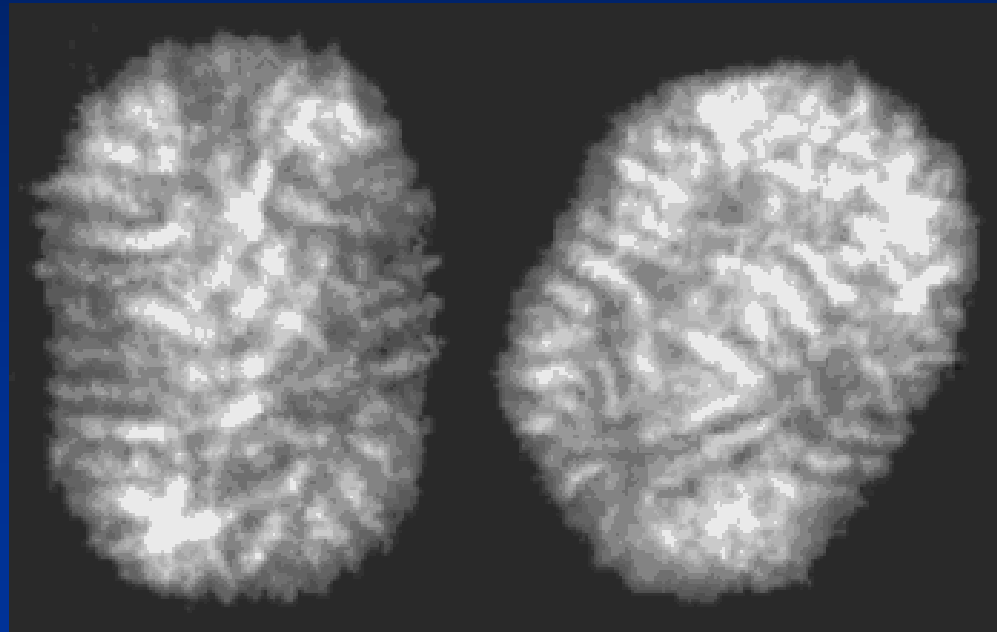
Vírus respiratório sincicial
(não segmentado)

VÍRUS COM SIMETRIA HELICOIDAL ENVELOPADO

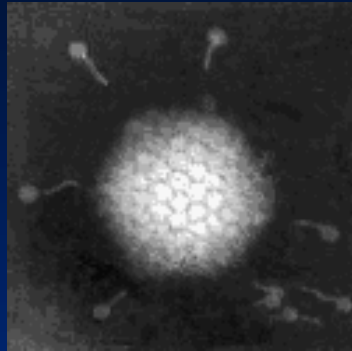


SIMETRIA DO NUCLEOCAPSÍDEO

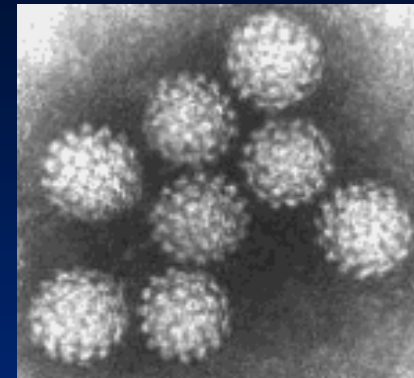
3- Complexa (somente poxvírus)



ALGUMAS FORMAS



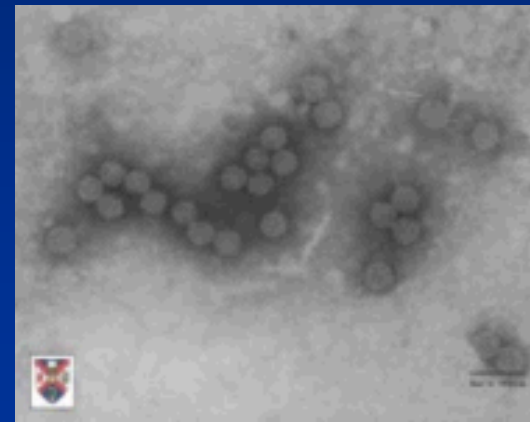
Adenovirus



Papilomavírus



Morbilivírus



Parvovírus

ALGUMAS FORMAS



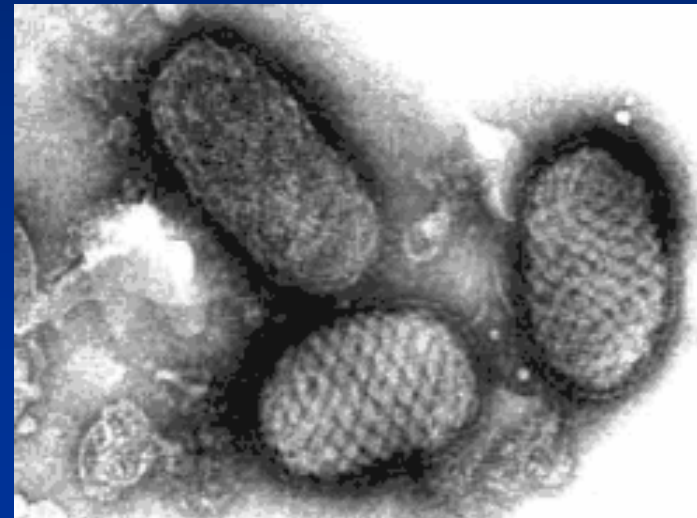
Herpesvírus



Parainfluenza



Vírus Influenza



Poxvírus

FIM! (Até que enfim!)



MEDIDAS COMUNS EM VIROLOGIA

Mícron (μ) = 1/1 000 mm (10^{-3} mm)

Nanômetro (nm) = 1/1 000 000 mm (10^{-6} mm)

Ângstrom (Å) = 1/ 10 000 000 mm (10^{-7} mm)

Dalton (Da, D, KDa)= $1,66 \times 10^{-24}$ g

