

BIOFIZICA CELULARĂ

CELULA

PĂRȚI COMPONENTE:

- MEMBRANA CELULARĂ
- CITOPLASMA
- NUCLEUL
- ORGANITE
 - RETICUL ENDOPLASMIC
 - APARAT GOLGI
 - MITOCONDRII
 - RIBOZOMI
 - LIZOZOMI
- CITOSCHELET
 - FILAMENTE DE ACTINĂ
 - MICROTUBULI
 - FILAMENTE INTERMEDIARE

PROPRIETĂȚI FIZICE

precursor
osteoblastic



oste

ost

matr

cal

oste



MEMBRANE BIOLOGICE ȘI FENOMENE DE TRANSPORT

MEMBRANA CELULARĂ

FUNCȚII:

- COMPARTIMENTARE
- TRANSPORT
 - ✓ DE MACROPRODUȘI;
 - ✓ PRIN MEMBRANA INTACTĂ;
 - ✓ DE INFORMAȚIE.
- REZISTENȚĂ MECANICĂ
- SEMNALIZARE (FENOMENE ELECTRICE)
- SEDIUL UNOR RECEPTORI

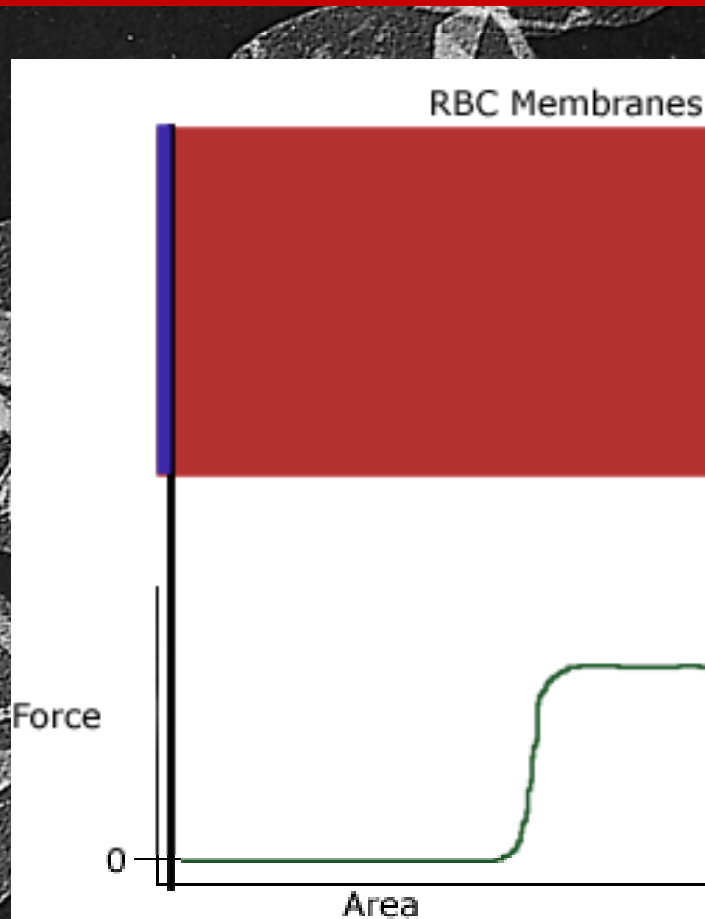
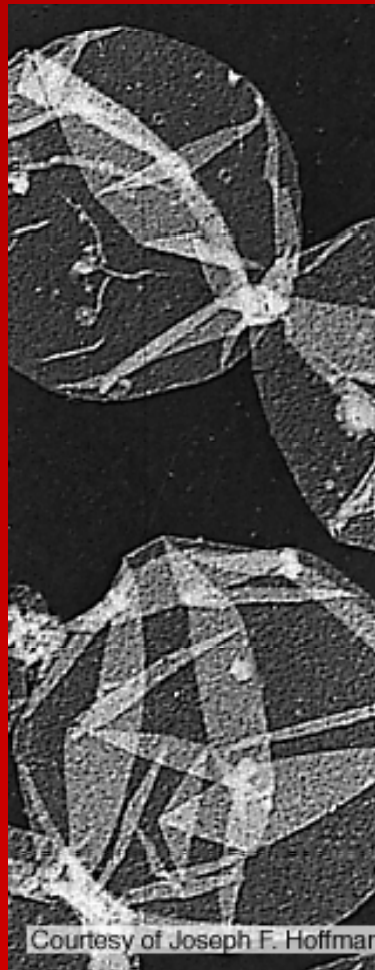
PROPRIETĂȚI FIZICE:

- GROSIME: 60-75 Å
- REZISTENȚĂ ELECTRICĂ: 1-100 kΩ/cm²
- CAPACITATE ELECTRICĂ: 0,5-8 μF/cm²
- CONDUCTANȚĂ IONICĂ:

$$g = g_{Na} + g_K + g_{Cl} + g_{alți\ ioni}$$

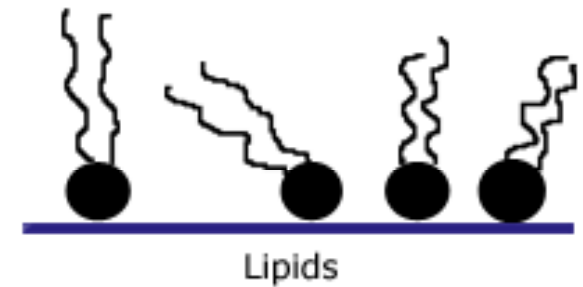
MODELE STRUCTURALE

1. MODELUL GORTER – GRENDEL (1925)



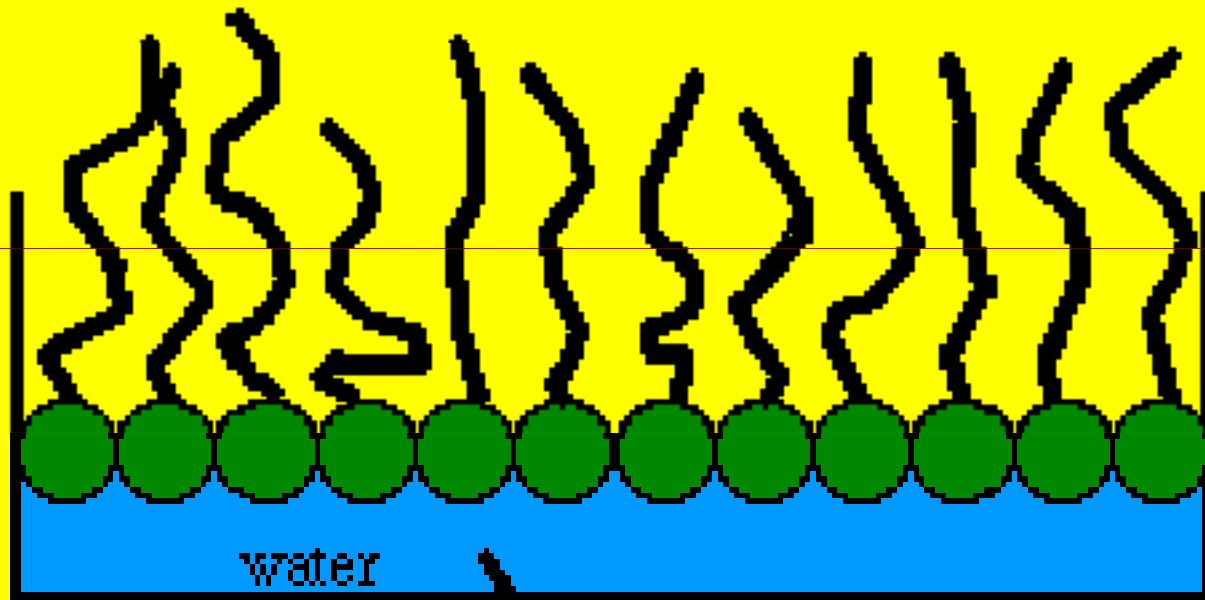
Agnes Pockels

AER



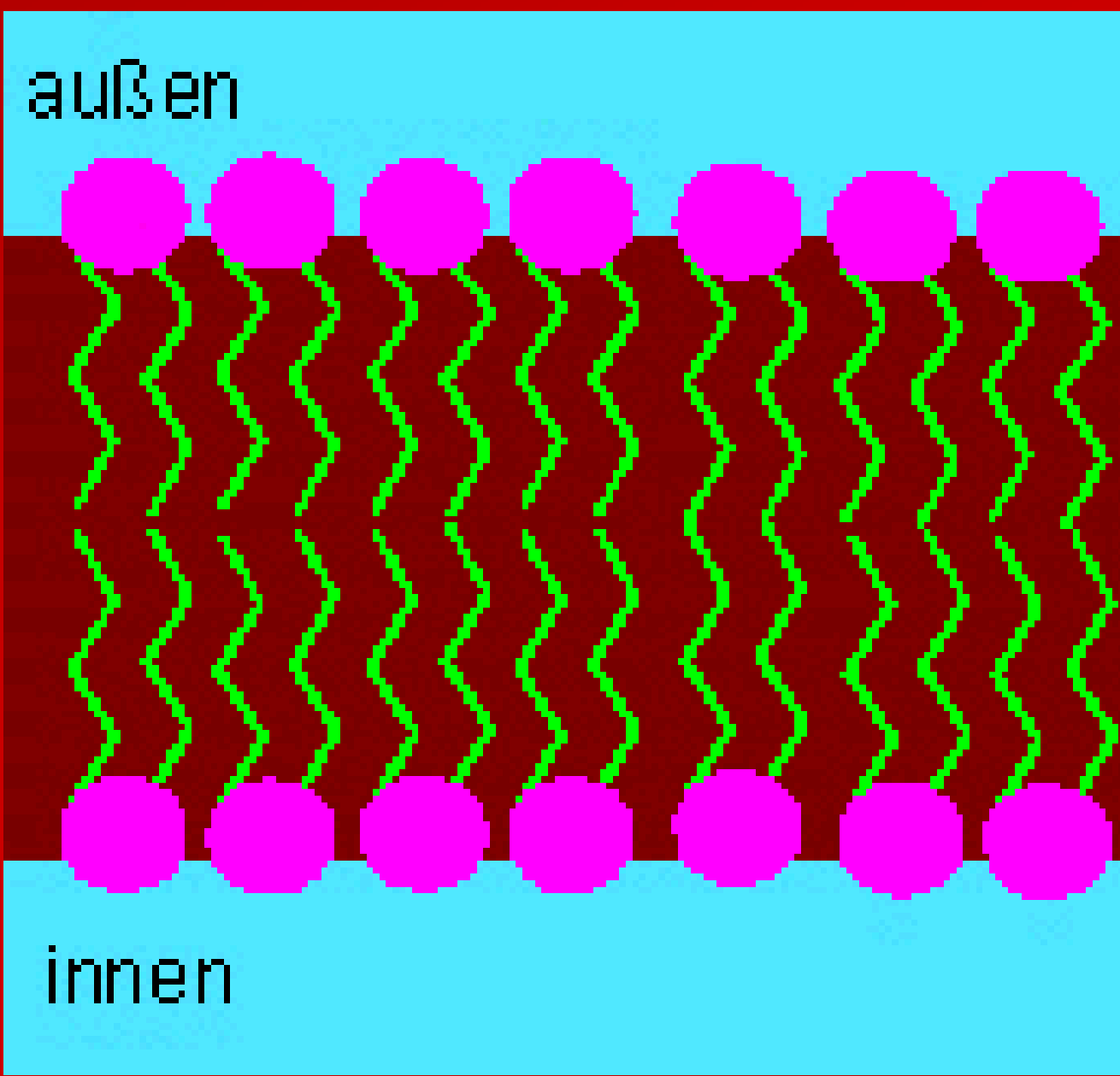
APĂ

aer

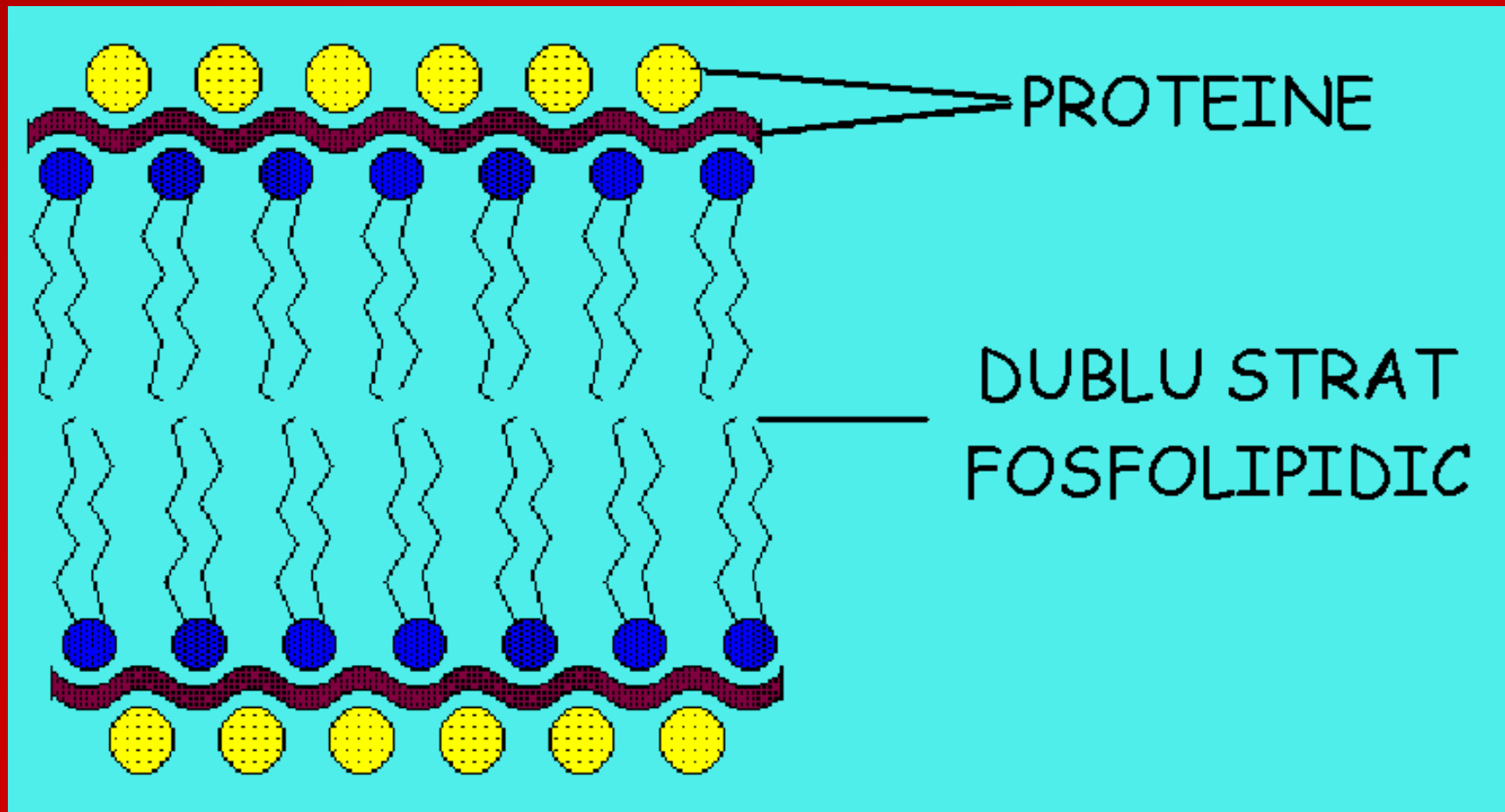


water

apa

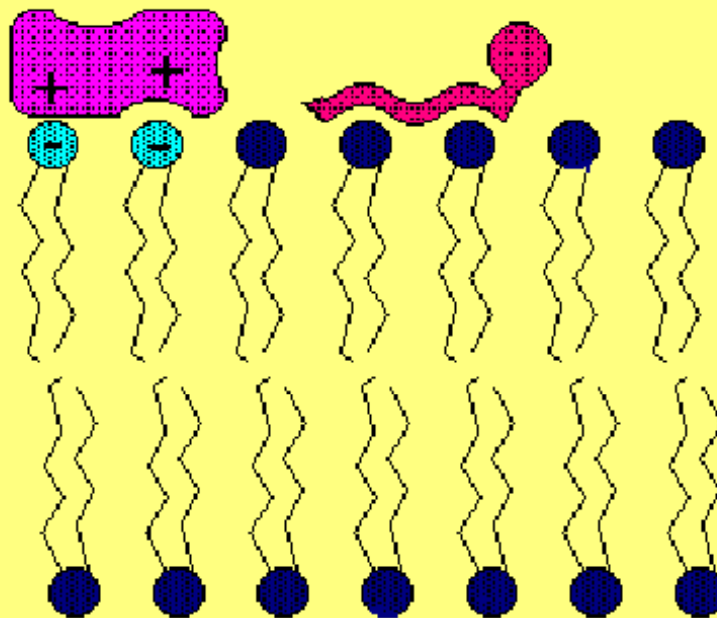


2. MODELUL DANIELLI – DAVSON (1935)



3. MODELUL SINGER – NICHOLSON (1972)

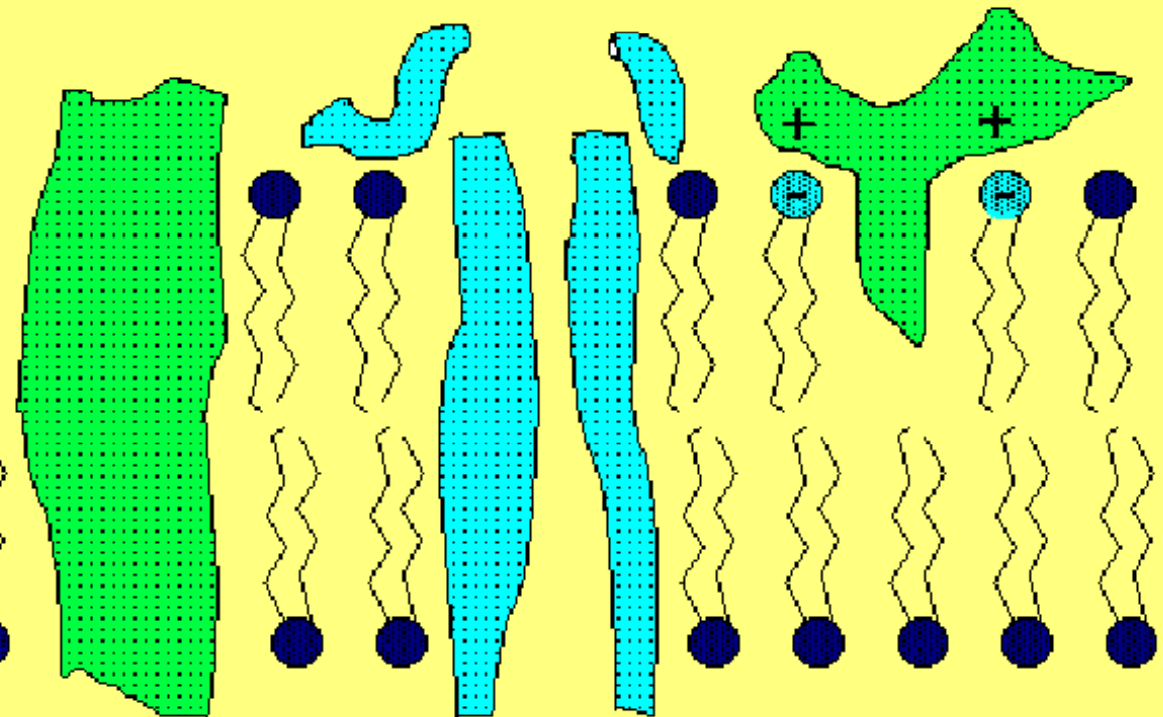
PROTEINE EXTRINSECI



ELECTRO-
STATIC

VAN DER
WAALS

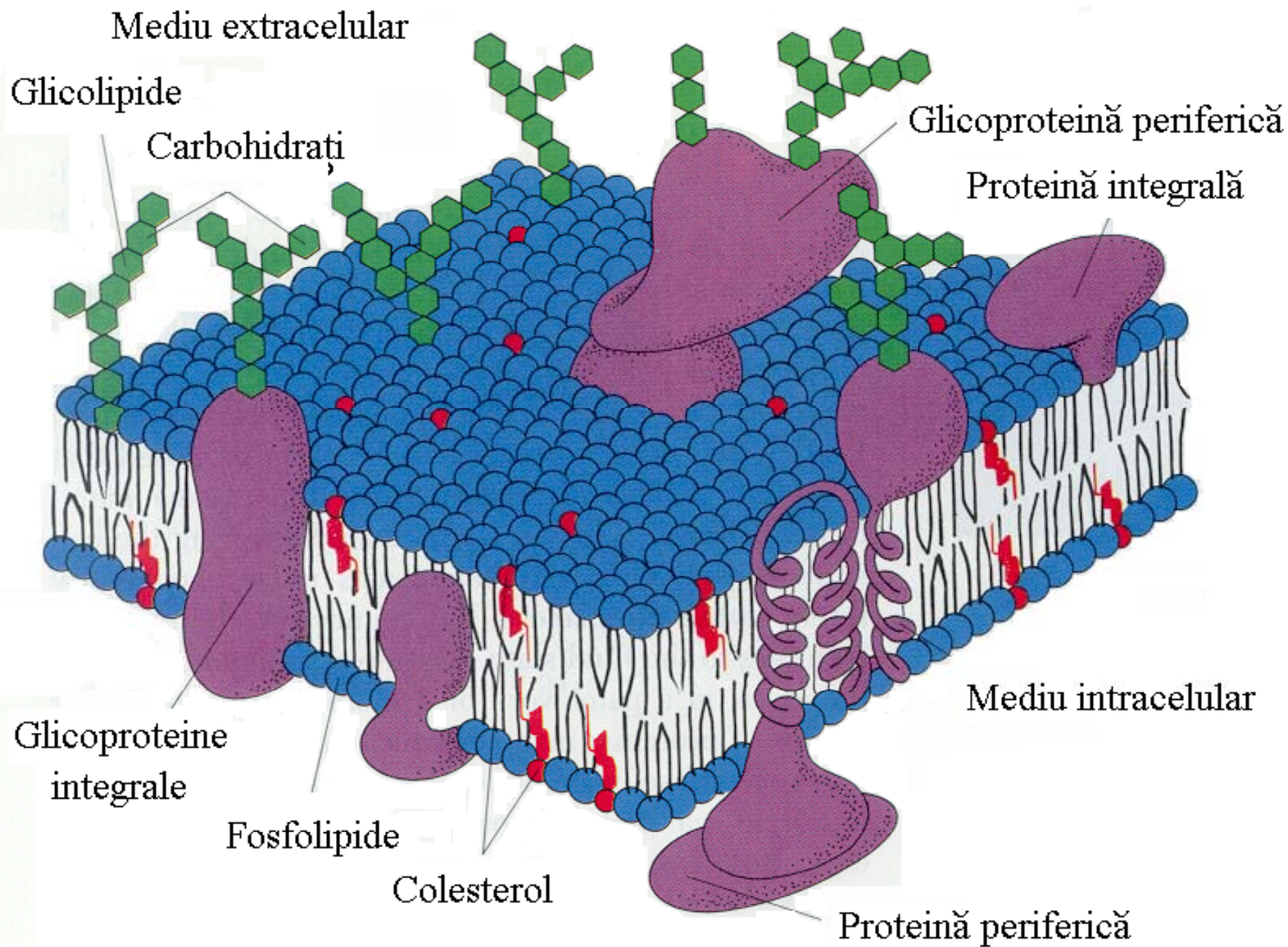
PROTEINE INTRINSECI



HIDROFOB

HIDROFOB SI
HIDROFIL

ELECTROSTATIC SI
HIDROFOB



COMPOZIȚIE:

TIPUL MEMBRANEI	LIPIDE	PROTEINE
➤ MIELINĂ	75%	25%
➤ ERITROCITARĂ	50%	50%
➤ NUCLEARĂ	25%	50%
➤ MITOCONDRIALĂ	25%	50%
➤ ENDOTELIALĂ	33%	67%

LIPIDELE MEMBRANARE

- ROL: Matrice de fixare, $5 \cdot 10^6$ molecule/cm²

- TIPURI:



- FOSFOLIPIDELE: 50 - 80 %

- FOSFATIDIL-COLINA

- FOSFATIDIL-SERINA

- FOSFATIDIL-ETANOLAMINA

- FOSFATIDIL-INOSITOL

- SFINGO-MIELINA

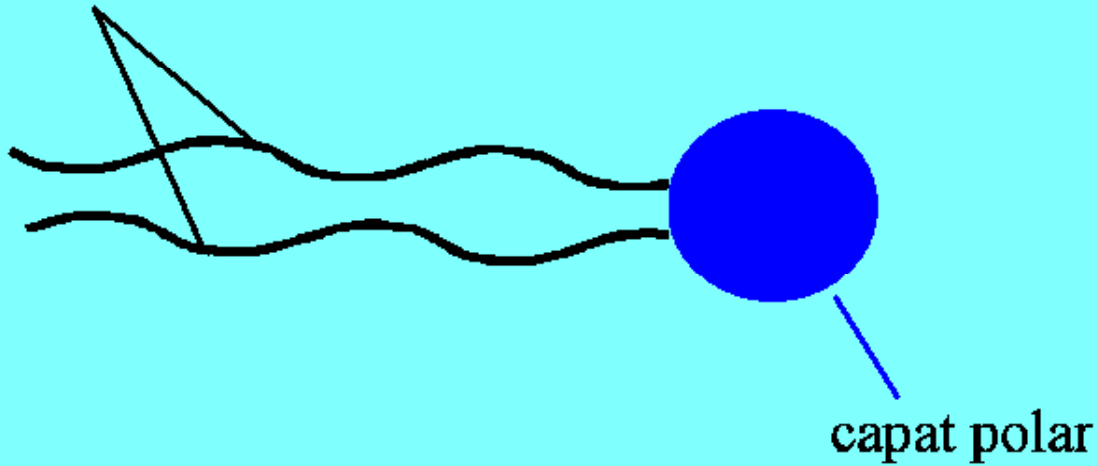


- COLESTEROL: 10 - 30 %



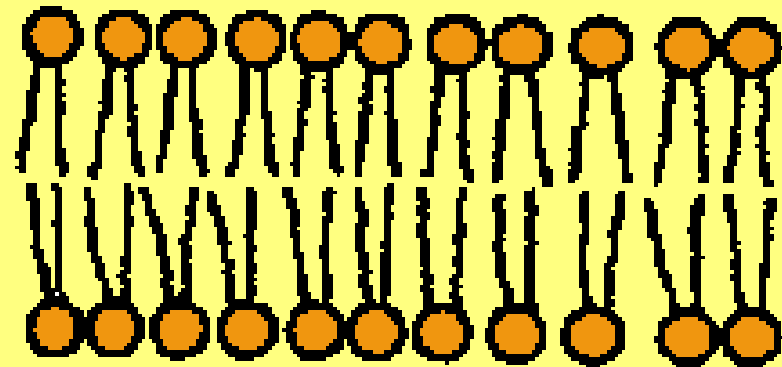
- GLICOLIPIDE: 0 - 12 %

terminatii hidrofobe

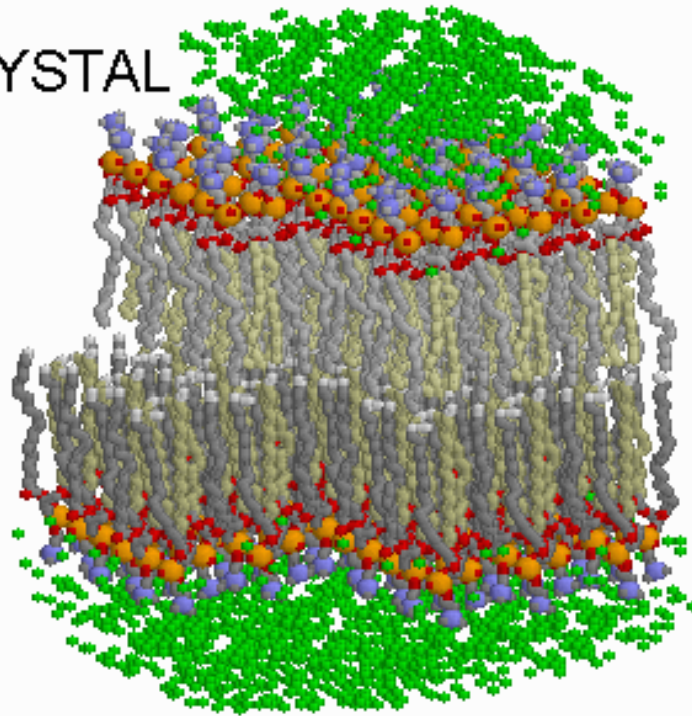


CARACTER
AMFIPATIC

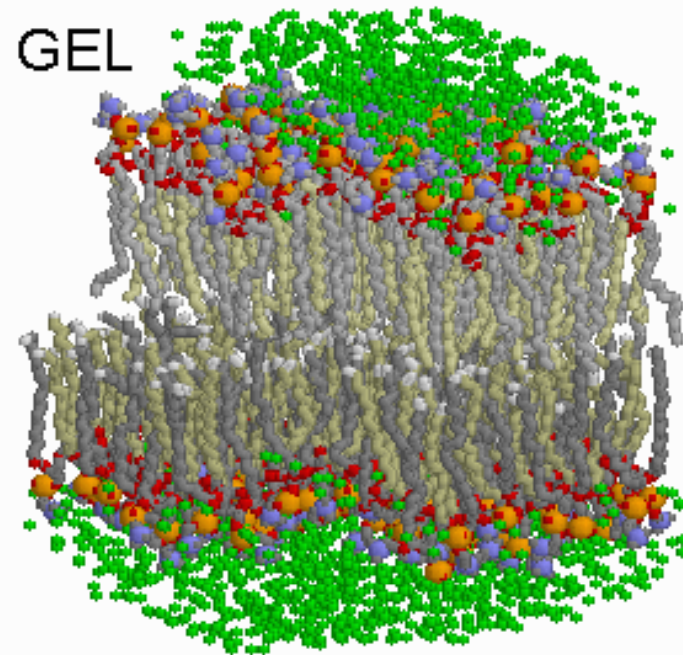
DUBLU STRAT
FOSFOLIPIDIC
(BILAYER)



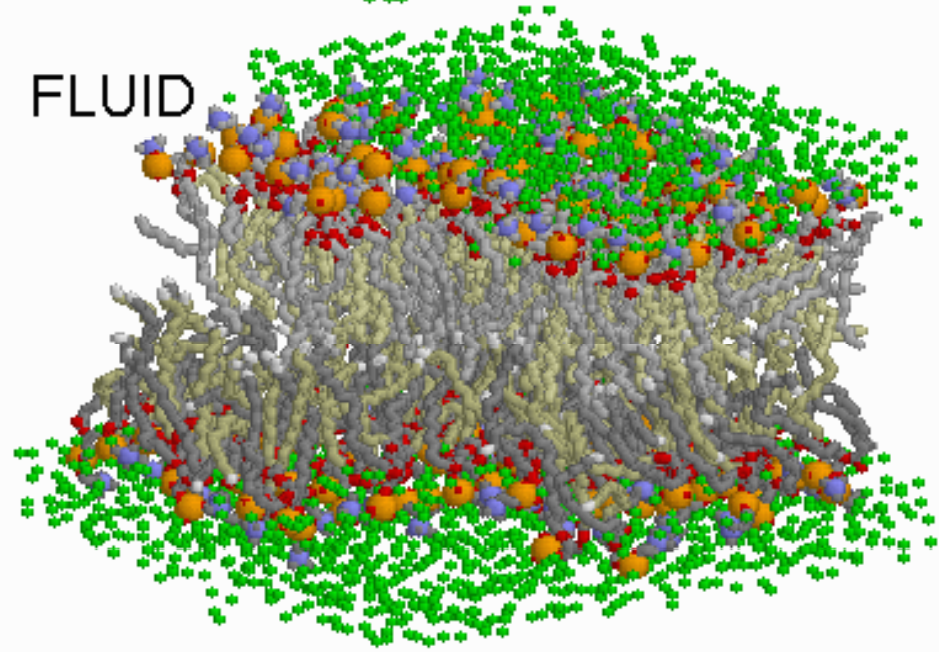
CRYSTAL



GEL



FLUID



Molecular Dynamics Simulation
of Phosphatidyl Choline Bilayer

Carbon/Palmitic Water Oxygens
Nitrogen Oleic Phosphorus
Oxygen

H Heller, M Schaefer, K Schulten,
J Phys Chem 97:8343, 1993.
RasMol Image by E Martz

PROTEINELE MEMBRANARE

- ROL: Funcții specifice: enzime, canale ionice, transportori, receptori

- TIPURI:



EXTRINSECI:

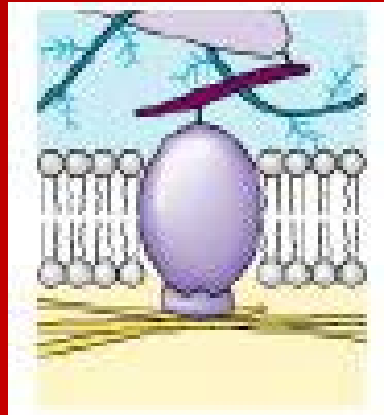
- EXTERNE: enzime, antigene
- INTERNE: suportul citoscheletului



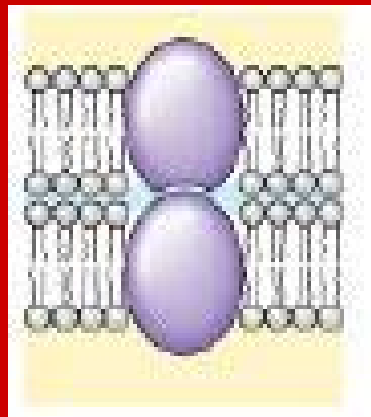
INTRINSECI:

- TIP I - receptori
- TIP II - canale, pompe

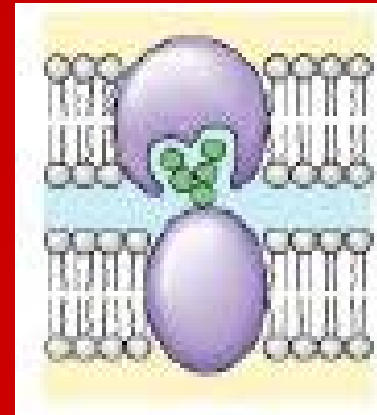
PROTEINE ...



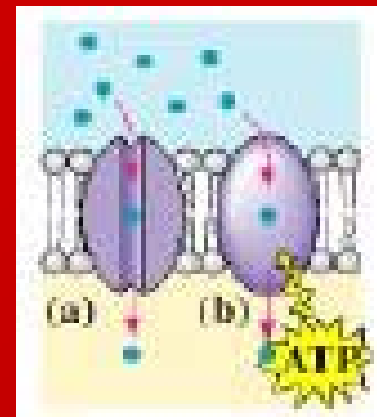
DE ANCORARE



DE ADEZIUNE



DE RECUNOAȘTERE



DE TRANSPORT