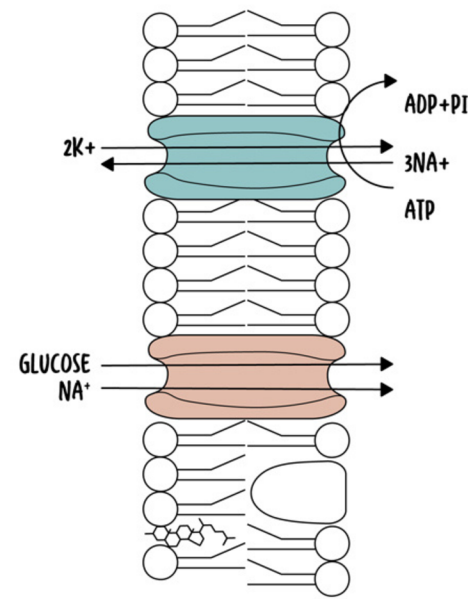
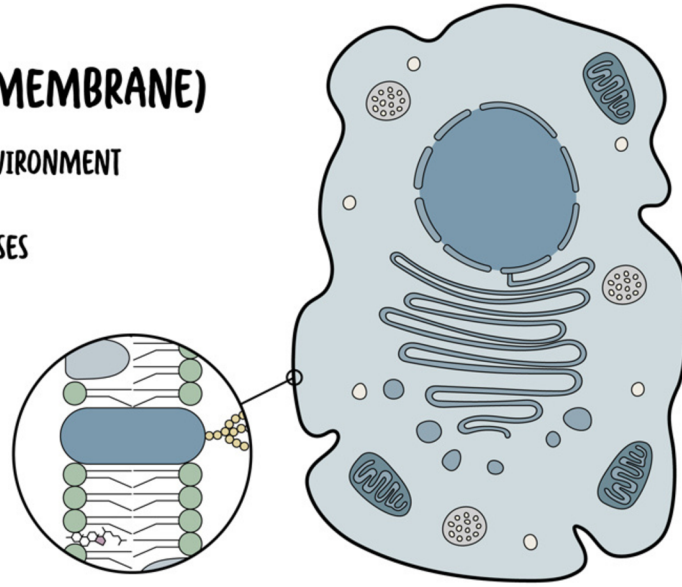


CELL MEMBRANE (PLASMA MEMBRANE)

SEPARATES THE CELL FROM THE EXTERNAL ENVIRONMENT
MAINTAINING CELLULAR INTEGRITY
MEDIATING VARIOUS PHYSIOLOGICAL PROCESSES



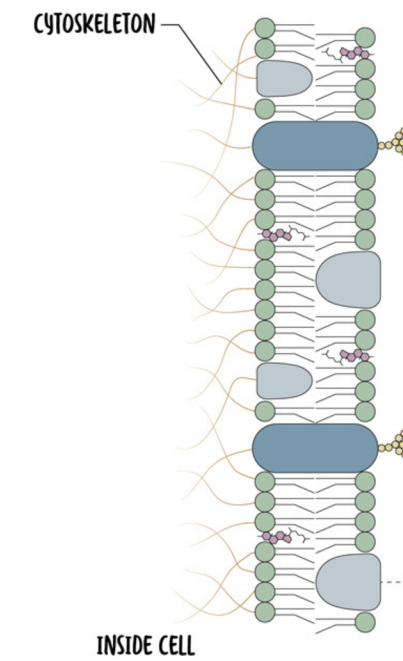
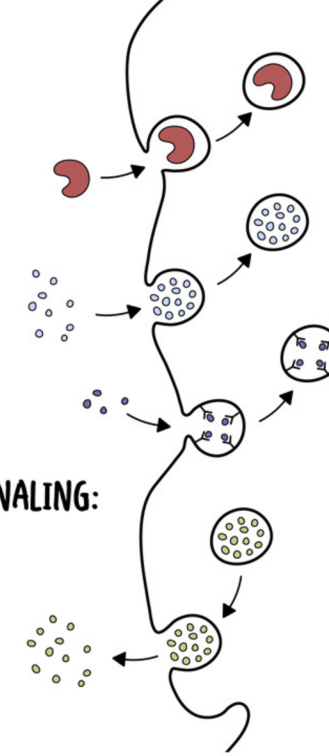
FUNCTION

1. SELECTIVE PERMEABILITY:

ENTRY AND EXIT OF SUBSTANCES
PREVENTING THE LOSS OF VITAL COMPONENTS
PROTECTING FROM HARMFUL SUBSTANCES

2. CELL COMMUNICATION AND SIGNALING:

RECEPTORS FOR SIGNALING MOLECULES
RESPONDING TO EXTERNAL STIMULI
COMMUNICATE WITH OTHER CELLS



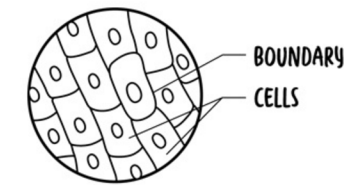
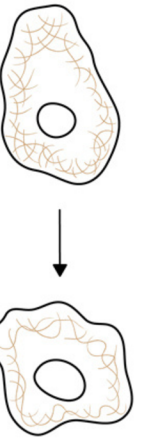
FUNCTION

3. STRUCTURAL SUPPORT, CELL SHAPE:

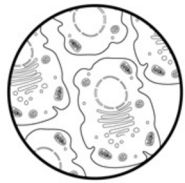
MAINTAINS THE CELL'S SHAPE
ATTACHMENT SITES FOR THE CYTOSKELETON
MAINTAINING STRUCTURAL INTEGRITY
FACILITATING CELLULAR MOVEMENT

4. CELL ADHESION AND INTERACTION:

THE MEMBRANE PROTEINS AND GLYCOCALYX MEDIATE
CELL-CELL AND CELL-MATRIX INTERACTIONS



LIGHT MICROSCOPY

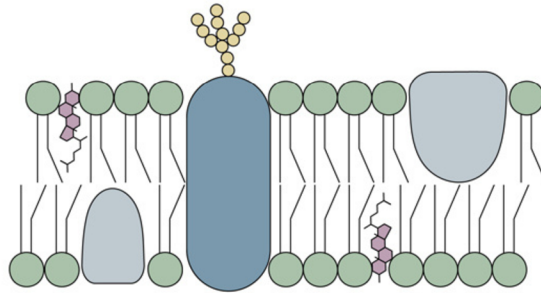


ELECTRON MICROSCOPY
(20TH CENTURY)

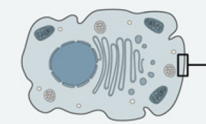
HISTORY

FLUID MOSAIC MODEL
(SINGER AND NICOLSON, 1972)

CELL MEMBRANE - FLUID, DYNAMIC BILAYER
COMPOSED OF LIPIDS AND PROTEINS



MOLECULAR BIOLOGY AND BIOPHYSICS
MEMBRANE'S COMPLEX ARCHITECTURE AND FUNCTIONS



STRUCTURE AND COMPOSITION

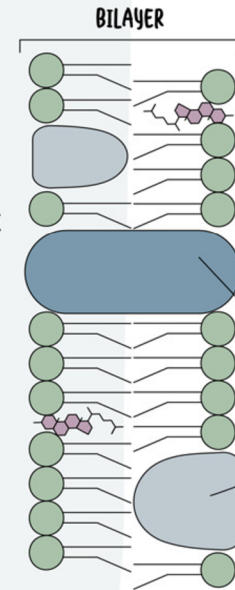
LIPID BILAYER:

1. PHOSPHOLIPIDS
MOST ABUNDANT LIPIDS IN THE MEMBRANE

HYDROPHILIC (WATER-ATTRACTING) HEAD
HYDROPHOBIC (WATER-REPELLING) TAILS

2. CHOLESTEROL
FLUIDITY AND STABILITY

INTRACELLULAR



CARBOHYDRATES:

GLYCOPROTEINS AND GLYCOLIPIDS
FORM THE GLYCOCALYX
CELL RECOGNITION, PROTECTION, INTERACTION WITH THE ENVIRONMENT

PROTEINS:

INTEGRAL (INTRINSIC) PROTEINS
TRANSPORT, SIGNALING, AND CELL ADHESION

PERIPHERAL (EXTRINSIC) PROTEINS
SIGNALING AND MAINTAINING THE CELL'S SHAPE

EXTRACELLULAR

PASSIVE TRANSPORT

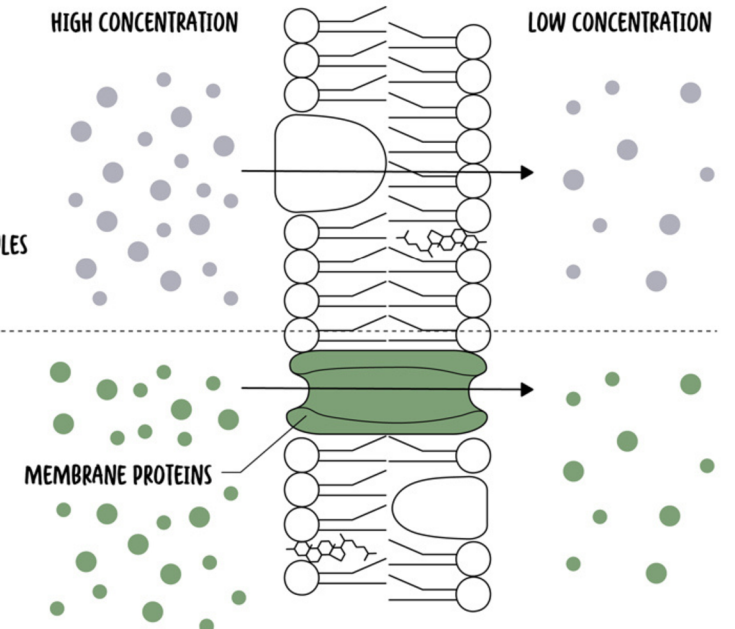
REQUIRES NO ENERGY

SIMPLE DIFFUSION

- I. DIFFUSION
- II. SIMPLE DIFFUSION: SMALL, NONPOLAR MOLECULES

FACILITATED DIFFUSION

- I. REQUIRES A TRANSPORT CHANNEL
- II. LARGER OR POLAR MOLECULES



ACTIVE TRANSPORT

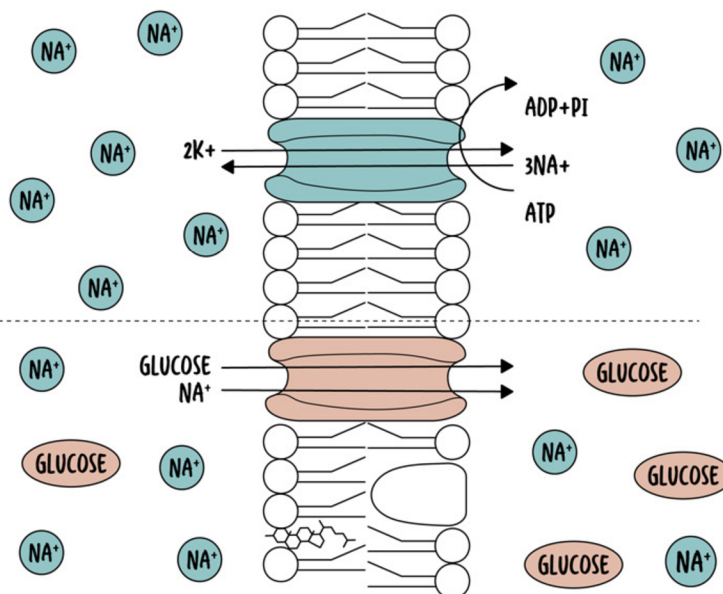
REQUIRES ENERGY (A FOR ATP)

PRIMARY ACTIVE TRANSPORT:

DIRECT USE OF ATP TO TRANSPORT MOLECULES
AGAINST THEIR CONCENTRATION GRADIENT
VIA PUMP PROTEINS (E.G., SODIUM-POTASSIUM PUMP)

SECONDARY ACTIVE TRANSPORT:

ELECTROCHEMICAL GRADIENT CREATED BY
PRIMARY ACTIVE TRANSPORT TO MOVE OTHER
SUBSTANCES AGAINST THEIR CONCENTRATION GRADIENT
(E.G., SODIUM-GLUCOSE CO-TRANSPORT)



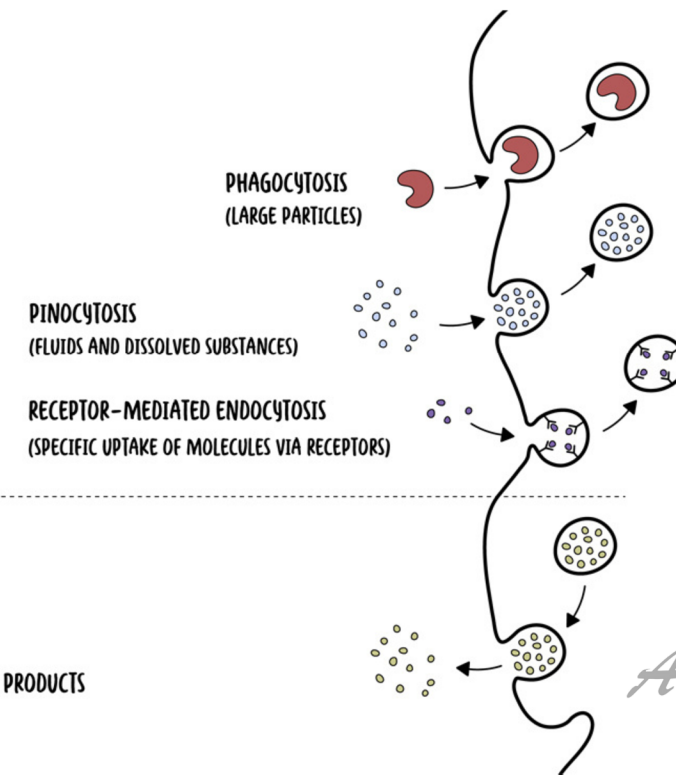
VESICULAR TRANSPORT

ENDOCYTOSIS:

CELLS ENGULF EXTERNAL SUBSTANCES WITHIN
VESICLES FORMED FROM THE PLASMA MEMBRANE

EXOCYTOSIS:

VESICLES FUSING WITH THE PLASMA MEMBRANE
TO RELEASE THEIR CONTENTS OUTSIDE THE CELL
SECRETION OF HORMONES, NEUROTRANSMITTERS, AND WASTE PRODUCTS



TYPES OF CELL MEMBRANES

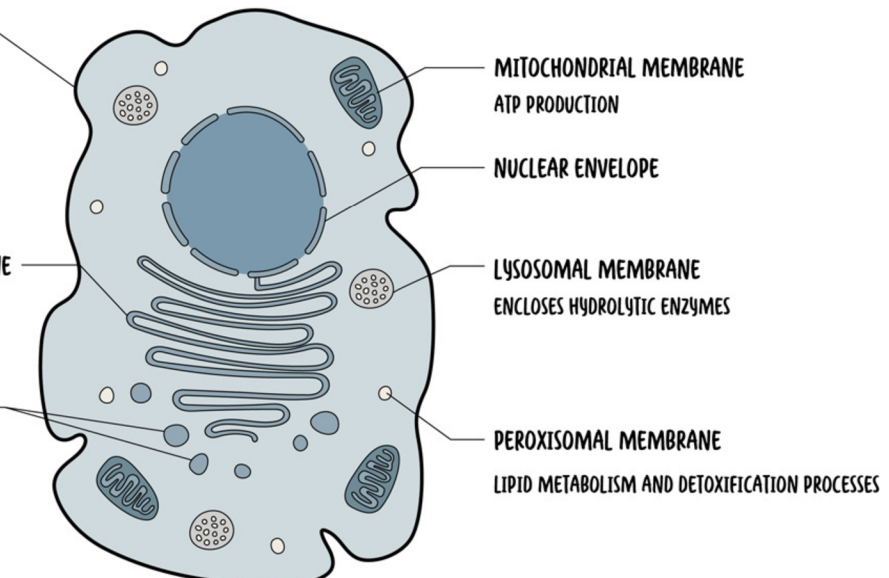
1. PLASMA MEMBRANE

REGULATING INTERACTIONS WITH
THE EXTERNAL ENVIRONMENT

2. ORGANELLE MEMBRANES:

ENDOPLASMIC RETICULUM (ER) MEMBRANE
INVOLVED IN PROTEIN AND LIPID SYNTHESIS

GOLGI APPARATUS MEMBRANE
MODIFY, SORT, PACKAGE PROTEINS AND LIPIDS



Armando H. Faigl