

Cell Biology

Active Transport

Learning Outcomes, page 15

- **Active transport is the movement of molecules (ions like sodium and potassium) across the cell membrane from a low to a high concentration (against the concentration gradient).**
- **Active transport is carried out by membrane proteins.**
- **Active transport requires energy.**
- **Temperature, availability of oxygen and concentration of glucose affect the rate of active transport.**
- **Examples of active transport are:**
 - a) sodium and potassium in nerve cells;**
 - b) iodine in seaweed.**

Active transport



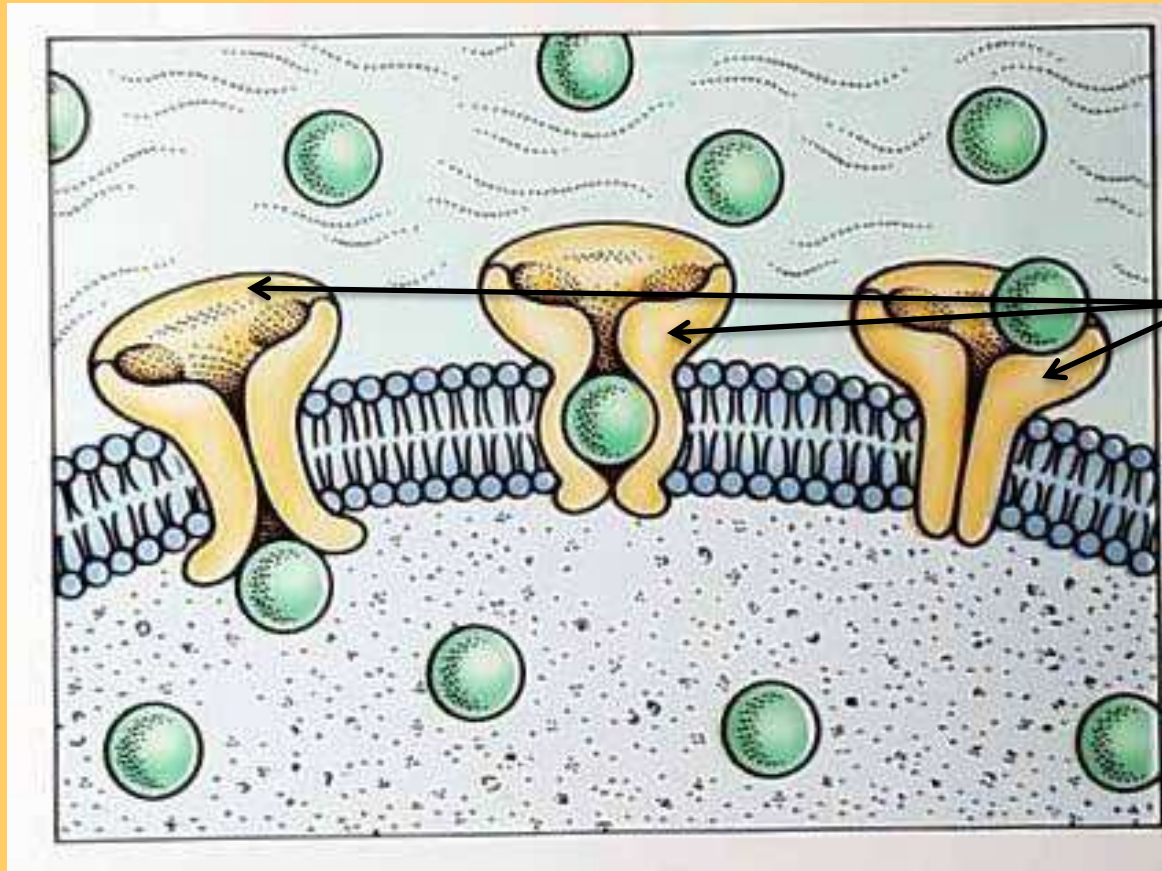
Against the current

Passive transport



Along with the current

Membrane Carrier Proteins

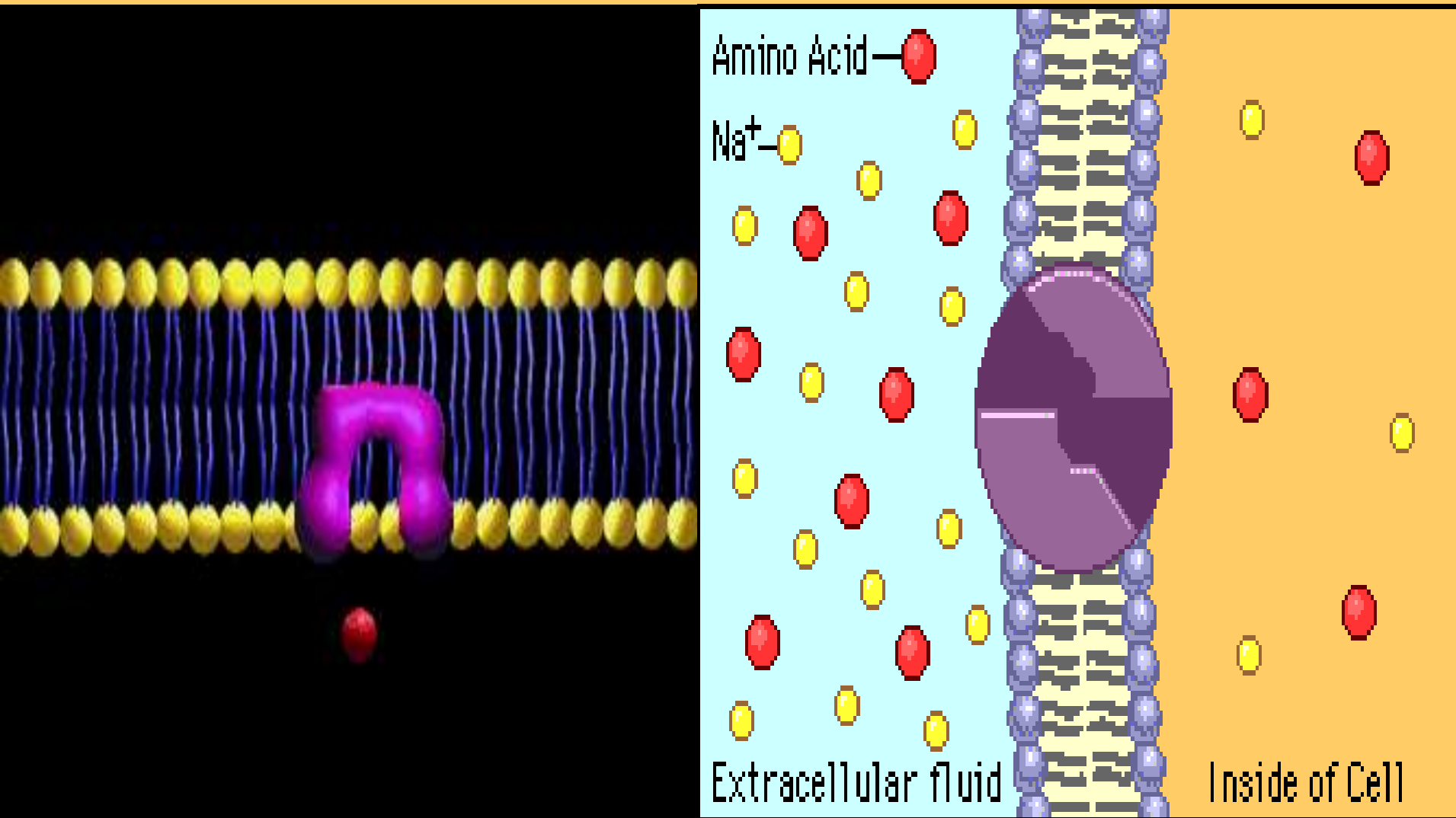


Carrier protein

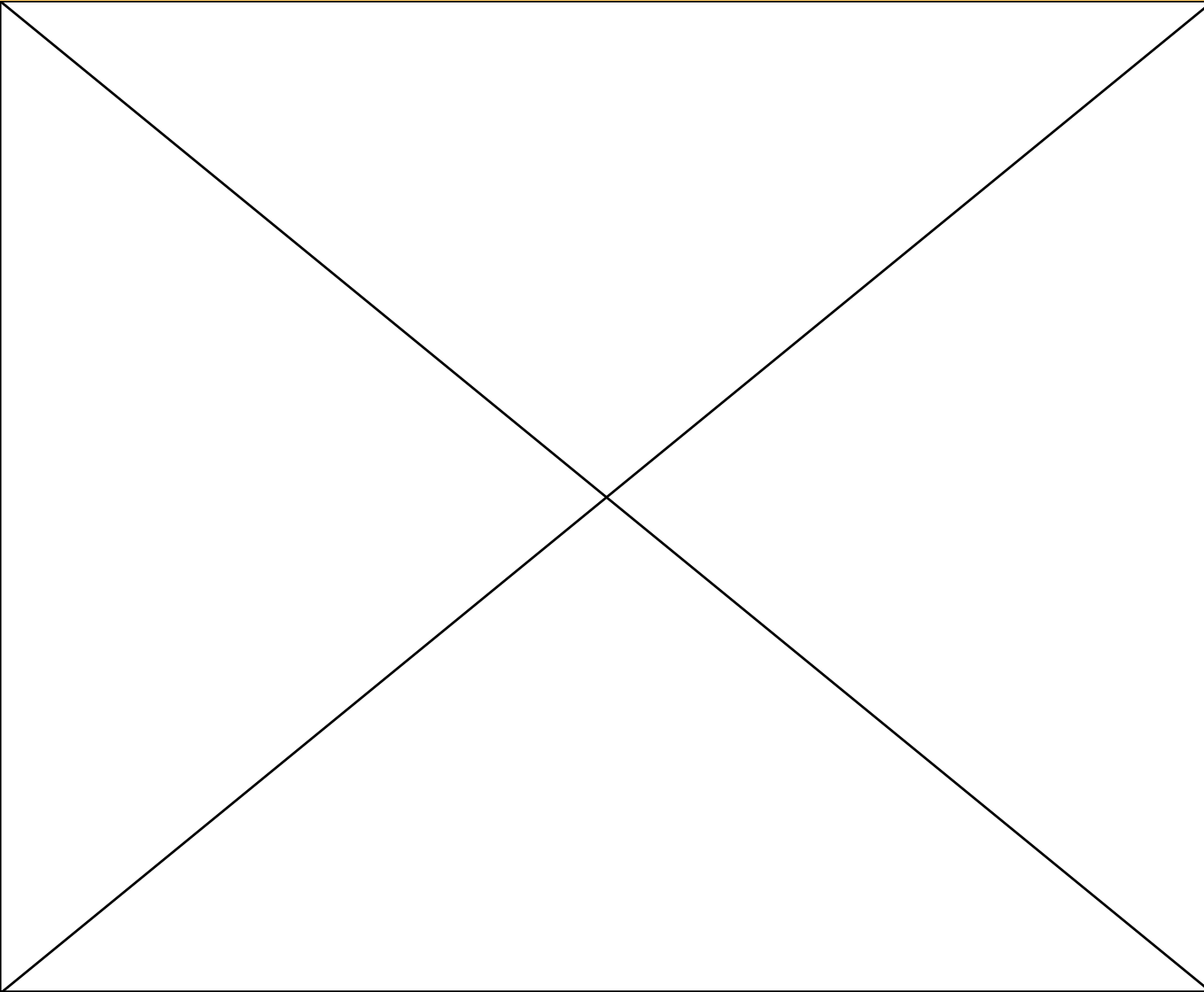
Transport AGAINST a concentration gradient.

Energy is required to carry the ions across the membrane.

These are carrier proteins. They bond and drag molecules through the phospholipid membrane and release them on the opposite side.



A Dual Role (Sodium/Potassium pump)



- The same carrier protein actively pumps sodium(**Na**) ions **out of** the cell and potassium(**K**) ions **into** the cell.

Conditions required for Active Transport

- Temperature
- Availability of respiratory substrate (e.g. glucose)
- Availability of oxygen (for aerobic respiration to provide the energy required)

Activity

Copy the diagram and follow
the instruction on
page 16

Extra Questions

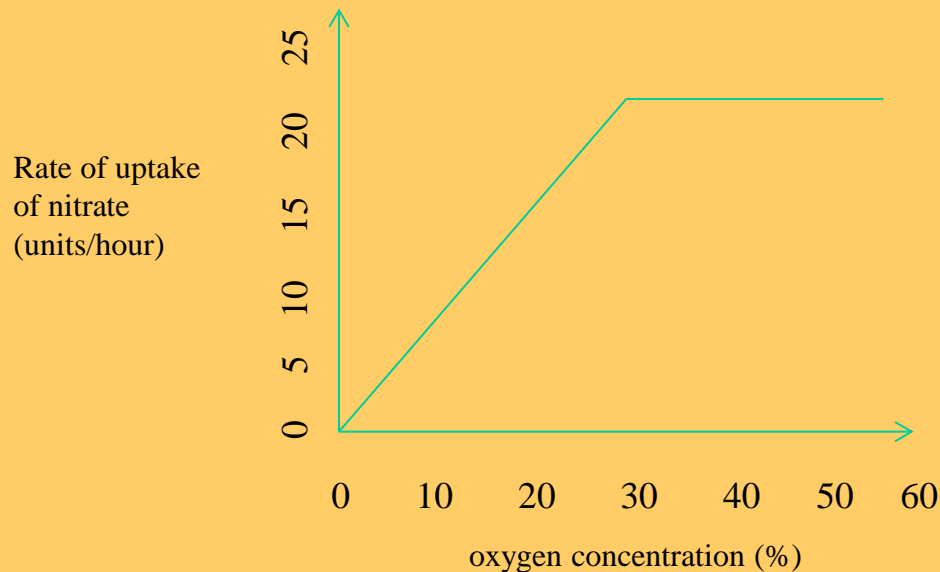
1. The table below shows the results of an experiment carried out to analyse the concentrations of potassium and sodium found in sea water and in the sap of cells of seaweed.

liquid	concentration (units)	
	potassium	sodium
seawater	0.02	0.59
cell sap	0.56	0.03

Write a conclusion for the experiment assuming that active transport is taking place.

Extra Questions

2. The graph shows the effect of oxygen concentration on the rate of uptake of nitrate ions by barley roots.



- Why does oxygen concentration affect the rate of uptake of nitrate from 0 to 30%?
- Suggest a reason why the rate of uptake levels off at oxygen concentrations greater than 30%.