Water balance

An introduction to

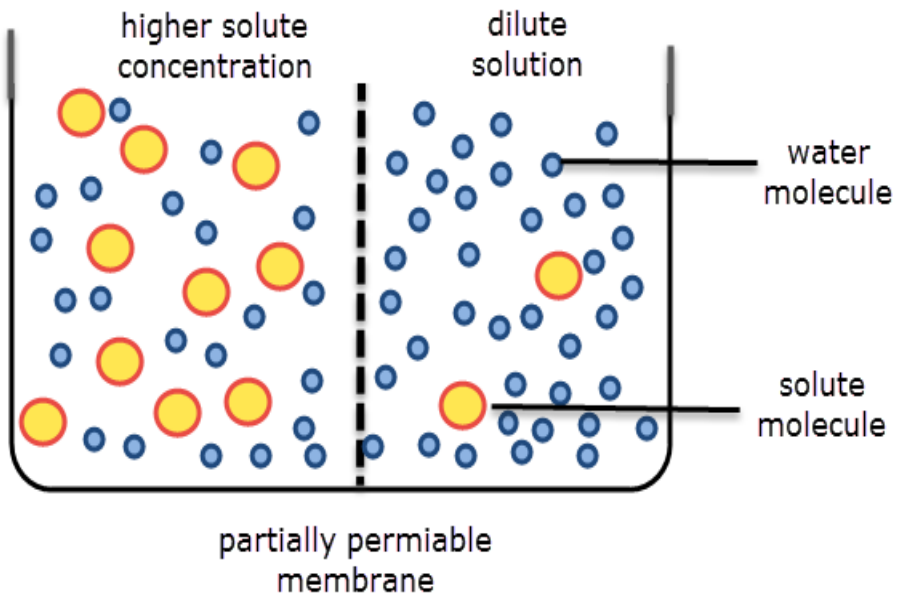
- Osmosis
- Osmoconformers
- Osmoregulators

Osmosis

The movement of water from a dilute solution to a more concentrated solution through a partially permeable membrane. (p.p.m.)

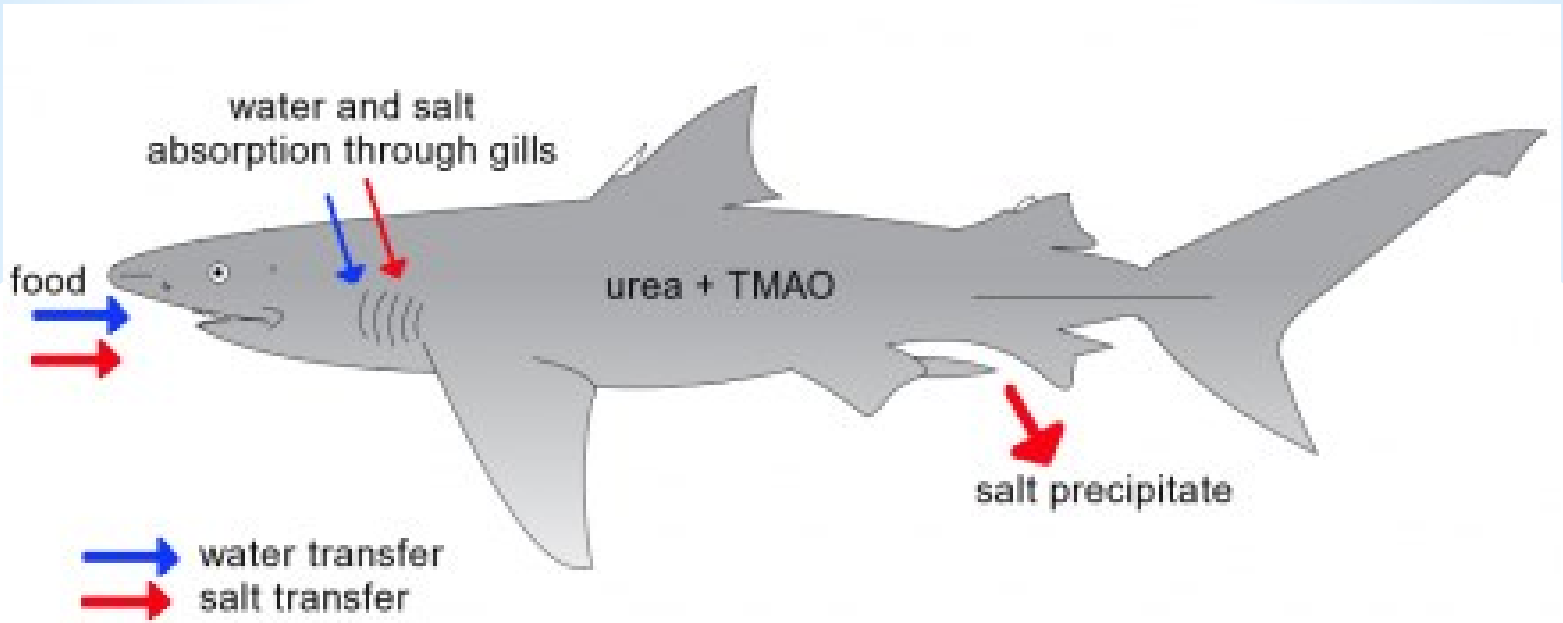
The movement of water from a solution with a lower solute concentration to a solution with a higher solute concentration, through a p.p.m.

Osmosis step by step



1) Water molecules can diffuse through the p.p.m. in both directions
2) There are more water molecules in the dilute solution
3) Solute molecules can't pass through the p.p.m.
4) More water molecules move from the dilute solution to the higher solute concentration.
5) The amount of water increases in the higher solute concentration
6) There is a net loss of water from the dilute solution

Osmoconformers



Osmoconformers keep the osmotic potential of their bodies the same as their sea water environment.

Often this involves taking in ions (salts) but sharks also accumulate high levels of urea which increases the concentration of solutes in their body.

Shark osmoregulation (By Chris_huh (Own work) [Public domain], via Wikimedia Commons)

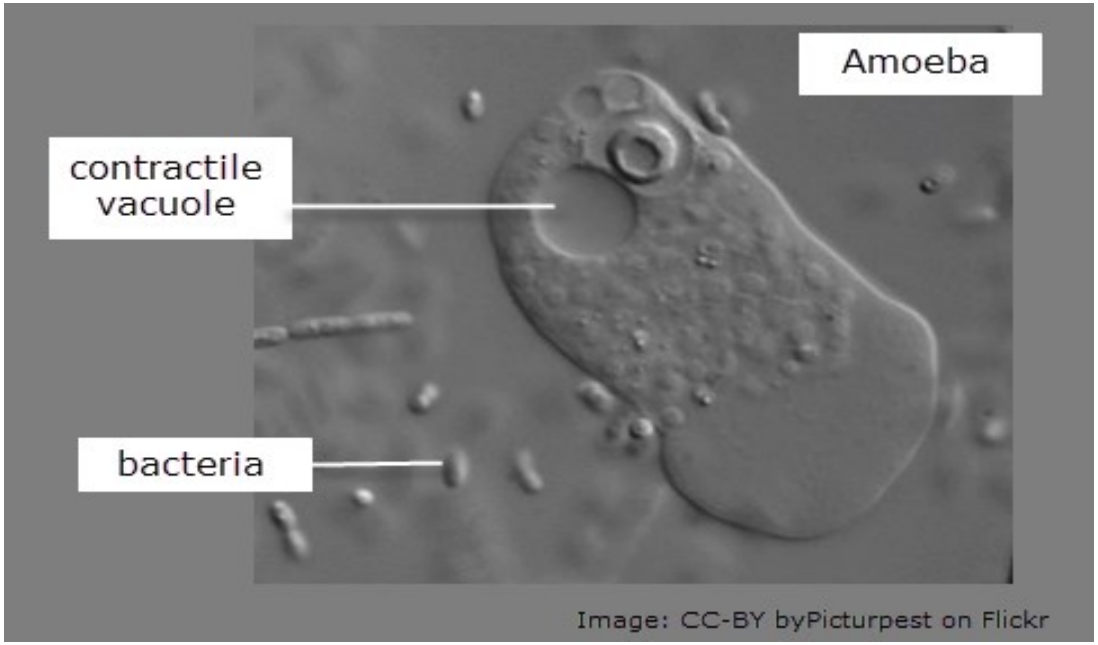
Marine invertebrates

Marine invertebrates are often osmoconformers.

They keep the solute concentration of their body tissues the same as the sea water they live in.

Single celled Osmoregulators

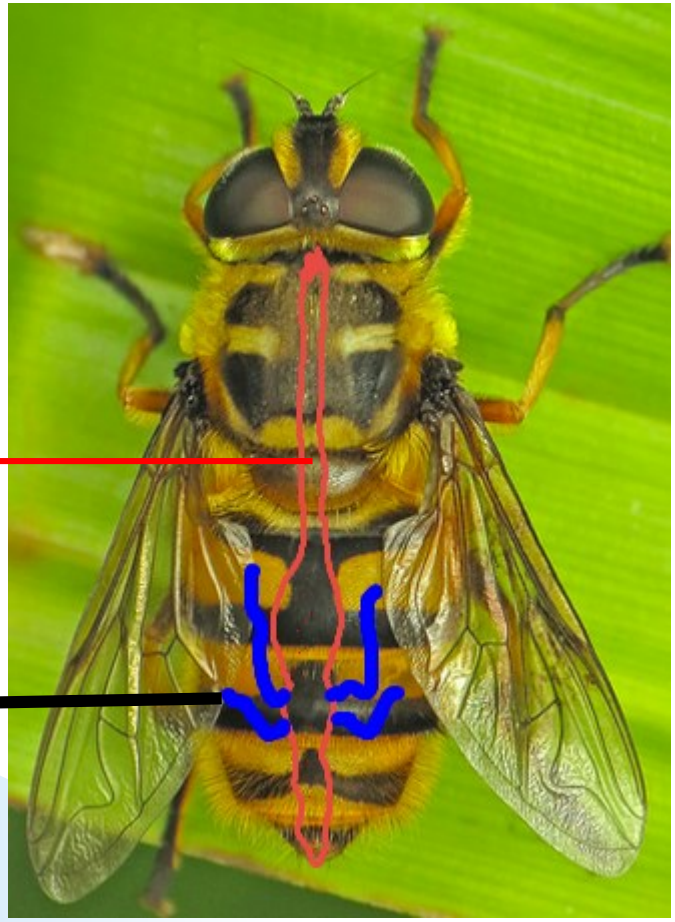
Amoeba lives in fresh water – it's cytoplasm has a high solute concentration compared to its 'dilute' watery habitat. Water is constantly entering it's body by osmosis.

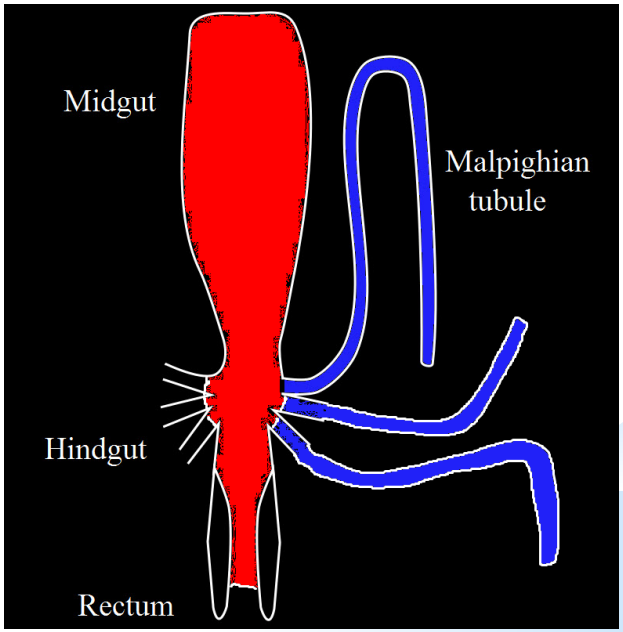


It regulates it's water content using a contractile vacuole. This organelle contracts and expels water out of the cell. The mechanism of contraction is still a mystery.

Insects are osmoreglators

Insects have special **malpighian tubules** to control water balance. They also excrete nitrogenous waste.





Mammals have kidneys

The kidney

- excretes urea and
- controls the balance of water and salt