

Osmoregulation

Introduction:

Osmoregulation is a dynamic body fluid process where animals maintain a suitable internal by regulating ~~water~~ movement of water and ions with the body fluid and the external medium.

Osmoregulation is a typical example for homeostasis. It is a adaptation.

Claude Bernard started that constancy of internal medium is essential for an independent life.

The term osmoregulation was coined by Haber in 1902.

Mechanism of Osmoregulation:-

Osmoregulation is an energy consuming process.

It is under the control of the animal.

As long as an animal remains alive, osmoregulation goes on.

Once it dies osmoregulation stops.

Animals live in a variety of environments.

They live in freshwater, seawater or on land.

There are different mechanisms in different animals for osmoregulation.

They carry out one or more of the following mechanisms for osmoregulation.

Removal of Excess Water:

In the case of freshwater animals, the body is fluid is hypertonic and the freshwater is hypotonic.

Hence exhalation occurs.

The freshwater animals have the

following adaptations to deal with the excess of water entering the body.

Amoeba removes the excess of water by Contractile Vacuole.

Crustaceans remove the excess of water by the green glands.

Coeloda viva, a platyhelminth stores the water in a special kind of cells called Palisade Parenchyma.

Fresh water fishes remove the excess of water by the glomerular kidney.

Compensation of Salt loss:-

When freshwater animals expel the excess of water, some amount of salt from the body is also lost.

This loss of salt is made good by the following methods:

① Crustaceans and freshwater fishes have special kind of cells in the gills. They are called chloride cells. They absorb salt from the freshwater and add to the body fluid.

② The kidney of freshwater fishes reabsorb some salts from the urine.

Compensation of Water loss:-

In case of marine animals, the body fluid is hypotonic and the sea water is hypertonic.

Hence osmosis occurs in marine animals. As a result the marine animals are dehydrated.

The loss of water is compensated by drinking sea water and by getting water from marine food.

The land animals are dehydrated by evaporation.

Removal of Excess of Salts:-

When the marine animals drink seawater to compensate their water loss, the salt content of the body increase.

The excess of salt is removed from the body by any one of the following methods.

(1) The marine fishes have chloride secretory cells in their gills.

(2) They secrete out the excess of salts present in the body fluid.

(3) In the case of marine turtles and marine birds salt glands secrete out the excess of salt.

Osmoregulation in Parotizon:-

Amoeba Vermucosa:-

A fresh water form, is cultured in increasing concentrations of seawater. The pulsation of the contractile vacuoles slows down and no vacuole is seen when the animal is in 50% seawater.

This is because when the concentration of external medium increases, the state of endosmosis decreases.

When the concentration of the external medium decrease, endosmosis occurs rapidly.

Crangon ulva:-

It is a marine polychaete. It lives near river mouths.

During high tides and during heavy inflow of freshwater the animal is forced to live in dilute seawater.

The excess of water entering the body is stored in special kind of cells called palisade parenchyma cells.