Practical Animal physiology
Lab. 1
(4th Grade)

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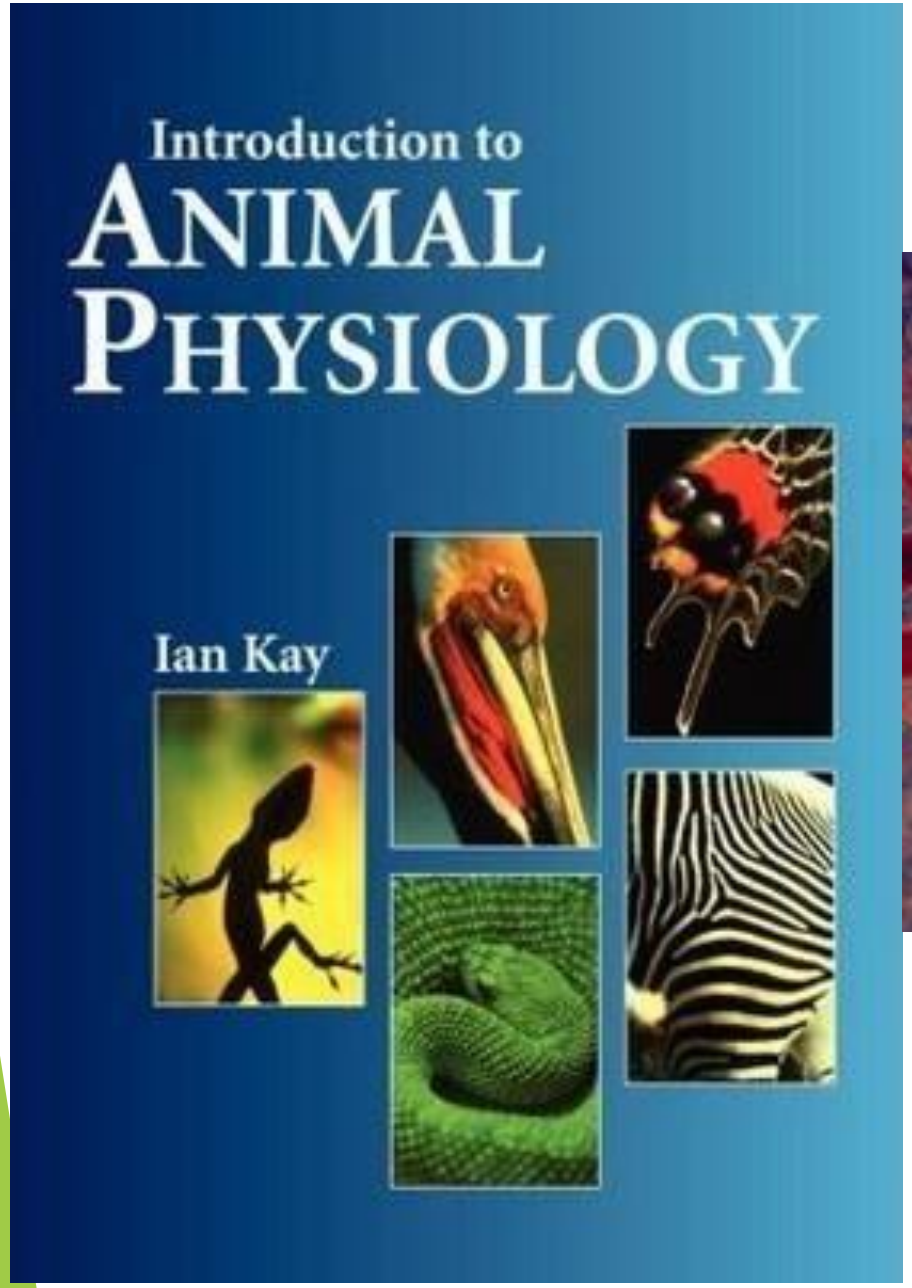
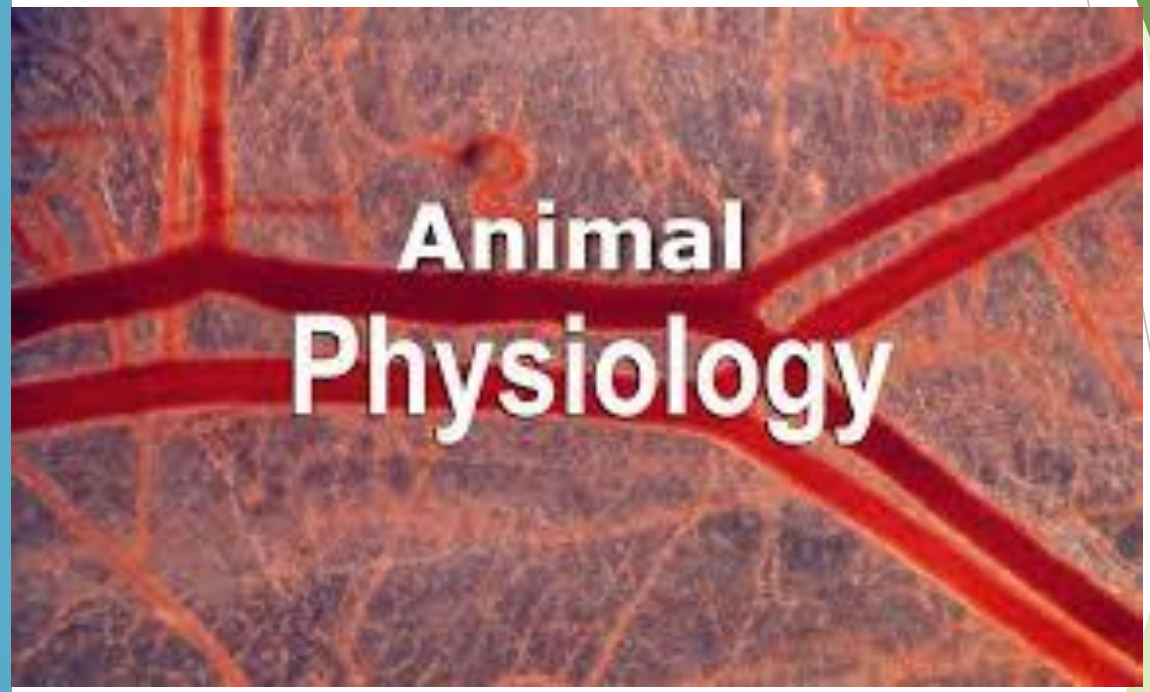

Introduction to
ANIMAL
PHYSIOLOGY
Ian Kay


Animal
Physiology

- What is animal physiology ?!
- Why do we study animal physiology?!
- Who is an animal physiologist?
- What is Homeostasis?!

Introduction:

is the scientific study of the life-supporting properties, functions and processes of **animals** or their parts. The discipline covers key homeostatic processes, such as the regulation of temperature, blood flow and hormones.

Why do we study animal physiology ?!

In order to be more familiar and go deeply inside the study of the internal physical and chemical functions of **animals**. Professionals in this field may explore the makeup of **animals**, including their genetics, their behaviors and their biological structure.

Who is an animal physiologist?

*An animal physiologist is a person who **studies** how animals function.*

Physiology

- **The study of the function of living organisms:**
- Whole organisms
- organ systems
- organs
- Tissue
- cells

Tissues:

1-epithelial

- Covering of organs and organ system.
- No space between cells.
- Normally tight junctions connect cells together.
- Act as barrier protections.

2- connective

- Support other tissues and hold them together.
- Connectively come from ECM.
- Cells excrete the components from ECM.
- Loose connective –binds.

- Fibrous- Tendons(muscle to bone) and ligaments (bone to bone).
- Cartilage –flexible structural support.
- Bone-strong structural support.
- Blood-plasma make it connective

3-Nervous Tissue

- Make of neuron
- Sense and transmit signals.

4-mouscle

- Strong like bull
- Use a lot of energy.
- Three type skeletal ,cardiac and smooth.

Organs:

- A group of tissue working together for the same function.

Organ system:

- Carry out the main functions of living systems.
- Must work together with other system.

Organ systems:

- Digestive : getting the most out of your food.
- Circulatory: moving stuff is the first job.
- Respiratory : gas exchange.
- Immune : protecting your body.
- Excretory : get ride of waste products.
- Endocrine: better communications through chemicals.

- Reproductive: for reproduction
- Nervous : transmit signals through it.
- Integumentary: your bodies first defense
- Skeletal: supporting your body.
- Muscular: for moving .

Homeostasis:

- Most organ systems work together to maintain homeostasis.
- **Homeostasis :maintaining the consistent internal environment.**
- Examples :
  - Body temperature.
  - Hormonal balancing .
  - Ph stabilization.
  - Solute stabilization.
- Three parts to controlling homeostasis:

1-A receptor-detects changes.

2-A control center (In many cases your brain).

3-An effector-cause needed changes.

- Is normally controlled through negative feedback.
- Response the signal is to reverse the trend (back to a set point).
- There are few cases of positive feedback.
- Pressure of baby on uterus increase contraction.

Thermoregulation:

-Two ways:

- **Endothermic (us):**
- Generate their own body heat to maintain their body internal temperature.
- High energy requirements.
- **Ectothermic:**
- Temperature matches outside.
- Less energy is needed , but can not maintain a lot of activity.

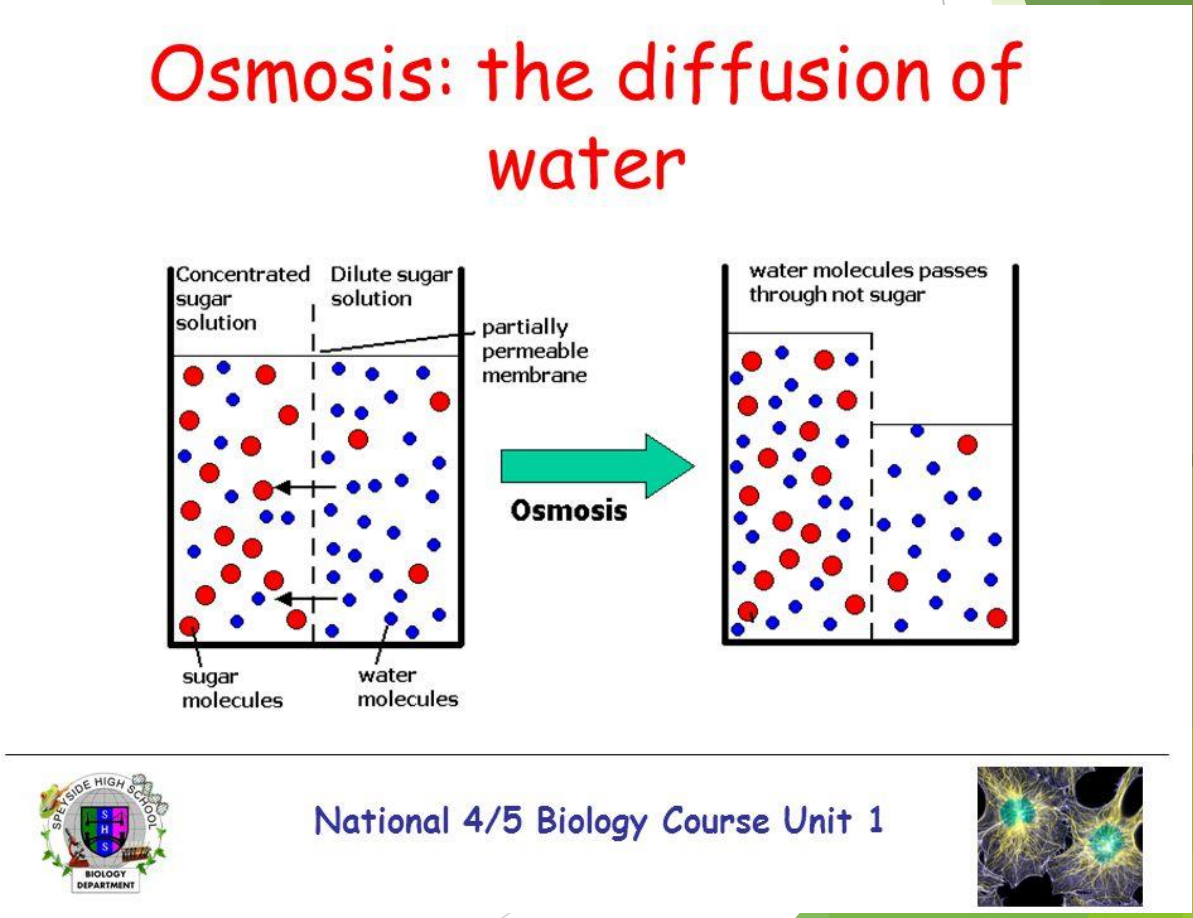
Osmosis and Diffusion

- Cells must move materials through membranes and throughout cytoplasm in order to maintain homeostasis. The movement is regulated because cellular membranes, including the plasma and organelle membranes, are selectively permeable. Membranes are phospholipid bilayers containing embedded proteins. The phospholipid fatty acids limit the movement of water because of their hydrophobic characteristics.

- The cellular environment is aqueous, meaning that the solutes (e.g., salts, organic molecules) dissolve in water, which is the solvent. Water may pass freely through the membrane by osmosis or through specialized protein channels called aquaporin's. Most ions move through protein channels, while larger molecules, such as carbohydrates, are carried by transport proteins.
- **Diffusion :** The simplest form of movement is diffusion, in which solutes move from an area of high concentration to an area of low concentration; diffusion is directly related to molecular kinetic energy. Diffusion does not require energy input.
- The movement of a solute from an area of low concentration to an area of high concentration requires energy input in the form of ATP and protein carriers called pumps.

Osmosis:

Water moves through membranes by diffusion; this process is called osmosis. Like solutes, water moves down its concentration gradient. Water moves from areas of high potential (high water concentration) and low solute concentration to areas of low potential (low water concentration) and high solute concentration.



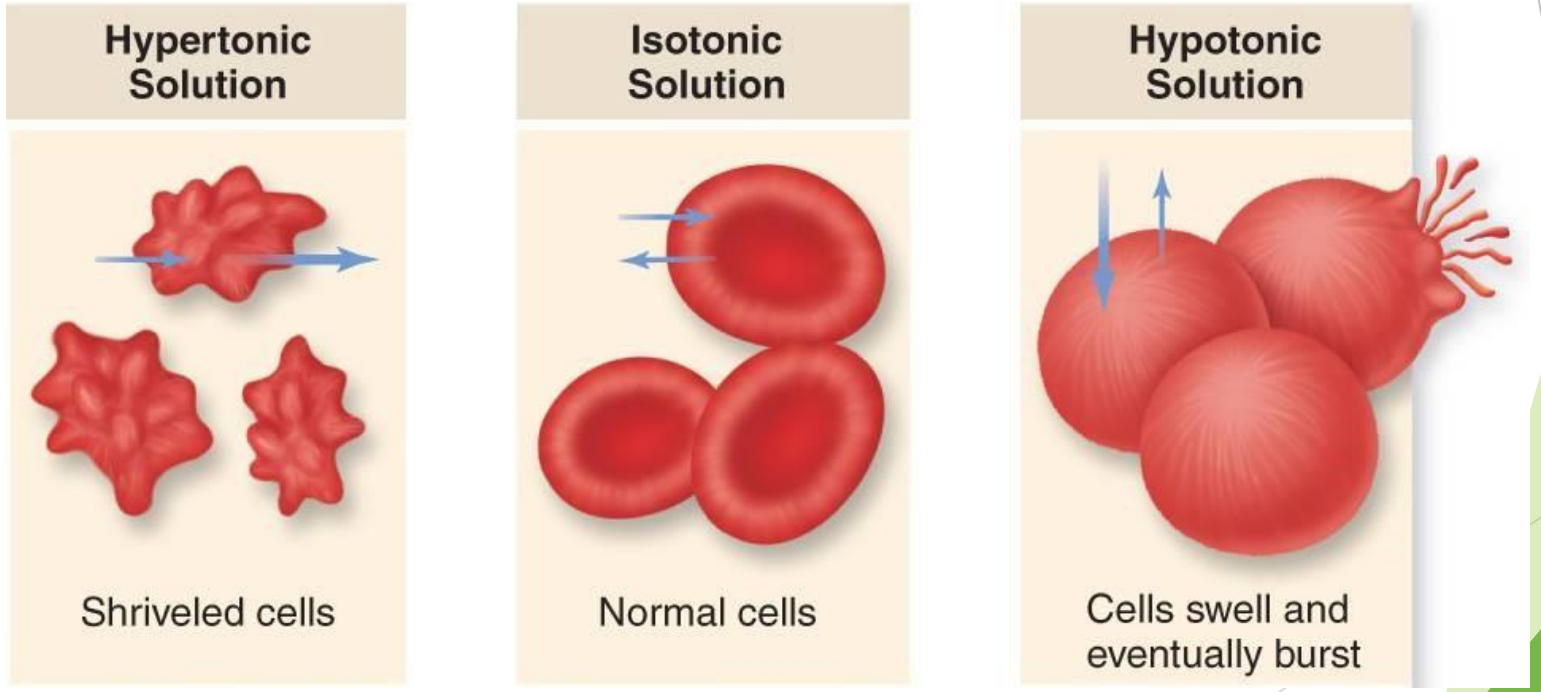
Two forces lead to the net movement of water across biological membranes:

- **1. Hydrostatic pressure difference**.(is the pressure exerted by a fluid at equilibrium at a given point within the fluid, due to the force of gravity).
- **2. Osmotic pressure difference.** The osmotic pressure exerted by particles in a solution, whether they are molecules or ions, is determined by the numbers of particles per unit volume of fluid and not the mass of the particles, because the large particles, which have greater mass (m) than the small particles, move at lower velocities (v), while the small particles move at higher velocities.

- The terms **hypertonic, hypotonic, and isotonic** are used to describe solutions separated by selectively permeable membranes.
- **Hypertonic:** A hypertonic solution has a higher solute concentration and a lower water potential as compared to the other solution; therefore, water will move into the hypertonic solution through the membrane.
- **Hypotonic** : A hypotonic solution has a lower solute concentration and a higher water potential than the solution on the other side of the membrane; water will move down its concentration gradient into the other solution.
- **Isotonic:** Isotonic solutions have equal water potential.

- **Procedure**
- Take the following test tubes (5ml):
- Tube A contains 5% NaCl solution (hypertonic solution).
- Tube B contains 0.9% NaCl solution (tonicity similar to that of blood plasma, isotonic solution).
- Tube C contains 0.0% NaCl solution (hypotonic solution).
- 2. Add for each tubes, one drop of whole blood, mix slowly.
- 3. after 15 minutes observe any changes that occurred in above tubes using light microscope.

- Note:
- Isotonic solution: there is no net movement of water across the membrane.
- Cells placed in a hypertonic solution will lose water and shrink.
- Cells placed in a hypotonic solution will gain water, expand and possibly will burst.



Thank You