Thermal Homeostasis

Why is temperature important?

- Temperature affects the rates of biophysical processes
- Temperature also contributes to the state and colour of something. This provides an explanation to why meats change colour when cooked.

Temperature vs heat

- Temperature refers to the intensity of molecular motion. The higher the temperature, the more the particles move around, hence a higher energy level.

Heat transfer

- **Conduction** – transfer of heat between objects in contact with each other through microscopic movement. (Fourier's law)
- **Convection** – transfer of heat between objects in contact with each other through macroscopic movement. (Requires the convection coefficient). – Can depend on the wind/wind speed.
- **Radiation** – the transfer of heat between objects at the speed of light without the need of a transfer medium. All bodies above absolute zero emit heat through radiation. (Stefan-Boltzmann equation)

Metabolic processes are inefficient and lose energy through the form of heat.

The temperature in our planet's atmosphere does not come from the sun's rays, but from the floor and the heat that accumulates up. The exchange of heat with the ground is very important in terms of heat loss and heat gain.

All animals produce heat which is lost to the environment if Ta < Tb

Thermal relations

You can't use a thermal imaging camera to track a polar bear because they do not lose a lot of heat, in comparison you could use a thermal imaging camera in order to track a lion because it loses so much heat.

- Does the animal maintain its own temperature, or does it depend on the environment.
- Most animals thermoregulate, but not all. However, only certain animals can thermoregulate using physiological means (homeotherms).

Responses to temperature

- Acute responses – prompt changes after fast temperature changes
- Chronic responses – stable changes after prolonged periods of temperature change
- Evolutionary responses – acquired after

Acute responses

- Metabolic rate increases exponentially with temperature (Arrhenius principle)